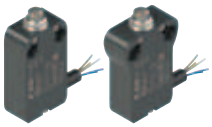
pizzato

2017-2018

General Catalogue Detection

Index General Catalogue Detection

4 Modular pre-wired position switches



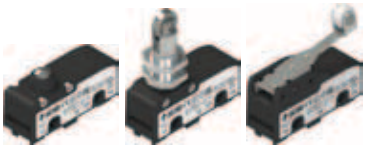
NA-NB series

▸ 115

NF-series

▸ 125

5 Microswitches



MK-series

▸ 139

6 Switches for special applications

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The dedicated catalogue is available.

7 Accessories

▸ 197

8 Appendix

MORE THAN 200 PROFESSIONALS WITH PASSION

It is people, with their professionalism and dedication that make a great company. This profound conviction has always guided Pizzato Elettrica in its choice of employees and partners. Today, Giuseppe and Marco Pizzato lead a tireless team providing the fastest and most efficient response to the demands of the market. This team has grown since the year 2000 and has achieved a considerable increase in business in all the countries where Pizzato Elettrica is present.

The various strategic sectors of the business are headed by professionals with significant experience and expertise. Many of these people have developed over years with the company. Others are experts in their specific field and have integrated personal experience with the Pizzato Elettrica ethos to extend the company's capability and knowledge.

From the design office to the technical assistance department, from managers to workers, every employee believes in the company and its future. Pizzato Elettrica employees all give the best of themselves secure in the knowledge they are the fundamental elements of a highly valuable enterprise.

100% MADE IN ITALY

Pizzato Elettrica is one of the leading European manufacturers of position switches, microswitches, safety devices, safety modules, foot switches, control and signalling devices, and devices for elevators.
An entrepreneurial company such as Pizzato Elettrica bases its foundations on a solid and widely shared value system. The pillars that form the basis of the company's work have remained constant, and constitute the fundamental guiding principles for all company activities.

PASSION FOR QUALITY

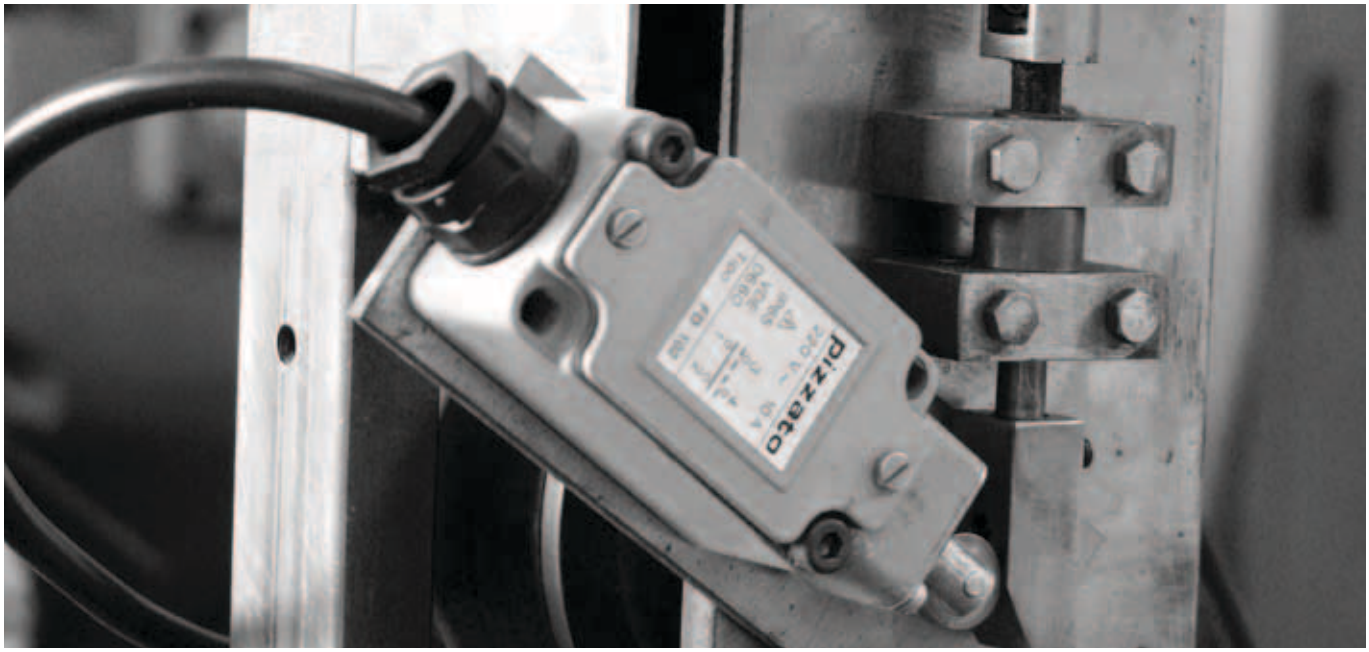
Passion for product quality, orientation towards excellence, innovation, and continuous development, represent the key principles of Pizzato Elettrica's everyday work.
Anyone using Pizzato Elettrica's products does so in the certainty that these devices are of certified quality, since they are the result of a process that is scrupulously controlled at every stage of the production.
The company's goal is to offer the market safe, reliable, and innovative solutions.

CARE FOR THE CUSTOMER

In order to be successful, a product must respond to the specific needs of those who will use it. Market developments must be carefully monitored in order to understand, in advance, which new applications will prove themselves truly useful. This is why Pizzato Elettrica has always cultivated close synergies with the companies that have chosen them as a supplier, using this continuous dialogue to identify the potential developments of the own product range in order to make it highly flexible, complete and capable to respond to the most diverse needs.

100% MADE IN ITALY

All Pizzato Elettrica products are designed, developed, and tested entirely at the 7 company plants in Marostica, in the province of Vicenza in Italy. The company is thus able to meet specific customer requirements at all times, by offering a comprehensive range of products and technologically advanced solutions.



1984: AN ENTREPRENEURIAL STORY BEGINS

1984
The company Pizzato di Pizzato B. & C. snc. manufacturer of position switches is founded.
1988
The company becomes a limited liability partnership, and is renamed Pizzato Elettrica, a brand shortly destined to become renowned and valued nationwide. Also in the year 1988, the first company-owned plant geared towards mechanical processing was built. By the end of the decade, thanks to the development of quality products and the experience built on the Italian market, Pizzato Elettrica turns to the international market.
1995
Building of the second plant geared towards the moulding of plastic materials. Development of the position switch range continues in parallel. Start of significant years in terms of safety devices planning. The safety sector becomes a key sector to the company.
1998
Construction of the third plant, housing the assembly department.
2002
New millennium starts with quality certifications: achievement of the ISO 9001:2000 certification. Launching of the first safety modules. Construction of the new headquarters and logistics site; currently the company head office. Continued expansion of the industrial safety and automation product range.
2007
Pizzato Elettrica faces their first generational change: Giuseppe and Marco Pizzato take over the company directorship.
2010
Extension of Pizzato Elettrica product portfolio, with the launch of the innovative EROUND line consisting of control and signalling devices. This product range accompanies position switches and safety devices, thus offering complete solutions to customers.
2012
Introduction of Gemnis Studio, the first software produced by Pizzato Elettrica. A graphic development environment for the creation, simulation, and debugging of programs that can be integrated in the Gemnis line modules.
2013
Foundation of first subsidiary of Pizzato Elettrica, Pizzato Deutschland GmbH, in Germany.
2014
A new production facility dedicated to switches and automatic machines is opened, spanning a surface area of 6000 m².
2016
Foundation of second subsidiary of Pizzato Elettrica, Pizzato France SARL, in France.
The new NS series of safety switches with electromagnets and RFID technology is introduced, fruit of the company's experience, spanning more than thirty years in the field of industrial safety. To date it is the state of the art in its industry.
2017
The company continues to expand and now includes an additional production facility, the new location of the offices in the sales network.
Today
Giuseppe and Marco Pizzato lead a company in constant growth in terms of new product launches, number of employees (more than 200 employees at present), turnover, and new markets. Pizzato Elettrica is continuing their new product internationalisation and development process.

70,000,000 PARTS SOLD WORLDWIDE

Pizzato Elettrica's product catalogue contains more than 7,000 articles, with more than 1,300 special codes developed for devices personalised according to clients' specific needs.
Pizzato Elettrica devices can be grouped, according to typology, into three main macro-categories:

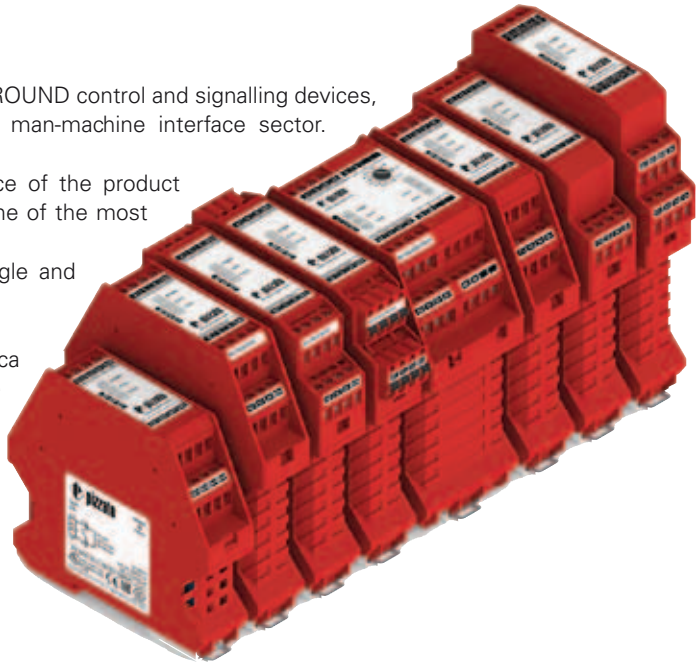
• POSITION SWITCHES. Pizzato Elettrica position switches are daily installed in every type of industrial machinery all over the world for applications in the sector of wood, metal, plastic, automotive, packaging, lifting, medicinal, naval, etc.
In order to be used in a such wide variety of sectors and countries, Pizzato Elettrica position switches are made to be assembled in a lot of configurations thanks to the various body shapes, dozens of contact blocks, hundreds of actuators and materials, forces, assembling versions.
Pizzato Elettrica can offer one of the widest product range of position switches in the world. Moreover, the use of high quality materials, high reliability technologies (e.g. twin bridge contact blocks) as well as the IP67 protection degree make this range of position switches one of the most technologically evolved.

• SAFETY DEVICES. The company Pizzato Elettrica has been one of the first Italian companies developing dedicated items for this sector, creating and patenting dozens of innovative products, thus becoming one of the main European manufacturers of safety devices. The wide range of specific products for machine safety completely designed and assembled in our company premises in Marostica (VI) - Italy, has been extended by the introduction of coded magnetic sensors, solenoid switches provided with emergency release devices, safety hinge switches and safety handles. Recent products include the safety sensors with RFID technology of the ST series, the stainless steel hinge safety switches of the HX series, the RFID safety switches with block of the NG series, the safety handle of the P-KUBE 2 line and the safety switches with electromagnets and RFID technology of the NS series.

• MAN-MACHINE INTERFACE. Thanks to the introduction of the EROUND control and signalling devices, Pizzato Elettrica has remarkably widened their offer within the man-machine interface sector.

Thanks to the new design, the care for details and the elegance of the product combined with its maximum safety and reliability, this series is one of the most complete and cutting-edge on the market.
Our company offers a wide range of products that includes single and modular foot switches with many patented joining kits.

In order to satisfy its customers' needs and requests, Pizzato Elettrica offers a lot of accessories purposely designed not only to complete their wide range of products, but also to help device installation on machineries.



12 MILLION CERTIFIED PRODUCT CODES

A simple brand isn't enough: the company is aiming for the Pizzato Elettrica brand to be widely recognised as a synonym for absolute quality and certainty.

A result that has been reached and consolidated over the years, updating and expanding the series of certifications obtained from the most important Italian and international control organisations. Product quality is assessed by five accredited external bodies: IMQ, UL, CCC, TÜV SÜD, EAC. These bodies lay out high technical and qualitative standards for the company to achieve and maintain, verified yearly with seven different inspections: these are performed, without prior notice, by qualified inspectors, who extract samples of products and materials destined for sale from plants, or from the market directly, to subject them to apposite tests.

• CE MARK. All Pizzato Elettrica products bear the CE marking in conformity with the European Directives in force.

• ISO 9001 CERTIFICATION. The company's production system complies with national UNI EN ISO 9001 and international ISO 9001 standards. The certification covers all of the company's plants and their production and managerial activities: entry checks, technical, purchasing and commercial department activities, manufacturing operations assessments, final pre-shipping product tests and checks, equipment reviews and the management of the metrological lab.

• CERTIFICATION OF COMPANY QUALITY SYSTEMS. Pizzato Elettrica has obtained the certificate of compliance with the UNI EN ISO 9000 regulations in force in Italy and abroad. It is issued by a recognised independent body that guarantees the quality and reliability of the service offered to clients worldwide.

• CSQ, CISQ AND IQNET. The CSQ system is part of the CISQ (Italian Certification of Quality Systems) federation, which consists of the primary certification bodies operating in Italy in the various product sectors. CISQ is the Italian representative body within IQNet, the biggest international Quality Systems and Company Management certification network, which is adhered to by 25 certification organs in as many countries.

TRADE FAIRS AND EVENTS

TRADE FAIRS

Pizzato Elettrica regularly participates to many trade fairs in Italy and abroad, presenting in this way to the market the products, the latest news, etc.

EVENTS

Besides offering qualified technical assistance, Pizzato Elettrica presents itself as a dynamic partner who is attentive to the needs of its customers. For this reason, the company organises several meetings and training courses with particular attention to the regulatory aspect of machinery safety.

MULTILINGUAL DOCUMENTATION

Pizzato Elettrica provides its customers with a wide range of technical documentation available in several languages: Italian, English, German, French, Spanish, etc.

From the general catalogue to the detailed brochures, from leaflets of new products to price lists and DVDs, Pizzato Elettrica customers can find in a quick and exact way all the information concerning products, the technical characteristics and functionality, the proper installation methods, application examples, etc.

NEW WEBSITE

To remain in line with its objectives and strategies, Pizzato Elettrica has also decided to renew their image online by designing and creating a new website.
The aim was therefore to create a more modern website: one that would be technologically competitive and feature eye-catching graphics but would also offer users detailed, up-to-date contents.
The main characteristics of version 2.0 of the website www.pizzato.com are therefore as follows:

SEARCH USING FILTERS
The product section has been extended and a decision was made to enhance it with several new aspects. Firstly, the use of filters, to aid customers as they search for products, and guide them in creating the item that best suits their requirements by enabling them to choose its characteristics.

RESPONSIVE DESIGN
Another significant characteristic is the compatibility of this new website with all kinds of devices. Indeed, it is a responsive site, capable of automatically adapting its graphic layout to suit the device with which it is viewed and so minimising the need for the user to resize and scroll the contents.

BROWSABLE, DOWNLOADABLE CATALOGUE
Users can also download our full catalogue or alternatively browse it directly online, an extremely handy solution for those wishing to consult our range of products simply and rapidly.

HIGH RESOLUTION IMAGES
The information provided for each one of our products is complete with high resolution images to offer visitors to the website a clear, accurate view of our items in close detail, also offering them the possibility to zoom in and out on the image.

LARGE VIDEO SECTION
The large video section of the website is capable of showcasing the main characteristics, functions and use of the various products.

TECHNICAL AND SALES ASSISTANCE

TECHNICAL DEPARTMENT

The Pizzato Elettrica technical department provides direct technical and qualified assistance in Italian and English, helping in this way the customers to choose the suitable product for their own application explaining the characteristics and the correct installation.

Office hours:	Monday to Friday 08 am - 12 pm / 02 pm - 06 pm CET
Phone:	+39.0424.470.930
fax:	+39.0424.470.955
e-mail:	tech@pizzato.com

Spoken languages:

SALES DEPARTMENT

Among the strengths in the company relationship with the commercial network, the direct assistance guaranteed in five languages: Italian, English, French, German and Spanish. A service that confirms Pizzato Elettrica quality and attention to the needs of customers from around the world.

Office hours:	Monday to Friday 08 am - 12 pm / 02 pm - 06 pm CET
Phone:	+39.0424.470.930
fax:	+39.0424.470.955
e-mail:	info@pizzato.com

Spoken languages:

Restyling position switches FD series

- New colour anthracite grey
- Indelible laser engraving
- Cover-integrated gasket
- Protection degree IP67
- Captive cover screws

▸ 15

Restyling position switches FP series

- Stainless steel plates for fixing screws
- New colour anthracite grey
- Cover with captive screw
- Indelible laser engraving
- Protection degree IP67

▸ 25

Restyling position switches FL series

- New colour anthracite grey
- Indelible laser engraving
- Cover-integrated gasket
- Protection degree IP67
- Captive cover screws

▸ 35

Restyling position switches FC series

- New colour anthracite grey
- Indelible laser engraving
- Cover-integrated gasket
- Protection degree IP67
- Captive cover screw

▸ 45

Restyling FD series switches for high temperature

- New black colour, bright and scratch resistant
- Indelible laser engraving
- Cover-integrated gasket
- Protection degree IP67

▸ 179

New M12 connector with cable - NA-NB-NF series

- Simplifies wiring in tight spaces
- Cable length 0,2 m, other lengths available on request
- M12 connector, 5-pole for versions with 2 contacts
- M12 connector, 8-pole for versions with 3 or 4 contacts
- M12 connector with anti-vibration fast locking ring

▸ 113

VF SL series signalling lights

- High luminosity LED indicator lights
- Protection degrees IP67 and IP69K
- Can be installed on switches of the FL, FX, FZ, FW, FG, FS and NG series
- Available with 24 V, 120 V, 230 V supply voltage

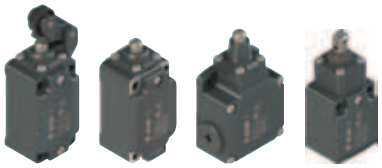
▸ 210

New contact blocks for ATEX series

- New contact blocks available for FD and FL series, with product code extension -EX7, -EX8 and -EX4.
- New contact blocks with 2 NC, 2 NO, 1NC+1NO contacts, slow action make before break or shifted, or snap action
- Available upon request, please contact our technical department

▸ 151

Description



Pizzato Elettrica position switches are daily installed in every type of industrial machinery all over the world for applications in the sector of wood, metal, plastic, automotive, packaging, lifting, medicinal, naval, etc.
In order to be used in a wide variety of sectors and countries, Pizzato Elettrica position switches are designed to be assembled in a lot of configurations, thanks to a wide range of body shapes, dozens of contact blocks, hundreds of actuators and materials, different actuating forces and several fixing methods.
Pizzato Elettrica can offer one of the widest product range of position switches in the world. Moreover, the use of high quality materials, high reliability technologies (e.g. twin bridge contact blocks) as well as the IP67 protection degree make this range of position switches one of the most technologically evolved.

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 EN 60529.
They can therefore be used in all environments where maximum protection degree of the housing is required.

Extended temperature range

-40°C

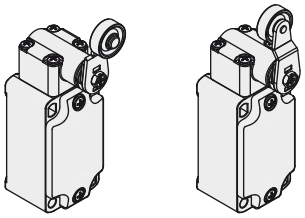
These devices are also available in a special version suitable for an ambient operating temperature range from -40°C up to +80°C.
They can therefore be used for applications in cold stores, sterilisers and other equipment with low temperature environments. The special materials used to produce these versions retain their characteristics even under these conditions, thereby expanding the installation possibilities.

Laser engraving

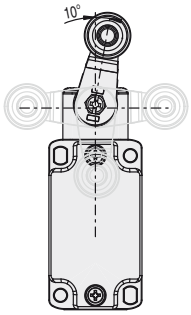
All devices are marked using a dedicated indelible laser system. These engravings are therefore suitable for extreme environments too. Thanks to this system that does not use labels, the loss of plate data is prevented and a greater resistance of the marking is achieved over time.

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.

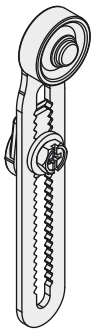


Adjustable levers



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.

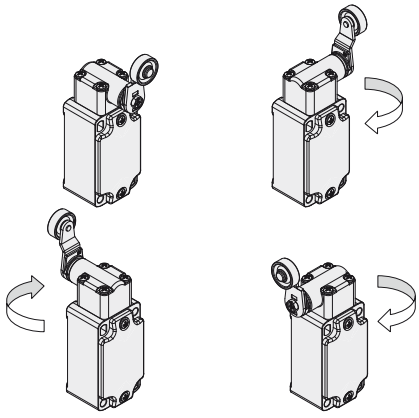
Adjustable safety lever



The adjustable lever code 56 (and variants) is provided with a notching that prevents the sliding also in case the fastening screw becomes loose.
Thanks to the special geometrical coupling it is suitable for safety applications.

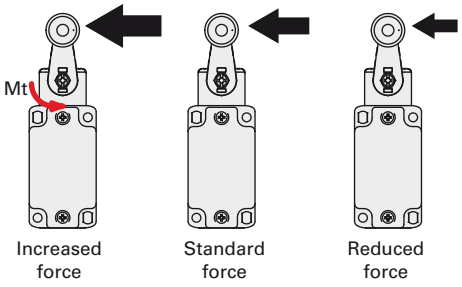
Head with variable orientation

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



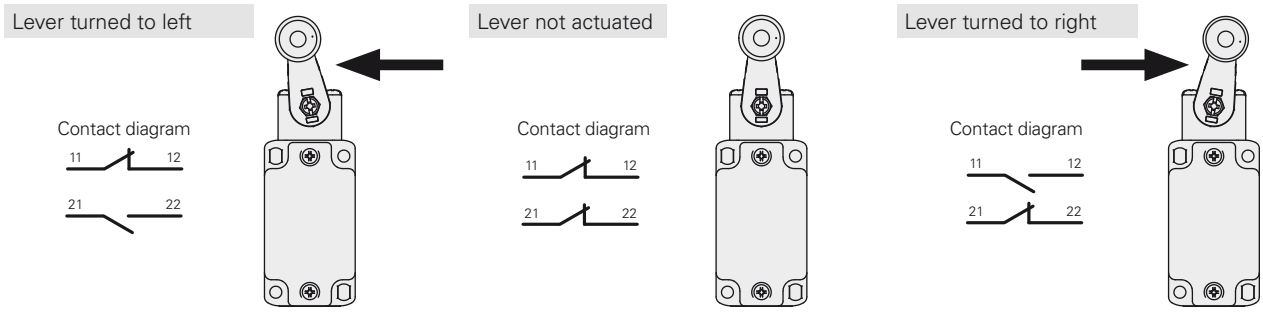
Increased or reduced actuating force

For actuators with swivelling lever, versions with increased or reduced actuating force are available upon request, in order to have a switch perfectly tailored for the application. For further information contact our technical department.



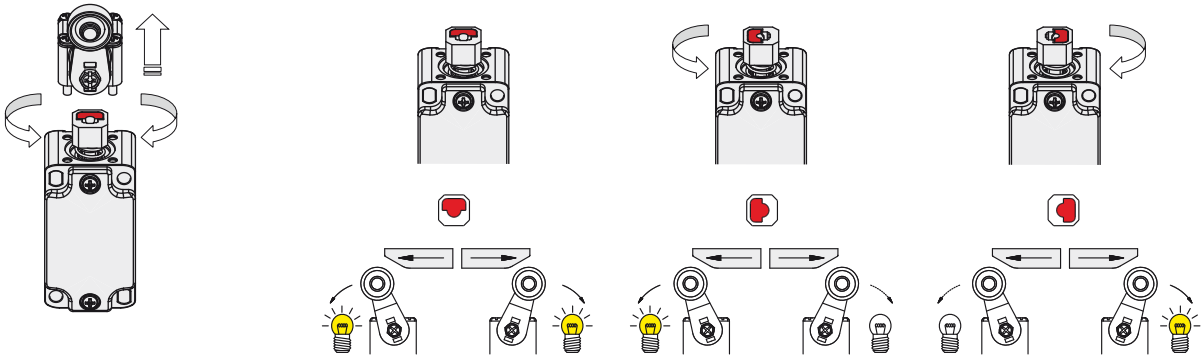
Independent contacts

The contact block 16 is provided with two NC contacts, **both with positive opening**, that can be independently switched depending on the lever turning direction.

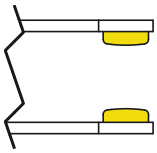


Unidirectional heads

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).

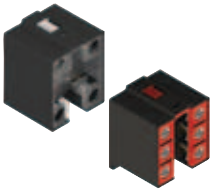


Gold-plated contacts



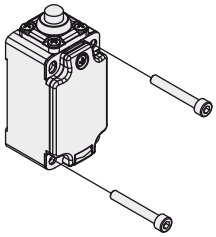
The contact blocks of these devices can be supplied gold-plated upon request. Ideal for applications with low voltages or currents; it ensures increased contact reliability. Available in two thicknesses (1 or 2.5 microns), it adapts perfectly to the various fields of application, ensuring a long endurance over time.

Contact block



Contact blocks with captive screws, finger protection, twin bridge contacts and double interruption for higher contact reliability. They are available in multiple variants with shifted activation travels, simultaneous or overlapping. They are suitable for many different applications.

Stainless steel fixing plates



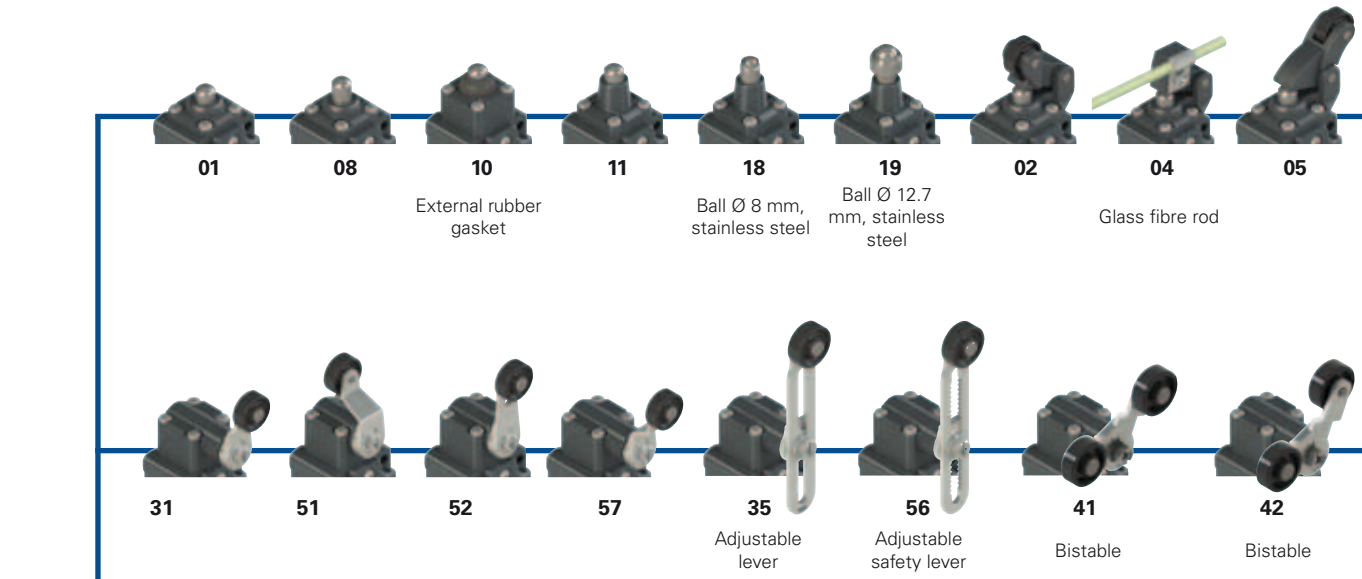
The technopolymer switches of the FP series are provided with two robust stainless steel fixing plates. In this way no washer is needed under the head and still the fixing of the switch is more stable over time.

Stainless steel external metallic parts

AISI 304

Upon request, some of these devices can be supplied with stainless steel external metallic parts instead of the usual zinc-plated steel. This solution is particularly suited for environments where aggressive chemical agents or saline mist are present. See page 191.

Selection diagram

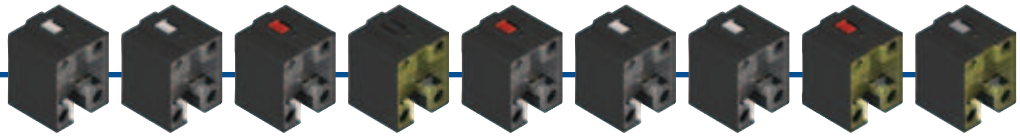


ACTUATORS

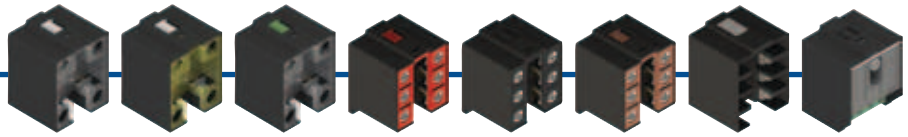
01
08
10 External rubber gasket
11
18 Ball Ø 8 mm, stainless steel
19 Ball Ø 12.7 mm, stainless steel
02
04 Glass fibre rod
05

31
51
52
57
35 Adjustable lever
56 Adjustable safety lever
41 Bistable
42 Bistable

CONTACT BLOCKS



5 1NO+1NC, snap action
6 1NO+1NC, slow action
7 1NO+1NC slow action, make before break
9 2NC slow action
10 2NO slow action
11 2NC snap action
12 2NO snap action
13 2NC slow action shifted and spaced
14 2NC slow action, shifted



15 2NO slow action, shifted
16 2NC slow action, independent
18 1NO+1NC, slow action, close
20 1NO+2NC, slow action
21 3NC slow action
22 2NO+1NC, slow action
2 2x (1NO-1NC) snap action
E1 1NO-1NC, electronic, PNP

CONDUIT ENTRY

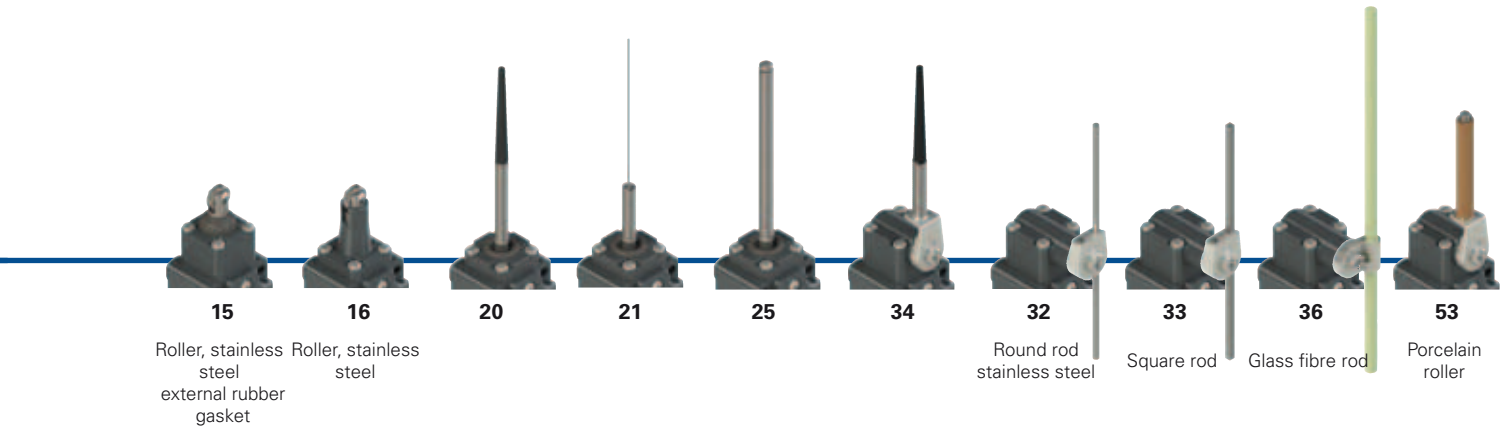
Threaded conduit entry	
M2	M20x1.5 (standard)
	PG 13.5

With cable gland	
K23	for cables Ø 6 … 12 mm
K27	for cables Ø 3 … 7 mm

With M12 metal connector	
K40	8-pole
K50	5-pole

product options

Sold separately as accessory



15 Roller, stainless steel external rubber gasket

16 Roller, stainless steel

20

21

25

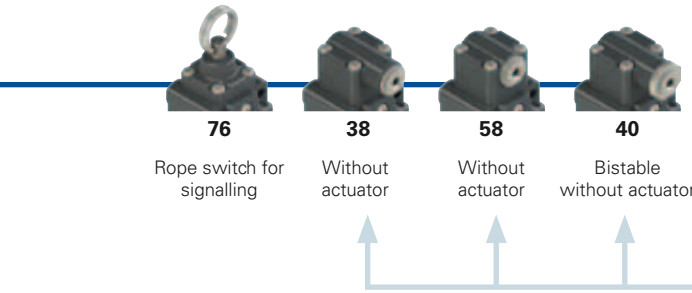
34

32 Round rod stainless steel

33 Square rod

36 Glass fibre rod

53 Porcelain roller



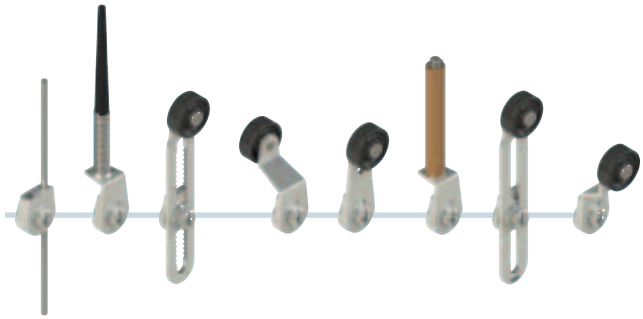
76 Rope switch for signalling

38 Without actuator

58 Without actuator

40 Bistable without actuator

SEPARATE ACTUATORS
See page 23



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 502-GM2K50R24T6

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
05	angled lever with roller
...	.....

Contact type

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

Threaded conduit entry

M2	M20x1.5 (standard)
	PG 13.5

Ambient temperature

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

Rollers

	standard roller
R24	stainless steel Ø 20 mm (for actuators 02, 05, 31, 35, 51, 52, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 31, 35, 51, 52, 56, 57)
R5	rubber, Ø 40 mm (for actuators 31, 35, 51, 52, 56, 57)
R26	rubber, Ø 50 mm (for actuators 31, 35, 51, 52, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 35 and 36)

Pre-installed cable glands or connectors

	no cable gland or connector (standard)
K23	cable gland for cables Ø 6 … 12 mm
K27	cable gland for cables Ø 3 … 7°mm
K40	M12 metal connector, 8-pole
K50	M12 metal connector, 5-pole

For the complete list of possible combinations please contact our technical department.

Main features
- Metal housing, one conduit entry
- Protection degree IP67
- 17 contact blocks available
- 28 actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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 529, EN 60529, UL 508, CSA 22.2 No.14.
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14, GB14048.5-2001.

Quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230000
EAC approval:	RU C-IT.АД35.В.00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 214. 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 on pages 211 to 222.**

	Electrical data		Utilization category
without connector	Thermal current (Ith):	10 A	
	Rated insulation voltage (Ui):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 20, 21, 22, 33, 34)	Alternating current: AC15 (50÷60 Hz) 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 Ue (V) 24 125 250 Ie (A) 6 1.1 0.4
	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	
with M12 connector 5-pole	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 Ue (V) 24 125 250 Ie (A) 4 1.1 0.4
	Protection against short circuits:	type gG fuse 4 A 500 V	
	Pollution degree:	3	
with M12 connector 8-pole	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 Ue (V) 24 Ie (A) 2
	Protection against short circuits:	type gG fuse 2 A 500 V	
	Pollution degree:	3	

Features approved by IMQ

Rated insulation voltage (Ui):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 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: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact block 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34, 66
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

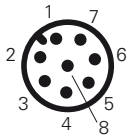
Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X, 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 Nm).
For contact 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).

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

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

Wiring diagram for M12 connectors

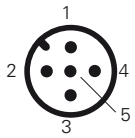
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

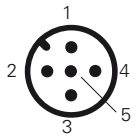
Contact block 5
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

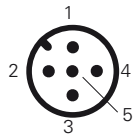
Contact block 6
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

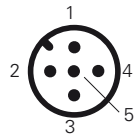
Contact block 7
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

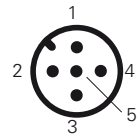
Contact block 9
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

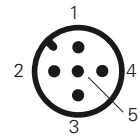
Contact block 10
2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

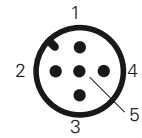
Contact block 11
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

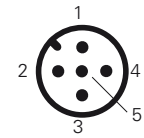
Contact block 12
2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

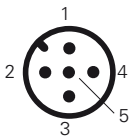
Contact block 13
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

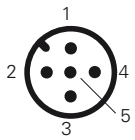
Contact block 14
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

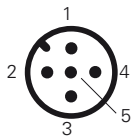
Contact block 15
2NO



M12 connector, 5-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4
ground	5

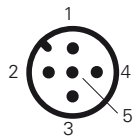
Contact block 16
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4
ground	5

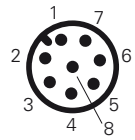
Contact block 18
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

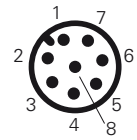
Contact block 20
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8
ground	1

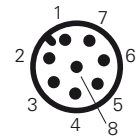
Contact block 21
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

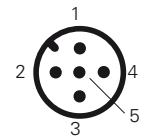
Contact block 22
1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8
ground	1

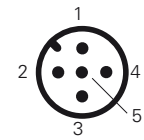
Contact block 33
1NC+1NO



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

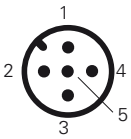
Contact block 34
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

Contact block E1
PNP



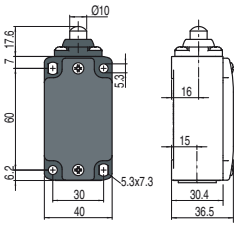
M12 connector, 5-pole

Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

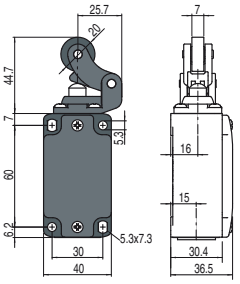
FD series position switches

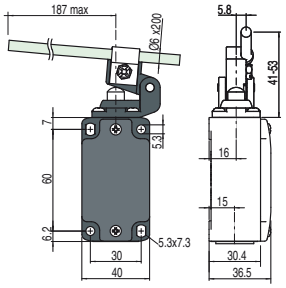
Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = scatto lento shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

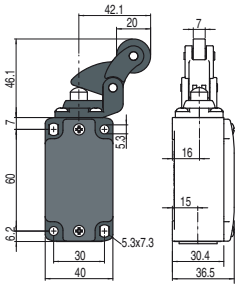


With stainless steel roller on request





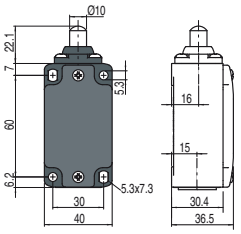
With stainless steel roller on request

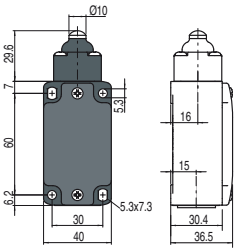


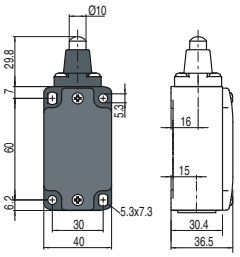
Contact block

5	R	FD 501-M2 1NO+1NC	FD 502-M2 1NO+1NC	FD 504-M2 1NO+1NC	FD 505-M2 1NO+1NC
6	L	FD 601-M2 1NO+1NC	FD 602-M2 1NO+1NC	FD 604-M2 1NO+1NC	FD 605-M2 1NO+1NC
7	LO	FD 701-M2 1NO+1NC	FD 702-M2 1NO+1NC	FD 704-M2 1NO+1NC	FD 705-M2 1NO+1NC
9	L	FD 901-M2 2NC	FD 902-M2 2NC	FD 904-M2 2NC	FD 905-M2 2NC
10	L	FD 1001-M2 2NO	FD 1002-M2 2NO	FD 1004-M2 2NO	FD 1005-M2 2NO
11	R	FD 1101-M2 2NC	FD 1102-M2 2NC	FD 1104-M2 2NC	FD 1105-M2 2NC
12	R	FD 1201-M2 2NO	FD 1202-M2 2NO	FD 1204-M2 2NO	FD 1205-M2 2NO
13	LV	FD 1301-M2 2NC	FD 1302-M2 2NC	FD 1304-M2 2NC	FD 1305-M2 2NC
14	LS	FD 1401-M2 2NC	FD 1402-M2 2NC	FD 1404-M2 2NC	FD 1405-M2 2NC
15	LS	FD 1501-M2 2NO	FD 1502-M2 2NO	FD 1504-M2 2NO	FD 1505-M2 2NO
18	LA	FD 1801-M2 1NO+1NC	FD 1802-M2 1NO+1NC	FD 1804-M2 1NO+1NC	FD 1805-M2 1NO+1NC
20	L	FD 2001-M2 1NO+2NC	FD 2002-M2 1NO+2NC	FD 2004-M2 1NO+2NC	FD 2005-M2 1NO+2NC
21	L	FD 2101-M2 3NC	FD 2102-M2 3NC	FD 2104-M2 3NC	FD 2105-M2 3NC
22	L	FD 2201-M2 2NO+1NC	FD 2202-M2 2NO+1NC	FD 2204-M2 2NO+1NC	FD 2205-M2 2NO+1NC
2	R	FD 201-M2 2x(1NO-1NC)	FD 202-M2 2x(1NO-1NC)	FD 204-M2 2x(1NO-1NC)	FD 205-M2 2x(1NO-1NC)
E1		FD E101-M2 1NO-1NC	FD E102-M2 1NO-1NC	FD E104-M2 1NO-1NC	FD E105-M2 1NO-1NC
Max. speed		page 213 - type 4	page 213 - type 3	0.5 m/s	page 213 - type 3
Actuating force		8 N (25 N ⊕)	6 N (25 N ⊕)	0.17 Nm	6 N (25 N ⊕)
Travel diagrams		page 214 - group 1	page 214 - group 2	page 214 - group 1	page 214 - group 2

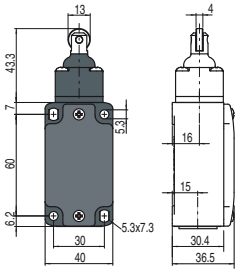
With external rubber gasket







With external rubber gasket



Contact block

5	R	FD 508-M2 1NO+1NC	FD 510-M2 1NO+1NC	FD 511-M2 1NO+1NC	FD 515-M2 1NO+1NC
6	L	FD 608-M2 1NO+1NC	FD 610-M2 1NO+1NC	FD 611-M2 1NO+1NC	FD 615-M2 1NO+1NC
7	LO	FD 708-M2 1NO+1NC	FD 710-M2 1NO+1NC	FD 711-M2 1NO+1NC	FD 715-M2 1NO+1NC
9	L	FD 908-M2 2NC	FD 910-M2 2NC	FD 911-M2 2NC	FD 915-M2 2NC
10	L	FD 1008-M2 2NO	FD 1010-M2 2NO	FD 1011-M2 2NO	FD 1015-M2 2NO
11	R	FD 1108-M2 2NC	FD 1110-M2 2NC	FD 1111-M2 2NC	FD 1115-M2 2NC
12	R	FD 1208-M2 2NO	FD 1210-M2 2NO	FD 1211-M2 2NO	FD 1215-M2 2NO
13	LV	FD 1308-M2 2NC	FD 1310-M2 2NC	FD 1311-M2 2NC	FD 1315-M2 2NC
14	LS	FD 1408-M2 2NC	FD 1410-M2 2NC	FD 1411-M2 2NC	FD 1415-M2 2NC
15	LS	FD 1508-M2 2NO	FD 1510-M2 2NO	FD 1511-M2 2NO	FD 1515-M2 2NO
18	LA	FD 1808-M2 1NO+1NC	FD 1810-M2 1NO+1NC	FD 1811-M2 1NO+1NC	FD 1815-M2 1NO+1NC
20	L	FD 2008-M2 1NO+2NC	FD 2010-M2 1NO+2NC	FD 2011-M2 1NO+2NC	FD 2015-M2 1NO+2NC
21	L	FD 2108-M2 3NC	FD 2110-M2 3NC	FD 2111-M2 3NC	FD 2115-M2 3NC
22	L	FD 2208-M2 2NO+1NC	FD 2210-M2 2NO+1NC	FD 2211-M2 2NO+1NC	FD 2215-M2 2NO+1NC
2	R	FD 208-M2 2x(1NO-1NC)	FD 210-M2 2x(1NO-1NC)	FD 211-M2 2x(1NO-1NC)	FD 215-M2 2x(1NO-1NC)
E1		FD E108-M2 1NO-1NC	FD E110-M2 1NO-1NC	FD E111-M2 1NO-1NC	FD E115-M2 1NO-1NC
Max. speed		page 213 - type 4	page 213 - type 4	page 213 - type 4	page 213 - type 2
Actuating force		8 N (25 N ⊕)	11 N (25 N ⊕)	8 N (25 N ⊕)	11 N (25 N ⊕)
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 1

All values in the drawings are in mm

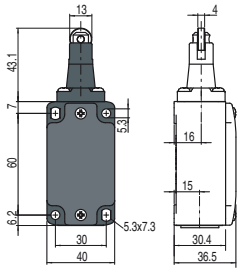
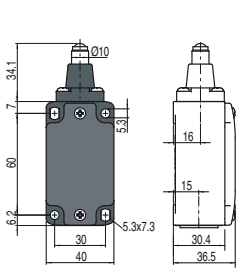
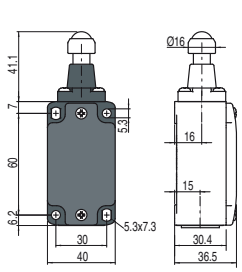
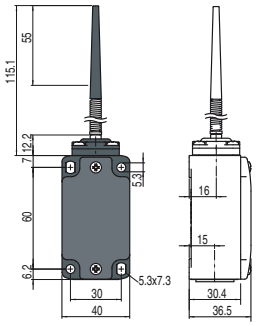
Items with code on **green** background are stock items

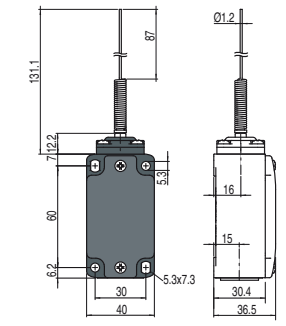
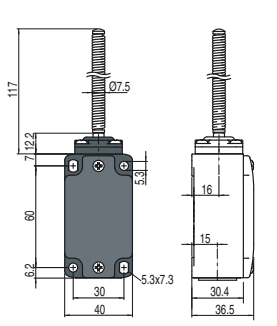
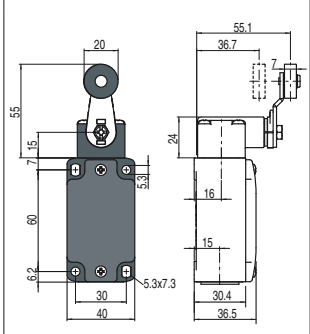
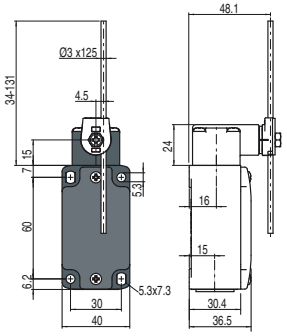
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block								
				 Ball, Ø 8 mm, stainless steel		 Ball, Ø 12.7 mm, stainless steel		 With external rubber gasket	
5	R	FD 516-M2	1NO+1NC	FD 518-M2	1NO+1NC	FD 519-M2	1NO+1NC	FD 520-M2	1NO+1NC
6	L	FD 616-M2	1NO+1NC	FD 618-M2	1NO+1NC	FD 619-M2	1NO+1NC		
7	LO	FD 716-M2	1NO+1NC	FD 718-M2	1NO+1NC	FD 719-M2	1NO+1NC		
9	L	FD 916-M2	2NC	FD 918-M2	2NC	FD 919-M2	2NC		
10	L	FD 1016-M2	2NO	FD 1018-M2	2NO	FD 1019-M2	2NO	FD 1020-M2	2NO
11	R	FD 1116-M2	2NC	FD 1118-M2	2NC	FD 1119-M2	2NC		
12	R	FD 1216-M2	2NO	FD 1218-M2	2NO	FD 1219-M2	2NO		
13	LV	FD 1316-M2	2NC	FD 1318-M2	2NC	FD 1319-M2	2NC		
14	LS	FD 1416-M2	2NC	FD 1418-M2	2NC	FD 1419-M2	2NC		
15	LS	FD 1516-M2	2NO	FD 1518-M2	2NO	FD 1519-M2	2NO		
18	LA	FD 1816-M2	1NO+1NC	FD 1818-M2	1NO+1NC	FD 1819-M2	1NO+1NC	FD 1820-M2	1NO+1NC
20	L	FD 2016-M2	1NO+2NC	FD 2018-M2	1NO+2NC	FD 2019-M2	1NO+2NC	FD 2020-M2	1NO+2NC
21	L	FD 2116-M2	3NC	FD 2118-M2	3NC	FD 2119-M2	3NC	FD 2120-M2	3NC
22	L	FD 2216-M2	2NO+1NC	FD 2218-M2	2NO+1NC	FD 2219-M2	2NO+1NC	FD 2220-M2	2NO+1NC
2	R	FD 216-M2	2x(1NO-1NC)	FD 218-M2	2x(1NO-1NC)	FD 219-M2	2x(1NO-1NC)	FD 220-M2	2x(1NO-1NC)
E1		FD E116-M2	1NO-1NC	FD E118-M2	1NO-1NC	FD E119-M2	1NO-1NC	FD E120-M2	1NO-1NC
Max. speed		page 213 - type 2		page 213 - type 4		page 213 - type 4		1 m/s	
Actuating force		8 N (25 N)		8 N (25 N)		8 N (25 N)		0.09 Nm	
Travel diagrams		page 214 - group 1		page 214 - group 1		page 214 - group 1		page 214 - group 3	

Contact block								
		 With external rubber gasket		 With external rubber gasket		 Other rollers available. See page 24		 Round rod, Ø 3 mm, stainless steel	
5	R	FD 521-M2	1NO+1NC	FD 525-M2	1NO+1NC	FD 531-M2	1NO+1NC	FD 532-M2	1NO+1NC
6	L					FD 631-M2	1NO+1NC	FD 632-M2	1NO+1NC
7	LO					FD 731-M2	1NO+1NC	FD 732-M2	1NO+1NC
9	L					FD 931-M2	2NC	FD 932-M2	2NC
10	L	FD 1021-M2	2NO	FD 1025-M2	2NO	FD 1031-M2	2NO	FD 1032-M2	2NO
11	R					FD 1131-M2	2NC	FD 1132-M2	2NC
12	R					FD 1231-M2	2NO	FD 1232-M2	2NO
13	LV					FD 1331-M2	2NC	FD 1332-M2	2NC
14	LS					FD 1431-M2	2NC	FD 1432-M2	2NC
15	LS					FD 1531-M2	2NO	FD 1532-M2	2NO
16	LI					FD 1631-M2	2NC	FD 1632-M2	2NC
18	LA	FD 1821-M2	1NO+1NC	FD 1825-M2	1NO+1NC	FD 1831-M2	1NO+1NC	FD 1832-M2	1NO+1NC
20	L	FD 2021-M2	1NO+2NC	FD 2025-M2	1NO+2NC	FD 2031-M2	1NO+2NC	FD 2032-M2	1NO+2NC
21	L	FD 2121-M2	3NC	FD 2125-M2	3NC	FD 2131-M2	3NC	FD 2132-M2	3NC
22	L	FD 2221-M2	2NO+1NC	FD 2225-M2	2NO+1NC	FD 2231-M2	2NO+1NC	FD 2232-M2	2NO+1NC
2	R	FD 221-M2	2x(1NO-1NC)	FD 225-M2	2x(1NO-1NC)	FD 231-M2	2x(1NO-1NC)	FD 232-M2	2x(1NO-1NC)
E1		FD E121-M2	1NO-1NC	FD E125-M2	1NO-1NC	FD E131-M2	1NO-1NC	FD E132-M2	1NO-1NC
Max. speed		1 m/s		1 m/s		page 213 - type 1		1.5 m/s	
Actuating force		0.08 Nm		0.14 Nm		0.1 Nm (0.25 Nm)		0.1 Nm	
Travel diagrams		page 214 - group 3		page 214 - group 3		page 214 - group 4		page 214 - group 4	

All values in the drawings are in mm

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

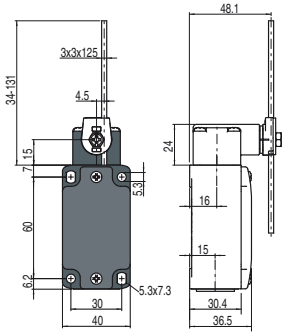
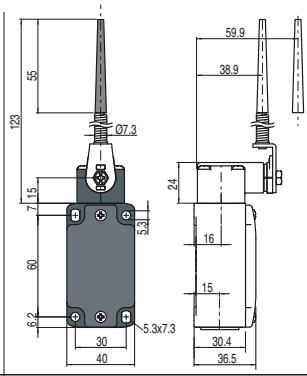
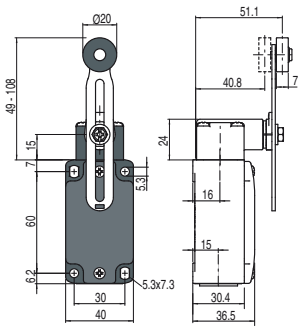
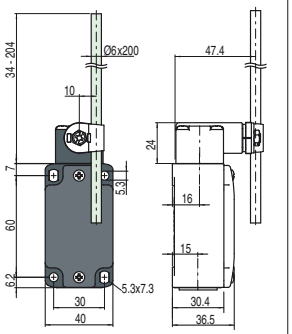
Accessories See page 197

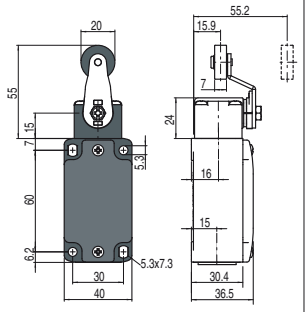
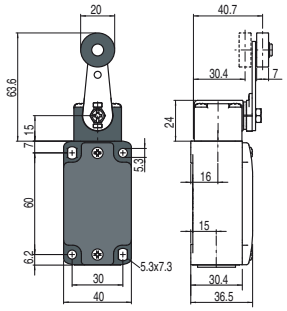
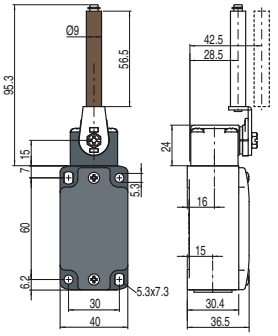
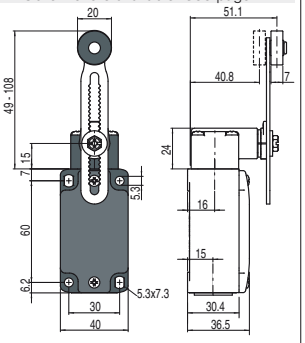
➔ The 2D and 3D files are available at **www.pizzato.com**

FD series position switches

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP

Contact block		Square rod, 3x3 mm		Other rollers available. See page 24	Glass fibre rod
					
5	R	FD 533-M2 1NO+1NC	FD 534-M2 1NO+1NC	FD 535-M2 (1) 1NO+1NC	FD 536-M2 1NO+1NC
6	L	FD 633-M2 1NO+1NC	FD 634-M2 1NO+1NC	FD 635-M2 (1) 1NO+1NC	FD 636-M2 1NO+1NC
7	LO	FD 733-M2 1NO+1NC	FD 734-M2 1NO+1NC	FD 735-M2 (1) 1NO+1NC	FD 736-M2 1NO+1NC
9	L	FD 933-M2 2NC	FD 934-M2 2NC	FD 935-M2 (1) 2NC	FD 936-M2 2NC
10	L	FD 1033-M2 2NO	FD 1034-M2 2NO	FD 1035-M2 2NO	FD 1036-M2 2NO
11	R	FD 1133-M2 2NC	FD 1134-M2 2NC	FD 1135-M2 (1) 2NC	FD 1136-M2 2NC
12	R	FD 1233-M2 2NO	FD 1234-M2 2NO	FD 1235-M2 2NO	FD 1236-M2 2NO
13	LV	FD 1333-M2 2NC	FD 1334-M2 2NC	FD 1335-M2 (1) 2NC	FD 1336-M2 2NC
14	LS	FD 1433-M2 2NC	FD 1434-M2 2NC	FD 1435-M2 (1) 2NC	FD 1436-M2 2NC
15	LS	FD 1533-M2 2NO	FD 1534-M2 2NO	FD 1535-M2 2NO	FD 1536-M2 2NO
16	LI	FD 1633-M2 2NC	FD 1634-M2 2NC	FD 1635-M2 (1) 2NC	FD 1636-M2 2NC
18	LA	FD 1833-M2 1NO+1NC	FD 1834-M2 1NO+1NC	FD 1835-M2 (1) 1NO+1NC	FD 1836-M2 1NO+1NC
20	L	FD 2033-M2 1NO+2NC	FD 2034-M2 1NO+2NC	FD 2035-M2 (1) 1NO+2NC	FD 2036-M2 1NO+2NC
21	L	FD 2133-M2 3NC	FD 2134-M2 3NC	FD 2135-M2 (1) 3NC	FD 2136-M2 3NC
22	L	FD 2233-M2 2NO+1NC	FD 2234-M2 2NO+1NC	FD 2235-M2 (1) 2NO+1NC	FD 2236-M2 2NO+1NC
2	R	FD 233-M2 2x(1NO-1NC)	FD 234-M2 2x(1NO-1NC)	FD 235-M2 2x(1NO-1NC)	FD 236-M2 2x(1NO-1NC)
E1		FD E133-M2 1NO-1NC	FD E134-M2 1NO-1NC	FD E135-M2 1NO-1NC	FD E136-M2 1NO-1NC
Max. speed		1.5 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.1 Nm	0.1 Nm	0.1 Nm (0.25 Nm)	0.1 Nm
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 4	page 214 - group 4

Contact block		Other rollers available. See page 24	Other rollers available. See page 24	Porcelain roller	Other rollers available. See page 24
					
5	R	FD 551-M2 1NO+1NC	FD 552-M2 1NO+1NC	FD 553-E11M2V9 1NO+1NC	FD 556-M2 1NO+1NC
6	L	FD 651-M2 1NO+1NC	FD 652-M2 1NO+1NC	FD 653-E11M2V9 1NO+1NC	FD 656-M2 1NO+1NC
7	LO	FD 751-M2 1NO+1NC	FD 752-M2 1NO+1NC	FD 753-E11M2V9 1NO+1NC	FD 756-M2 1NO+1NC
9	L	FD 951-M2 2NC	FD 952-M2 2NC	FD 953-E11M2V9 2NC	FD 956-M2 2NC
10	L	FD 1051-M2 2NO	FD 1052-M2 2NO	FD 1053-E11M2V9 2NO	FD 1056-M2 2NO
11	R	FD 1151-M2 2NC	FD 1152-M2 2NC		FD 1156-M2 2NC
12	R	FD 1251-M2 2NO	FD 1252-M2 2NO	FD 1253-E11M2V9 2NO	FD 1256-M2 2NO
13	LV	FD 1351-M2 2NC	FD 1352-M2 2NC	FD 1353-E11M2V9 2NC	FD 1356-M2 2NC
14	LS	FD 1451-M2 2NC	FD 1452-M2 2NC	FD 1453-E11M2V9 2NC	FD 1456-M2 2NC
15	LS	FD 1551-M2 2NO	FD 1552-M2 2NO	FD 1553-E11M2V9 2NO	FD 1556-M2 2NO
16	LI				FD 1656-M2 2NC
18	LA	FD 1851-M2 1NO+1NC	FD 1852-M2 1NO+1NC	FD 1853-E11M2V9 1NO+1NC	FD 1856-M2 1NO+1NC
20	L	FD 2051-M2 1NO+2NC	FD 2052-M2 1NO+2NC	FD 2053-E11M2V9 1NO+2NC	FD 2056-M2 1NO+2NC
21	L	FD 2151-M2 3NC	FD 2152-M2 3NC	FD 2153-E11M2V9 3NC	FD 2156-M2 3NC
22	L	FD 2251-M2 2NO+1NC	FD 2252-M2 2NO+1NC	FD 2253-E11M2V9 2NO+1NC	FD 2256-M2 2NO+1NC
2	R	FD 251-M2 2x(1NO-1NC)	FD 252-M2 2x(1NO-1NC)	FD 253-E11M2 2x(1NO-1NC)	FD 256-M2 2x(1NO-1NC)
E1		FD E151-M2 1NO-1NC	FD E152-M2 1NO-1NC	FD E153-E11M2V9 1NO-1NC	FD E156-M2 1NO-1NC
Max. speed		page 213 - type 1	page 213 - type 1	0.5 m/s	page 213 - type 1
Actuating force		0.06 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)	0.03 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 5	page 214 - group 4

(1) Positive opening only with actuator set to max. See page 23.

All values in the drawings are in mm

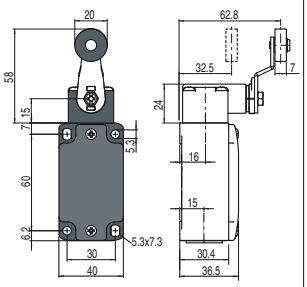
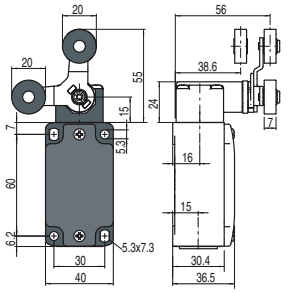
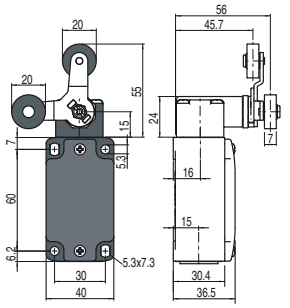
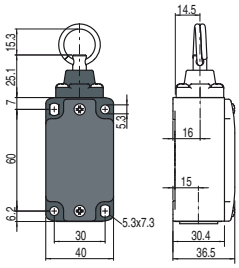
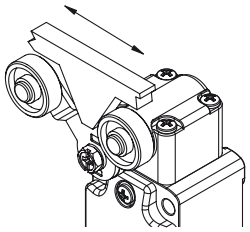
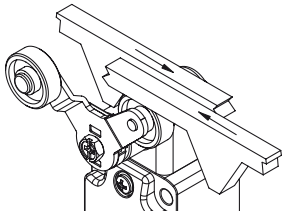
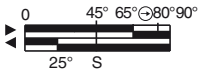
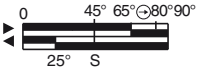
Items with code on **green** background are stock items

Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Other rollers available. See page 24	With stainless steel rollers on request	With stainless steel rollers on request	Rope switch for signalling
					
5	R	FD 557-M2 1NO+1NC	**FD 541-M2** 1NO+1NC	**FD 542-M2** 1NO+1NC	**FD 576-M2** 1NO+1NC
6	L	FD 657-M2 1NO+1NC	Bistable switch with lyra lever, single track	Bistable switch with lyra lever, dual track	FD 676-M2 1NO+1NC
7	LO	FD 757-M2 1NO+1NC			FD 776-M2 1NO+1NC
9	L	FD 957-M2 2NC			FD 976-M2 2NO
10	L	FD 1057-M2 2NO	S = mechanical switching point positive opening on contacts 21-22 only	S = mechanical switching point positive opening on contacts 21-22 only	FD 1076-M2 2NC
11	R	FD 1157-M2 2NC			FD 1176-M2 2NO
12	R	FD 1257-M2 2NO			FD 1276-M2 2NC
13	LV	FD 1357-M2 2NC			FD 1376-M2 2NO
14	LS	FD 1457-M2 2NC			FD 1476-M2 2NO
15	LS	FD 1557-M2 2NO			FD 1576-M2 2NC
16	LI	FD 1657-M2 2NC			
18	LA	FD 1857-M2 1NO+1NC			FD 1876-M2 1NO+1NC
20	L	FD 2057-M2 1NO+2NC			FD 2076-M2 2NO+1NC
21	L	FD 2157-M2 3NC			FD 2176-M2 3NC
22	L	FD 2257-M2 2NO+1NC			FD 2276-M2 1NO+2NC
2	R	FD 257-M2 2x(1NO-1NC)			FD 276-M2 2x(1NO-1NC)
E1		FD E157-M2 1NO-1NC			
Max. speed		page 213 - type 1	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Actuating force		0.1 Nm (0.25 Nm)	0.21 Nm (0.36 Nm)	0.21 Nm (0.36 Nm)	initial 20 N - final 40 N
Travel diagrams		page 214 - group 4			page 214 - group 6

All values in the drawings are in mm

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

Accessories See page 197

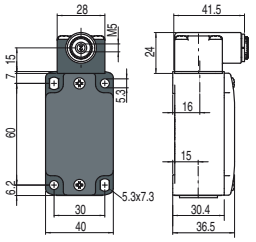
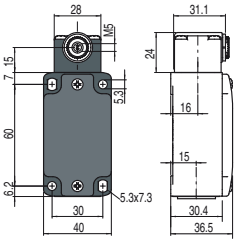
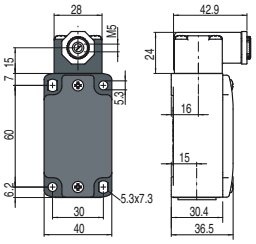
→ The 2D and 3D files are available at **www.pizzato.com**

Position switches with swivelling lever without actuator

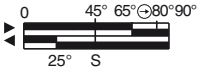
All values in the drawings are in mm

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Regular head	Compact head	
				
5	R	FD 538-M2 ⊖ 1NO+1NC	FD 558-M2 ⊖ 1NO+1NC	FD 540-M2 ⊖ 1NO+1NC
6	L	FD 638-M2 ⊖ 1NO+1NC	FD 658-M2 ⊖ 1NO+1NC	
7	LO	FD 738-M2 ⊖ 1NO+1NC	FD 758-M2 ⊖ 1NO+1NC	
9	L	FD 938-M2 ⊖ 2NC	FD 958-M2 ⊖ 2NC	
10	L	FD 1038-M2 2NO	FD 1058-M2 2NO	
11	R	FD 1138-M2 ⊖ 2NC	FD 1158-M2 ⊖ 2NC	
12	R	FD 1238-M2 2NO	FD 1258-M2 2NO	
13	LV	FD 1338-M2 ⊖ 2NC	FD 1358-M2 ⊖ 2NC	
14	LS	FD 1438-M2 ⊖ 2NC	FD 1458-M2 ⊖ 2NC	
15	LS	FD 1538-M2 2NO	FD 1558-M2 2NO	
16	LI	FD 1638-M2 ⊖ 2NC		
18	LA	FD 1838-M2 ⊖ 1NO+1NC	FD 1858-M2 ⊖ 1NO+1NC	
20	L	FD 2038-M2 ⊖ 1NO+2NC	FD 2058-M2 ⊖ 1NO+2NC	
21	L	FD 2138-M2 ⊖ 3NC	FD 2158-M2 ⊖ 3NC	
22	L	FD 2238-M2 ⊖ 2NO+1NC	FD 2258-M2 ⊖ 2NO+1NC	
2	R	FD 238-M2 2x(1NO-1NC)	FD 258-M2 2x(1NO-1NC)	
E1		FD E138-M2 1NO-1NC	FD E158-M2 1NO-1NC	
Actuating force		0.1 Nm (0.25 Nm ⊖)	0.06 Nm (0.25 Nm ⊖)	0.5 m/s with cam at 30°
Travel diagrams		page 214 - group 4	page 214 - group 4	0.21 Nm (0.36 Nm ⊖)

Bistable switch



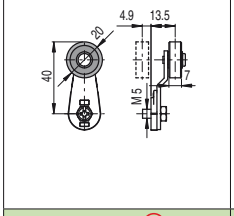
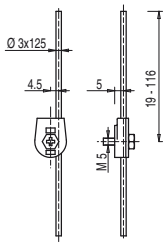
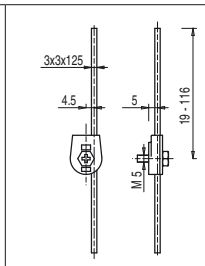
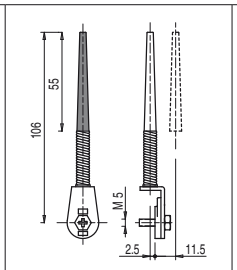
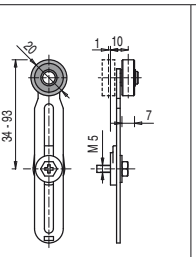
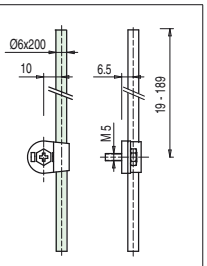
S = mechanical switching point
positive opening on contacts 21-22 only

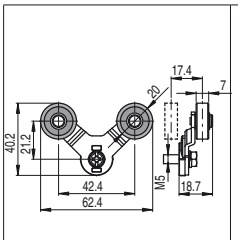
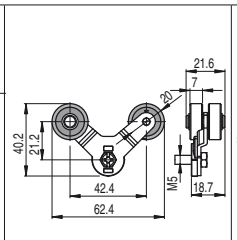
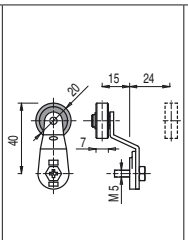
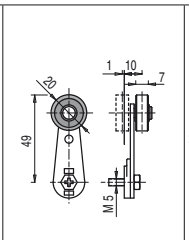
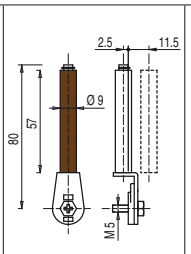
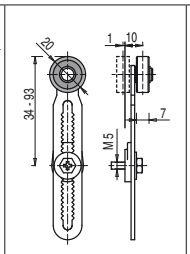
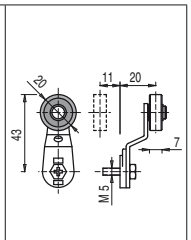
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

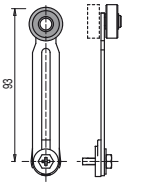
All values in the drawings are in mm

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

Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable glass fibre rod
					
VF L31 ⊖	VF L32 (3)	VF L33 (3)	VF L34	VF L35 ⊖ (1) (3)	VF L36 (3)

Lyra actuator, single track	Lyra actuator, dual track	Technopolymer roller, Ø 20 mm	Technopolymer roller, Ø 20 mm	Porcelain roller	Adjustable safety actuator with technopolymer roller	Technopolymer roller, Ø 20 mm
						
VF L41 ⊖	VF L42 ⊖	VF L51 ⊖	VF L52 ⊖	VF L53 ⊖ (2)	VF L56 ⊖ (3)	VF L57 ⊖

- (1) Actuator 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) The position switch obtained by assembling switch FD •58-M2 (e.g. FD 558-M2, FD 658-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FD •53-E11M2V9 (e.g. FD 553-E11M2V9, FD 653-E11M2V9…).
- (3) If installed with switch FD •58-M2 (e.g. FC 558-M2, FD 658-M2…) the actuator may hit the housing of the switch upon actuation. This possible interference depends on the fixing position of actuator and switch head.
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

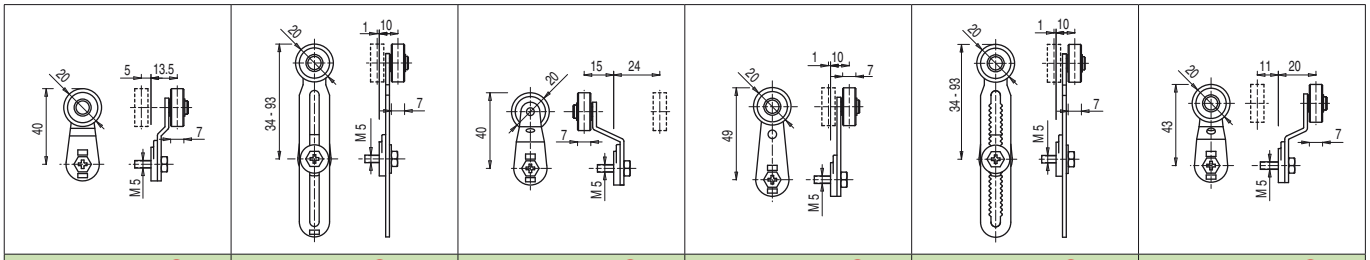
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

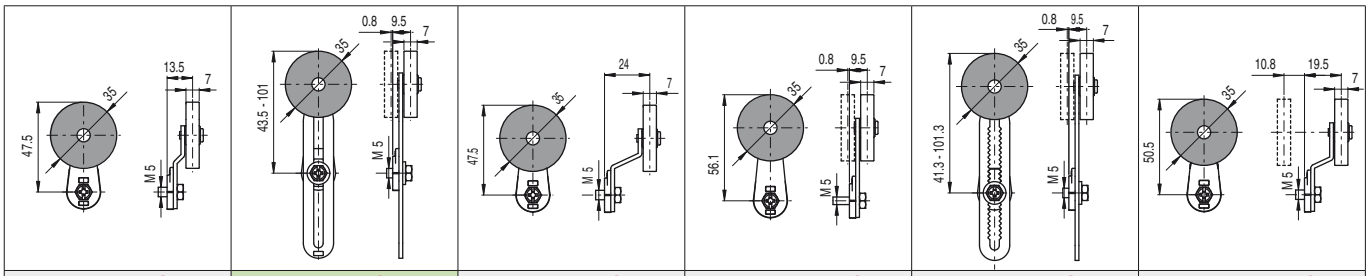
IMPORTANT: These separate actuators can be used only with items of the FD, FP, FL, FC series.

Stainless steel rollers, Ø 20 mm



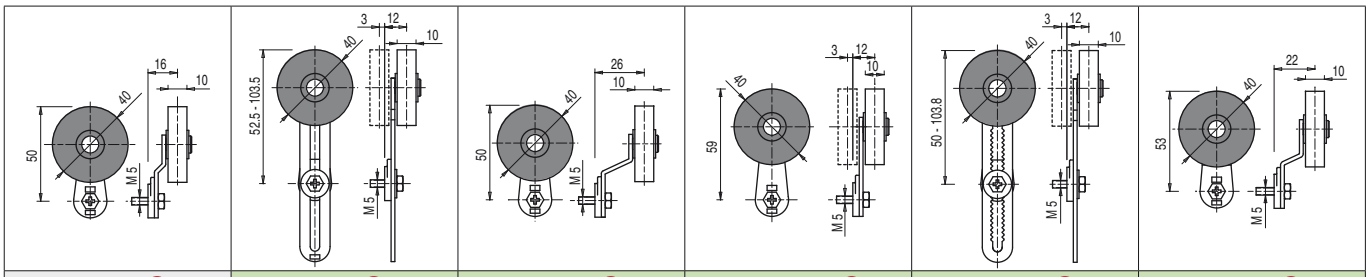
VF L31-R24	VF L35-R24 (1) (3)	VF L51-R24	VF L52-R24	VF L56-R24 (3)	VF L57-R24

Technopolymer rollers, Ø 35 mm



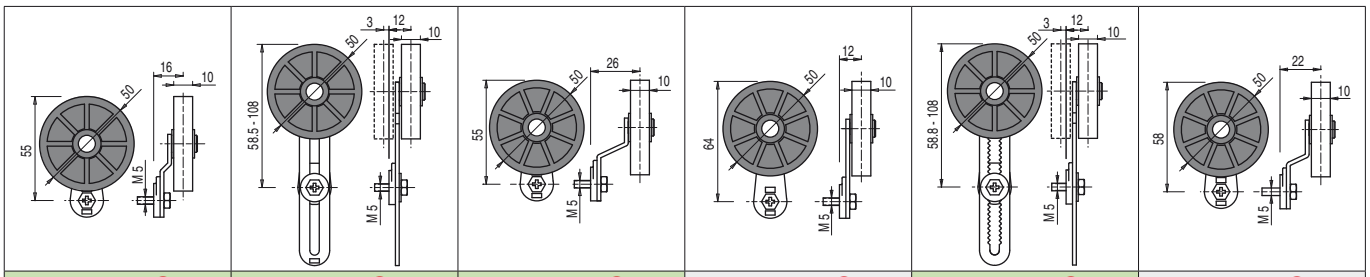
VF L31-R25 (4)	VF L35-R25 (1) (3)	VF L51-R25 (4)	VF L52-R25	VF L56-R25 (3)	VF L57-R25

Rubber rollers, Ø 40 mm



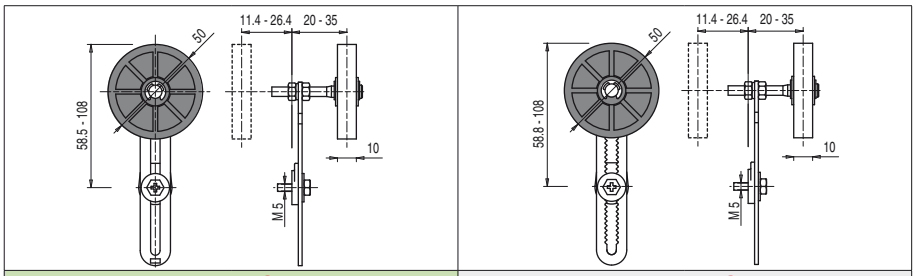
VF L31-R5 (4)	VF L35-R5 (1) (3)	VF L51-R5 (4)	VF L52-R5	VF L56-R5 (3)	VF L57-R5 (4)

Rubber rollers, Ø 50 mm



VF L31-R26 (4)	VF L35-R26 (1) (3)	VF L51-R26 (4)	VF L52-R26 (4)	VF L56-R26 (3)	VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm



VF L35-R27 (1) (3)	VF L56-R27 (3)

Accessories See page 197

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

Selection diagram

01

08

10
External rubber gasket

11

18
Ball Ø 8 mm, stainless steel

19
Ball Ø 12.7 mm, stainless steel

02

04
Glass fibre rod

05

31

51

52

57

35
Adjustable lever

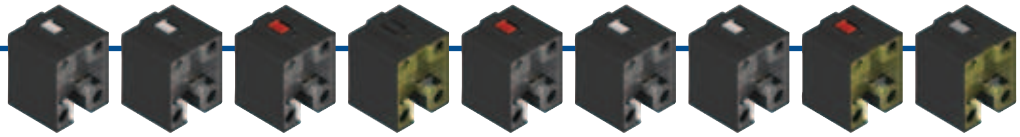
56
Adjustable safety lever

41
Bistable

42
Bistable

ACTUATORS

CONTACT BLOCKS



5
1NO+1NC snap action

6
1NO+1NC slow action

7
1NO+1NC slow action, make before break

9
2NC slow action

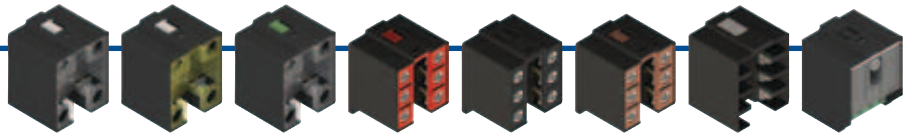
10
2NO slow action

11
2NC snap action

12
2NO snap action

13
2NC slow action shifted and spaced

14
2NC slow action, shifted



15
2NO slow action, shifted

16
2NC slow action, independent

18
1NO+1NC slow action, close

20
1NO+2NC slow action

21
3NC slow action

22
2NO+1NC slow action

2
2x (1NO-1NC) snap action

E1
1NO-1NC electronic, PNP

CONDUIT ENTRY

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

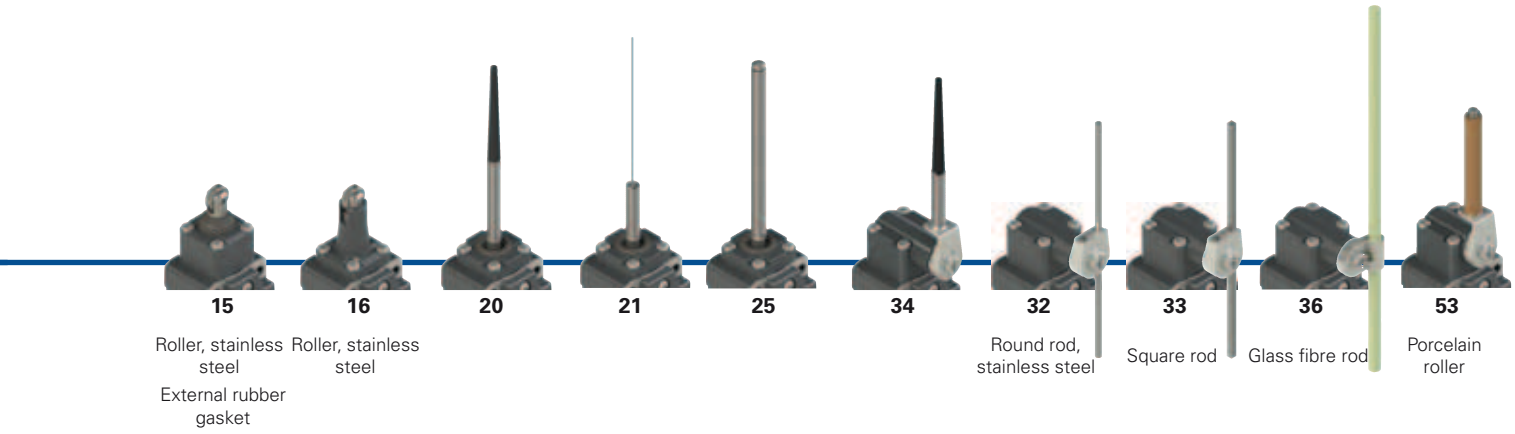
With cable gland	
K23	for cables Ø 6 … 12 mm
K27	for cables Ø 3 … 7 mm

With M12 plastic connector	
K70	4-pole, bottom
K45	8-pole, bottom

With M12 metal connector	
K40	8-pole, bottom
K60	4-pole, bottom

product options

Sold separately as accessory



15 Roller, stainless steel
External rubber gasket

16 Roller, stainless steel

20

21

25

34

32 Round rod, stainless steel

33 Square rod

36 Glass fibre rod

53 Porcelain roller

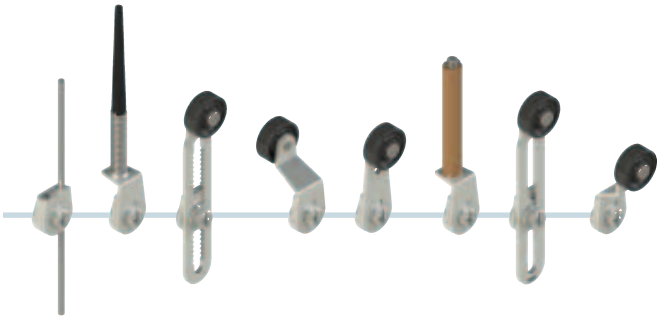
76 Rope switch for signalling

38 Without actuator

58 Without actuator

40 Bistable without actuator

SEPARATE ACTUATORS
See page 33



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

FP 502-GM2K70R24T6

Housing	
FP	technopolymer, 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
05	angled lever with roller
...	.....

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

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

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

Rollers	
	standard roller
R24	stainless steel Ø 20 mm (for actuators 02, 05, 31, 35, 51, 52, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 31, 35, 51, 52, 56, 57)
R5	rubber, Ø 40 mm (for actuators 31, 35, 51, 52, 56, 57)
R26	rubber, Ø 50 mm (for actuators 31, 35, 51, 52, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 35 and 36)

Pre-installed cable glands or connectors	
	no cable gland or connector (standard)
K23	cable gland for cables Ø 6 … 12 mm
K27	cable gland for cables Ø 3 … 7°mm
K45	M12 plastic connector, 8-pole
K70	M12 plastic connector, 4-pole

For the complete list of possible combinations please contact our technical department.

Main features
- Technopolymer housing, one conduit entry
- Protection degree IP67
- Stainless steel fixing plates
- 17 contact blocks available
- 28 actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈
One threaded conduit entry: M20x1.5 (standard)
Protection degree: IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230014
EAC approval:	RU C-IT.АД35.В.00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 214. 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 on pages 211 to 222.**

Electrical data			Utilization category
without connector	Thermal current (I_{th}):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 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
	Protection against short circuits:	type aM fuse 10 A 500 V	Ie (A) 6 1.1 0.4
	Pollution degree:	3	
with M12 connector 4-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	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-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	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

Features approved by IMQ

Rated insulation voltage (U_i):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 20, 21,22, 33, 34)
Conventional free air thermal current (I_{th}):	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 (U_e):	400 Vac (50 Hz)
Operating current (I_e):	3 A

Forms of the contact element: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

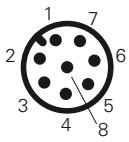
Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 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).

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

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

Wiring diagram for M12 connectors

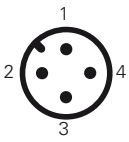
Contact block 2 — 1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

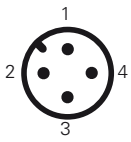
Contact block 5 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

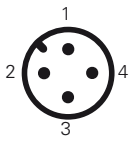
Contact block 6 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

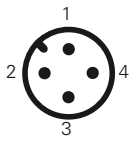
Contact block 7 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NC	3-4

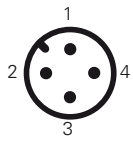
Contact block 9 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

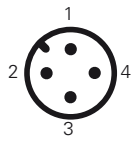
Contact block 10 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

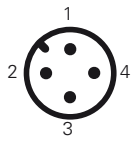
Contact block 11 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

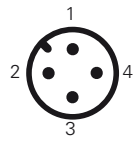
Contact block 12 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

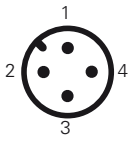
Contact block 13 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

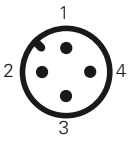
Contact block 14 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

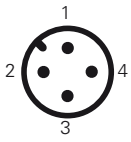
Contact block 15 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4

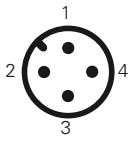
Contact block 16 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4

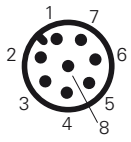
Contact block 18 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

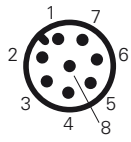
Contact block 20 — 2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8

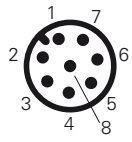
Contact block 21 — 3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8

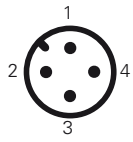
Contact block 22 — 1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8

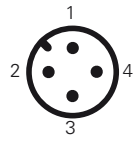
Contact block 33 — 1NC+1NO



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

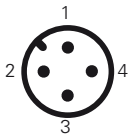
Contact block 34 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

Contact block E1 — PNP



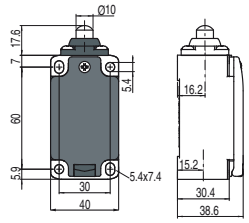
M12 connector, 4-pole

Contacts	Pin no.
+	1
-	3
NC	2
NO	4

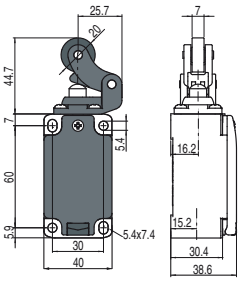
FP series position switches

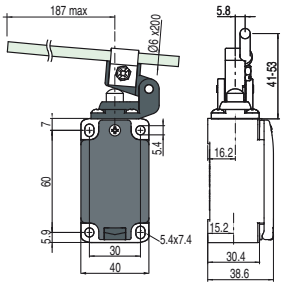
Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

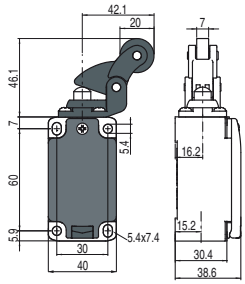


With stainless steel roller on request

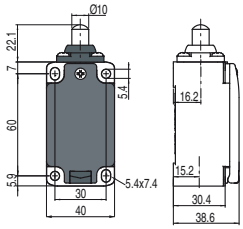




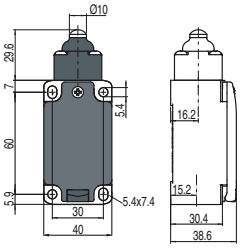
With stainless steel roller on request

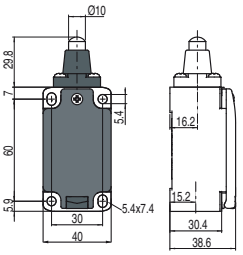


Contact block								
5	R	FP 501-M2	1NO+1NC	FP 502-M2	1NO+1NC	FP 504-M2	1NO+1NC	FP 505-M2	1NO+1NC
6	L	FP 601-M2	1NO+1NC	FP 602-M2	1NO+1NC	FP 604-M2	1NO+1NC	FP 605-M2	1NO+1NC
7	LO	FP 701-M2	1NO+1NC	FP 702-M2	1NO+1NC	FP 704-M2	1NO+1NC	FP 705-M2	1NO+1NC
9	L	FP 901-M2	2NC	FP 902-M2	2NC	FP 904-M2	2NC	FP 905-M2	2NC
10	L	FP 1001-M2	2NO	FP 1002-M2	2NO	FP 1004-M2	2NO	FP 1005-M2	2NO
11	R	FP 1101-M2	2NC	FP 1102-M2	2NC	FP 1104-M2	2NC	FP 1105-M2	2NC
12	R	FP 1201-M2	2NO	FP 1202-M2	2NO	FP 1204-M2	2NO	FP 1205-M2	2NO
13	LV	FP 1301-M2	2NC	FP 1302-M2	2NC	FP 1304-M2	2NC	FP 1305-M2	2NC
14	LS	FP 1401-M2	2NC	FP 1402-M2	2NC	FP 1404-M2	2NC	FP 1405-M2	2NC
15	LS	FP 1501-M2	2NO	FP 1502-M2	2NO	FP 1504-M2	2NO	FP 1505-M2	2NO
18	LA	FP 1801-M2	1NO+1NC	FP 1802-M2	1NO+1NC	FP 1804-M2	1NO+1NC	FP 1805-M2	1NO+1NC
20	L	FP 2001-M2	1NO+2NC	FP 2002-M2	1NO+2NC	FP 2004-M2	1NO+2NC	FP 2005-M2	1NO+2NC
21	L	FP 2101-M2	3NC	FP 2102-M2	3NC	FP 2104-M2	3NC	FP 2105-M2	3NC
22	L	FP 2201-M2	2NO+1NC	FP 2202-M2	2NO+1NC	FP 2204-M2	2NO+1NC	FP 2205-M2	2NO+1NC
2	R	FP 201-M2	2x(1NO-1NC)	FP 202-M2	2x(1NO-1NC)	FP 204-M2	2x(1NO-1NC)	FP 205-M2	2x(1NO-1NC)
E1		FP E101-M2	1NO-1NC	FP E102-M2	1NO-1NC	FP E104-M2	1NO-1NC	FP E105-M2	1NO-1NC
Max. speed		page 213 - type 4		page 213 - type 3		0.5 m/s		page 213 - type 3	
Actuating force		8 N (25 N →)		6 N (25 N →)		0.17 Nm		6 N (25 N →)	
Travel diagrams		page 214 - group 1		page 214 - group 2		page 214 - group 1		page 214 - group 2	

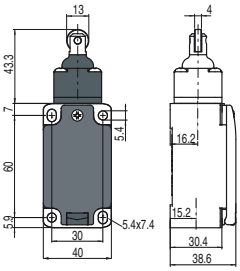


With external rubber gasket





With external rubber gasket



Contact block								
5	R	FP 508-M2	1NO+1NC	FP 510-M2	1NO+1NC	FP 511-M2	1NO+1NC	FP 515-M2	1NO+1NC
6	L	FP 608-M2	1NO+1NC	FP 610-M2	1NO+1NC	FP 611-M2	1NO+1NC	FP 615-M2	1NO+1NC
7	LO	FP 708-M2	1NO+1NC	FP 710-M2	1NO+1NC	FP 711-M2	1NO+1NC	FP 715-M2	1NO+1NC
9	L	FP 908-M2	2NC	FP 910-M2	2NC	FP 911-M2	2NC	FP 915-M2	2NC
10	L	FP 1008-M2	2NO	FP 1010-M2	2NO	FP 1011-M2	2NO	FP 1015-M2	2NO
11	R	FP 1108-M2	2NC	FP 1110-M2	2NC	FP 1111-M2	2NC	FP 1115-M2	2NC
12	R	FP 1208-M2	2NO	FP 1210-M2	2NO	FP 1211-M2	2NO	FP 1215-M2	2NO
13	LV	FP 1308-M2	2NC	FP 1310-M2	2NC	FP 1311-M2	2NC	FP 1315-M2	2NC
14	LS	FP 1408-M2	2NC	FP 1410-M2	2NC	FP 1411-M2	2NC	FP 1415-M2	2NC
15	LS	FP 1508-M2	2NO	FP 1510-M2	2NO	FP 1511-M2	2NO	FP 1515-M2	2NO
18	LA	FP 1808-M2	1NO+1NC	FP 1810-M2	1NO+1NC	FP 1811-M2	1NO+1NC	FP 1815-M2	1NO+1NC
20	L	FP 2008-M2	1NO+2NC	FP 2010-M2	1NO+2NC	FP 2011-M2	1NO+2NC	FP 2015-M2	1NO+2NC
21	L	FP 2108-M2	3NC	FP 2110-M2	3NC	FP 2111-M2	3NC	FP 2115-M2	3NC
22	L	FP 2208-M2	2NO+1NC	FP 2210-M2	2NO+1NC	FP 2211-M2	2NO+1NC	FP 2215-M2	2NO+1NC
2	R	FP 208-M2	2x(1NO-1NC)	FP 210-M2	2x(1NO-1NC)	FP 211-M2	2x(1NO-1NC)	FP 215-M2	2x(1NO-1NC)
E1		FP E108-M2	1NO-1NC	FP E110-M2	1NO-1NC	FP E111-M2	1NO-1NC	FP E115-M2	1NO-1NC
Max. speed		page 213 - type 4		page 213 - type 4		page 213 - type 4		page 213 - type 2	
Actuating force		8 N (25 N →)		11 N (25 N →)		8 N (25 N →)		11 N (25 N →)	
Travel diagrams		page 214 - group 1		page 214 - group 1		page 214 - group 1		page 214 - group 1	

All values in the drawings are in mm

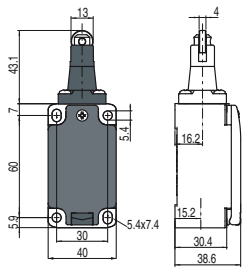
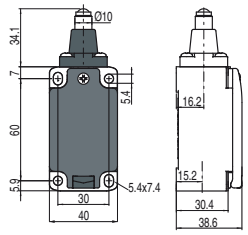
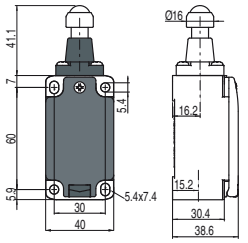
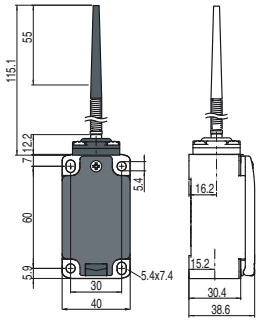
Items with code on **green** background are stock items

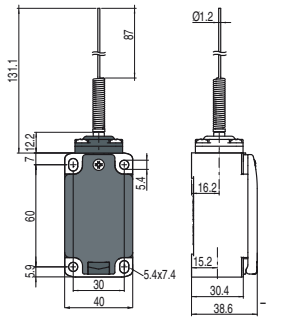
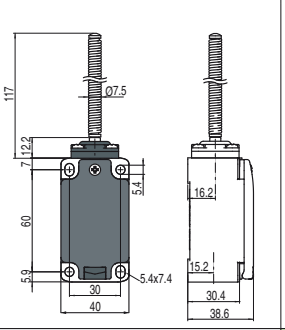
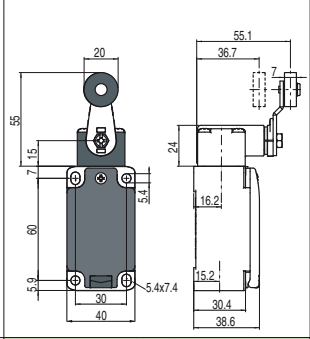
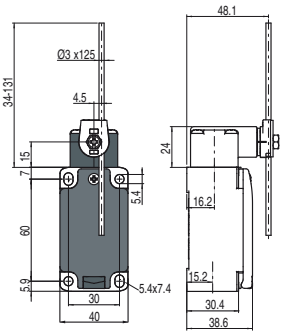
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block			Ball, Ø 8 mm, stainless steel 	Ball, Ø 12.7 mm, stainless steel 	With external rubber gasket 
5	R	FP 516-M2 1NO+1NC	FP 518-M2 1NO+1NC	FP 519-M2 1NO+1NC	FP 520-M2 1NO+1NC
6	L	FP 616-M2 1NO+1NC	FP 618-M2 1NO+1NC	FP 619-M2 1NO+1NC	
7	LO	FP 716-M2 1NO+1NC	FP 718-M2 1NO+1NC	FP 719-M2 1NO+1NC	
9	L	FP 916-M2 2NC	FP 918-M2 2NC	FP 919-M2 2NC	
10	L	FP 1016-M2 2NO	FP 1018-M2 2NO	FP 1019-M2 2NO	FP 1020-M2 2NO
11	R	FP 1116-M2 2NC	FP 1118-M2 2NC	FP 1119-M2 2NC	
12	R	FP 1216-M2 2NO	FP 1218-M2 2NO	FP 1219-M2 2NO	
13	LV	FP 1316-M2 2NC	FP 1318-M2 2NC	FP 1319-M2 2NC	
14	LS	FP 1416-M2 2NC	FP 1418-M2 2NC	FP 1419-M2 2NC	
15	LS	FP 1516-M2 2NO	FP 1518-M2 2NO	FP 1519-M2 2NO	
18	LA	FP 1816-M2 1NO+1NC	FP 1818-M2 1NO+1NC	FP 1819-M2 1NO+1NC	FP 1820-M2 1NO+1NC
20	L	FP 2016-M2 1NO+2NC	FP 2018-M2 1NO+2NC	FP 2019-M2 1NO+2NC	FP 2020-M2 1NO+2NC
21	L	FP 2116-M2 3NC	FP 2118-M2 3NC	FP 2119-M2 3NC	FP 2120-M2 3NC
22	L	FP 2216-M2 2NO+1NC	FP 2218-M2 2NO+1NC	FP 2219-M2 2NO+1NC	FP 2220-M2 2NO+1NC
2	R	FP 216-M2 2x(1NO-1NC)	FP 218-M2 2x(1NO-1NC)	FP 219-M2 2x(1NO-1NC)	FP 220-M2 2x(1NO-1NC)
E1		FP E116-M2 1NO-1NC	FP E118-M2 1NO-1NC	FP E119-M2 1NO-1NC	FP E120-M2 1NO-1NC
Max. speed		page 213 - type 2	page 213 - type 4	page 213 - type 4	1 m/s
Actuating force		8 N (25 N ⊖)	8 N (25 N ⊖)	8 N (25 N ⊖)	0.09 Nm
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 3

Contact block		With external rubber gasket 	With external rubber gasket 	Other rollers available. See page 34 	Round rod, Ø 3 mm, stainless steel 
5	R	FP 521-M2 1NO+1NC	FP 525-M2 1NO+1NC	FP 531-M2 1NO+1NC	FP 532-M2 1NO+1NC
6	L			FP 631-M2 1NO+1NC	FP 632-M2 1NO+1NC
7	LO			FP 731-M2 1NO+1NC	FP 732-M2 1NO+1NC
9	L			FP 931-M2 2NC	FP 932-M2 2NC
10	L	FP 1021-M2 2NO	FP 1025-M2 2NO	FP 1031-M2 2NO	FP 1032-M2 2NO
11	R			FP 1131-M2 2NC	FP 1132-M2 2NC
12	R			FP 1231-M2 2NO	FP 1232-M2 2NO
13	LV			FP 1331-M2 2NC	FP 1332-M2 2NC
14	LS			FP 1431-M2 2NC	FP 1432-M2 2NC
15	LS			FP 1531-M2 2NO	FP 1532-M2 2NO
16	LI			FP 1631-M2 2NC	FP 1632-M2 2NC
18	LA	FP 1821-M2 1NO+1NC	FP 1825-M2 1NO+1NC	FP 1831-M2 1NO+1NC	FP 1832-M2 1NO+1NC
20	L	FP 2021-M2 1NO+2NC	FP 2025-M2 1NO+2NC	FP 2031-M2 1NO+2NC	FP 2032-M2 1NO+2NC
21	L	FP 2121-M2 3NC	FP 2125-M2 3NC	FP 2131-M2 3NC	FP 2132-M2 3NC
22	L	FP 2221-M2 2NO+1NC	FP 2225-M2 2NO+1NC	FP 2231-M2 2NO+1NC	FP 2232-M2 2NO+1NC
2	R	FP 221-M2 2x(1NO-1NC)	FP 225-M2 2x(1NO-1NC)	FP 231-M2 2x(1NO-1NC)	FP 232-M2 2x(1NO-1NC)
E1		FP E121-M2 1NO-1NC	FP E125-M2 1NO-1NC	FP E131-M2 1NO-1NC	FP E132-M2 1NO-1NC
Max. speed		1 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.08 Nm	0.14 Nm	0.1 Nm (0.25 Nm ⊖)	0.1 Nm
Travel diagrams		page 214 - group 3	page 214 - group 3	page 214 - group 4	page 214 - group 4

All values in the drawings are in mm

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

Accessories See page 197

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

FP series position switches

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP

Contact block		Square rod, 3x3 mm	Square rod, 3x3 mm	Other rollers available. See page 34	Glass fibre rod
5	R	FP 533-M2 1NO+1NC	FP 534-M2 1NO+1NC	FP 535-M2 (1) 1NO+1NC	FP 536-M2 1NO+1NC
6	L	FP 633-M2 1NO+1NC	FP 634-M2 1NO+1NC	FP 635-M2 (1) 1NO+1NC	FP 636-M2 1NO+1NC
7	LO	FP 733-M2 1NO+1NC	FP 734-M2 1NO+1NC	FP 735-M2 (1) 1NO+1NC	FP 736-M2 1NO+1NC
9	L	FP 933-M2 2NC	FP 934-M2 2NC	FP 935-M2 (1) 2NC	FP 936-M2 2NC
10	L	FP 1033-M2 2NO	FP 1034-M2 2NO	FP 1035-M2 2NO	FP 1036-M2 2NO
11	R	FP 1133-M2 2NC	FP 1134-M2 2NC	FP 1135-M2 (1) 2NC	FP 1136-M2 2NC
12	R	FP 1233-M2 2NO	FP 1234-M2 2NO	FP 1235-M2 2NO	FP 1236-M2 2NO
13	LV	FP 1333-M2 2NC	FP 1334-M2 2NC	FP 1335-M2 (1) 2NC	FP 1336-M2 2NC
14	LS	FP 1433-M2 2NC	FP 1434-M2 2NC	FP 1435-M2 (1) 2NC	FP 1436-M2 2NC
15	LS	FP 1533-M2 2NO	FP 1534-M2 2NO	FP 1535-M2 2NO	FP 1536-M2 2NO
16	LI	FP 1633-M2 2NC	FP 1634-M2 2NC	FP 1635-M2 (1) 2NC	FP 1636-M2 2NC
18	LA	FP 1833-M2 1NO+1NC	FP 1834-M2 1NO+1NC	FP 1835-M2 (1) 1NO+1NC	FP 1836-M2 1NO+1NC
20	L	FP 2033-M2 1NO+2NC	FP 2034-M2 1NO+2NC	FP 2035-M2 (1) 1NO+2NC	FP 2036-M2 1NO+2NC
21	L	FP 2133-M2 3NC	FP 2134-M2 3NC	FP 2135-M2 (1) 3NC	FP 2136-M2 3NC
22	L	FP 2233-M2 2NO+1NC	FP 2234-M2 2NO+1NC	FP 2235-M2 (1) 2NO+1NC	FP 2236-M2 2NO+1NC
2	R	FP 233-M2 2x(1NO-1NC)	FP 234-M2 2x(1NO-1NC)	FP 235-M2 2x(1NO-1NC)	FP 236-M2 2x(1NO-1NC)
E1		FP E133-M2 1NO-1NC	FP E134-M2 1NO-1NC	FP E135-M2 1NO-1NC	FP E136-M2 1NO-1NC
Max. speed		1.5 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.1 Nm	0.1 Nm	0.1 Nm (0.25 Nm)	0.1 Nm
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 4	page 214 - group 4

Contact block		Other rollers available. See page 34	Other rollers available. See page 34	Porcelain roller	Other rollers available. See page 34
5	R	FP 551-M2 1NO+1NC	FP 552-M2 1NO+1NC	FP 553-E11M2V9 1NO+1NC	FP 556-M2 1NO+1NC
6	L	FP 651-M2 1NO+1NC	FP 652-M2 1NO+1NC	FP 653-E11M2V9 1NO+1NC	FP 656-M2 1NO+1NC
7	LO	FP 751-M2 1NO+1NC	FP 752-M2 1NO+1NC	FP 753-E11M2V9 1NO+1NC	FP 756-M2 1NO+1NC
9	L	FP 951-M2 2NC	FP 952-M2 2NC	FP 953-E11M2V9 2NC	FP 956-M2 2NC
10	L	FP 1051-M2 2NO	FP 1052-M2 2NO	FP 1053-E11M2V9 2NO	FP 1056-M2 2NO
11	R	FP 1151-M2 2NC	FP 1152-M2 2NC		FP 1156-M2 2NC
12	R	FP 1251-M2 2NO	FP 1252-M2 2NO	FP 1253-E11M2V9 2NO	FP 1256-M2 2NO
13	LV	FP 1351-M2 2NC	FP 1352-M2 2NC	FP 1353-E11M2V9 2NC	FP 1356-M2 2NC
14	LS	FP 1451-M2 2NC	FP 1452-M2 2NC	FP 1453-E11M2V9 2NC	FP 1456-M2 2NC
15	LS	FP 1551-M2 2NO	FP 1552-M2 2NO	FP 1553-E11M2V9 2NO	FP 1556-M2 2NO
16	LI				FP 1656-M2 2NC
18	LA	FP 1851-M2 1NO+1NC	FP 1852-M2 1NO+1NC	FP 1853-E11M2V9 1NO+1NC	FP 1856-M2 1NO+1NC
20	L	FP 2051-M2 1NO+2NC	FP 2052-M2 1NO+2NC	FP 2053-E11M2V9 1NO+2NC	FP 2056-M2 1NO+2NC
21	L	FP 2151-M2 3NC	FP 2152-M2 3NC	FP 2153-E11M2V9 3NC	FP 2156-M2 3NC
22	L	FP 2251-M2 2NO+1NC	FP 2252-M2 2NO+1NC	FP 2253-E11M2V9 2NO+1NC	FP 2256-M2 2NO+1NC
2	R	FP 251-M2 2x(1NO-1NC)	FP 252-M2 2x(1NO-1NC)	FP 253-E11M2 2x(1NO-1NC)	FP 256-M2 2x(1NO-1NC)
E1		FP E151-M2 1NO-1NC	FP E152-M2 1NO-1NC	FP E153-E11M2V9 1NO-1NC	FP E156-M2 1NO-1NC
Max. speed		page 213 - type 1	page 213 - type 1	0.5 m/s	page 213 - type 1
Actuating force		0.06 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)	0.03 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 5	page 214 - group 4

(1) Positive opening only with actuator set to max. See page 33.

All values in the drawings are in mm

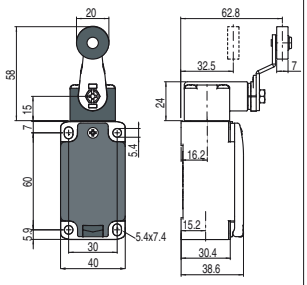
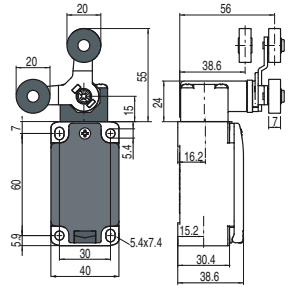
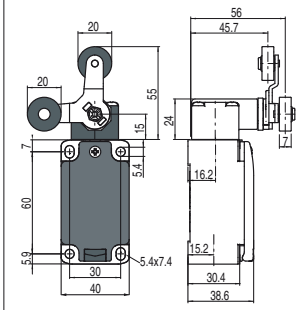
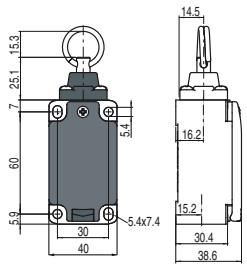
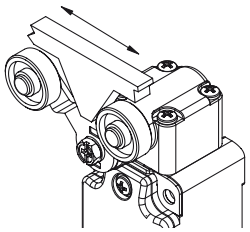
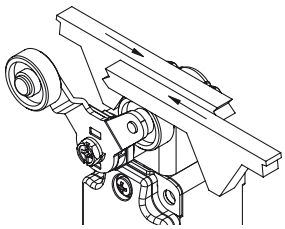
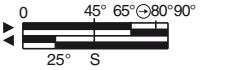
Items with code on **green** background are stock items

Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Other rollers available. See page 34	With stainless steel rollers on request	With stainless steel rollers on request	Rope switch for signalling
					
5	R	FP 557-M2 1NO+1NC	FP 541-M2 1NO+1NC	FP 542-M2 1NO+1NC	FP 576-M2 1NO+1NC
6	L	FP 657-M2 1NO+1NC	Bistable switch with lyra lever, single track	Bistable switch with lyra lever, dual track	FP 676-M2 1NO+1NC
7	LO	FP 757-M2 1NO+1NC			FP 776-M2 1NO+1NC
9	L	FP 957-M2 2NC			FP 976-M2 2NO
10	L	FP 1057-M2 2NO	S = mechanical switching point positive opening on contacts 21-22 only	S = mechanical switching point positive opening on contacts 21-22 only	FP 1076-M2 2NC
11	R	FP 1157-M2 2NC			FP 1176-M2 2NO
12	R	FP 1257-M2 2NO			FP 1276-M2 2NC
13	LV	FP 1357-M2 2NC			FP 1376-M2 2NO
14	LS	FP 1457-M2 2NC			FP 1476-M2 2NO
15	LS	FP 1557-M2 2NO			FP 1576-M2 2NC
16	LI	FP 1657-M2 2NC			
18	LA	FP 1857-M2 1NO+1NC			FP 1876-M2 1NO+1NC
20	L	FP 2057-M2 1NO+2NC			FP 2076-M2 2NO+1NC
21	L	FP 2157-M2 3NC			FP 2176-M2 3NO
22	L	FP 2257-M2 2NO+1NC			FP 2276-M2 1NO+2NC
2	R	FP 257-M2 2x(1NO-1NC)			FP 276-M2 2x(1NO-1NC)
E1		FP E157-M2 1NO-1NC			
Max. speed		page 213 - type 1	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Actuating force		0.1 Nm (0.25 Nm ⊖)	0.21 Nm (0.36 Nm ⊖)	0.21 Nm (0.36 Nm ⊖)	initial 20 N - final 40 N
Travel diagrams		page 214 - group 4			page 214 - group 6

All values in the drawings are in mm

Accessories See page 197

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

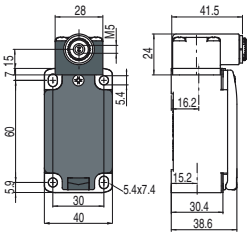
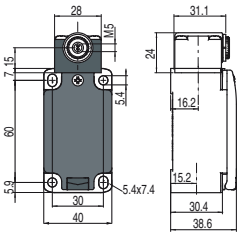
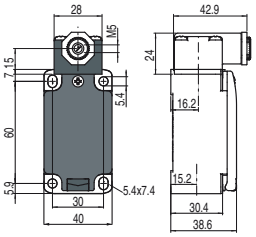
Position switches with swivelling lever without actuator

All values in the drawings are in mm

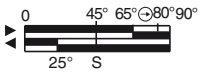
Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block

		Regular head	Compact head	
				
5	R	FP 538-M2 ⊖ 1NO+1NC	FP 558-M2 ⊖ 1NO+1NC	FP 540-M2 ⊖ 1NO+1NC
6	L	FP 638-M2 ⊖ 1NO+1NC	FP 658-M2 ⊖ 1NO+1NC	
7	LO	FP 738-M2 ⊖ 1NO+1NC	FP 758-M2 ⊖ 1NO+1NC	
9	L	FP 938-M2 ⊖ 2NC	FP 958-M2 ⊖ 2NC	
10	L	FP 1038-M2 2NO	FP 1058-M2 2NO	
11	R	FP 1138-M2 ⊖ 2NC	FP 1158-M2 ⊖ 2NC	
12	R	FP 1238-M2 2NO	FP 1258-M2 2NO	
13	LV	FP 1338-M2 ⊖ 2NC	FP 1358-M2 ⊖ 2NC	
14	LS	FP 1438-M2 ⊖ 2NC	FP 1458-M2 ⊖ 2NC	
15	LS	FP 1538-M2 2NO	FP 1558-M2 2NO	
16	LI	FP 1638-M2 ⊖ 2NC		
18	LA	FP 1838-M2 ⊖ 1NO+1NC	FP 1858-M2 ⊖ 1NO+1NC	
20	L	FP 2038-M2 ⊖ 1NO+2NC	FP 2058-M2 ⊖ 1NO+2NC	
21	L	FP 2138-M2 ⊖ 3NC	FP 2158-M2 ⊖ 3NC	
22	L	FP 2238-M2 ⊖ 2NO+1NC	FP 2258-M2 ⊖ 2NO+1NC	
2	R	FP 238-M2 2x(1NO-1NC)	FP 258-M2 2x(1NO-1NC)	
E1		FP E138-M2 1NO+1NC	FP E158-M2 1NO+1NC	
Actuating force		0.1 Nm (0.25 Nm ⊖)	0.06 Nm (0.25 Nm ⊖)	0.5 m/s with cam at 30°
Travel diagrams		page 214 - group 4	page 214 - group 4	0.21 Nm (0.36 Nm ⊖)

Bistable switch



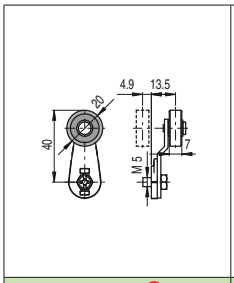
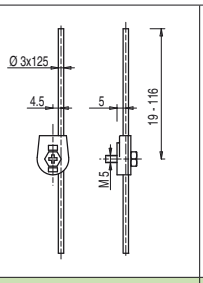
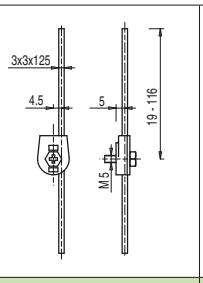
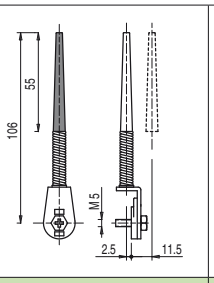
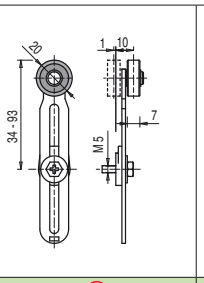
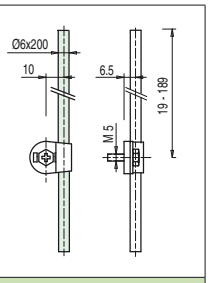
S = mechanical switching point
positive opening on contacts 21-22 only

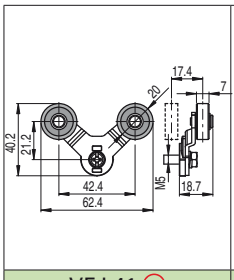
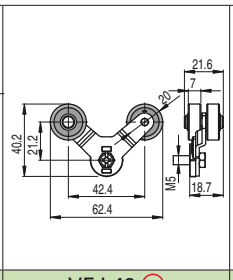
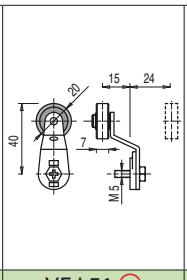
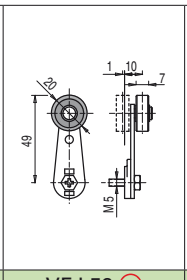
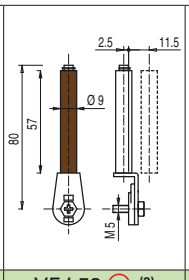
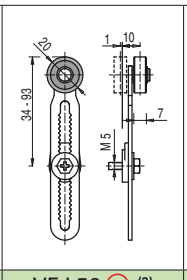
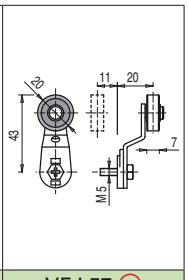
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

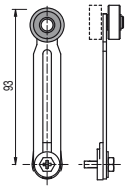
All values in the drawings are in mm

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

Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable glass fibre rod
					
VF L31 ⊖	VF L32 (3)	VF L33 (3)	VF L34	VF L35 ⊖ (1) (3)	VF L36 (3)

Lyra actuator, single track	Lyra actuator, dual track	Technopolymer roller, Ø 20 mm	Technopolymer roller, Ø 20 mm	Porcelain roller	Adjustable safety actuator with technopolymer roller	Technopolymer roller, Ø 20 mm
						
VF L41 ⊖	VF L42 ⊖	VF L51 ⊖	VF L52 ⊖	VF L53 ⊖ (2)	VF L56 ⊖ (3)	VF L57 ⊖

- (1) Actuator 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) The position switch obtained by assembling switch FP •58-M2 (e.g. FP 558-M2, FP 658-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FP •53-E11M2V9 (e.g. FP 553-E11M2V9, FP 653-E11M2V9…).
- (3) If installed with switch FP •58-M2 (e.g. FP 558-M2, FP 658-M2…) the actuator may hit the housing of the switch upon actuation. This possible interference depends on the fixing position of actuator and switch head.
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

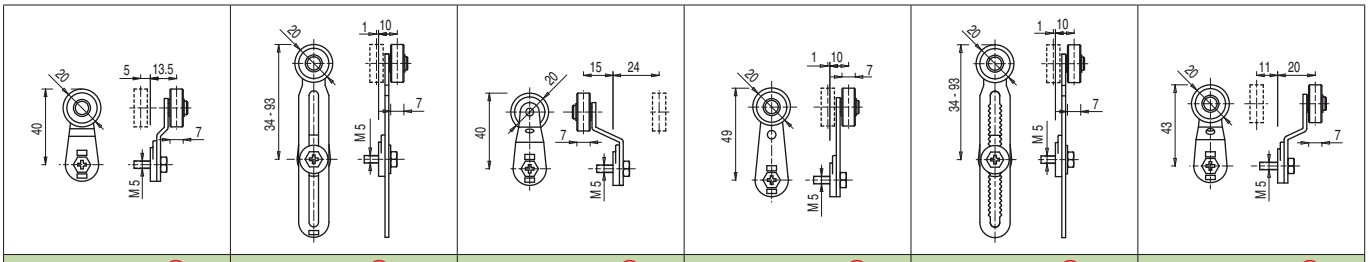
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

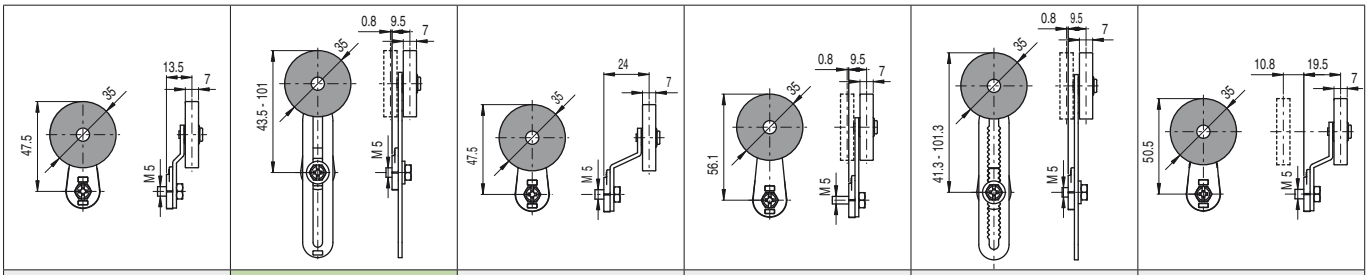
IMPORTANT: These separate actuators can be used only with items of the FD, FP, FL, FC series.

Stainless steel rollers, Ø 20 mm



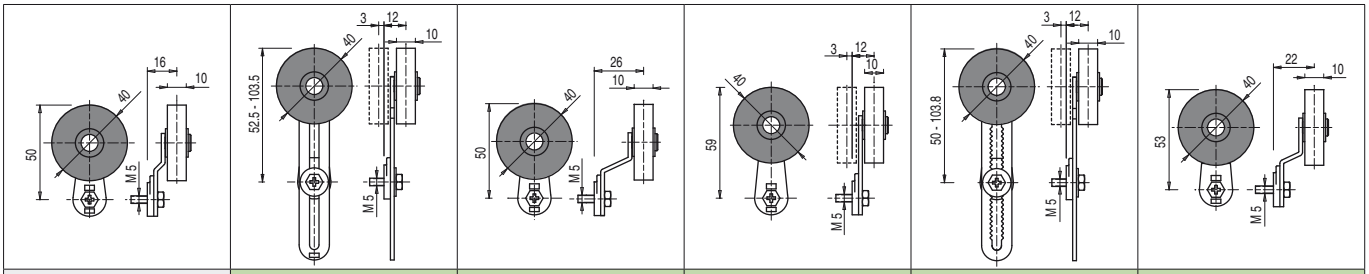
VF L31-R24 | VF L35-R24 (1) (3) | VF L51-R24 | VF L52-R24 | VF L56-R24 (3) | VF L57-R24

Technopolymer rollers, Ø 35 mm



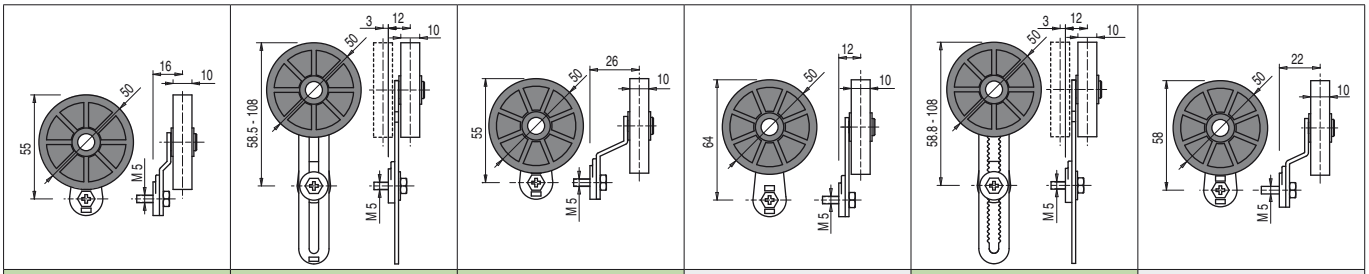
VF L31-R25 (4) | VF L35-R25 (1) (3) | VF L51-R25 (4) | VF L52-R25 | VF L56-R25 (3) | VF L57-R25

Rubber rollers, Ø 40 mm



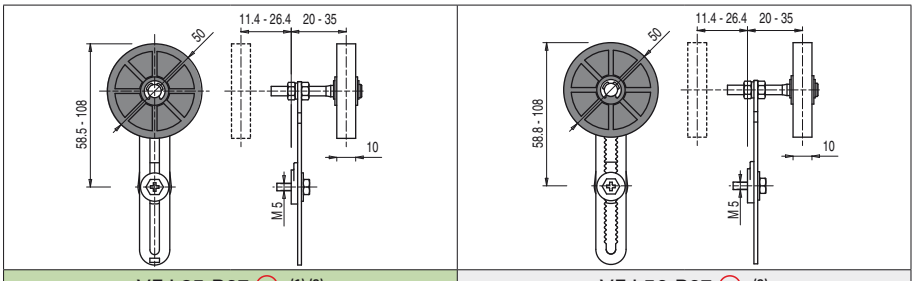
VF L31-R5 (4) | VF L35-R5 (1) (3) | VF L51-R5 (4) | VF L52-R5 | VF L56-R5 (3) | VF L57-R5 (4)

Rubber rollers, Ø 50 mm



VF L31-R26 (4) | VF L35-R26 (1) (3) | VF L51-R26 (4) | VF L52-R26 (4) | VF L56-R26 (3) | VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm

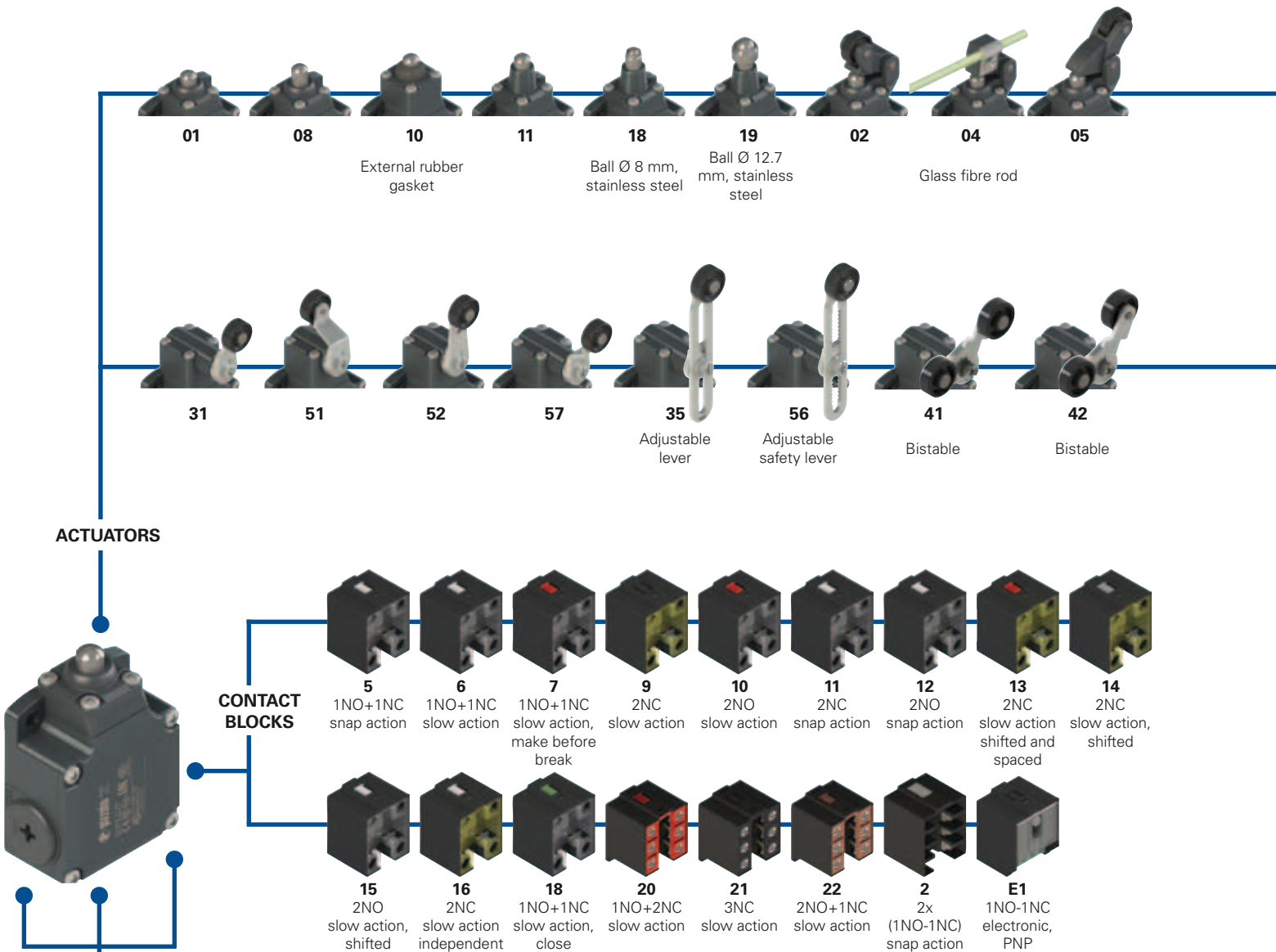


VF L35-R27 (1) (3) | VF L56-R27 (3)

Accessories See page 197

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

Selection diagram



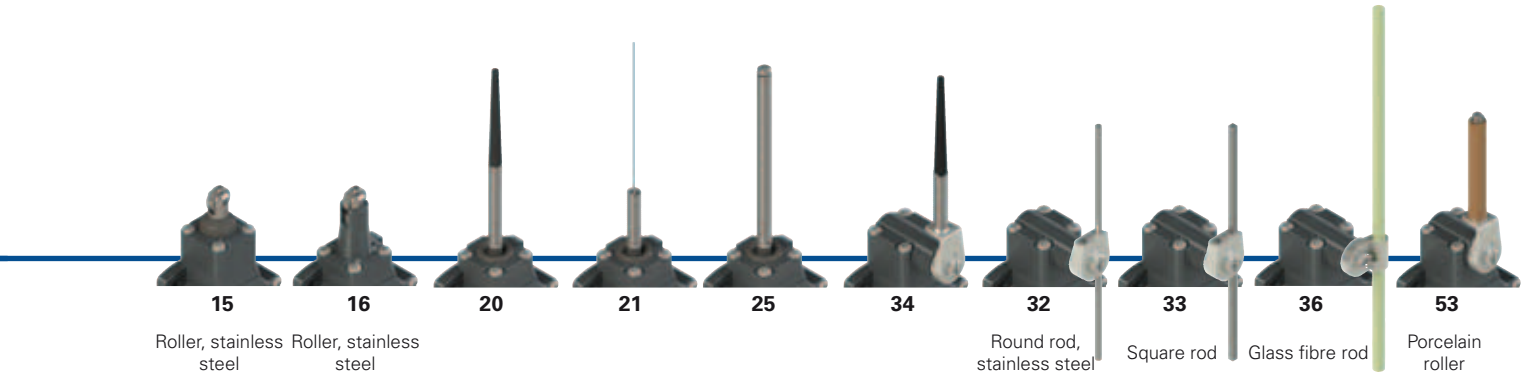
Threaded conduit entries	
M2	M20x1.5 (standard)
	PG 13.5

With cable gland	
K23	for cables Ø 6 … 12 mm on the bottom
K123	for cables Ø 6 … 12 mm on the right
K223	for cables Ø 6 … 12 mm on the left
K27	for cables Ø 3 … 7 mm on the bottom
K127	for cables Ø 3 … 7 mm on the right
K227	for cables Ø 3 … 7 mm on the left

With M12 metal connector	
K40	8-pole, bottom
K41	8-pole, right
K42	8-pole, left
K50	5-pole, bottom
K51	5-pole, right
K52	5-pole, left

product options

Sold separately as accessory



15 Roller, stainless steel. External rubber gasket

16 Roller, stainless steel

20

21

25

34

32 Round rod, stainless steel

33 Square rod

36 Glass fibre rod

53 Porcelain roller

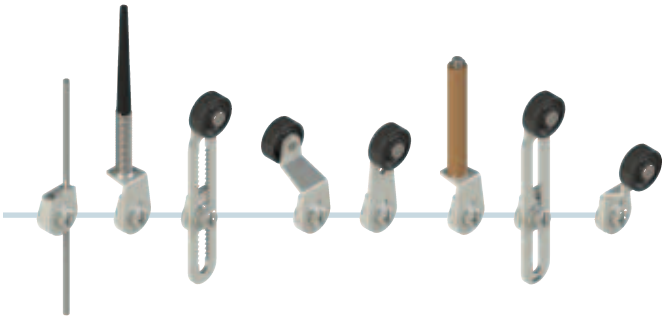
76 Rope switch for signalling

38 Without actuator

58 Without actuator

40 Bistable without actuator

SEPARATE ACTUATORS
See page 43



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

FL 502-GM2K50R24T6

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
05	angled lever with roller
...	.....

Contact type

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

Threaded conduit entries

M2	M20x1.5 (standard)
	PG 13.5

Ambient temperature

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

Rollers

	standard roller
R24	stainless steel Ø 20 mm (for actuators 02, 05, 31, 35, 51, 52, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 31, 35, 51, 52, 56, 57)
R5	rubber, Ø 40 mm (for actuators 31, 35, 51, 52, 56, 57)
R26	rubber, Ø 50 mm (for actuators 31, 35, 51, 52, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 35 and 36)

Pre-installed cable glands or connectors

	no cable gland or connector (standard)
K23	cable gland for cables Ø 6 … 12 mm
K50	M12 metal connector, 5-pole

For the complete list of possible combinations please contact our technical department.

Main features
- Metal housing, three conduit entries
- Protection degree IP67
- 17 contact blocks available
- 28 actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Quality marks:

IMQ approval: EG605
UL approval: E131787
CCC approval: 2007010305230000
EAC approval: RU C-IT.АД35.B.00454

Technical data

Housing
Metal housing, powder-coated
Three threaded conduit entries: M20x1.5 (standard)
Protection degree: IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data
Ambient temperature: -25°C … +80°C
Max. actuation frequency: 3600 operating cycles/hour
Mechanical endurance: 20 million operating cycles
Mounting position: any
Safety parameter B_{10D}: 40,000,000 for NC contacts
Mechanical interlock, not coded: type 1 acc. to EN ISO 14119
Tightening torques for installation: see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1, VDE 0660-206.

Installation for safety applications:
Use only switches marked with the symbol ⊖ next to 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 214. 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 on pages 211 to 222.**

Electrical data			Utilization category
without connector	Thermal current (I_{th}):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 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
	Protection against short circuits:	type aM fuse 10 A 500 V	Ie (A) 6 1.1 0.4
	Pollution degree:	3	
with M12 connector 5-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Protection against short circuits:	type gG fuse 4 A 500 V	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24 125 250
			Ie (A) 4 1.1 0.4
with M12 connector 8-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	30 Vac 36 Vdc	Ue (V) 24
	Protection against short circuits:	type gG fuse 2 A 500 V	Ie (A) 2
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 2

Features approved by IMQ

Rated insulation voltage (U_i):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 20, 21,22, 33, 34)
Conventional free air thermal current (I_{th}):	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 (U_e):	400 Vac (50 Hz)
Operating current (I_e):	3 A

Forms of the contact element: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

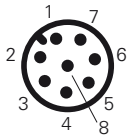
Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X, 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 Nm).
For contact 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).

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

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

Wiring diagram for M12 connectors

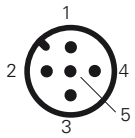
Contact block 2 — 1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

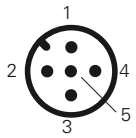
Contact block 5 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

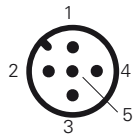
Contact block 6 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

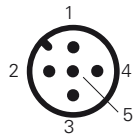
Contact block 7 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

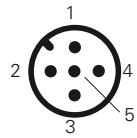
Contact block 9 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

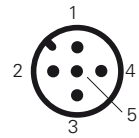
Contact block 10 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

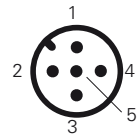
Contact block 11 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

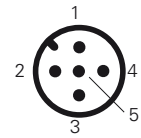
Contact block 12 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

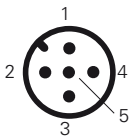
Contact block 13 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

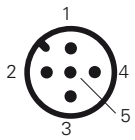
Contact block 14 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

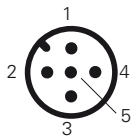
Contact block 15 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4
ground	5

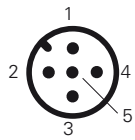
Contact block 16 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4
ground	5

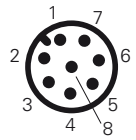
Contact block 18 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

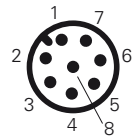
Contact block 20 — 2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8
ground	1

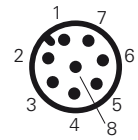
Contact block 21 — 3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

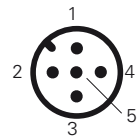
Contact block 22 — 1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8
ground	1

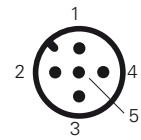
Contact block 33 — 1NC+1NO



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

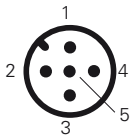
Contact block 34 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

Contact block E1 — PNP



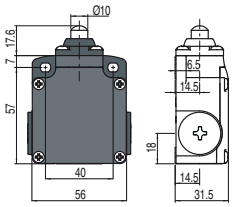
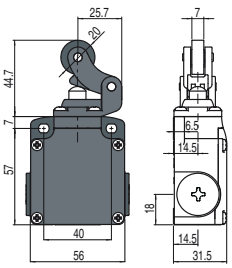
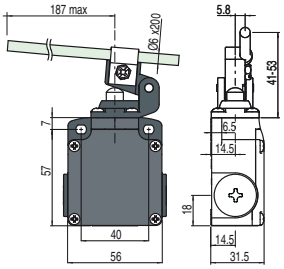
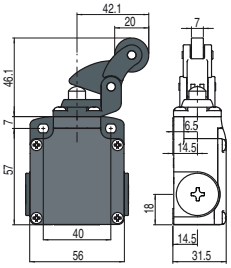
M12 connector, 5-pole

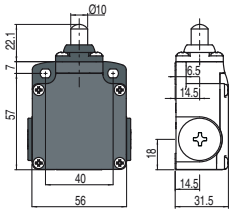
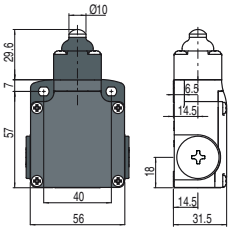
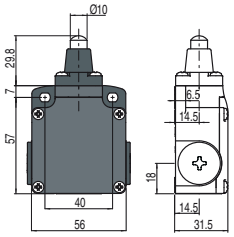
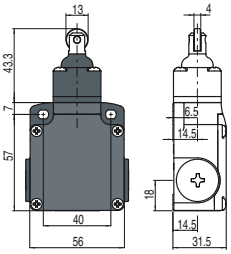
Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

FL series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block					
			With stainless steel roller on request 		With stainless steel roller on request 
5	R	FL 501-M2 1NO+1NC	FL 502-M2 1NO+1NC	FL 504-M2 1NO+1NC	FL 505-M2 1NO+1NC
6	L	FL 601-M2 1NO+1NC	FL 602-M2 1NO+1NC	FL 604-M2 1NO+1NC	FL 605-M2 1NO+1NC
7	LO	FL 701-M2 1NO+1NC	FL 702-M2 1NO+1NC	FL 704-M2 1NO+1NC	FL 705-M2 1NO+1NC
9	L	FL 901-M2 2NC	FL 902-M2 2NC	FL 904-M2 2NC	FL 905-M2 2NC
10	L	FL 1001-M2 2NO	FL 1002-M2 2NO	FL 1004-M2 2NO	FL 1005-M2 2NO
11	R	FL 1101-M2 2NC	FL 1102-M2 2NC	FL 1104-M2 2NC	FL 1105-M2 2NC
12	R	FL 1201-M2 2NO	FL 1202-M2 2NO	FL 1204-M2 2NO	FL 1205-M2 2NO
13	LV	FL 1301-M2 2NC	FL 1302-M2 2NC	FL 1304-M2 2NC	FL 1305-M2 2NC
14	LS	FL 1401-M2 2NC	FL 1402-M2 2NC	FL 1404-M2 2NC	FL 1405-M2 2NC
15	LS	FL 1501-M2 2NO	FL 1502-M2 2NO	FL 1504-M2 2NO	FL 1505-M2 2NO
18	LA	FL 1801-M2 1NO+1NC	FL 1802-M2 1NO+1NC	FL 1804-M2 1NO+1NC	FL 1805-M2 1NO+1NC
20	L	FL 2001-M2 1NO+2NC	FL 2002-M2 1NO+2NC	FL 2004-M2 1NO+2NC	FL 2005-M2 1NO+2NC
21	L	FL 2101-M2 3NC	FL 2102-M2 3NC	FL 2104-M2 3NC	FL 2105-M2 3NC
22	L	FL 2201-M2 2NO+1NC	FL 2202-M2 2NO+1NC	FL 2204-M2 2NO+1NC	FL 2205-M2 2NO+1NC
2	R	FL 201-M2 2x(1NO-1NC)	FL 202-M2 2x(1NO-1NC)	FL 204-M2 2x(1NO-1NC)	FL 205-M2 2x(1NO-1NC)
E1		FL E101-M2 1NO-1NC	FL E102-M2 1NO-1NC	FL E104-M2 1NO-1NC	FL E105-M2 1NO-1NC
Max. speed		page 213 - type 4	page 213 - type 3	0.5 m/s	page 213 - type 3
Actuating force		8 N (25 N →)	6 N (25 N →)	0.17 Nm	6 N (25 N →)
Travel diagrams		page 214 - group 1	page 214 - group 2	page 214 - group 1	page 214 - group 2

Contact block					
			With external rubber gasket 		With external rubber gasket 
5	R	FL 508-M2 1NO+1NC.	FL 510-M2 1NO+1NC	FL 511-M2 1NO+1NC	FL 515-M2 1NO+1NC
6	L	FL 608-M2 1NO+1NC	FL 610-M2 1NO+1NC	FL 611-M2 1NO+1NC	FL 615-M2 1NO+1NC
7	LO	FL 708-M2 1NO+1NC	FL 710-M2 1NO+1NC	FL 711-M2 1NO+1NC	FL 715-M2 1NO+1NC
9	L	FL 908-M2 2NC	FL 910-M2 2NC	FL 911-M2 2NC	FL 915-M2 2NC
10	L	FL 1008-M2 2NO	FL 1010-M2 2NO	FL 1011-M2 2NO	FL 1015-M2 2NO
11	R	FL 1108-M2 2NC	FL 1110-M2 2NC	FL 1111-M2 2NC	FL 1115-M2 2NC
12	R	FL 1208-M2 2NO	FL 1210-M2 2NO	FL 1211-M2 2NO	FL 1215-M2 2NO
13	LV	FL 1308-M2 2NC	FL 1310-M2 2NC	FL 1311-M2 2NC	FL 1315-M2 2NC
14	LS	FL 1408-M2 2NC	FL 1410-M2 2NC	FL 1411-M2 2NC	FL 1415-M2 2NC
15	LS	FL 1508-M2 2NO	FL 1510-M2 2NO	FL 1511-M2 2NO	FL 1515-M2 2NO
18	LA	FL 1808-M2 1NO+1NC	FL 1810-M2 1NO+1NC	FL 1811-M2 1NO+1NC	FL 1815-M2 1NO+1NC
20	L	FL 2008-M2 1NO+2NC	FL 2010-M2 1NO+2NC	FL 2011-M2 1NO+2NC	FL 2015-M2 1NO+2NC
21	L	FL 2108-M2 3NC	FL 2110-M2 3NC	FL 2111-M2 3NC	FL 2115-M2 3NC
22	L	FL 2208-M2 2NO+1NC	FL 2210-M2 2NO+1NC	FL 2211-M2 2NO+1NC	FL 2215-M2 2NO+1NC
2	R	FL 208-M2 2x(1NO-1NC)	FL 210-M2 2x(1NO-1NC)	FL 211-M2 2x(1NO-1NC)	FL 215-M2 2x(1NO-1NC)
E1		FL E108-M2 1NO-1NC	FL E110-M2 1NO-1NC	FL E111-M2 1NO-1NC	FL E115-M2 1NO-1NC
Max. speed		page 213 - type 4	page 213 - type 4	page 213 - type 4	page 213 - type 2
Actuating force		8 N (25 N →)	11 N (25 N →)	8 N (25 N →)	11 N (25 N →)
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 1

All values in the drawings are in mm

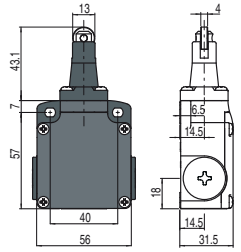
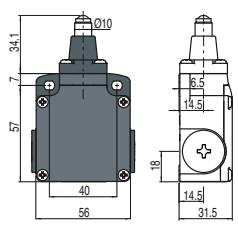
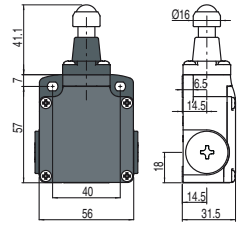
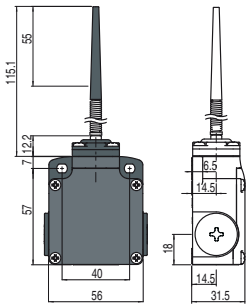
Items with code on **green** background are stock items

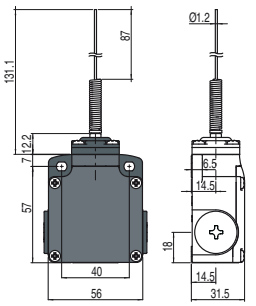
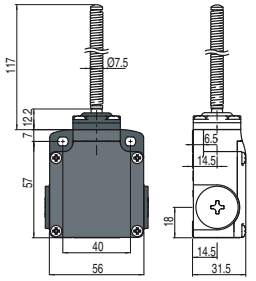
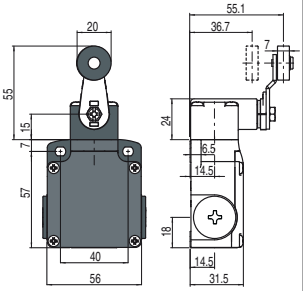
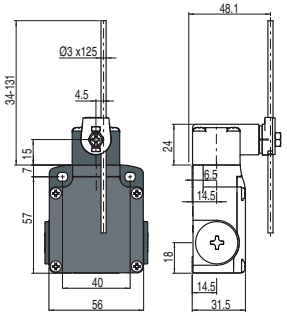
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Ball, Ø 8 mm, stainless steel	Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
					
5	R	FL 516-M2 1NO+1NC	FL 518-M2 1NO+1NC	FL 519-M2 1NO+1NC	FL 520-M2 1NO+1NC
6	L	FL 616-M2 1NO+1NC	FL 618-M2 1NO+1NC	FL 619-M2 1NO+1NC	
7	LO	FL 716-M2 1NO+1NC	FL 718-M2 1NO+1NC	FL 719-M2 1NO+1NC	
9	L	FL 916-M2 2NC	FL 918-M2 2NC	FL 919-M2 2NC	
10	L	FL 1016-M2 2NO	FL 1018-M2 2NO	FL 1019-M2 2NO	FL 1020-M2 2NO
11	R	FL 1116-M2 2NC	FL 1118-M2 2NC	FL 1119-M2 2NC	
12	R	FL 1216-M2 2NO	FL 1218-M2 2NO	FL 1219-M2 2NO	
13	LV	FL 1316-M2 2NC	FL 1318-M2 2NC	FL 1319-M2 2NC	
14	LS	FL 1416-M2 2NC	FL 1418-M2 2NC	FL 1419-M2 2NC	
15	LS	FL 1516-M2 2NO	FL 1518-M2 2NO	FL 1519-M2 2NO	
18	LA	FL 1816-M2 1NO+1NC	FL 1818-M2 1NO+1NC	FL 1819-M2 1NO+1NC	FL 1820-M2 1NO+1NC
20	L	FL 2016-M2 1NO+2NC	FL 2018-M2 1NO+2NC	FL 2019-M2 1NO+2NC	FL 2020-M2 1NO+2NC
21	L	FL 2116-M2 3NC	FL 2118-M2 3NC	FL 2119-M2 3NC	FL 2120-M2 3NC
22	L	FL 2216-M2 2NO+1NC	FL 2218-M2 2NO+1NC	FL 2219-M2 2NO+1NC	FL 2220-M2 2NO+1NC
2	R	FL 216-M2 2x(1NO-1NC)	FL 218-M2 2x(1NO-1NC)	FL 219-M2 2x(1NO-1NC)	FL 220-M2 2x(1NO-1NC)
E1		FL E116-M2 1NO-1NC	FL E118-M2 1NO-1NC	FL E119-M2 1NO-1NC	FL E120-M2 1NO-1NC
Max. speed		page 213 - type 2	page 213 - type 4	page 213 - type 4	1 m/s
Actuating force		8 N (25 N ⊕)	8 N (25 N ⊕)	8 N (25 N ⊕)	0.09 Nm
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 3

Contact block		With external rubber gasket	With external rubber gasket	Other rollers available. See page 44	Round rod, Ø 3 mm, stainless steel
					
5	R	FL 521-M2 1NO+1NC	FL 525-M2 1NO+1NC	FL 531-M2 1NO+1NC	FL 532-M2 1NO+1NC
6	L			FL 631-M2 1NO+1NC	FL 632-M2 1NO+1NC
7	LO			FL 731-M2 1NO+1NC	FL 732-M2 1NO+1NC
9	L			FL 931-M2 2NC	FL 932-M2 2NC
10	L	FL 1021-M2 2NO	FL 1025-M2 2NO	FL 1031-M2 2NO	FL 1032-M2 2NO
11	R			FL 1131-M2 2NC	FL 1132-M2 2NC
12	R			FL 1231-M2 2NO	FL 1232-M2 2NO
13	LV			FL 1331-M2 2NC	FL 1332-M2 2NC
14	LS			FL 1431-M2 2NC	FL 1432-M2 2NC
15	LS			FL 1531-M2 2NO	FL 1532-M2 2NO
16	LI			FL 1631-M2 2NC	FL 1632-M2 2NC
18	LA	FL 1821-M2 1NO+1NC	FL 1825-M2 1NO+1NC	FL 1831-M2 1NO+1NC	FL 1832-M2 1NO+1NC
20	L	FL 2021-M2 1NO+2NC	FL 2025-M2 1NO+2NC	FL 2031-M2 1NO+2NC	FL 2032-M2 1NO+2NC
21	L	FL 2121-M2 3NC	FL 2125-M2 3NC	FL 2131-M2 3NC	FL 2132-M2 3NC
22	L	FL 2221-M2 2NO+1NC	FL 2225-M2 2NO+1NC	FL 2231-M2 2NO+1NC	FL 2232-M2 2NO+1NC
2	R	FL 221-M2 2x(1NO-1NC)	FL 225-M2 2x(1NO-1NC)	FL 231-M2 2x(1NO-1NC)	FL 232-M2 2x(1NO-1NC)
E1		FL E121-M2 1NO-1NC	FL E125-M2 1NO-1NC	FL E131-M2 1NO-1NC	FL E132-M2 1NO-1NC
Max. speed		1 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.08 Nm	0.14 Nm	0.1 Nm (0.25 Nm ⊕)	0.1 Nm
Travel diagrams		page 214 - group 3	page 214 - group 3	page 214 - group 4	page 214 - group 4

All values in the drawings are in mm

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

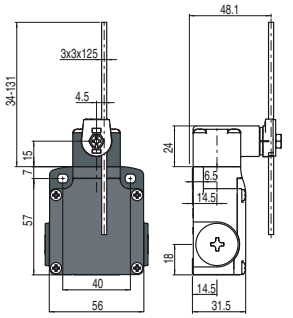
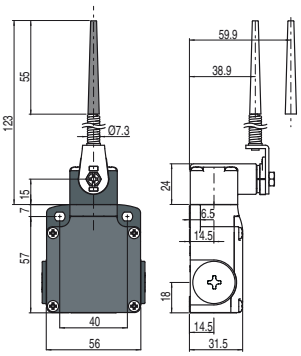
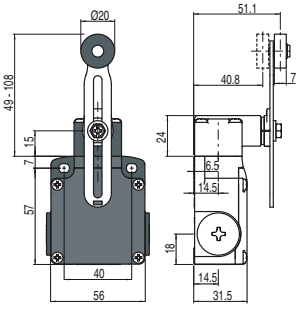
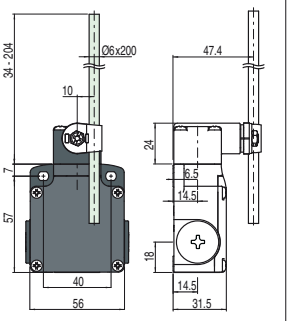
Accessories See page 197

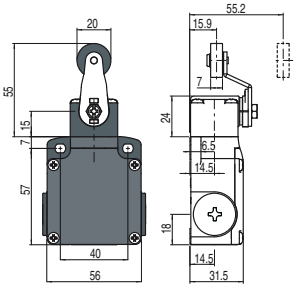
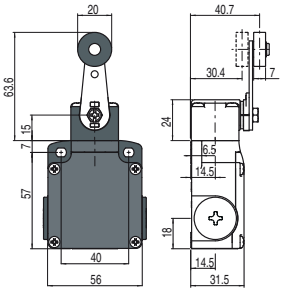
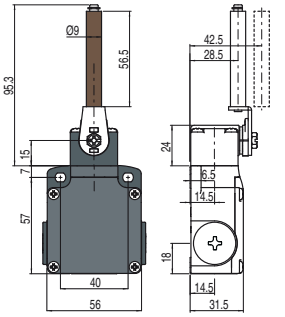
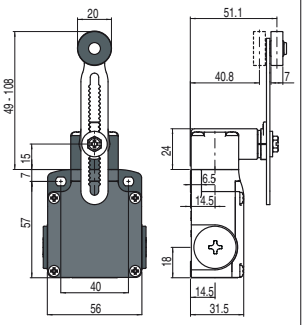
➔ The 2D and 3D files are available at **www.pizzato.com**

FL series position switches

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP

Contact block		Square rod, 3x3 mm		Other rollers available. See page 44	Glass fibre rod
					
5	R	FL 533-M2 1NO+1NC	FL 534-M2 1NO+1NC	FL 535-M2 (1) 1NO+1NC	FL 536-M2 1NO+1NC
6	L	FL 633-M2 1NO+1NC	FL 634-M2 1NO+1NC	FL 635-M2 (1) 1NO+1NC	FL 636-M2 1NO+1NC
7	LO	FL 733-M2 1NO+1NC	FL 734-M2 1NO+1NC	FL 735-M2 (1) 1NO+1NC	FL 736-M2 1NO+1NC
9	L	FL 933-M2 2NC	FL 934-M2 2NC	FL 935-M2 (1) 2NC	FL 936-M2 2NC
10	L	FL 1033-M2 2NO	FL 1034-M2 2NO	FL 1035-M2 2NO	FL 1036-M2 2NO
11	R	FL 1133-M2 2NC	FL 1134-M2 2NC	FL 1135-M2 (1) 2NC	FL 1136-M2 2NC
12	R	FL 1233-M2 2NO	FL 1234-M2 2NO	FL 1235-M2 2NO	FL 1236-M2 2NO
13	LV	FL 1333-M2 2NC	FL 1334-M2 2NC	FL 1335-M2 (1) 2NC	FL 1336-M2 2NC
14	LS	FL 1433-M2 2NC	FL 1434-M2 2NC	FL 1435-M2 (1) 2NC	FL 1436-M2 2NC
15	LS	FL 1533-M2 2NO	FL 1534-M2 2NO	FL 1535-M2 2NO	FL 1536-M2 2NO
16	LI	FL 1633-M2 2NC	FL 1634-M2 2NC	FL 1635-M2 (1) 2NC	FL 1636-M2 2NC
18	LA	FL 1833-M2 1NO+1NC	FL 1834-M2 1NO+1NC	FL 1835-M2 (1) 1NO+1NC	FL 1836-M2 1NO+1NC
20	L	FL 2033-M2 1NO+2NC	FL 2034-M2 1NO+2NC	FL 2035-M2 (1) 1NO+2NC	FL 2036-M2 1NO+2NC
21	L	FL 2133-M2 3NC	FL 2134-M2 3NC	FL 2135-M2 (1) 3NC	FL 2136-M2 3NC
22	L	FL 2233-M2 2NO+1NC	FL 2234-M2 2NO+1NC	FL 2235-M2 (1) 2NO+1NC	FL 2236-M2 2NO+1NC
2	R	FL 233-M2 2x(1NO-1NC)	FL 234-M2 2x(1NO-1NC)	FL 235-M2 2x(1NO-1NC)	FL 236-M2 2x(1NO-1NC)
E1		FL E133-M2 1NO-1NC	FL E134-M2 1NO-1NC	FL E135-M2 1NO-1NC	FL E136-M2 1NO-1NC
Max. speed		1.5 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.1 Nm	0.1 Nm	0.1 Nm (0.25 Nm)	0.1 Nm
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 4	page 214 - group 4

Contact block		Other rollers available. See page 44	Other rollers available. See page 44	Porcelain roller	Other rollers available. See page 44
					
5	R	FL 551-M2 1NO+1NC	FL 552-M2 1NO+1NC	FL 553-E11M2V9 1NO+1NC	FL 556-M2 1NO+1NC
6	L	FL 651-M2 1NO+1NC	FL 652-M2 1NO+1NC	FL 653-E11M2V9 1NO+1NC	FL 656-M2 1NO+1NC
7	LO	FL 751-M2 1NO+1NC	FL 752-M2 1NO+1NC	FL 753-E11M2V9 1NO+1NC	FL 756-M2 1NO+1NC
9	L	FL 951-M2 2NC	FL 952-M2 2NC	FL 953-E11M2V9 2NC	FL 956-M2 2NC
10	L	FL 1051-M2 2NO	FL 1052-M2 2NO	FL 1053-E11M2V9 2NO	FL 1056-M2 2NO
11	R	FL 1151-M2 2NC	FL 1152-M2 2NC		FL 1156-M2 2NC
12	R	FL 1251-M2 2NO	FL 1252-M2 2NO	FL 1253-E11M2V9 2NO	FL 1256-M2 2NO
13	LV	FL 1351-M2 2NC	FL 1352-M2 2NC	FL 1353-E11M2V9 2NC	FL 1356-M2 2NC
14	LS	FL 1451-M2 2NC	FL 1452-M2 2NC	FL 1453-E11M2V9 2NC	FL 1456-M2 2NC
15	LS	FL 1551-M2 2NO	FL 1552-M2 2NO	FL 1553-E11M2V9 2NO	FL 1556-M2 2NO
16	LI				FL 1656-M2 2NC
18	LA	FL 1851-M2 1NO+1NC	FL 1852-M2 1NO+1NC	FL 1853-E11M2V9 1NO+1NC	FL 1856-M2 1NO+1NC
20	L	FL 2051-M2 1NO+2NC	FL 2052-M2 1NO+2NC	FL 2053-E11M2V9 1NO+2NC	FL 2056-M2 1NO+2NC
21	L	FL 2151-M2 3NC	FL 2152-M2 3NC	FL 2153-E11M2V9 3NC	FL 2156-M2 3NC
22	L	FL 2251-M2 2NO+1NC	FL 2252-M2 2NO+1NC	FL 2253-E11M2V9 2NO+1NC	FL 2256-M2 2NO+1NC
2	R	FL 251-M2 2x(1NO-1NC)	FL 252-M2 2x(1NO-1NC)	FL 253-E11M2 2x(1NO-1NC)	FL 256-M2 2x(1NO-1NC)
E1		FL E151-M2 1NO-1NC	FL E152-M2 1NO-1NC	FL E153-E11M2V9 1NO-1NC	FL E156-M2 1NO-1NC
Max. speed		page 213 - type 1	page 213 - type 1	0.5 m/s	page 213 - type 1
Actuating force		0.06 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)	0.03 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 5	page 214 - group 4

(1) Positive opening only with actuator set to max. See page 43.

All values in the drawings are in mm

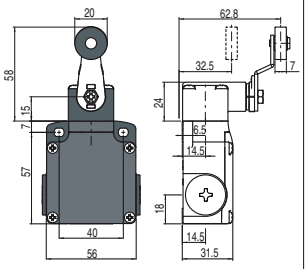
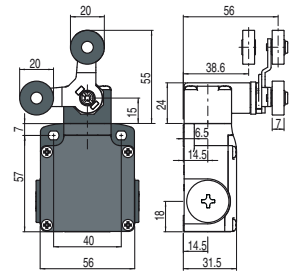
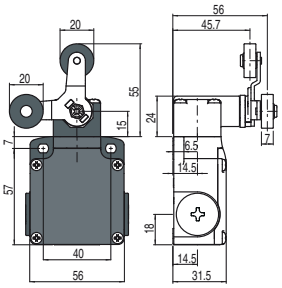
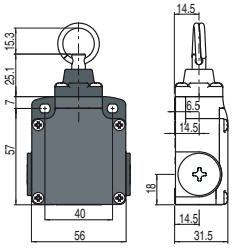
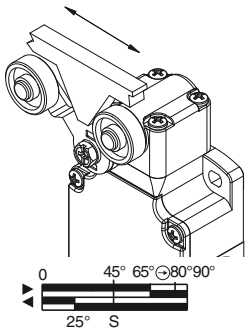
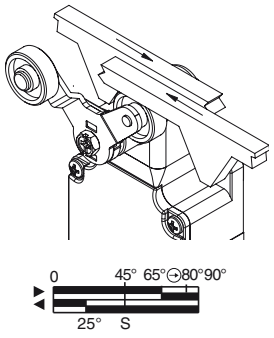
Items with code on **green** background are stock items

Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Other rollers available. See page 44	With stainless steel rollers on request	With stainless steel rollers on request	Rope switch for signalling
					
5	R	FL 557-M2 1NO+1NC	FL 541-M2 1NO+1NC	FL 542-M2 1NO+1NC	FL 576-M2 1NO+1NC
6	L	FL 657-M2 1NO+1NC	Bistable switch with lyra lever, single track	Bistable switch with lyra lever, dual track	FL 676-M2 1NO+1NC
7	LO	FL 757-M2 1NO+1NC			FL 776-M2 1NO+1NC
9	L	FL 957-M2 2NC	0 45° 65° 80° 90° 25° S	0 45° 65° 80° 90° 25° S	FL 976-M2 2NO
10	L	FL 1057-M2 2NO	S = mechanical switching point positive opening on contacts 21-22 only	S = mechanical switching point positive opening on contacts 21-22 only	FL 1076-M2 2NC
11	R	FL 1157-M2 2NC			FL 1176-M2 2NO
12	R	FL 1257-M2 2NO			FL 1276-M2 2NC
13	LV	FL 1357-M2 2NC			FL 1376-M2 2NO
14	LS	FL 1457-M2 2NC			FL 1476-M2 2NO
15	LS	FL 1557-M2 2NO			FL 1576-M2 2NC
16	LI	FL 1657-M2 2NC			
18	LA	FL 1857-M2 1NO+1NC			FL 1876-M2 1NO+1NC
20	L	FL 2057-M2 1NO+2NC			FL 2076-M2 2NO+1NC
21	L	FL 2157-M2 3NC			FL 2176-M2 3NO
22	L	FL 2257-M2 2NO+1NC			FL 2276-M2 1NO+2NC
2	R	FL 257-M2 2x(1NO-1NC)			FL 276-M2 2x(1NO-1NC)
E1		FL E157-M2 1NO-1NC			
Max. speed		page 213 - type 1	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Actuating force		0.1 Nm (0.25 Nm)	0.21 Nm (0.36 Nm)	0.21 Nm (0.36 Nm)	initial 20 N - final 40 N
Travel diagrams		page 214 - group 4			page 214 - group 6

All values in the drawings are in mm

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

Accessories See page 197

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

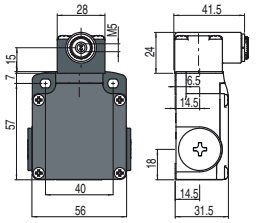
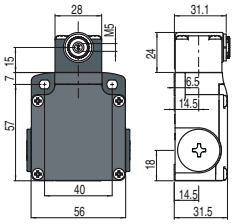
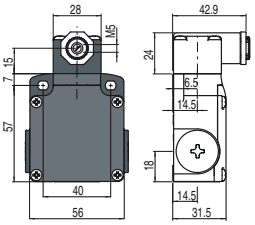
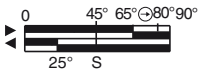
Position switches with swivelling lever without actuator

All values in the drawings are in mm

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP

Contact block

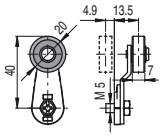
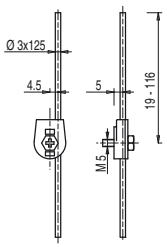
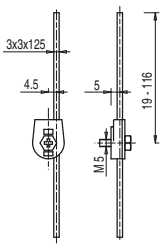
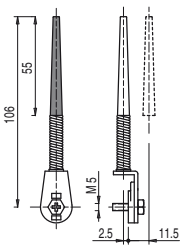
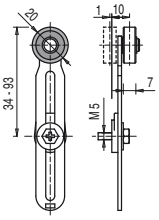
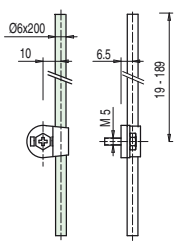
		Regular head	Compact head	
				
5	R	FL 538-M2 ⊖ 1NO+1NC	FL 558-M2 ⊖ 1NO+1NC	FL 540-M2 ⊖ 1NO+1NC
6	L	FL 638-M2 ⊖ 1NO+1NC	FL 658-M2 ⊖ 1NO+1NC	Bistable switch
7	LO	FL 738-M2 ⊖ 1NO+1NC	FL 758-M2 ⊖ 1NO+1NC	
9	L	FL 938-M2 ⊖ 2NC	FL 958-M2 ⊖ 2NC	S = mechanical switching point positive opening on contacts 21-22 only
10	L	FL 1038-M2 2NO	FL 1058-M2 2NO	
11	R	FL 1138-M2 ⊖ 2NC	FL 1158-M2 ⊖ 2NC	
12	R	FL 1238-M2 2NO	FL 1258-M2 2NO	
13	LV	FL 1338-M2 ⊖ 2NC	FL 1358-M2 ⊖ 2NC	
14	LS	FL 1438-M2 ⊖ 2NC	FL 1458-M2 ⊖ 2NC	
15	LS	FL 1538-M2 2NO	FL 1558-M2 2NO	
16	LI	FL 1638-M2 ⊖ 2NC		
18	LA	FL 1838-M2 ⊖ 1NO+1NC	FL 1858-M2 ⊖ 1NO+1NC	
20	L	FL 2038-M2 ⊖ 1NO+2NC	FL 2058-M2 ⊖ 1NO+2NC	
21	L	FL 2138-M2 ⊖ 3NC	FL 2158-M2 ⊖ 3NC	
22	L	FL 2238-M2 ⊖ 2NO+1NC	FL 2258-M2 ⊖ 2NO+1NC	
2	R	FL 238-M2 2x(1NO-1NC)	FL 258-M2 2x(1NO-1NC)	
E1		FL E138-M2 1NO-1NC	FL E158-M2 1NO-1NC	
Actuating force		0.1 Nm (0.25 Nm ⊖)	0.06 Nm (0.25 Nm ⊖)	0.5 m/s with cam at 30°
Travel diagrams		page 214 - group 4	page 214 - group 4	0.21 Nm (0.36 Nm ⊖)

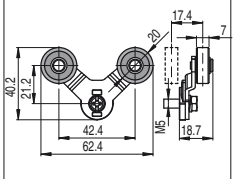
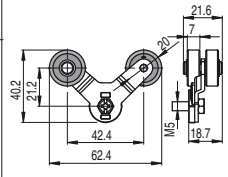
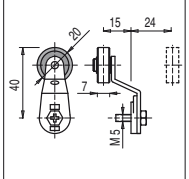
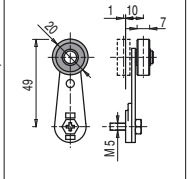
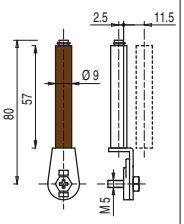
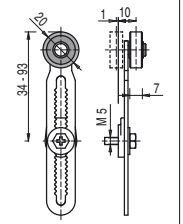
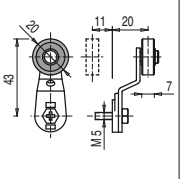
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

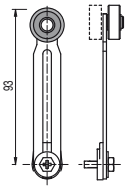
All values in the drawings are in mm

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

Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable glass fibre rod
					
VF L31 ⊖	VF L32 (3)	VF L33 (3)	VF L34	VF L35 ⊖ (1) (3)	VF L36 (3)

Lyra actuator, single track	Lyra actuator, dual track	Technopolymer roller, Ø 20 mm	Technopolymer roller, Ø 20 mm	Porcelain roller	Adjustable safety actuator with technopolymer roller	Technopolymer roller, Ø 20 mm
						
VF L41 ⊖	VF L42 ⊖	VF L51 ⊖	VF L52 ⊖	VF L53 ⊖ (2)	VF L56 ⊖ (3)	VF L57 ⊖

- (1) Actuator 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) The position switch obtained by assembling switch FL •58-M2 (e.g. FL 558-M2, FL 658-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FL •53-E11M2V9 (e.g. FL 553-E11M2V9, FL 653-E11M2V9…).
- (3) If installed with switch FL •58-M2 (e.g. FL 558-M2, FL 658-M2…) the actuator may hit the housing of the switch upon actuation. This possible interference depends on the fixing position of actuator and switch head.
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

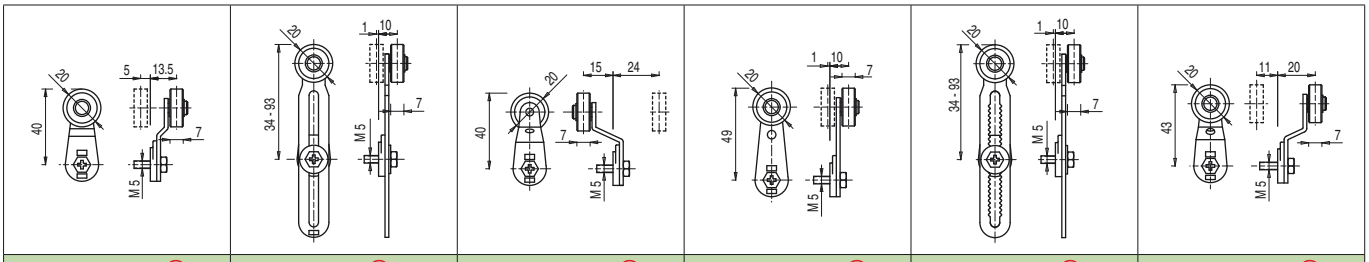
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

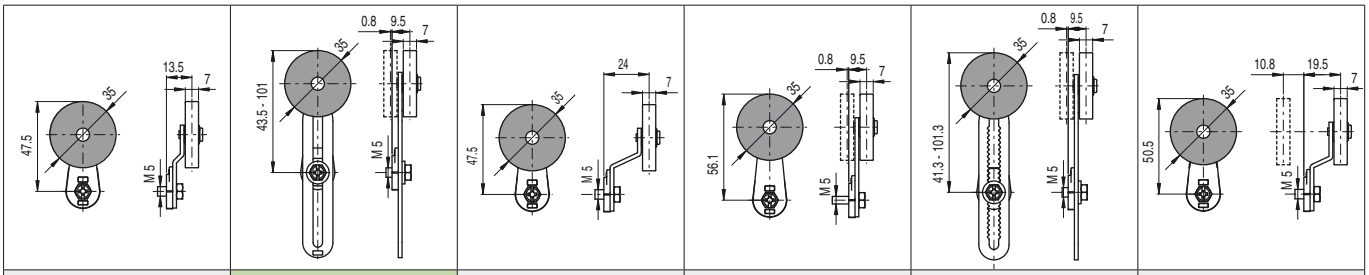
IMPORTANT: These separate actuators can be used only with items of the FD, FP, FL, FC series.

Stainless steel rollers, Ø 20 mm



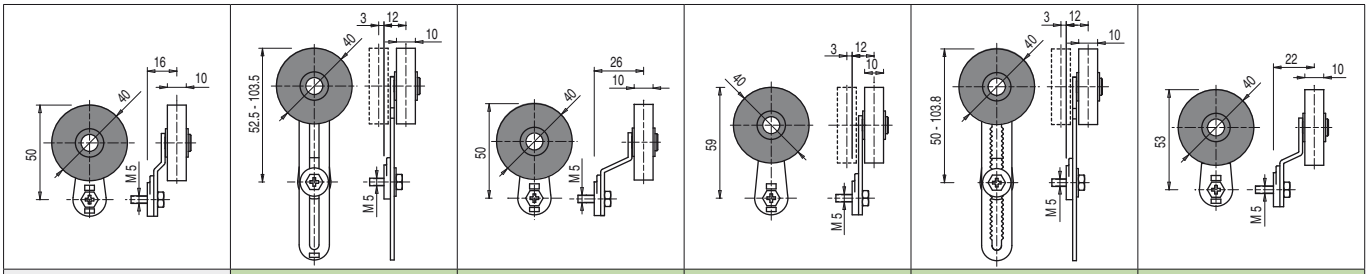
VF L31-R24 | VF L35-R24 (1) (3) | VF L51-R24 | VF L52-R24 | VF L56-R24 (3) | VF L57-R24

Technopolymer rollers, Ø 35 mm



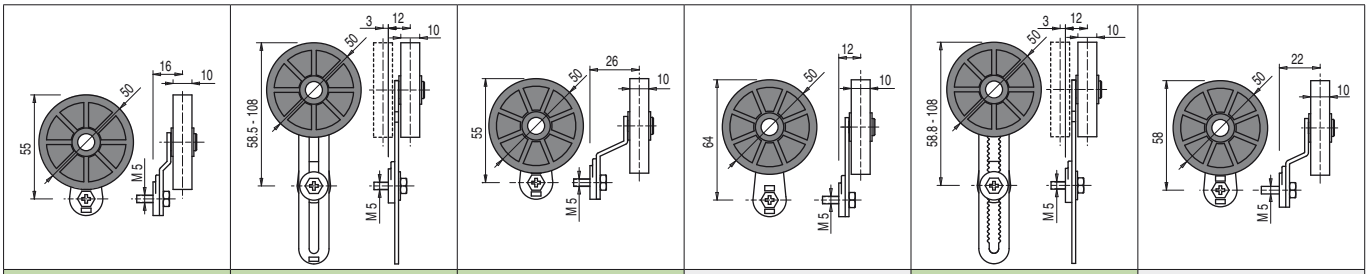
VF L31-R25 (4) | VF L35-R25 (1) (3) | VF L51-R25 (4) | VF L52-R25 | VF L56-R25 (3) | VF L57-R25

Rubber rollers, Ø 40 mm



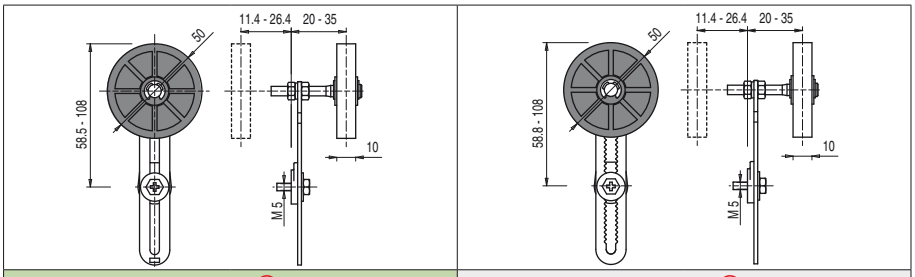
VF L31-R5 (4) | VF L35-R5 (1) (3) | VF L51-R5 (4) | VF L52-R5 | VF L56-R5 (3) | VF L57-R5 (4)

Rubber rollers, Ø 50 mm



VF L31-R26 (4) | VF L35-R26 (1) (3) | VF L51-R26 (4) | VF L52-R26 (4) | VF L56-R26 (3) | VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm

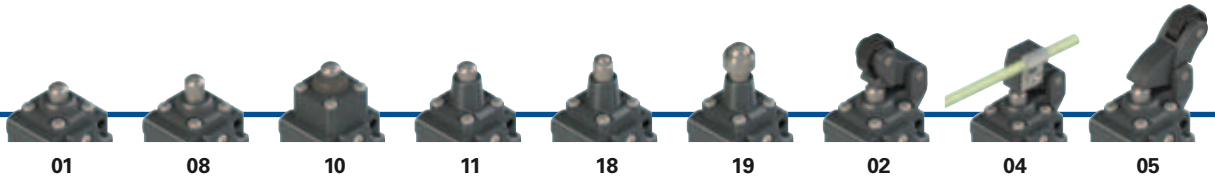


VF L35-R27 (1) (3) | VF L56-R27 (3)

Accessories See page 197

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

Selection diagram



01

08

10
External rubber gasket

11

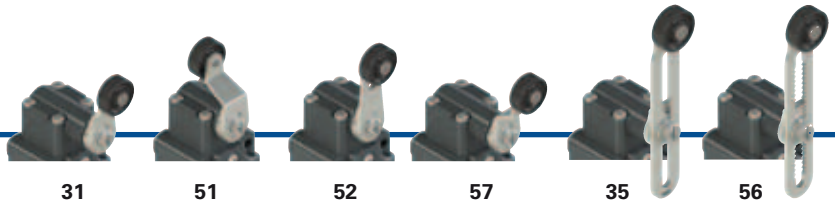
18
Ball Ø 8 mm, stainless steel

19
Ball Ø 12.7 mm, stainless steel

02

04
Glass fibre rod

05



31

51

52

57

35
Adjustable lever

56
Adjustable safety lever

ACTUATORS

CONTACT BLOCKS

3
1NO-1NC
snap action

33
1NO+1NC
slow action

34
2NC
slow action

CONDUIT ENTRY

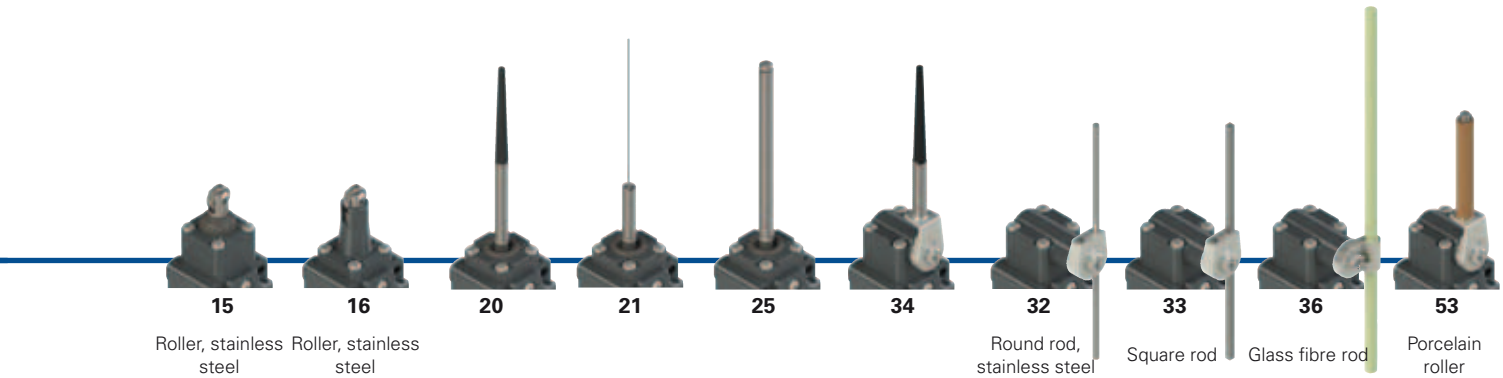
Threaded conduit entry	
M2	M20x1.5 (standard)
	PG 11

With cable gland	
K23	for cables Ø 6 … 12 mm
K27	for cables Ø 3 … 7 mm

With M12 metal connector	
K50	5-pole, bottom

product options

Sold separately as accessory



15 Roller, stainless steel External rubber gasket

16 Roller, stainless steel

20

21

25

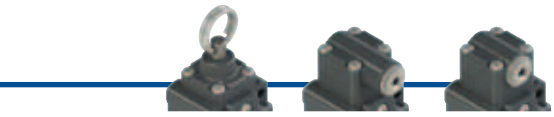
34

32 Round rod, stainless steel

33 Square rod

36 Glass fibre rod

53 Porcelain roller

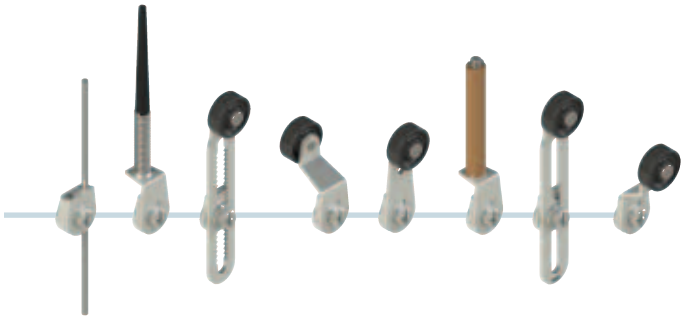


76 Rope switch for signalling

38 Without actuator

58 Without actuator

SEPARATE ACTUATORS
See page 51



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

FC 302-GM2K50R24T6

Housing	
FC	metal, one conduit entry

Contact block	
3	1NO+1NC, snap action
33	1NO+1NC, slow action
34	2NC, slow action

Actuators	
01	short plunger
02	roller lever
05	angled lever with roller
...	.....

Contact type	
	silver contacts (standard)
G	silver contacts, 1 µm gold coating (not for contact block 3)

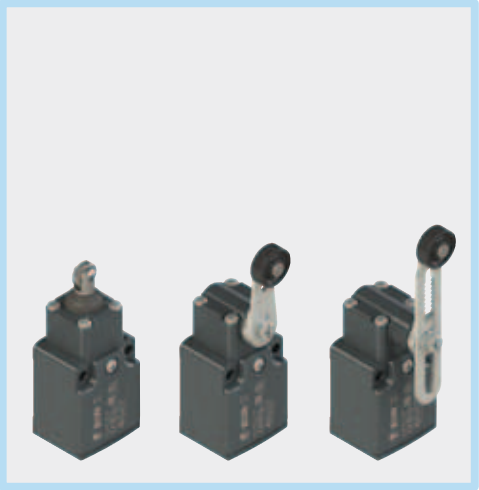
Threaded conduit entry	
M2	M20x1.5 (standard)
	PG11

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

Rollers	
	standard roller
R24	stainless steel Ø 20 mm (for actuators 02, 05, 31, 35, 51, 52, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 31, 35, 51, 52, 56, 57)
R5	rubber, Ø 40 mm (for actuators 31, 35, 51, 52, 56, 57)
R26	rubber, Ø 50 mm (for actuators 31, 35, 51, 52, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 35 and 36)

Pre-installed cable glands	
	no cable gland (standard)
K23	cable gland for cables Ø 6 … 12 mm
K27	cable gland for cables Ø 3 … 7°mm
K50	M12 metal connector, 5-pole

For the complete list of possible combinations please contact our technical department.



Main features
- Metal housing, one conduit entry
- Protection degree IP67
- 3 contact blocks available
- 26 actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

Cable cross section (flexible copper strands)

Contact blocks 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 3:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230000
EAC approval:	RU C-IT.АД35.B.00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 214. 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 on pages 211 to 222.**

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

Features approved by IMQ

Rated insulation voltage (U_i):	500 Vac 400 Vac (for contact blocks 33, 34)
Conventional free air thermal current (I_{th}):	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 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

Positive opening of contacts on contact blocks 33, 34
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

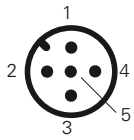
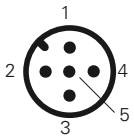
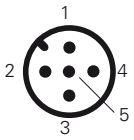
Features approved by UL

Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 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).

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

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

Wiring diagram for M12 connectors

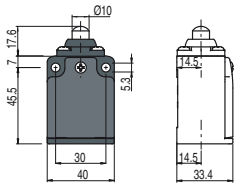
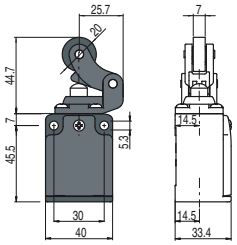
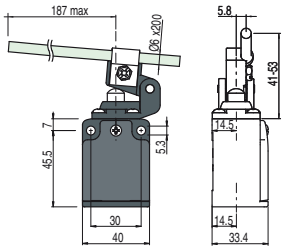
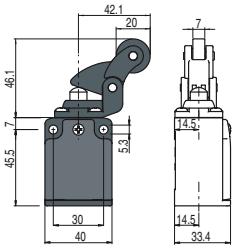
Contact block 3 1NC-1NO	Contact block 33 1NC+1NO	Contact block 34 2NC
 M12 connector, 5-pole	 M12 connector, 5-pole	 M12 connector, 5-pole

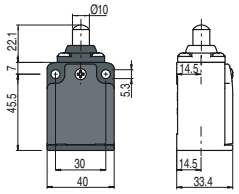
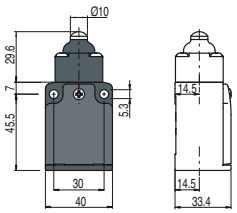
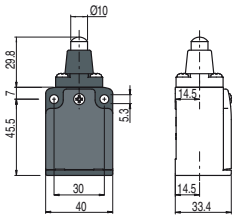
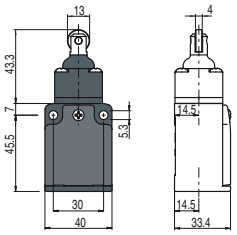
Contacts	Pin no.	Contacts	Pin no.	Contacts	Pin no.
NC	1-2	NC	1-2	NC	1-2
NO	3-4	NO	3-4	NC	3-4
ground	5	ground	5	ground	5

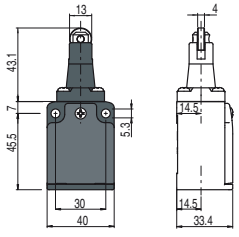
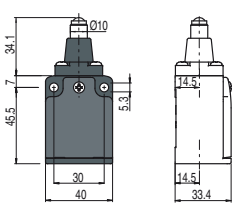
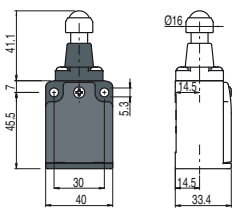
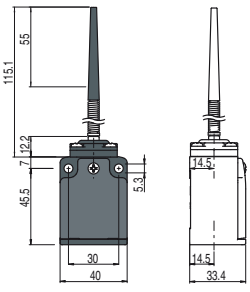
FC series position switches

Contact type:

R = snap action
L = slow action

Contact block					
			With stainless steel roller on request 		With stainless steel roller on request 
3	R	FC 301-M2 1NO-1NC	FC 302-M2 1NO-1NC	FC 304-M2 1NO-1NC	FC 305-M2 1NO-1NC
33	L	FC 3301-M2 → 1NO+1NC	FC 3302-M2 → 1NO+1NC	FC 3304-M2 1NO+1NC	FC 3305-M2 → 1NO+1NC
34	L	FC 3401-M2 → 2NC	FC 3402-M2 → 2NC	FC 3404-M2 2NC	FC 3405-M2 → 2NC
Max. speed		page 213 - type 4	page 213 - type 3	0.5 m/s	page 213 - type 3
Actuating force		6 N (25 N →)	4 N (25 N →)	0.17 Nm	4 N (25 N →)
Travel diagrams		page 214 - group 1	page 214 - group 2	page 214 - group 1	page 214 - group 2

Contact block					
			With external rubber gasket 		With external rubber gasket 
3	R	FC 308-M2 1NO-1NC	FC 310-M2 1NO-1NC	FC 311-M2 1NO-1NC	FC 315-M2 1NO-1NC
33	L	FC 3308-M2 → 1NO+1NC	FC 3310-M2 → 1NO+1NC	FC 3311-M2 → 1NO+1NC	FC 3315-M2 → 1NO+1NC
34	L	FC 3408-M2 → 2NC	FC 3410-M2 → 2NC	FC 3411-M2 → 2NC	FC 3415-M2 → 2NC
Max. speed		page 213 - type 4	page 213 - type 4	page 213 - type 4	page 213 - type 2
Actuating force		6 N (25 N →)	7 N (25 N →)	6 N (25 N →)	7 N (25 N →)
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 1

Contact block					
			Ball, Ø 8 mm, stainless steel 	Ball, Ø 12.7 mm, stainless steel 	With external rubber gasket 
3	R	FC 316-M2 1NO-1NC	FC 318-M2 1NO-1NC	FC 319-M2 1NO-1NC	FC 320-M2 1NO-1NC
33	L	FC 3316-M2 → 1NO+1NC	FC 3318-M2 → 1NO+1NC	FC 3319-M2 → 1NO+1NC	FC 3320-M2 1NO+1NC
34	L	FC 3416-M2 → 2NC	FC 3418-M2 → 2NC	FC 3419-M2 → 2NC	FC 3420-M2 2NC
Max. speed		page 213 - type 2	page 213 - type 4	page 213 - type 4	1 m/s
Actuating force		6 N (25 N →)	6 N (25 N →)	6 N (25 N →)	0.07 Nm
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 3

All values in the drawings are in mm

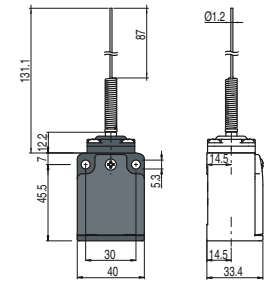
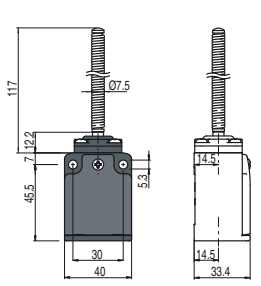
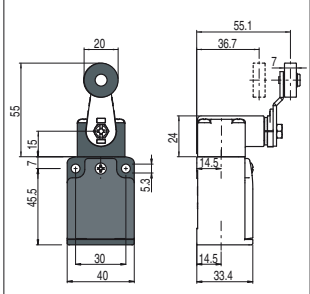
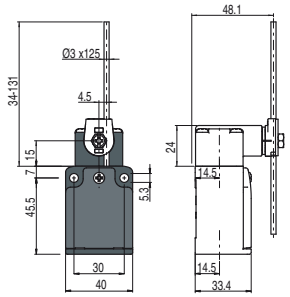
Items with code on **green** background are stock items

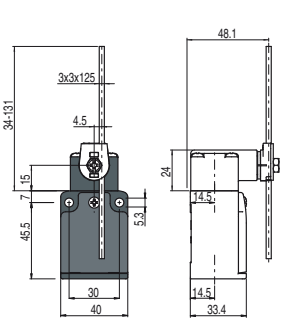
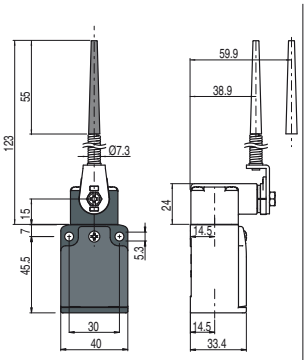
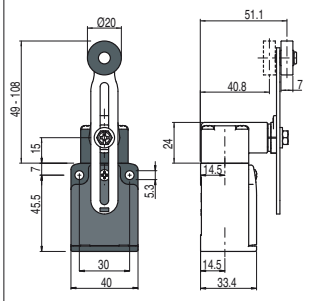
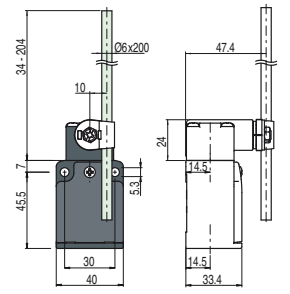
Accessories See page 197

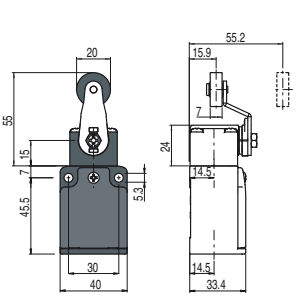
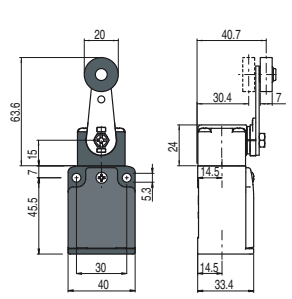
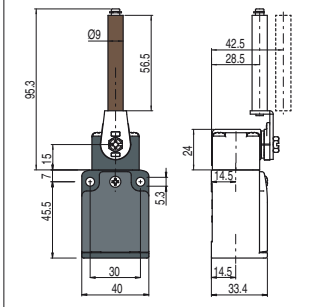
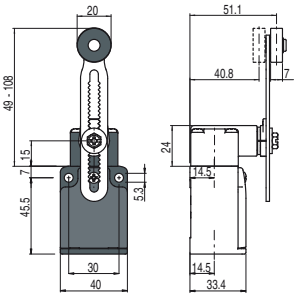
→ The 2D and 3D files are available at **www.pizzato.com**

Contact type:

R = snap action
L = slow action

Contact block		With external rubber gasket	With external rubber gasket	Other rollers available. See page 52	Round rod, Ø 3 mm, stainless steel
					
3	R	FC 321-M2 1NO-1NC	FC 325-M2 1NO-1NC	FC 331-M2 1NO-1NC	FC 332-M2 1NO-1NC
33	L	FC 3321-M2 1NO+1NC	FC 3325-M2 1NO+1NC	FC 3331-M2 → 1NO+1NC	FC 3332-M2 1NO+1NC
34	L	FC 3421-M2 2NC	FC 3425-M2 2NC	FC 3431-M2 → 2NC	FC 3432-M2 2NC
Max. speed		1 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.06 Nm	0.1 Nm	0.09 Nm (0.25 Nm →)	0.09 Nm
Travel diagrams		page 214 - group 3	page 214 - group 3	page 214 - group 4	page 214 - group 4

Contact block		Square rod, 3x3 mm		Other rollers available. See page 52	Glass fibre rod
					
3	R	FC 333-M2 1NO-1NC	FC 334-M2 1NO-1NC	FC 335-M2 1NO-1NC	FC 336-M2 1NO-1NC
33	L	FC 3333-M2 1NO+1NC	FC 3334-M2 1NO+1NC	FC 3335-M2 → (1) 1NO+1NC	FC 3336-M2 1NO+1NC
34	L	FC 3433-M2 2NC	FC 3434-M2 2NC	FC 3435-M2 → (1) 2NC	FC 3436-M2 2NC
Max. speed		1.5 m/s	1 m/s	page 213 - type 1	1.5 m/s
Actuating force		0.09 Nm	0.09 Nm	0.09 Nm (0.25 Nm →)	0.09 Nm
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 4	page 214 - group 4

Contact block		Other rollers available. See page 52	Other rollers available. See page 52	Porcelain roller	Other rollers available. See page 52
					
3	R	FC 351-M2 1NO-1NC	FC 352-M2 1NO-1NC	FC 353-E11M2 1NO-1NC	FC 356-M2 1NO-1NC
33	L	FC 3351-M2 → 1NO+1NC	FC 3352-M2 → 1NO+1NC	FC 3353-E11M2V9 → 1NO+1NC	FC 3356-M2 → 1NO+1NC
34	L	FC 3451-M2 → 2NC	FC 3452-M2 → 2NC	FC 3453-E11M2V9 → 2NC	FC 3456-M2 → 2NC
Max. speed		page 213 - type 1	page 213 - type 1	0.5 m/s	page 213 - type 1
Actuating force		0.05 Nm (0.25 Nm →)	0.05 Nm (0.25 Nm →)	0.02 Nm (0.25 Nm →)	0.09 Nm (0.25 Nm →)
Travel diagrams		page 214 - group 4	page 214 - group 4	page 214 - group 5	page 214 - group 4

(1) Positive opening only with actuator set to max. See page 51.

All values in the drawings are in mm

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

Accessories See page 197

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

Contact type:

R = snap action
L = slow action

Contact block		Other rollers available. See page 52	Rope switch for signalling
3	R	FC 357-M2 1NO-1NC	FC 376-M2 1NO-1NC
33	L	FC 3357-M2 ⊖ 1NO+1NC	FC 3376-M2 1NO+1NC
34	L	FC 3457-M2 ⊖ 2NC	FC 3476-M2 2NC
Max. speed		page 213 - type 1	0.5 m/s
Actuating force		0.09 Nm (0.25 Nm ⊖)	initial 20 N - final 40 N
Travel diagrams		page 214 - group 4	page 214 - group 6

All values in the drawings are in mm

Position switches with swivelling lever without actuator

All values in the drawings are in mm

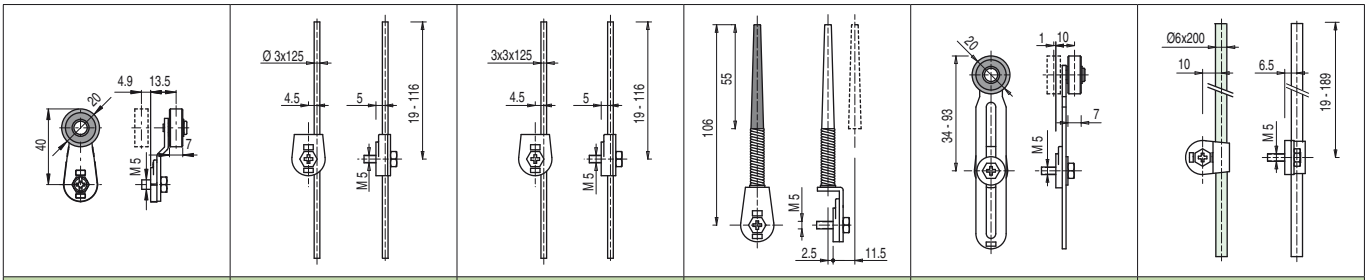
Contact block		Regular head	Compact head
3	R	FC 338-M2 1NO-1NC	FC 358-M2 1NO-1NC
33	L	FC 3338-M2 ⊖ 1NO+1NC	FC 3358-M2 ⊖ 1NO+1NC
34	L	FC 3438-M2 ⊖ 2NC	FC 3458-M2 ⊖ 2NC
Actuating force		0.09 Nm (0.25 Nm ⊖)	0.05 Nm (0.25 Nm ⊖)
Travel diagrams		page 214 - group 4	page 214 - group 4

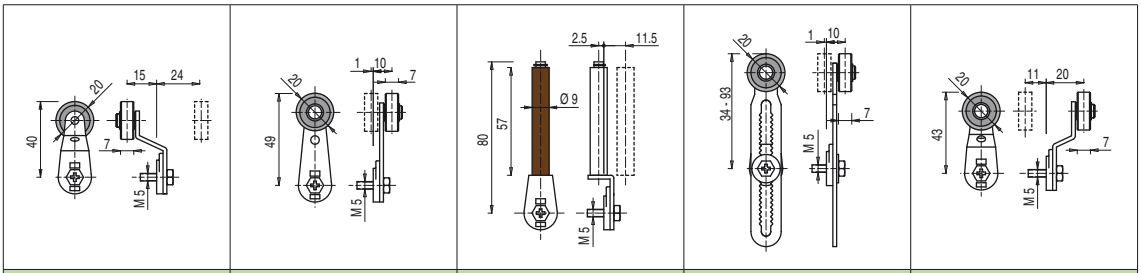
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

All values in the drawings are in mm

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

Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable glass fibre rod
					
VF L31 ⊖	VF L32 (3)	VF L33 (3)	VF L34	VF L35 ⊖ (1) (3)	VF L36 (3)

Technopolymer roller Ø 20 mm	Technopolymer roller Ø 20 mm	Porcelain roller	Adjustable safety actuator with technopolymer roller	Technopolymer roller Ø 20 mm
				
VF L51 ⊖	VF L52 ⊖	VF L53 ⊖ (2)	VF L56 ⊖ (3)	VF L57 ⊖

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

Accessories See page 197

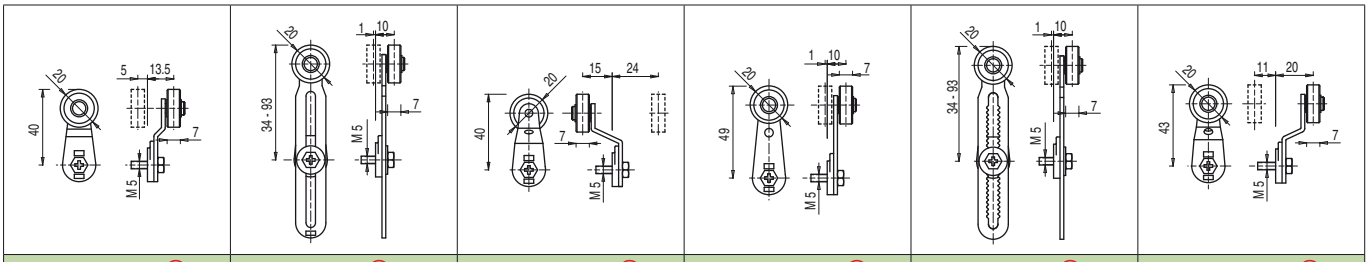
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

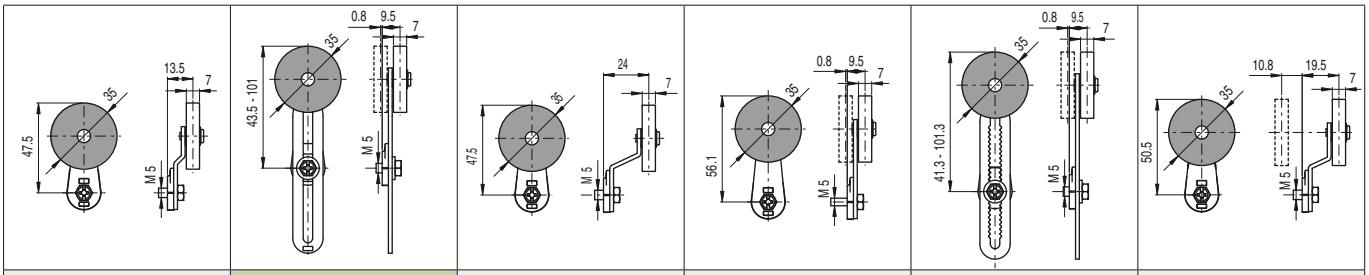
IMPORTANT: These separate actuators can be used only with items of the FD, FP, FL, FC series.

Stainless steel rollers, Ø 20 mm



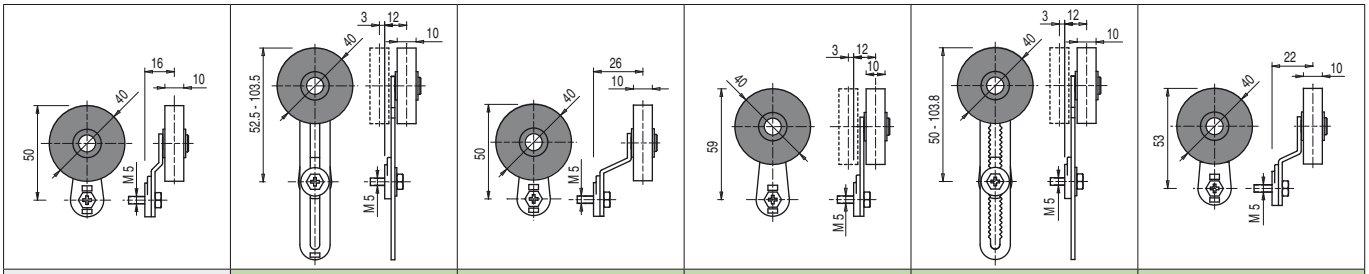
VF L31-R24 | VF L35-R24 (1) (3) | VF L51-R24 | VF L52-R24 | VF L56-R24 (3) | VF L57-R24

Technopolymer rollers, Ø 35 mm



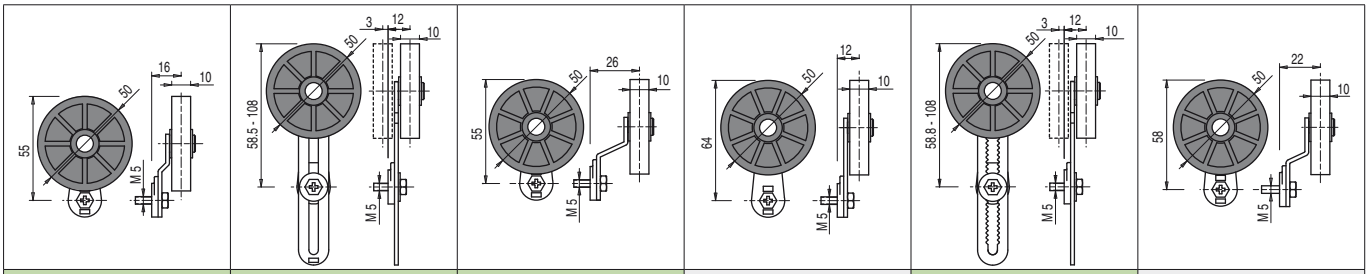
VF L31-R25 (4) | VF L35-R25 (1) (3) | VF L51-R25 (4) | VF L52-R25 | VF L56-R25 (3) | VF L57-R25

Rubber rollers, Ø 40 mm



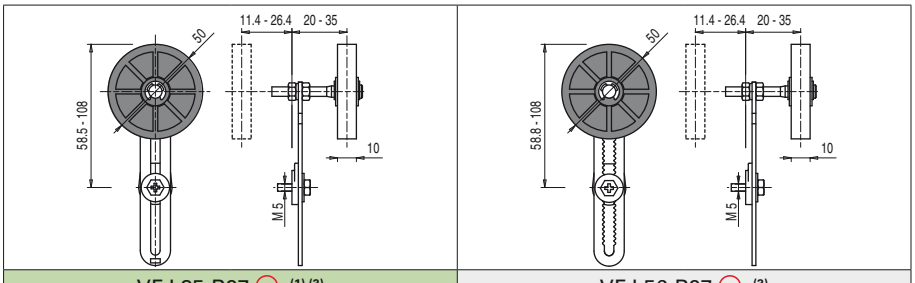
VF L31-R5 (4) | VF L35-R5 (1) (3) | VF L51-R5 (4) | VF L52-R5 | VF L56-R5 (3) | VF L57-R5 (4)

Rubber rollers, Ø 50 mm



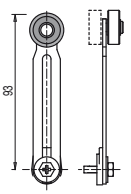
VF L31-R26 (4) | VF L35-R26 (1) (3) | VF L51-R26 (4) | VF L52-R26 (4) | VF L56-R26 (3) | VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm



VF L35-R27 (1) (3) | VF L56-R27 (3)

- (1) Actuator 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) The position switch obtained by assembling switch FC •58-M2 (e.g. FC 358-M2, FC 3358-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FC •53-E11M2 (e.g. FC 353-E11M2, FC 3353-E11M2V9…).
- (3) If installed with switch FC •58-M2 (e.g. FC 358-M2, FC 3358-M2…) the actuator may hit the housing of the switch upon actuation. This possible interference depends on the fixing position of actuator and switch head.
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



Accessories See page 197

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

FR-FM-FX-FZ-FK series position switches for normal applications

Description

Pizzato Elettrica position switches are daily installed in every type of industrial machinery all over the world for applications in the sector of wood, metal, plastic, automotive, packaging, lifting, medicinal, naval, etc.
In order to be used in a wide variety of sectors and countries, Pizzato Elettrica position switches are designed to be assembled in a lot of configurations, thanks to a wide range of body shapes, dozens of contact blocks, hundreds of actuators and materials, different actuating forces and several fixing methods.
Pizzato Elettrica can offer one of the widest product range of position switches in the world. Moreover, the use of high quality materials, high reliability technologies (e.g. twin bridge contact blocks) as well as the IP67 protection degree make this range of position switches one of the most technologically evolved.

Protection degree IP67

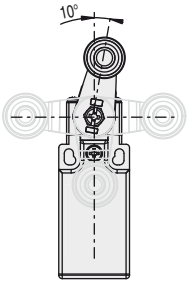
IP67 These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to EN 60529. They can therefore be used in all environments where maximum protection degree of the housing is required.

Extended temperature range

-40°C These devices are also available in a special version suitable for an ambient operating temperature range from -40°C up to +80°C. They can therefore be used for applications in cold stores, sterilisers and other equipment with low temperature environments. The special materials used to produce these versions retain their characteristics even under these conditions, thereby expanding the installation possibilities.

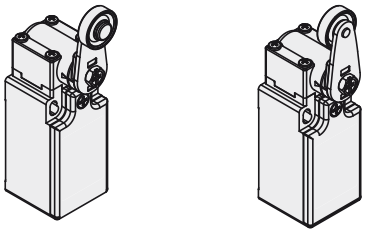
Adjustable levers

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.



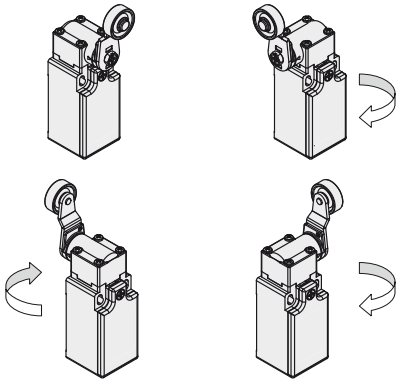
Reversible levers

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.

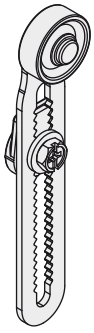


Head with variable orientation

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



Adjustable safety lever



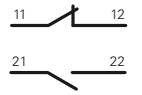
The adjustable lever code 56 (and variants) is provided with a notching that prevents the sliding also in case the fastening screw becomes loose.
Thanks to the special geometrical coupling it is suitable for safety applications.

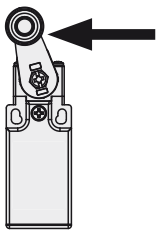
Independent contacts

The contact block 16 is provided with two NC contacts, **both with positive opening**, that can be independently switched depending on the lever turning direction.

Lever turned to left

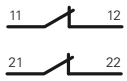
Contact diagram

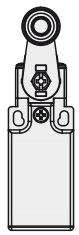




Lever not actuated

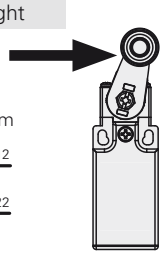
Contact diagram



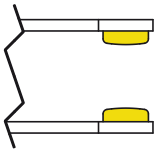


Lever turned to right

Contact diagram

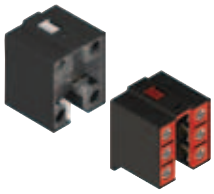


Gold-plated contacts



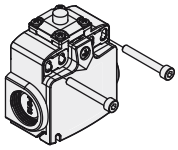
The contact blocks of these devices can be supplied gold-plated upon request. Ideal for applications with low voltages or currents; it ensures increased contact reliability. Available in two thicknesses (1 or 2.5 microns), it adapts perfectly to the various fields of application, ensuring a long endurance over time.

Contact block



Contact blocks with captive screws, finger protection, twin bridge contacts and double interruption for higher contact reliability. They are available in multiple variants with shifted activation travels, simultaneous or overlapping. They are suitable for many different applications.

Fixing plates



The technopolymer switches of the FX series are provided with two robust fixing plates. In this way no washer is needed under the head and still the fixing of the switch is more stable over time.

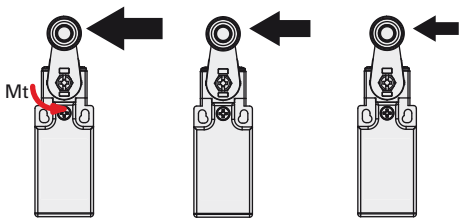
Stainless steel external metallic parts

AISI 304

Upon request, some of these devices can be supplied with stainless steel external metallic parts instead of the usual zinc-plated steel. This solution is particularly suited for environments where aggressive chemical agents or saline mist are present. See page 191.

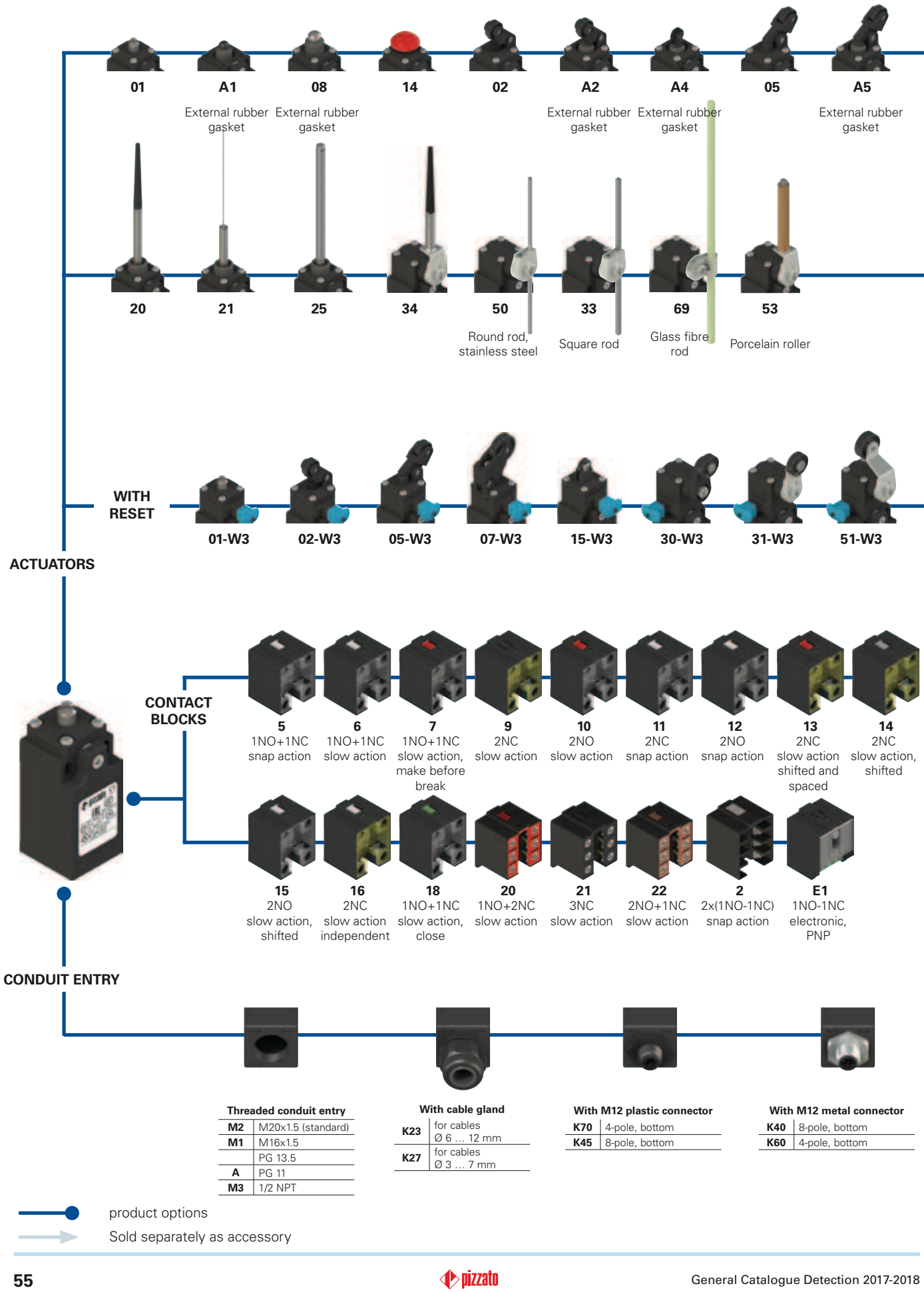
Increased or reduced actuating force

For actuators with swivelling lever, versions with increased or reduced actuating force are available upon request, in order to have a switch perfectly tailored for the application. For further information contact our technical department.



Increased force | Standard force | Reduced force

Selection diagram



Threaded conduit entry	
M2	M20x1.5 (standard)
M1	M16x1.5
	PG 13.5
A	PG 11
M3	1/2 NPT

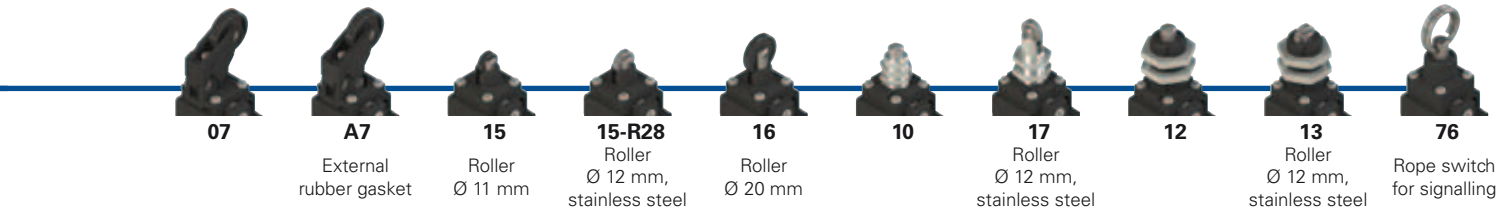
With cable gland	
K23	for cables Ø 6 … 12 mm
K27	for cables Ø 3 … 7 mm

With M12 plastic connector	
K70	4-pole, bottom
K45	8-pole, bottom

With M12 metal connector	
K40	8-pole, bottom
K60	4-pole, bottom

product options

Sold separately as accessory



07

A7
External rubber gasket

15
Roller Ø 11 mm

15-R28
Roller Ø 12 mm, stainless steel

16
Roller Ø 20 mm

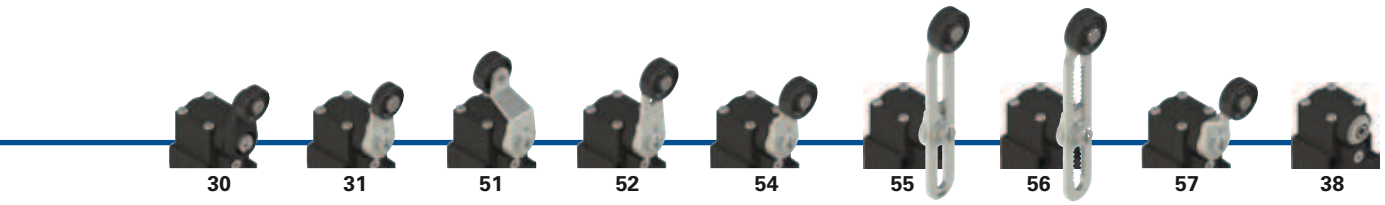
10

17
Roller Ø 12 mm, stainless steel

12

13
Roller Ø 12 mm, stainless steel

76
Rope switch for signalling

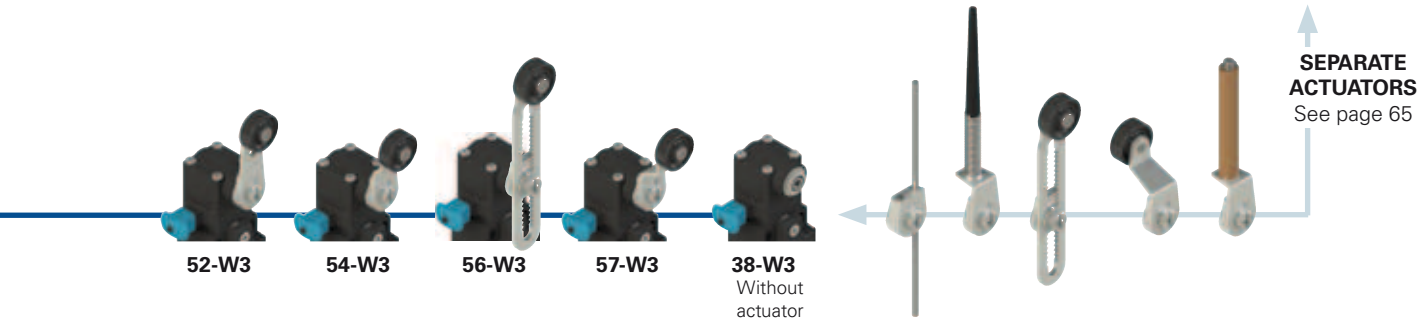


30 **31** **51** **52** **54**

55
Adjustable lever

56
Adjustable safety lever

57 **38**
Without actuator



52-W3 **54-W3** **56-W3** **57-W3**

38-W3
Without actuator

SEPARATE ACTUATORS
See page 65

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 502-W3XGM2K70R23T6

Housing

FR	technopolymer, 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
05	angled lever with roller
...	.....

Reset

	without reset (standard)
W3	simultaneous reset
W4	simultaneous reset, increased force

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Threaded conduit entry

M2	M20x1.5 (standard)
M1	M16x1.5
	PG 13.5
A	PG 11
M3	1/2 NPT

Contact type

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

Pre-installed cable glands or connectors

	no cable gland or connector (standard)
K23	cable gland for cables Ø 6 … 12 mm
K70	M12 plastic connector, 4-pole

For the complete list of possible combinations please contact our technical department.

Ambient temperature

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

Rollers

	standard roller
R28	stainless steel Ø 12 mm (for actuators A4, 15)
R23	stainless steel Ø 14 mm (for actuators A2, 02, A5, 05, 30, 31, 51, 52, 54, 55, 56, 57)
R24	stainless steel Ø 20 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R5	rubber, Ø 40 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R26	rubber, Ø 50 mm (for actuators 51, 52, 54, 55, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 55, 56)

Main features

- Technopolymer housing, one conduit entry
- Protection degree IP67
- 17 contact blocks available
- 48 actuators available
- Versions with external parts in stainless steel
- Versions with M12 connector
- Versions with gold-plated silver contacts

Quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2007010305230013
EAC approval:	RU C-IT.АД35.B.00454

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈

One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 216. 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 on pages 211 to 222.**

	Electrical data		Utilization category
without connector	Thermal current (I_{th}):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 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
	Protection against short circuits:	type aM fuse 10 A 500 V	Ie (A) 6 1.1 0.4
	Pollution degree:	3	
with M12 connector 4-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Protection against short circuits:	type gG fuse 4 A 500 V	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24 125 250
			Ie (A) 4 1.1 0.4
with M12 connector 8-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	30 Vac 36 Vdc	Ue (V) 24
	Protection against short circuits:	type gG fuse 2 A 500 V	Ie (A) 2
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 2

Features approved by IMQ

Rated insulation voltage (Ui):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 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: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

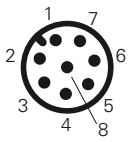
Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 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).

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

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

Wiring diagram for M12 connectors

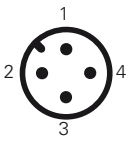
Contact block 2 — 1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

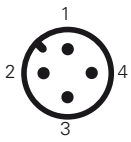
Contact block 5 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

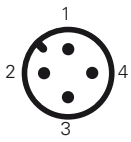
Contact block 6 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

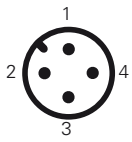
Contact block 7 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

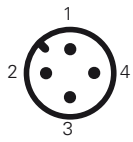
Contact block 9 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

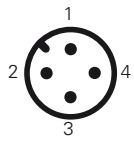
Contact block 10 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

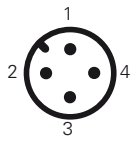
Contact block 11 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

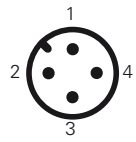
Contact block 12 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

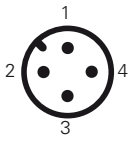
Contact block 13 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

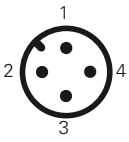
Contact block 14 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

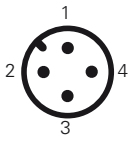
Contact block 15 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4

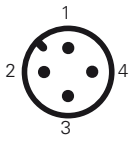
Contact block 16 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4

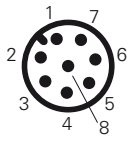
Contact block 18 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

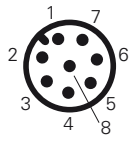
Contact block 20 — 2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8

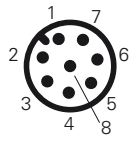
Contact block 21 — 3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8

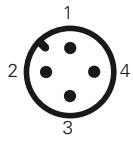
Contact block 22 — 1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8

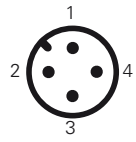
Contact block 33 — 1NC+1NO



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

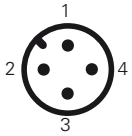
Contact block 34 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

Contact block E1 — PNP



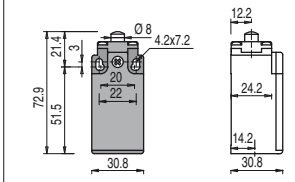
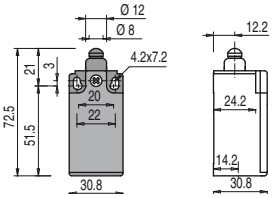
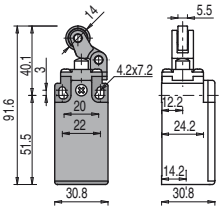
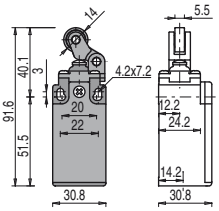
M12 connector, 4-pole

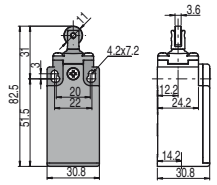
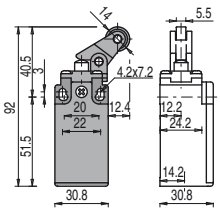
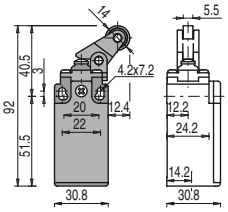
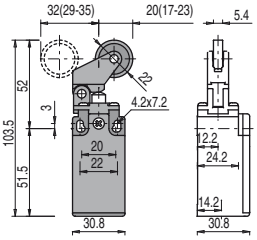
Contacts	Pin no.
+	1
-	3
NC	2
NO	4

FR series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block					
			With external rubber gasket 	With stainless steel roller on request 	With external rubber gasket With stainless steel roller on request 
5	R	FR 501-M2 → 1NO+1NC	FR 5A1-M2 → 1NO+1NC	FR 502-M2 → 1NO+1NC	FR 5A2-M2 → 1NO+1NC
6	L	FR 601-M2 → 1NO+1NC	FR 6A1-M2 → 1NO+1NC	FR 602-M2 → 1NO+1NC	FR 6A2-M2 → 1NO+1NC
7	LO	FR 701-M2 → 1NO+1NC	FR 7A1-M2 → 1NO+1NC	FR 702-M2 → 1NO+1NC	FR 7A2-M2 → 1NO+1NC
9	L	FR 901-M2 → 2NC	FR 9A1-M2 → 2NC	FR 902-M2 → 2NC	FR 9A2-M2 → 2NC
10	L	FR 1001-M2 2NO	FR 10A1-M2 2NO	FR 1002-M2 2NO	FR 10A2-M2 2NO
11	R	FR 1101-M2 → 2NC	FR 11A1-M2 → 2NC	FR 1102-M2 → 2NC	FR 11A2-M2 → 2NC
12	R	FR 1201-M2 2NO	FR 12A1-M2 2NO	FR 1202-M2 2NO	FR 12A2-M2 2NO
13	LV	FR 1301-M2 → 2NC	FR 13A1-M2 → 2NC	FR 1302-M2 → 2NC	FR 13A2-M2 → 2NC
14	LS	FR 1401-M2 → 2NC	FR 14A1-M2 → 2NC	FR 1402-M2 → 2NC	FR 14A2-M2 → 2NC
15	LS	FR 1501-M2 2NO	FR 15A1-M2 2NO	FR 1502-M2 2NO	FR 15A2-M2 2NO
18	LA	FR 1801-M2 → 1NO+1NC	FR 18A1-M2 → 1NO+1NC	FR 1802-M2 → 1NO+1NC	FR 18A2-M2 → 1NO+1NC
20	L	FR 2001-M2 → 1NO+2NC	FR 20A1-M2 → 1NO+2NC	FR 2002-M2 → 1NO+2NC	FR 20A2-M2 → 1NO+2NC
21	L	FR 2101-M2 → 3NC	FR 21A1-M2 → 3NC	FR 2102-M2 → 3NC	FR 21A2-M2 → 3NC
22	L	FR 2201-M2 → 2NO+1NC	FR 22A1-M2 → 2NO+1NC	FR 2202-M2 → 2NO+1NC	FR 22A2-M2 → 2NO+1NC
2	R	FR 201-M2 2x(1NO-1NC)		FR 202-M2 2x(1NO-1NC)	FR 2A2-M2 2x(1NO-1NC)
E1		FR E101-M2 1NO-1NC	FR E1A1-M2 1NO-1NC	FR E102-M2 1NO-1NC	FR E1A2-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 4	page 215 - type 3	page 215 - type 3
Actuating force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 2	page 216 - group 2

Contact block					
		With external rubber gasket With Ø 12 mm stainless steel roller on request 	With stainless steel roller on request 	With external rubber gasket With stainless steel roller on request 	
5	R	FR 5A4-M2 → 1NO+1NC	FR 505-M2 → 1NO+1NC	FR 5A5-M2 → 1NO+1NC	FR 507-M2 → 1NO+1NC
6	L	FR 6A4-M2 → 1NO+1NC	FR 605-M2 → 1NO+1NC	FR 6A5-M2 → 1NO+1NC	FR 607-M2 → 1NO+1NC
7	LO	FR 7A4-M2 → 1NO+1NC	FR 705-M2 → 1NO+1NC	FR 7A5-M2 → 1NO+1NC	FR 707-M2 → 1NO+1NC
9	L	FR 9A4-M2 → 2NC	FR 905-M2 → 2NC	FR 9A5-M2 → 2NC	FR 907-M2 → 2NC
10	L	FR 10A4-M2 2NO	FR 1005-M2 2NO	FR 10A5-M2 2NO	FR 1007-M2 2NO
11	R	FR 11A4-M2 → 2NC	FR 1105-M2 → 2NC	FR 11A5-M2 → 2NC	FR 1107-M2 → 2NC
12	R	FR 12A4-M2 2NO	FR 1205-M2 2NO	FR 12A5-M2 2NO	FR 1207-M2 2NO
13	LV	FR 13A4-M2 → 2NC	FR 1305-M2 → 2NC	FR 13A5-M2 → 2NC	FR 1307-M2 → 2NC
14	LS	FR 14A4-M2 → 2NC	FR 1405-M2 → 2NC	FR 14A5-M2 → 2NC	FR 1407-M2 → 2NC
15	LS	FR 15A4-M2 2NO	FR 1505-M2 2NO	FR 15A5-M2 2NO	FR 1507-M2 2NO
18	LA	FR 18A4-M2 → 1NO+1NC	FR 1805-M2 → 1NO+1NC	FR 18A5-M2 → 1NO+1NC	FR 1807-M2 → 1NO+1NC
20	L	FR 20A4-M2 → 1NO+2NC	FR 2005-M2 → 1NO+2NC	FR 20A5-M2 → 1NO+2NC	FR 2007-M2 → 1NO+2NC
21	L	FR 21A4-M2 → 3NC	FR 2105-M2 → 3NC	FR 21A5-M2 → 3NC	FR 2107-M2 → 3NC
22	L	FR 22A4-M2 → 2NO+1NC	FR 2205-M2 → 2NO+1NC	FR 22A5-M2 → 2NO+1NC	FR 2207-M2 → 2NO+1NC
2	R	FR 2A4-M2 2x(1NO-1NC)	FR 205-M2 2x(1NO-1NC)	FR 2A5-M2 2x(1NO-1NC)	FR 207-M2 2x(1NO-1NC)
E1		FR E1A4-M2 1NO-1NC	FR E105-M2 1NO-1NC	FR E1A5-M2 1NO-1NC	FR E107-M2 1NO-1NC
Max. speed		page 215 - type 5	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		6 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 3

All values in the drawings are in mm

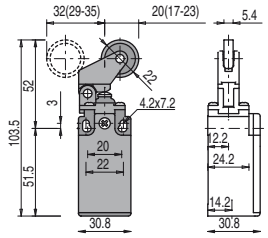
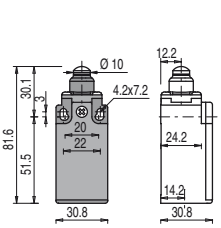
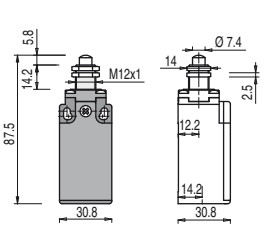
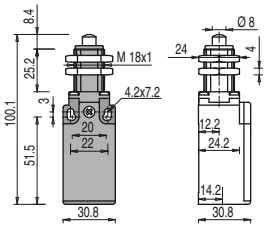
Items with code on **green** background are stock items

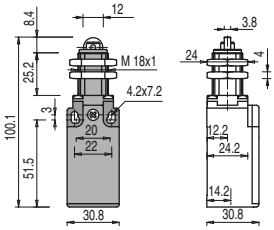
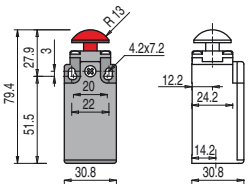
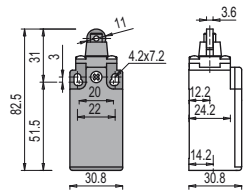
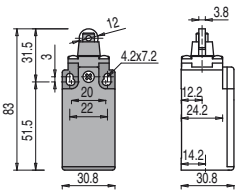
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		With external rubber gasket	With external rubber gasket	Secured only by means of threaded head in vertical position	
					
5	R	FR 5A7-M2 1NO+1NC	FR 508-M2 1NO+1NC	FR 510-M2 1NO+1NC	FR 512-M2 1NO+1NC
6	L	FR 6A7-M2 1NO+1NC	FR 608-M2 1NO+1NC	FR 610-M2 1NO+1NC	FR 612-M2 1NO+1NC
7	LO	FR 7A7-M2 1NO+1NC	FR 708-M2 1NO+1NC	FR 710-M2 1NO+1NC	FR 712-M2 1NO+1NC
9	L	FR 9A7-M2 2NC	FR 908-M2 2NC	FR 910-M2 2NC	FR 912-M2 2NC
10	L	FR 10A7-M2 2NO	FR 1008-M2 2NO	FR 1010-M2 2NO	FR 1012-M2 2NO
11	R	FR 11A7-M2 2NC	FR 1108-M2 2NC	FR 1110-M2 2NC	FR 1112-M2 2NC
12	R	FR 12A7-M2 2NO	FR 1208-M2 2NO	FR 1210-M2 2NO	FR 1212-M2 2NO
13	LV	FR 13A7-M2 2NC	FR 1308-M2 2NC	FR 1310-M2 2NC	FR 1312-M2 2NC
14	LS	FR 14A7-M2 2NC	FR 1408-M2 2NC	FR 1410-M2 2NC	FR 1412-M2 2NC
15	LS	FR 15A7-M2 2NO	FR 1508-M2 2NO	FR 1510-M2 2NO	FR 1512-M2 2NO
18	LA	FR 18A7-M2 1NO+1NC	FR 1808-M2 1NO+1NC	FR 1810-M2 1NO+1NC	FR 1812-M2 1NO+1NC
20	L	FR 20A7-M2 1NO+2NC	FR 2008-M2 1NO+2NC	FR 2010-M2 1NO+2NC	FR 2012-M2 1NO+2NC
21	L	FR 21A7-M2 3NC	FR 2108-M2 3NC	FR 2110-M2 3NC	FR 2112-M2 3NC
22	L	FR 22A7-M2 2NO+1NC	FR 2208-M2 2NO+1NC	FR 2210-M2 2NO+1NC	FR 2212-M2 2NO+1NC
2	R	FR 2A7-M2 2x(1NO-1NC)	FR 208-M2 2x(1NO-1NC)	FR 210-M2 2x(1NO-1NC)	FR 212-M2 2x(1NO-1NC)
E1		FR E1A7-M2 1NO-1NC	FR E108-M2 1NO-1NC	FR E110-M2 1NO-1NC	FR E112-M2 1NO-1NC
Max. speed		page 215 - type 3	page 215 - type 4	page 215 - type 4	page 215 - type 4
Actuating force		3 N (25 N ⊖)	8 N (25 N ⊖)	8 N (25 N ⊖)	8 N (25 N ⊖)
Travel diagrams		page 216 - group 3	page 216 - group 1	page 216 - group 1	page 216 - group 1

Contact block				Roller, Ø 11 mm, technopolymer	Roller, Ø 12 mm, stainless steel
					
5	R	FR 513-M2 1NO+1NC	FR 514-M2 1NO+1NC	FR 515-M2 1NO+1NC	FR 515-M2R28 1NO+1NC
6	L	FR 613-M2 1NO+1NC	FR 614-M2 1NO+1NC	FR 615-M2 1NO+1NC	FR 615-M2R28 1NO+1NC
7	LO	FR 713-M2 1NO+1NC	FR 714-M2 1NO+1NC	FR 715-M2 1NO+1NC	FR 715-M2R28 1NO+1NC
9	L	FR 913-M2 2NC	FR 914-M2 2NC	FR 915-M2 2NC	FR 915-M2R28 2NC
10	L	FR 1013-M2 2NO	FR 1014-M2 2NO	FR 1015-M2 2NO	FR 1015-M2R28 2NO
11	R	FR 1113-M2 2NC	FR 1114-M2 2NC	FR 1115-M2 2NC	FR 1115-M2R28 2NC
12	R	FR 1213-M2 2NO	FR 1214-M2 2NO	FR 1215-M2 2NO	FR 1215-M2R28 2NO
13	LV	FR 1313-M2 2NC	FR 1314-M2 2NC	FR 1315-M2 2NC	FR 1315-M2R28 2NC
14	LS	FR 1413-M2 2NC	FR 1414-M2 2NC	FR 1415-M2 2NC	FR 1415-M2R28 2NC
15	LS	FR 1513-M2 2NO	FR 1514-M2 2NO	FR 1515-M2 2NO	FR 1515-M2R28 2NO
18	LA	FR 1813-M2 1NO+1NC	FR 1814-M2 1NO+1NC	FR 1815-M2 1NO+1NC	FR 1815-M2R28 1NO+1NC
20	L	FR 2013-M2 1NO+2NC	FR 2014-M2 1NO+2NC	FR 2015-M2 1NO+2NC	FR 2015-M2R28 1NO+2NC
21	L	FR 2113-M2 3NC	FR 2114-M2 3NC	FR 2115-M2 3NC	FR 2115-M2R28 3NC
22	L	FR 2213-M2 2NO+1NC	FR 2214-M2 2NO+1NC	FR 2215-M2 2NO+1NC	FR 2215-M2R28 2NO+1NC
2	R	FR 213-M2 2x(1NO-1NC)	FR 214-M2 2x(1NO-1NC)	FR 215-M2 2x(1NO-1NC)	FR 215-M2R28 2x(1NO-1NC)
E1		FR E113-M2 1NO-1NC	FR E114-M2 1NO-1NC	FR E115-M2 1NO-1NC	FR E115-M2R28 1NO-1NC
Max. speed		page 215 - type 2	page 215 - type 4	page 215 - type 2	page 215 - type 2
Actuating force		8 N (25 N ⊖)	8 N (25 N ⊖)	8 N (25 N ⊖)	8 N (25 N ⊖)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

All values in the drawings are in mm

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

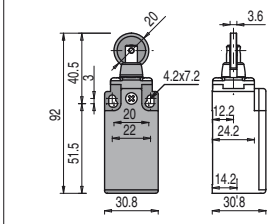
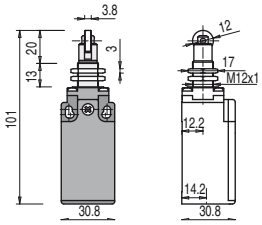
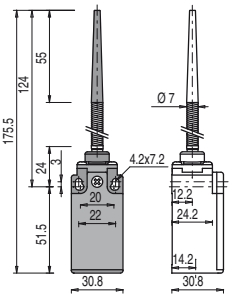
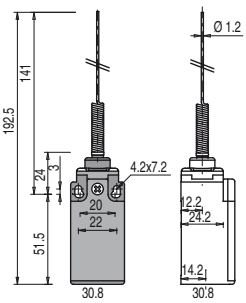
Accessories See page 197

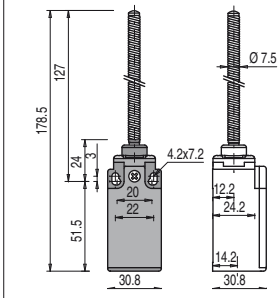
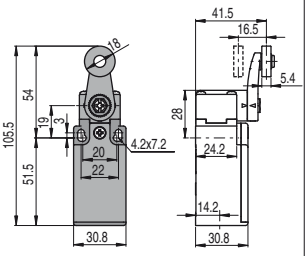
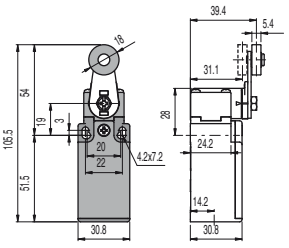
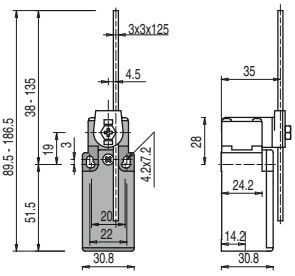
→ The 2D and 3D files are available at **www.pizzato.com**

FR series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block								
			Secured only by means of threaded head in vertical position 		With external rubber gasket 		With external rubber gasket 	
5	R	FR 516-M2	1NO+1NC	FR 517-M2	1NO+1NC	FR 520-M2	1NO+1NC	FR 521-M2	1NO+1NC
6	L	FR 616-M2	1NO+1NC	FR 617-M2	1NO+1NC				
7	LO	FR 716-M2	1NO+1NC	FR 717-M2	1NO+1NC				
9	L	FR 916-M2	2NC	FR 917-M2	2NC				
10	L	FR 1016-M2	2NO	FR 1017-M2	2NO	FR 1020-M2	2NO	FR 1021-M2	2NO
11	R	FR 1116-M2	2NC	FR 1117-M2	2NC				
12	R	FR 1216-M2	2NO	FR 1217-M2	2NO	FR 1220-M2	2NO	FR 1221-M2	2NO
13	LV	FR 1316-M2	2NC	FR 1317-M2	2NC				
14	LS	FR 1416-M2	2NC	FR 1417-M2	2NC				
15	LS	FR 1516-M2	2NO	FR 1517-M2	2NO				
18	LA	FR 1816-M2	1NO+1NC	FR 1817-M2	1NO+1NC	FR 1820-M2	1NO+1NC	FR 1821-M2	1NO+1NC
20	L	FR 2016-M2	1NO+2NC	FR 2017-M2	1NO+2NC	FR 2020-M2	1NO+2NC	FR 2021-M2	1NO+2NC
21	L	FR 2116-M2	3NC	FR 2117-M2	3NC	FR 2120-M2	3NC	FR 2121-M2	3NC
22	L	FR 2216-M2	2NO+1NC	FR 2217-M2	2NO+1NC	FR 2220-M2	2NO+1NC	FR 2221-M2	2NO+1NC
2	R	FR 216-M2	2x(1NO-1NC)	FR 217-M2	2x(1NO-1NC)	FR 220-M2	2x(1NO-1NC)	FR 221-M2	2x(1NO-1NC)
E1		FR E116-M2	1NO-1NC	FR E117-M2	1NO-1NC	FR E120-M2	1NO-1NC	FR E121-M2	1NO-1NC
Max. speed		page 215 - type 2		page 215 - type 2		1 m/s		1 m/s	
Actuating force		8 N (25 N →)		8 N (25 N →)		0.07 Nm		0.07 Nm	
Travel diagrams		page 216 - group 1		page 216 - group 1		page 216 - group 4		page 216 - group 4	

Contact block								
		With external rubber gasket 	With Ø 20 mm stainless steel roller on request 		Other rollers available. See on page 66 		Square rod, 3x3 mm 	
5	R	FR 525-M2	1NO+1NC	FR 530-M2	1NO+1NC	FR 531-M2	1NO+1NC	FR 533-M2	1NO+1NC
6	L			FR 630-M2	1NO+1NC	FR 631-M2	1NO+1NC	FR 633-M2	1NO+1NC
7	LO			FR 730-M2	1NO+1NC	FR 731-M2	1NO+1NC	FR 733-M2	1NO+1NC
9	L			FR 930-M2	2NC	FR 931-M2	2NC	FR 933-M2	2NC
10	L	FR 1025-M2	2NO	FR 1030-M2	2NO	FR 1031-M2	2NO	FR 1033-M2	2NO
11	R			FR 1130-M2	2NC	FR 1131-M2	2NC	FR 1133-M2	2NC
12	R	FR 1225-M2	2NO	FR 1230-M2	2NO	FR 1231-M2	2NO	FR 1233-M2	2NO
13	LV			FR 1330-M2	2NC	FR 1331-M2	2NC	FR 1333-M2	2NC
14	LS			FR 1430-M2	2NC	FR 1431-M2	2NC	FR 1433-M2	2NC
15	LS			FR 1530-M2	2NO	FR 1531-M2	2NO	FR 1533-M2	2NO
16	LI			FR 1630-M2	2NC	FR 1631-M2	2NC	FR 1633-M2	2NC
18	LA	FR 1825-M2	1NO+1NC	FR 1830-M2	1NO+1NC	FR 1831-M2	1NO+1NC	FR 1833-M2	1NO+1NC
20	L	FR 2025-M2	1NO+2NC	FR 2030-M2	1NO+2NC	FR 2031-M2	1NO+2NC	FR 2033-M2	1NO+2NC
21	L	FR 2125-M2	3NC	FR 2130-M2	3NC	FR 2131-M2	3NC	FR 2133-M2	3NC
22	L	FR 2225-M2	2NO+1NC	FR 2230-M2	2NO+1NC	FR 2231-M2	2NO+1NC	FR 2233-M2	2NO+1NC
2	R	FR 225-M2	2x(1NO-1NC)	FR 230-M2	2x(1NO-1NC)	FR 231-M2	2x(1NO-1NC)	FR 233-M2	2x(1NO-1NC)
E1		FR E125-M2	1NO-1NC	FR E130-M2	1NO-1NC	FR E131-M2	1NO-1NC	FR E133-M2	1NO-1NC
Max. speed		1 m/s		page 215 - type 1		page 215 - type 1		1.5 m/s	
Actuating force		0.12 Nm		0.06 Nm (0.25 Nm →)		0.06 Nm (0.25 Nm →)		0.06 Nm	
Travel diagrams		page 216 - group 4		page 216 - group 5		page 216 - group 5		page 216 - group 5	

All values in the drawings are in mm

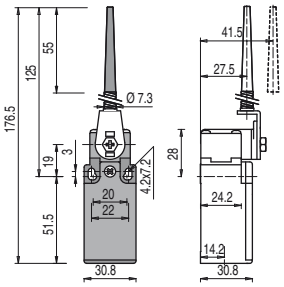
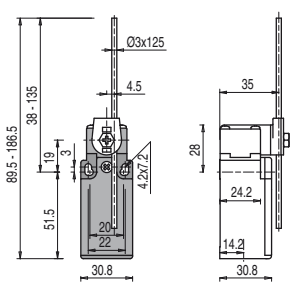
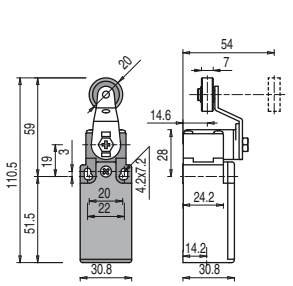
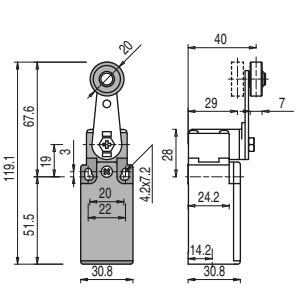
Items with code on **green** background are stock items

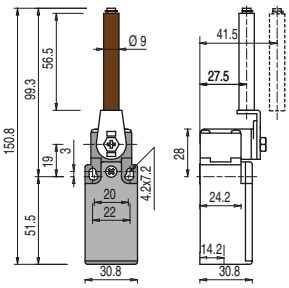
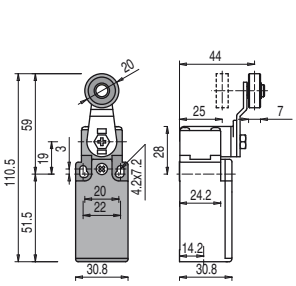
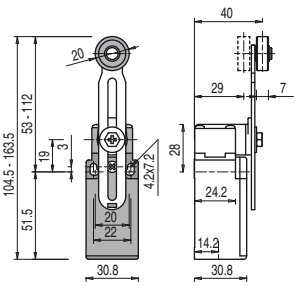
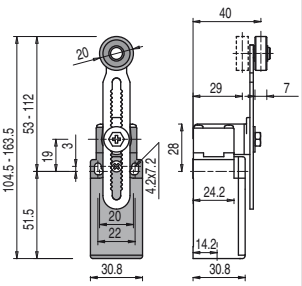
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block				Round rod, Ø 3 mm, stainless steel		Other rollers available. See on page 66		Other rollers available. See on page 66	
									
5	R	FR 534-M2	1NO+1NC	FR 550-M2	1NO+1NC	FR 551-M2	1NO+1NC	FR 552-M2	1NO+1NC
6	L	FR 634-M2	1NO+1NC	FR 650-M2	1NO+1NC	FR 651-M2	1NO+1NC	FR 652-M2	1NO+1NC
7	LO	FR 734-M2	1NO+1NC	FR 750-M2	1NO+1NC	FR 751-M2	1NO+1NC	FR 752-M2	1NO+1NC
9	L	FR 934-M2	2NC	FR 950-M2	2NC	FR 951-M2	2NC	FR 952-M2	2NC
10	L	FR 1034-M2	2NO	FR 1050-M2	2NO	FR 1051-M2	2NO	FR 1052-M2	2NO
11	R	FR 1134-M2	2NC	FR 1150-M2	2NC	FR 1151-M2	2NC	FR 1152-M2	2NC
12	R	FR 1234-M2	2NO	FR 1250-M2	2NO	FR 1251-M2	2NO	FR 1252-M2	2NO
13	LV	FR 1334-M2	2NC	FR 1350-M2	2NC	FR 1351-M2	2NC	FR 1352-M2	2NC
14	LS	FR 1434-M2	2NC	FR 1450-M2	2NC	FR 1451-M2	2NC	FR 1452-M2	2NC
15	LS	FR 1534-M2	2NO	FR 1550-M2	2NO	FR 1551-M2	2NO	FR 1552-M2	2NO
16	LI	FR 1634-M2	2NC	FR 1650-M2	2NC	FR 1651-M2	2NC	FR 1652-M2	2NC
18	LA	FR 1834-M2	1NO+1NC	FR 1850-M2	1NO+1NC	FR 1851-M2	1NO+1NC	FR 1852-M2	1NO+1NC
20	L	FR 2034-M2	1NO+2NC	FR 2050-M2	1NO+2NC	FR 2051-M2	1NO+2NC	FR 2052-M2	1NO+2NC
21	L	FR 2134-M2	3NC	FR 2150-M2	3NC	FR 2151-M2	3NC	FR 2152-M2	3NC
22	L	FR 2234-M2	2NO+1NC	FR 2250-M2	2NO+1NC	FR 2251-M2	2NO+1NC	FR 2252-M2	2NO+1NC
2	R	FR 234-M2	2x(1NO-1NC)	FR 250-M2	2x(1NO-1NC)	FR 251-M2	2x(1NO-1NC)	FR 252-M2	2x(1NO-1NC)
E1		FR E134-M2	1NO-1NC	FR E150-M2	1NO-1NC	FR E151-M2	1NO-1NC	FR E152-M2	1NO-1NC
Max. speed		1.5 m/s		1.5 m/s		page 215 - type 1		page 215 - type 1	
Actuating force		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)	
Travel diagrams		page 216 - group 5		page 216 - group 5		page 216 - group 5		page 216 - group 5	

Contact block		Porcelain roller		Other rollers available. See on page 66		Other rollers available. See on page 66		Other rollers available. See on page 66	
									
5	R	FR 553-E0M2V9	1NO+1NC	FR 554-M2	1NO+1NC	FR 555-M2 (1)	1NO+1NC	FR 556-M2	1NO+1NC
6	L	FR 653-E0M2V9	1NO+1NC	FR 654-M2	1NO+1NC	FR 655-M2 (1)	1NO+1NC	FR 656-M2	1NO+1NC
7	LO	FR 753-E0M2V9	1NO+1NC	FR 754-M2	1NO+1NC	FR 755-M2 (1)	1NO+1NC	FR 756-M2	1NO+1NC
9	L	FR 953-E0M2V9	2NC	FR 954-M2	2NC	FR 955-M2 (1)	2NC	FR 956-M2	2NC
10	L	FR 1053-E0M2V9	2NO	FR 1054-M2	2NO	FR 1055-M2	2NO	FR 1056-M2	2NO
11	R			FR 1154-M2	2NC	FR 1155-M2 (1)	2NC	FR 1156-M2	2NC
12	R	FR 1253-E0M2V9	2NO	FR 1254-M2	2NO	FR 1255-M2	2NO	FR 1256-M2	2NO
13	LV	FR 1353-E0M2V9	2NC	FR 1354-M2	2NC	FR 1355-M2 (1)	2NC	FR 1356-M2	2NC
14	LS	FR 1453-E0M2V9	2NC	FR 1454-M2	2NC	FR 1455-M2 (1)	2NC	FR 1456-M2	2NC
15	LS	FR 1553-E0M2V9	2NO	FR 1554-M2	2NO	FR 1555-M2	2NO	FR 1556-M2	2NO
16	LI			FR 1654-M2	2NC	FR 1655-M2 (1)	2NC	FR 1656-M2	2NC
18	LA	FR 1853-E0M2V9	1NO+1NC	FR 1854-M2	1NO+1NC	FR 1855-M2 (1)	1NO+1NC	FR 1856-M2	1NO+1NC
20	L	FR 2053-E0M2V9	1NO+2NC	FR 2054-M2	1NO+2NC	FR 2055-M2 (1)	1NO+2NC	FR 2056-M2	1NO+2NC
21	L	FR 2153-E0M2V9	3NC	FR 2154-M2	3NC	FR 2155-M2 (1)	3NC	FR 2156-M2	3NC
22	L	FR 2253-E0M2V9	2NO+1NC	FR 2254-M2	2NO+1NC	FR 2255-M2 (1)	2NO+1NC	FR 2256-M2	2NO+1NC
2	R	FR 253-E0M2	2x(1NO-1NC)	FR 254-M2	2x(1NO-1NC)	FR 255-M2	2x(1NO-1NC)	FR 256-M2	2x(1NO-1NC)
E1		FR E153-E0M2V9	1NO-1NC	FR E154-M2	1NO-1NC	FR E155-M2	1NO-1NC	FR E156-M2	1NO-1NC
Max. speed		0.5 m/s		page 215 - type 1		page 215 - type 1		page 215 - type 1	
Actuating force		0.03 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)	
Travel diagrams		page 216 - group 6		page 216 - group 5		page 216 - group 5		page 216 - group 5	

(1) Positive opening only with actuator set to max. See page 65.

All values in the drawings are in mm

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

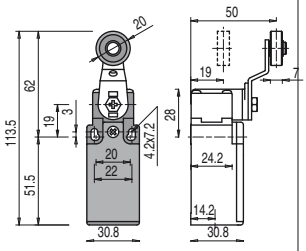
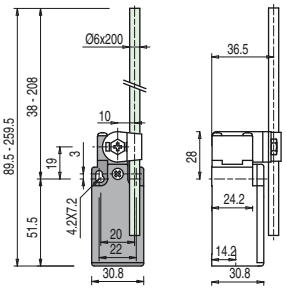
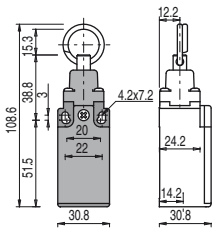
Accessories See page 197

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

FR series position switches

Contact type:

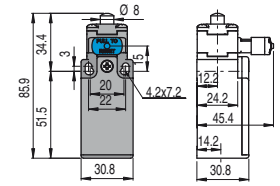
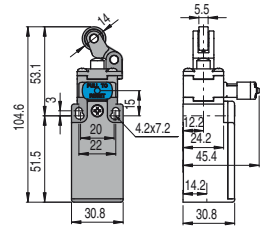
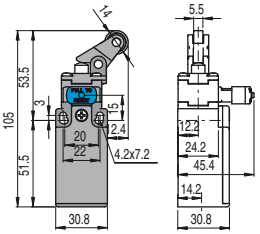
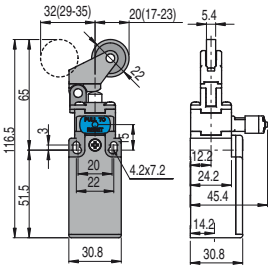
R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Other rollers available. See on page 66	Glass fibre rod	Rope switch for signalling	
					
5	R	FR 557-M2 1NO+1NC	FR 569-M2 1NO+1NC	FR 576-M2 1NO+1NC	
6	L	FR 657-M2 1NO+1NC	FR 669-M2 1NO+1NC	FR 676-M2 1NO+1NC	
7	LO	FR 757-M2 1NO+1NC	FR 769-M2 1NO+1NC	FR 776-M2 1NO+1NC	
9	L	FR 957-M2 2NC	FR 969-M2 2NC	FR 976-M2 2NO	
10	L	FR 1057-M2 2NO	FR 1069-M2 2NO	FR 1076-M2 2NC	
11	R	FR 1157-M2 2NC	FR 1169-M2 2NC	FR 1176-M2 2NO	
12	R	FR 1257-M2 2NO	FR 1269-M2 2NO	FR 1276-M2 2NC	
13	LV	FR 1357-M2 2NC	FR 1369-M2 2NC	FR 1376-M2 2NO	
14	LS	FR 1457-M2 2NC	FR 1469-M2 2NC	FR 1476-M2 2NO	
15	LS	FR 1557-M2 2NO	FR 1569-M2 2NO	FR 1576-M2 2NC	
16	LI	FR 1657-M2 2NC	FR 1669-M2 2NC		
18	LA	FR 1857-M2 1NO+1NC	FR 1869-M2 1NO+1NC	FR 1876-M2 1NO+1NC	
20	L	FR 2057-M2 1NO+2NC	FR 2069-M2 1NO+2NC	FR 2076-M2 2NO+1NC	
21	L	FR 2157-M2 3NC	FR 2169-M2 3NC	FR 2176-M2 3NO	
22	L	FR 2257-M2 2NO+1NC	FR 2269-M2 2NO+1NC	FR 2276-M2 1NO+2NC	
2	R	FR 257-M2 2x(1NO-1NC)	FR 269-M2 2x(1NO-1NC)	FR 276-M2 2x(1NO-1NC)	
E1		FR E157-M2 1NO-1NC	FR E169-M2 1NO-1NC		
Max. speed		page 215 - type 1	1.5 m/s	0.5 m/s	
Actuating force		0.06 Nm (0.25 Nm)	0.06 Nm	initial 20 N - final 40 N	
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 7	

FR series position switches with reset

Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping.
This device consists in a block to be mounted between the body and the head of the switch that can be rotated independently from the head. This new device offers the following advantages:

- The reset device can be integrated into almost all standard actuator heads
- Contact blocks with snap action are no more necessary because the tripping movement is executed by the reset device itself
- The reset device can be rotated independently from the head ensuring maximum flexibility during installation
- Two actuating forces: standard and increased for vibration applications
- Mechanical endurance: 1 million operating cycles.

Contact block			With stainless steel roller on request	With stainless steel roller on request	
					
6	L	FR 601-W3M2 1NO+1NC	FR 602-W3M2 1NO+1NC	FR 605-W3M2 1NO+1NC	FR 607-W3M2 1NO+1NC
9	L	FR 901-W3M2 2NC	FR 902-W3M2 2NC	FR 905-W3M2 2NC	FR 907-W3M2 2NC
10	L	FR 1001-W3M2 2NO	FR 1002-W3M2 2NO	FR 1005-W3M2 2NO	FR 1007-W3M2 2NO
20	L	FR 2001-W3M2 1NO+2NC	FR 2002-W3M2 1NO+2NC	FR 2005-W3M2 1NO+2NC	FR 2007-W3M2 1NO+2NC
21	L	FR 2101-W3M2 3NC	FR 2102-W3M2 3NC	FR 2105-W3M2 3NC	FR 2107-W3M2 3NC
22	L	FR 2201-W3M2 2NO+1NC	FR 2202-W3M2 2NO+1NC	FR 2205-W3M2 2NO+1NC	FR 2207-W3M2 2NO+1NC
2	R	FR 201-W3M2 2NO+2NC	FR 202-W3M2 2NO+2NC	FR 205-W3M2 2NO+2NC	FR 207-W3M2 2NO+2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		4.5 N (25 N)	4 N (25 N)	4 N (25 N)	2.5 N (25 N)
Travel diagrams		page 217 - group 1	page 217 - group 2	page 217 - group 2	page 217 - group 3

All values in the drawings are in mm

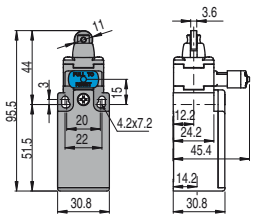
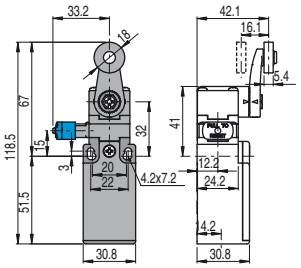
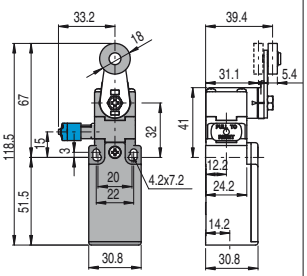
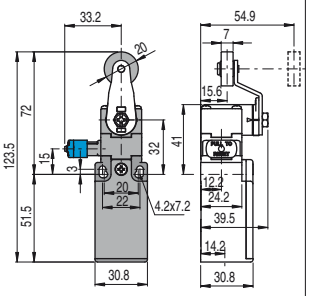
Items with code on **green** background are stock items

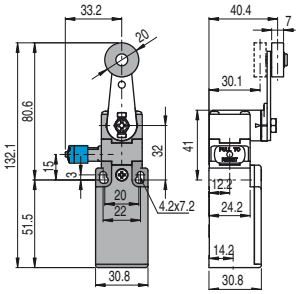
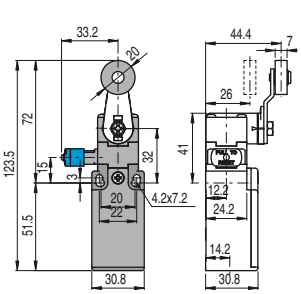
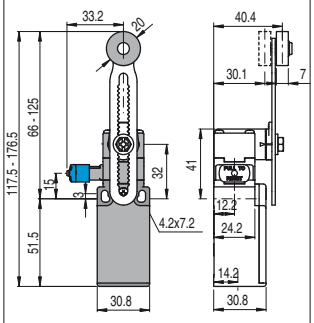
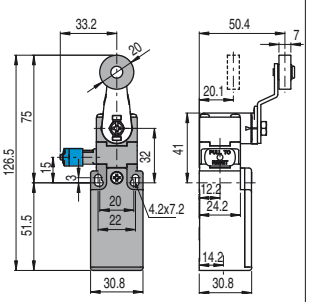
Accessories See page 197

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

Contact type:

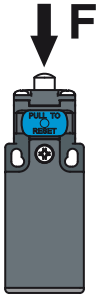
R = snap action
L = slow action

Contact block		With Ø 12 mm stainless steel roller on request	With Ø 20 mm stainless steel roller on request	Other rollers available. See on page 66	Other rollers available. See on page 66
					
6	L	FR 615-W3M2 → 1NO+1NC	FR 630-W3M2 → 1NO+1NC	FR 631-W3M2 → 1NO+1NC	FR 651-W3M2 → 1NO+1NC
9	L	FR 915-W3M2 → 2NC	FR 930-W3M2 → 2NC	FR 931-W3M2 → 2NC	FR 951-W3M2 → 2NC
10	L	FR 1015-W3M2 2NO	FR 1030-W3M2 2NO	FR 1031-W3M2 2NO	FR 1051-W3M2 2NO
20	L	FR 2015-W3M2 → 1NO+2NC	FR 2030-W3M2 → 1NO+2NC	FR 2031-W3M2 → 1NO+2NC	FR 2051-W3M2 → 1NO+2NC
21	L	FR 2115-W3M2 → 3NC	FR 2130-W3M2 → 3NC	FR 2131-W3M2 → 3NC	FR 2151-W3M2 → 3NC
22	L	FR 2215-W3M2 → 2NO+1NC	FR 2230-W3M2 → 2NO+1NC	FR 2231-W3M2 → 2NO+1NC	FR 2251-W3M2 → 2NO+1NC
2	R	FR 215-W3M2 2NO+2NC	FR 230-W3M2 2NO+2NC	FR 231-W3M2 2NO+2NC	FR 251-W3M2 2NO+2NC
Max. speed		page 215 - type 2	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		4.5 N (25 N →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 1	page 217 - group 4	page 217 - group 4	page 217 - group 4

Contact block		Other rollers available. See on page 66	Other rollers available. See on page 66	Other rollers available. See on page 66	Other rollers available. See on page 66
					
6	L	FR 652-W3M2 → 1NO+1NC	FR 654-W3M2 → 1NO+1NC	FR 656-W3M2 → 1NO+1NC	FR 657-W3M2 → 1NO+1NC
9	L	FR 952-W3M2 → 2NC	FR 954-W3M2 → 2NC	FR 956-W3M2 → 2NC	FR 957-W3M2 → 2NC
10	L	FR 1052-W3M2 2NO	FR 1054-W3M2 2NO	FR 1056-W3M2 2NO	FR 1057-W3M2 2NO
20	L	FR 2052-W3M2 → 1NO+2NC	FR 2054-W3M2 → 1NO+2NC	FR 2056-W3M2 → 1NO+2NC	FR 2057-W3M2 → 1NO+2NC
21	L	FR 2152-W3M2 → 3NC	FR 2154-W3M2 → 3NC	FR 2156-W3M2 → 3NC	FR 2157-W3M2 → 3NC
22	L	FR 2252-W3M2 → 2NO+1NC	FR 2254-W3M2 → 2NO+1NC	FR 2256-W3M2 → 2NO+1NC	FR 2257-W3M2 → 2NO+1NC
2	R	FR 252-W3M2 2NO+2NC	FR 254-W3M2 2NO+2NC	FR 256-W3M2 2NO+2NC	FR 257-W3M2 2NO+2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

All values in the drawings are in mm

Increased actuating force



The switch can be delivered with increased actuating force (option W4). Ideal for vibration applications.

Actuators	Actuating force
01, 14, 15, 16	7 N
02, 05	6 N
07	3.5 N
30 … 57	0.08 Nm

To order the switch with reset and increased actuating force, replace the -W3 option with -W4 in the order code.
Example: FR 601-**W3**M2 ➔ FR 601-**W4**M2

Accessories See page 197

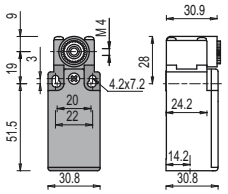
➔ The 2D and 3D files are available at **www.pizzato.com**

Position switches with swivelling lever without actuator

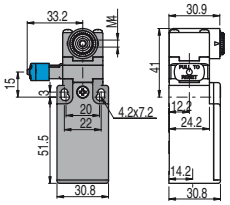
All values in the drawings are in mm

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP



With manual reset knob



Contact block				With manual reset knob	
5	R	FR 538-M2	1NO+1NC		
6	L	FR 638-M2	1NO+1NC	FR 638-W3M2	1NO+1NC
7	LO	FR 738-M2	1NO+1NC		
9	L	FR 938-M2	2NC	FR 938-W3M2	2NC
10	L	FR 1038-M2	2NO	FR 1038-W3M2	2NO
11	R	FR 1138-M2	2NC		
12	R	FR 1238-M2	2NO		
13	LV	FR 1338-M2	2NC		
14	LS	FR 1438-M2	2NC		
15	LS	FR 1538-M2	2NO		
16	LI	FR 1638-M2	2NC		
18	LA	FR 1838-M2	1NO+1NC		
20	L	FR 2038-M2	1NO+2NC	FR 2038-W3M2	1NO+2NC
21	L	FR 2138-M2	3NC	FR 2138-W3M2	3NC
22	L	FR 2238-M2	2NO+1NC	FR 2238-W3M2	2NO+1NC
2	R	FR 238-M2	2x(1NO-1NC)	FR 238-W3M2	2NO+2NC
E1		FR E138-M2	1NO-1NC		
Actuating force		0.06 Nm (0.25 Nm ⊖)		0.07 Nm (0.25 Nm ⊖)	
Travel diagrams		page 216 - group 5		page 217 - group 4	

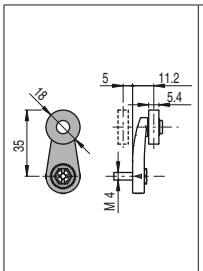
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

All values in the drawings are in mm

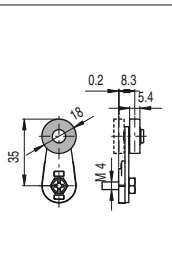
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Technopolymer roller Ø 18 mm



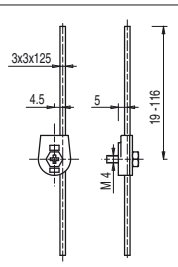
VF LE30 ⊖

Technopolymer roller Ø 18 mm



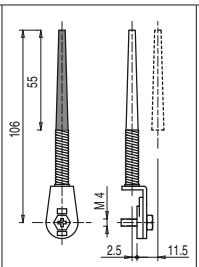
VF LE31 ⊖

Adjustable square rod, 3x3x125 mm



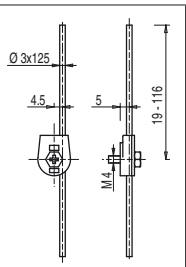
VF LE33

Flexible rod with pointed end



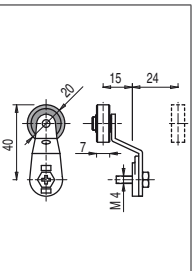
VF LE34

Adjustable round rod Ø 3x125 mm



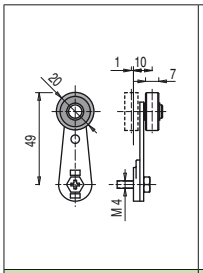
VF LE50

Technopolymer roller Ø 20 mm



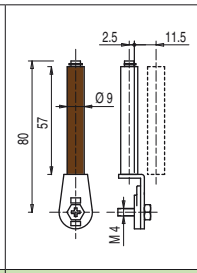
VF LE51 ⊖

Technopolymer roller Ø 20 mm



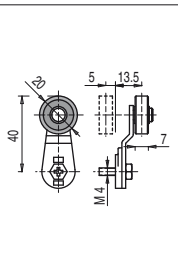
VF LE52 ⊖

Porcelain roller



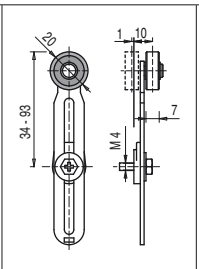
VF LE53 ⊖ (2)

Technopolymer roller Ø 20 mm



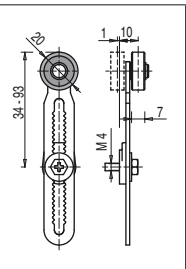
VF LE54 ⊖

Adjustable actuator with technopolymer roller



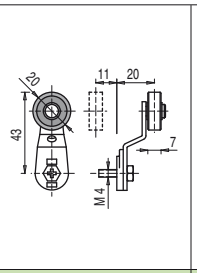
VF LE55 ⊖ (1)

Adjustable safety actuator with technopolymer roller



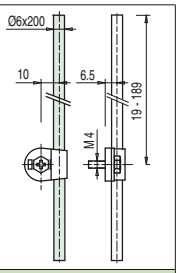
VF LE56 ⊖

Technopolymer roller Ø 20 mm



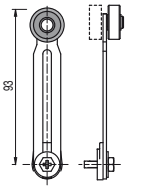
VF LE57 ⊖

Adjustable glass fibre rod



VF LE69

- (1) Actuator VF LE55 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 LE56 adjustable safety lever.
- (2) The position switch obtained by assembling switch FR •38-M2 (e.g. FR 538-M2, FR 638-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FR •53-E0M2V9 (e.g. FR 553-E0M2V9, FR 653-E0M2V9…).
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

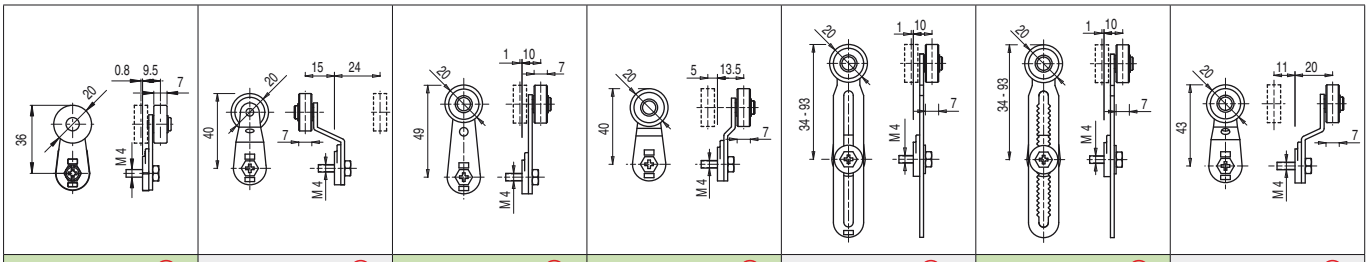
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

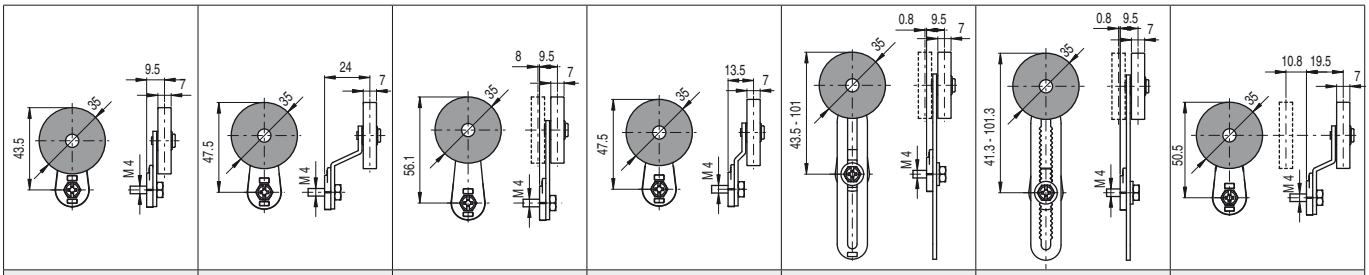
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Stainless steel rollers, Ø 20 mm



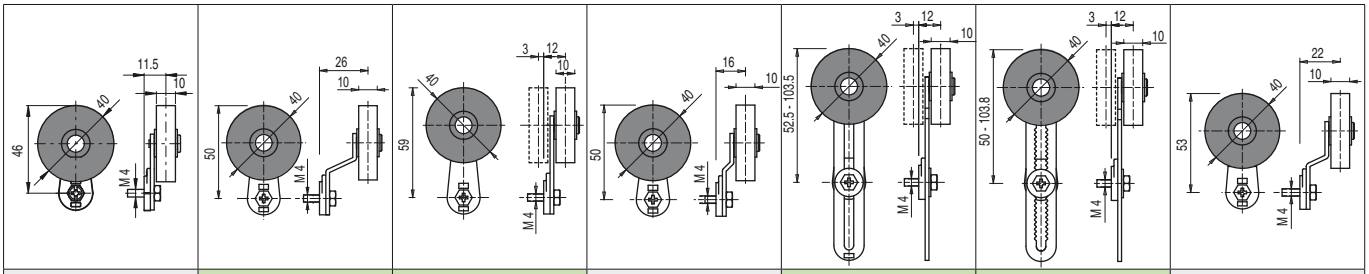
VF LE31-R24 | VF LE51-R24 | VF LE52-R24 | VF LE54-R24 | VF LE55-R24 (1) | VF LE56-R24 | VF LE57-R24

Technopolymer rollers, Ø 35 mm



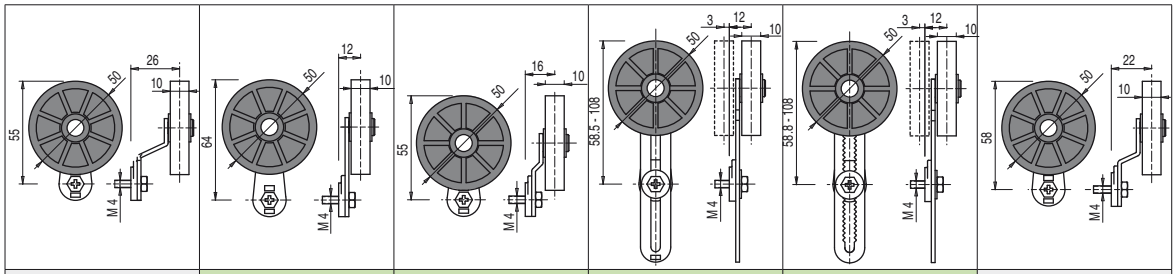
VF LE31-R25 (4) | VF LE51-R25 (4) | VF LE52-R25 | VF LE54-R25 (4) | VF LE55-R25 (1) | VF LE56-R25 | VF LE57-R25

Rubber rollers, Ø 40 mm



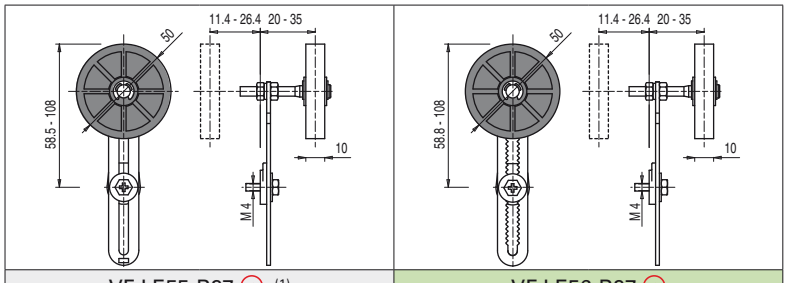
VF LE31-R5 (4) | VF LE51-R5 (4) | VF LE52-R5 | VF LE54-R5 (4) | VF LE55-R5 (1) | VF LE56-R5 | VF LE57-R5 (4)

Rubber rollers, Ø 50 mm



VF LE51-R26 (4) | VF LE52-R26 (4) | VF LE54-R26 (4) | VF LE55-R26 (1) | VF LE56-R26 | VF LE57-R26 (4)

Protruding rubber rollers, Ø 50 mm



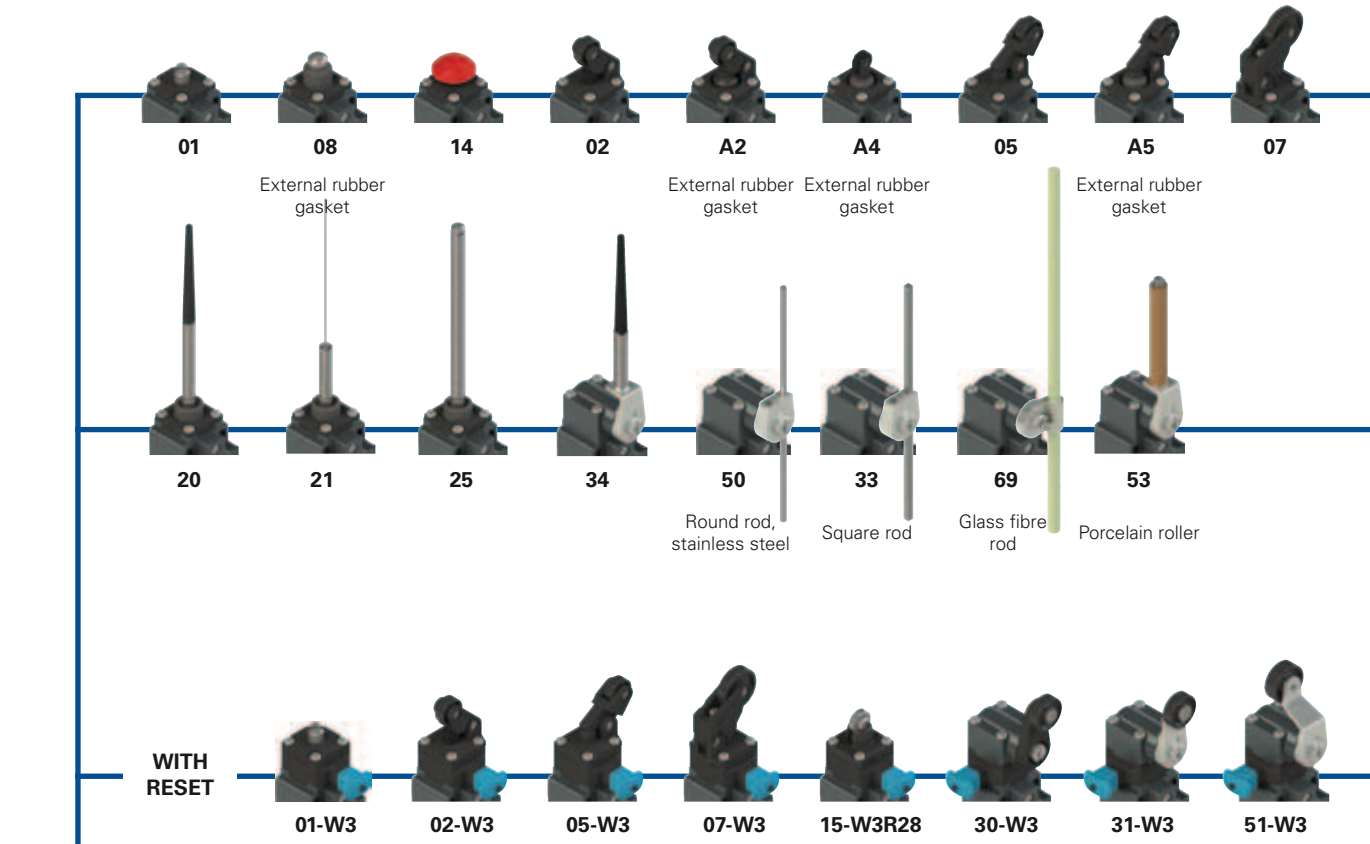
VF LE55-R27 (1) | VF LE56-R27

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

Accessories See page 197

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

Selection diagram



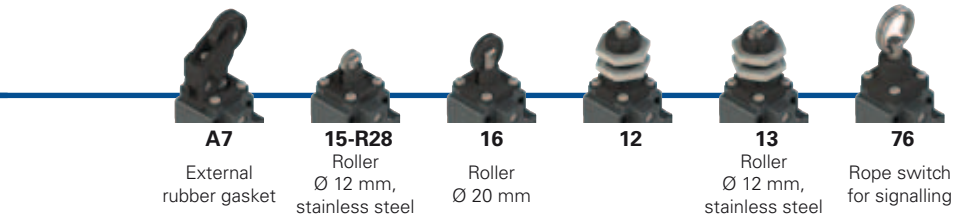
Threaded conduit entry	
M2	M20x1.5 (standard)
	PG 13.5

With cable gland	
K23	for cables Ø 6 … 12 mm
K27	for cables Ø 3 … 7 mm

With M12 metal connector	
K40	8-pole, bottom
K50	5-pole, bottom

product options

Sold separately as accessory



A7
External rubber gasket

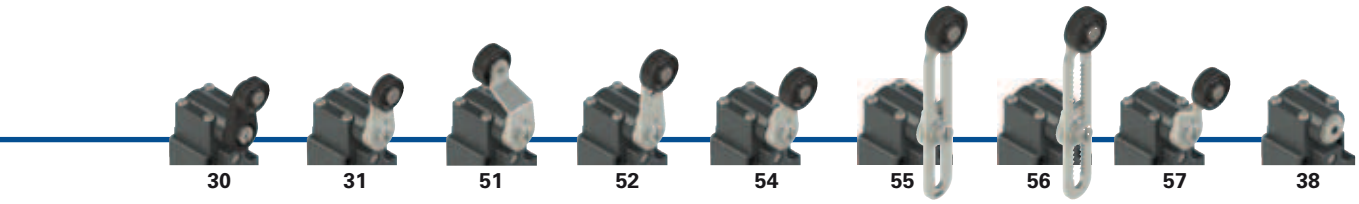
15-R28
Roller Ø 12 mm, stainless steel

16
Roller Ø 20 mm

12

13
Roller Ø 12 mm, stainless steel

76
Rope switch for signalling

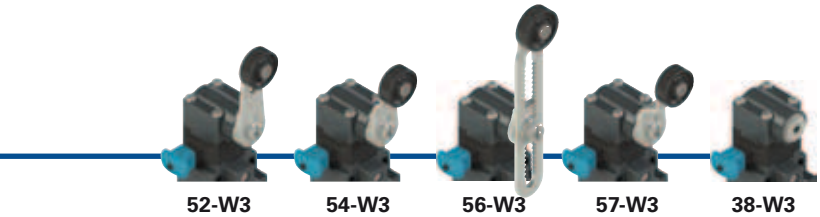


30 **31** **51** **52** **54** **55** **56** **57** **38**

55 Adjustable lever

56 Adjustable safety lever

38 Without actuator



52-W3 **54-W3** **56-W3** **57-W3**

38-W3
Without actuator

SEPARATE ACTUATORS
See page 77

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

FM 502-W3GM2K50R23T6

Housing

FM	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
05	angled lever with roller
...	.....

Reset

	without reset (standard)
W3	simultaneous reset
W4	simultaneous reset, increased force

Contact type

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

Ambient temperature

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

Pre-installed cable glands or connectors

	no cable gland or connector (standard)
K23	cable gland for cables Ø 6 … 12 mm
K50	M12 metal connector, 5-pole

For the complete list of possible combinations please contact our technical department.

Threaded conduit entry

M2	M20x1.5 (standard)
	PG 13.5

Rollers

	standard roller
R28	stainless steel Ø 12 mm (for actuators A4, 15)
R23	stainless steel Ø 14 mm (for actuators A2, 02, A5, 05, 30, 31, 51, 52, 54, 55, 56, 57)
R24	stainless steel Ø 20 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R5	rubber, Ø 40 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R26	rubber, Ø 50 mm (for actuators 51, 52, 54, 55, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 55, 56)

Main features
- Metal housing, one conduit entry
- Protection degree IP67
- 17 contact blocks available
- 43 actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Quality marks:

IMQ approval: EG609
UL approval: E131787
CCC approval: 2007010305229998
EAC approval: RU C-IT.АД35.B.00454

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 216. 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 on pages 211 to 222.**

	Electrical data		Utilization category
without connector	Thermal current (I_{th}):	10 A	
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 20, 21, 22, 33, 34)	Alternating current: AC15 (50÷60 Hz) 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 Ue (V) 24 125 250 Ie (A) 6 1.1 0.4
	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	
with M12 connector 5-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 120 250 Ie (A) 4 4 4
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Direct current: DC13 Ue (V) 24 125 250 Ie (A) 4 1.1 0.4
	Protection against short circuits:	type gG fuse 4 A 500 V	
	Pollution degree:	3	
with M12 connector 8-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 Ie (A) 2
	Rated insulation voltage (U_i):	30 Vac 36 Vdc	Direct current: DC13 Ue (V) 24 Ie (A) 2
	Protection against short circuits:	type gG fuse 2 A 500 V	
	Pollution degree:	3	

Features approved by IMQ

Rated insulation voltage (U_i):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 20, 21,22, 33, 34)
Conventional free air thermal current (I_{th}):	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 (U_e):	400 Vac (50 Hz)
Operating current (I_e):	3 A

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

Positive opening of contacts on contact blocks 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34

In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)

Housing features type 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).

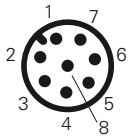
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductors, rigid or flexible, wire size 14 AWG. Tightening torque for terminal screws of 12 lb in (1.4 Nm).

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

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

Wiring diagram for M12 connectors

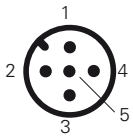
Contact block 2 — 1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

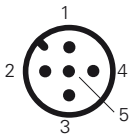
Contact block 5 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

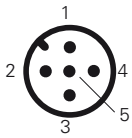
Contact block 6 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

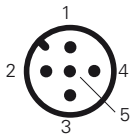
Contact block 7 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

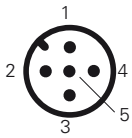
Contact block 9 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

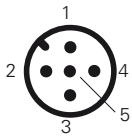
Contact block 10 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

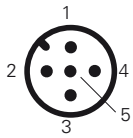
Contact block 11 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

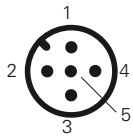
Contact block 12 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

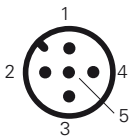
Contact block 13 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

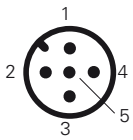
Contact block 14 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

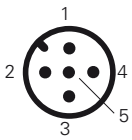
Contact block 15 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4
ground	5

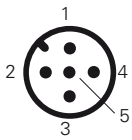
Contact block 16 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4
ground	5

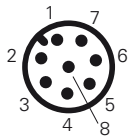
Contact block 18 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

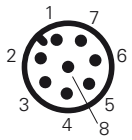
Contact block 20 — 2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8
ground	1

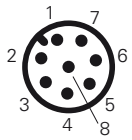
Contact block 21 — 3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

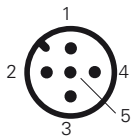
Contact block 22 — 1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8
ground	1

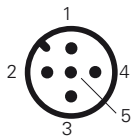
Contact block 33 — 1NC+1NO



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

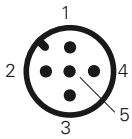
Contact block 34 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

Contact block E1 — PNP



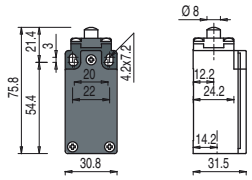
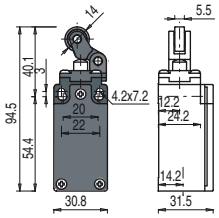
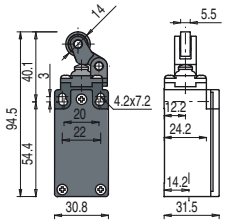
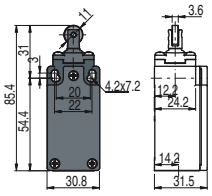
M12 connector, 5-pole

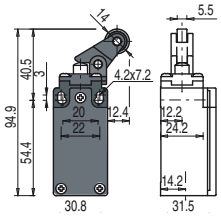
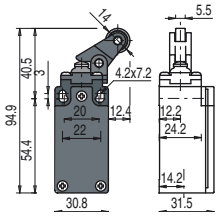
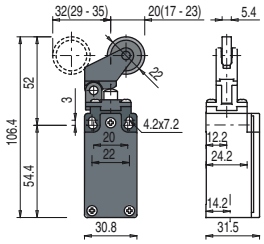
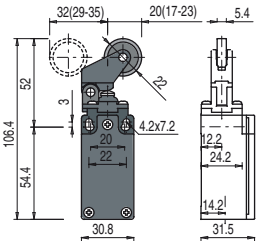
Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

FM series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block			With stainless steel roller on request	With external rubber gasket With stainless steel roller on request	With external rubber gasket
					
5	R	FM 501-M2 1NO+1NC	FM 502-M2 1NO+1NC	FM 5A2-M2 1NO+1NC	FM 5A4-M2 1NO+1NC
6	L	FM 601-M2 1NO+1NC	FM 602-M2 1NO+1NC	FM 6A2-M2 1NO+1NC	FM 6A4-M2 1NO+1NC
7	LO	FM 701-M2 1NO+1NC	FM 702-M2 1NO+1NC	FM 7A2-M2 1NO+1NC	FM 7A4-M2 1NO+1NC
9	L	FM 901-M2 2NC	FM 902-M2 2NC	FM 9A2-M2 2NC	FM 9A4-M2 2NC
10	L	FM 1001-M2 2NO	FM 1002-M2 2NO	FM 10A2-M2 2NO	FM 10A4-M2 2NO
11	R	FM 1101-M2 2NC	FM 1102-M2 2NC	FM 11A2-M2 2NC	FM 11A4-M2 2NC
12	R	FM 1201-M2 2NO	FM 1202-M2 2NO	FM 12A2-M2 2NO	FM 12A4-M2 2NO
13	LV	FM 1301-M2 2NC	FM 1302-M2 2NC	FM 13A2-M2 2NC	FM 13A4-M2 2NC
14	LS	FM 1401-M2 2NC	FM 1402-M2 2NC	FM 14A2-M2 2NC	FM 14A4-M2 2NC
15	LS	FM 1501-M2 2NO	FM 1502-M2 2NO	FM 15A2-M2 2NO	FM 15A4-M2 2NO
18	LA	FM 1801-M2 1NO+1NC	FM 1802-M2 1NO+1NC	FM 18A2-M2 1NO+1NC	FM 18A4-M2 1NO+1NC
20	L	FM 2001-M2 1NO+2NC	FM 2002-M2 1NO+2NC	FM 20A2-M2 1NO+2NC	FM 20A4-M2 1NO+2NC
21	L	FM 2101-M2 3NC	FM 2102-M2 3NC	FM 21A2-M2 3NC	FM 21A4-M2 3NC
22	L	FM 2201-M2 2NO+1NC	FM 2202-M2 2NO+1NC	FM 22A2-M2 2NO+1NC	FM 22A4-M2 2NO+1NC
2	R	FM 201-M2 2x(1NO-1NC)	FM 202-M2 2x(1NO-1NC)	FM 2A2-M2 2x(1NO-1NC)	FM 2A4-M2 2x(1NO-1NC)
E1		FM E101-M2 1NO-1NC	FM E102-M2 1NO-1NC	FM E1A2-M2 1NO-1NC	FM E1A4-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 5
Actuating force		8 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 1

Contact block			With stainless steel roller on request	With external rubber gasket With stainless steel roller on request		With external rubber gasket
					
5	R	FM 505-M2 1NO+1NC	FM 5A5-M2 1NO+1NC	FM 507-M2 1NO+1NC	FM 5A7-M2 1NO+1NC
6	L	FM 605-M2 1NO+1NC	FM 6A5-M2 1NO+1NC	FM 607-M2 1NO+1NC	FM 6A7-M2 1NO+1NC
7	LO	FM 705-M2 1NO+1NC	FM 7A5-M2 1NO+1NC	FM 707-M2 1NO+1NC	FM 7A7-M2 1NO+1NC
9	L	FM 905-M2 2NC	FM 9A5-M2 2NC	FM 907-M2 2NC	FM 9A7-M2 2NC
10	L	FM 1005-M2 2NO	FM 10A5-M2 2NO	FM 1007-M2 2NO	FM 10A7-M2 2NO
11	R	FM 1105-M2 2NC	FM 11A5-M2 2NC	FM 1107-M2 2NC	FM 11A7-M2 2NC
12	R	FM 1205-M2 2NO	FM 12A5-M2 2NO	FM 1207-M2 2NO	FM 12A7-M2 2NO
13	LV	FM 1305-M2 2NC	FM 13A5-M2 2NC	FM 1307-M2 2NC	FM 13A7-M2 2NC
14	LS	FM 1405-M2 2NC	FM 14A5-M2 2NC	FM 1407-M2 2NC	FM 14A7-M2 2NC
15	LS	FM 1505-M2 2NO	FM 15A5-M2 2NO	FM 1507-M2 2NO	FM 15A7-M2 2NO
18	LA	FM 1805-M2 1NO+1NC	FM 18A5-M2 1NO+1NC	FM 1807-M2 1NO+1NC	FM 18A7-M2 1NO+1NC
20	L	FM 2005-M2 1NO+2NC	FM 20A5-M2 1NO+2NC	FM 2007-M2 1NO+2NC	FM 20A7-M2 1NO+2NC
21	L	FM 2105-M2 3NC	FM 21A5-M2 3NC	FM 2107-M2 3NC	FM 21A7-M2 3NC
22	L	FM 2205-M2 2NO+1NC	FM 22A5-M2 2NO+1NC	FM 2207-M2 2NO+1NC	FM 22A7-M2 2NO+1NC
2	R	FM 205-M2 2x(1NO-1NC)	FM 2A5-M2 2x(1NO-1NC)	FM 207-M2 2x(1NO-1NC)	FM 2A7-M2 2x(1NO-1NC)
E1		FM E105-M2 1NO-1NC	FM E1A5-M2 1NO-1NC	FM E107-M2 1NO-1NC	FM E1A7-M2 1NO-1NC
Max. speed		page 215 - type 3	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		6 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)	3 N (25 N →)
Travel diagrams		page 216 - group 2	page 216 - group 2	page 216 - group 3	page 216 - group 3

All values in the drawings are in mm

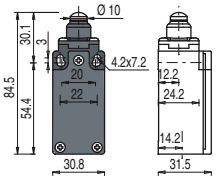
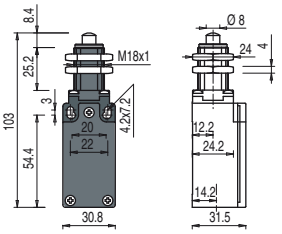
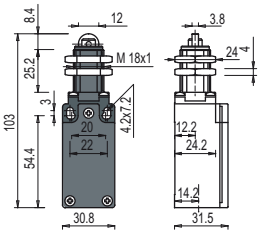
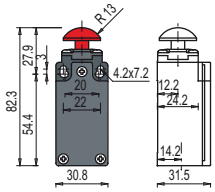
Items with code on **green** background are stock items

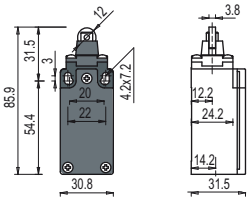
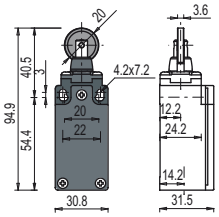
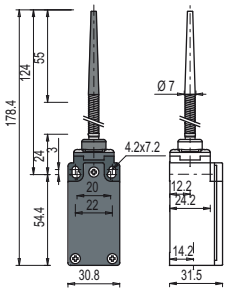
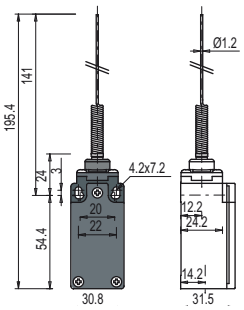
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		With external rubber gasket			
					
5	R	FM 508-M2 → 1NO+1NC	FM 512-M2 → 1NO+1NC	FM 513-M2 → 1NO+1NC	FM 514-M2 → 1NO+1NC
6	L	FM 608-M2 → 1NO+1NC	FM 612-M2 → 1NO+1NC	FM 613-M2 → 1NO+1NC	FM 614-M2 → 1NO+1NC
7	LO	FM 708-M2 → 1NO+1NC	FM 712-M2 → 1NO+1NC	FM 713-M2 → 1NO+1NC	FM 714-M2 → 1NO+1NC
9	L	FM 908-M2 → 2NC	FM 912-M2 → 2NC	FM 913-M2 → 2NC	FM 914-M2 → 2NC
10	L	FM 1008-M2 2NO	FM 1012-M2 2NO	FM 1013-M2 2NO	FM 1014-M2 2NO
11	R	FM 1108-M2 → 2NC	FM 1112-M2 → 2NC	FM 1113-M2 → 2NC	FM 1114-M2 → 2NC
12	R	FM 1208-M2 2NO	FM 1212-M2 2NO	FM 1213-M2 2NO	FM 1214-M2 2NO
13	LV	FM 1308-M2 → 2NC	FM 1312-M2 → 2NC	FM 1313-M2 → 2NC	FM 1314-M2 → 2NC
14	LS	FM 1408-M2 → 2NC	FM 1412-M2 → 2NC	FM 1413-M2 → 2NC	FM 1414-M2 → 2NC
15	LS	FM 1508-M2 2NO	FM 1512-M2 2NO	FM 1513-M2 2NO	FM 1514-M2 2NO
18	LA	FM 1808-M2 → 1NO+1NC	FM 1812-M2 → 1NO+1NC	FM 1813-M2 → 1NO+1NC	FM 1814-M2 → 1NO+1NC
20	L	FM 2008-M2 → 1NO+2NC	FM 2012-M2 → 1NO+2NC	FM 2013-M2 → 1NO+2NC	FM 2014-M2 → 1NO+2NC
21	L	FM 2108-M2 → 3NC	FM 2112-M2 → 3NC	FM 2113-M2 → 3NC	FM 2114-M2 → 3NC
22	L	FM 2208-M2 → 2NO+1NC	FM 2212-M2 → 2NO+1NC	FM 2213-M2 → 2NO+1NC	FM 2214-M2 → 2NO+1NC
2	R	FM 208-M2 2x(1NO-1NC)	FM 212-M2 2x(1NO-1NC)	FM 213-M2 2x(1NO-1NC)	FM 214-M2 2x(1NO-1NC)
E1		FM E108-M2 1NO-1NC	FM E112-M2 1NO-1NC	FM E113-M2 1NO-1NC	FM E114-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 4	page 215 - type 2	page 215 - type 4
Actuating force		8 N (25 N →)	8 N (25 N →)	8 N (25 N →)	8 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

Contact block				With external rubber gasket	With external rubber gasket
					
5	R	FM 515-M2R28 → 1NO+1NC	FM 516-M2 → 1NO+1NC	FM 520-M2 1NO+1NC	FM 521-M2 1NO+1NC
6	L	FM 615-M2R28 → 1NO+1NC	FM 616-M2 → 1NO+1NC		
7	LO	FM 715-M2R28 → 1NO+1NC	FM 716-M2 → 1NO+1NC		
9	L	FM 915-M2R28 → 2NC	FM 916-M2 → 2NC		
10	L	FM 1015-M2R28 2NO	FM 1016-M2 2NO	FM 1020-M2 2NO	FM 1021-M2 2NO
11	R	FM 1115-M2R28 → 2NC	FM 1116-M2 → 2NC		
12	R	FM 1215-M2R28 2NO	FM 1216-M2 2NO	FM 1220-M2 2NO	FM 1221-M2 2NO
13	LV	FM 1315-M2R28 → 2NC	FM 1316-M2 → 2NC		
14	LS	FM 1415-M2R28 → 2NC	FM 1416-M2 → 2NC		
15	LS	FM 1515-M2R28 2NO	FM 1516-M2 2NO		
18	LA	FM 1815-M2R28 → 1NO+1NC	FM 1816-M2 → 1NO+1NC	FM 1820-M2 1NO+1NC	FM 1821-M2 1NO+1NC
20	L	FM 2015-M2R28 → 1NO+2NC	FM 2016-M2 → 1NO+2NC	FM 2020-M2 1NO+2NC	FM 2021-M2 1NO+2NC
21	L	FM 2115-M2R28 → 3NC	FM 2116-M2 → 3NC	FM 2120-M2 3NC	FM 2121-M2 3NC
22	L	FM 2215-M2R28 → 2NO+1NC	FM 2216-M2 → 2NO+1NC	FM 2220-M2 2NO+1NC	FM 2221-M2 2NO+1NC
2	R	FM 215-M2R28 2x(1NO-1NC)	FM 216-M2 2x(1NO-1NC)	FM 220-M2 2x(1NO-1NC)	FM 221-M2 2x(1NO-1NC)
E1		FM E115-M2R28 1NO-1NC	FM E116-M2 1NO-1NC	FM E120-M2 1NO-1NC	FM E121-M2 1NO-1NC
Max. speed		page 215 - type 2	page 215 - type 2	1 m/s	1 m/s
Actuating force		8 N (25 N →)	8 N (25 N →)	0.07 Nm	0.07 Nm
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 4	page 216 - group 4

All values in the drawings are in mm

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

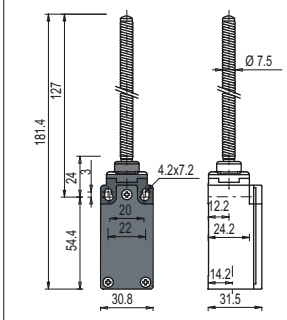
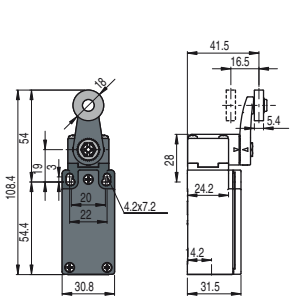
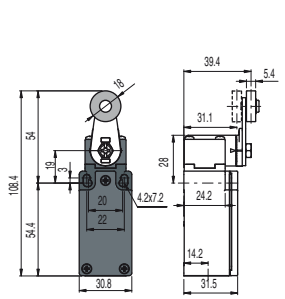
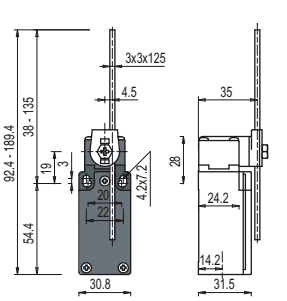
Accessories See page 197

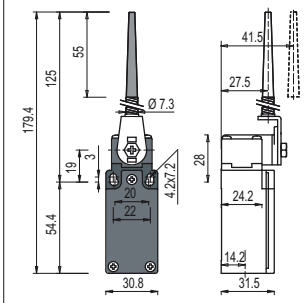
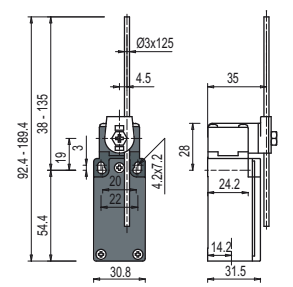
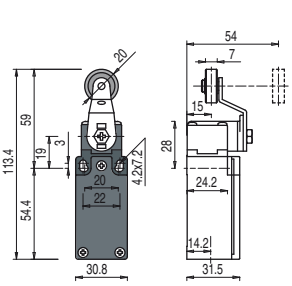
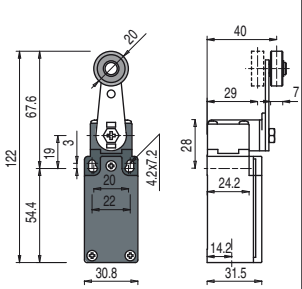
→ The 2D and 3D files are available at **www.pizzato.com**

FM series position switches

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP

Contact block		With external rubber gasket		With Ø 20 mm stainless steel roller on request		Other rollers available. See on page 78		Square rod, 3x3 mm	
									
5	R	FM 525-M2	1NO+1NC	FM 530-M2	1NO+1NC	FM 531-M2	1NO+1NC	FM 533-M2	1NO+1NC
6	L			FM 630-M2	1NO+1NC	FM 631-M2	1NO+1NC	FM 633-M2	1NO+1NC
7	LO			FM 730-M2	1NO+1NC	FM 731-M2	1NO+1NC	FM 733-M2	1NO+1NC
9	L			FM 930-M2	2NC	FM 931-M2	2NC	FM 933-M2	2NC
10	L	FM 1025-M2	2NO	FM 1030-M2	2NO	FM 1031-M2	2NO	FM 1033-M2	2NO
11	R			FM 1130-M2	2NC	FM 1131-M2	2NC	FM 1133-M2	2NC
12	R	FM 1225-M2	2NO	FM 1230-M2	2NO	FM 1231-M2	2NO	FM 1233-M2	2NO
13	LV			FM 1330-M2	2NC	FM 1331-M2	2NC	FM 1333-M2	2NC
14	LS			FM 1430-M2	2NC	FM 1431-M2	2NC	FM 1433-M2	2NC
15	LS			FM 1530-M2	2NO	FM 1531-M2	2NO	FM 1533-M2	2NO
16	LI			FM 1630-M2	2NC	FM 1631-M2	2NC	FM 1633-M2	2NC
18	LA	FM 1825-M2	1NO+1NC	FM 1830-M2	1NO+1NC	FM 1831-M2	1NO+1NC	FM 1833-M2	1NO+1NC
20	L	FM 2025-M2	1NO+2NC	FM 2030-M2	1NO+2NC	FM 2031-M2	1NO+2NC	FM 2033-M2	1NO+2NC
21	L	FM 2125-M2	3NC	FM 2130-M2	3NC	FM 2131-M2	3NC	FM 2133-M2	3NC
22	L	FM 2225-M2	2NO+1NC	FM 2230-M2	2NO+1NC	FM 2231-M2	2NO+1NC	FM 2233-M2	2NO+1NC
2	R	FM 225-M2	2x(1NO-1NC)	FM 230-M2	2x(1NO-1NC)	FM 231-M2	2x(1NO-1NC)	FM 233-M2	2x(1NO-1NC)
E1		FM E125-M2	1NO-1NC	FM E130-M2	1NO-1NC	FM E131-M2	1NO-1NC	FM E133-M2	1NO-1NC
Max. speed		1 m/s		page 215 - type 1		page 215 - type 1		1.5 m/s	
Actuating force		0.12 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)		0.06 Nm	
Travel diagrams		page 216 - group 4		page 216 - group 5		page 216 - group 5		page 216 - group 5	

Contact block				Round rod, Ø 3 mm, stainless steel 		Other rollers available. See on page 78 		Other rollers available. See on page 78 	
5	R	FM 534-M2	1NO+1NC	FM 550-M2	1NO+1NC	FM 551-M2	1NO+1NC	FM 552-M2	1NO+1NC
6	L	FM 634-M2	1NO+1NC	FM 650-M2	1NO+1NC	FM 651-M2	1NO+1NC	FM 652-M2	1NO+1NC
7	LO	FM 734-M2	1NO+1NC	FM 750-M2	1NO+1NC	FM 751-M2	1NO+1NC	FM 752-M2	1NO+1NC
9	L	FM 934-M2	2NC	FM 950-M2	2NC	FM 951-M2	2NC	FM 952-M2	2NC
10	L	FM 1034-M2	2NO	FM 1050-M2	2NO	FM 1051-M2	2NO	FM 1052-M2	2NO
11	R	FM 1134-M2	2NC	FM 1150-M2	2NC	FM 1151-M2	2NC	FM 1152-M2	2NC
12	R	FM 1234-M2	2NO	FM 1250-M2	2NO	FM 1251-M2	2NO	FM 1252-M2	2NO
13	LV	FM 1334-M2	2NC	FM 1350-M2	2NC	FM 1351-M2	2NC	FM 1352-M2	2NC
14	LS	FM 1434-M2	2NC	FM 1450-M2	2NC	FM 1451-M2	2NC	FM 1452-M2	2NC
15	LS	FM 1534-M2	2NO	FM 1550-M2	2NO	FM 1551-M2	2NO	FM 1552-M2	2NO
16	LI	FM 1634-M2	2NC	FM 1650-M2	2NC	FM 1651-M2	2NC	FM 1652-M2	2NC
18	LA	FM 1834-M2	1NO+1NC	FM 1850-M2	1NO+1NC	FM 1851-M2	1NO+1NC	FM 1852-M2	1NO+1NC
20	L	FM 2034-M2	1NO+2NC	FM 2050-M2	1NO+2NC	FM 2051-M2	1NO+2NC	FM 2052-M2	1NO+2NC
21	L	FM 2134-M2	3NC	FM 2150-M2	3NC	FM 2151-M2	3NC	FM 2152-M2	3NC
22	L	FM 2234-M2	2NO+1NC	FM 2250-M2	2NO+1NC	FM 2251-M2	2NO+1NC	FM 2252-M2	2NO+1NC
2	R	FM 234-M2	2x(1NO-1NC)	FM 250-M2	2x(1NO-1NC)	FM 251-M2	2x(1NO-1NC)	FM 252-M2	2x(1NO-1NC)
E1		FM E134-M2	1NO-1NC	FM E150-M2	1NO-1NC	FM E151-M2	1NO-1NC	FM E152-M2	1NO-1NC
Max. speed		1.5 m/s		1.5 m/s		page 215 - type 1		page 215 - type 1	
Actuating force		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)	
Travel diagrams		page 216 - group 5		page 216 - group 5		page 216 - group 5		page 216 - group 5	

All values in the drawings are in mm

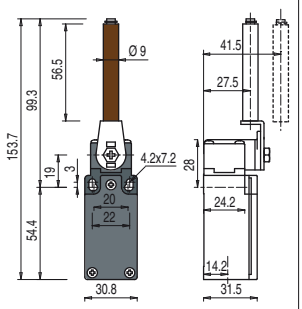
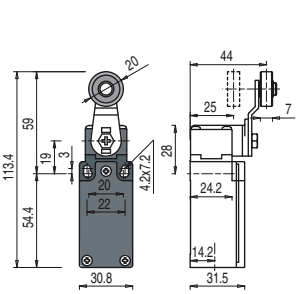
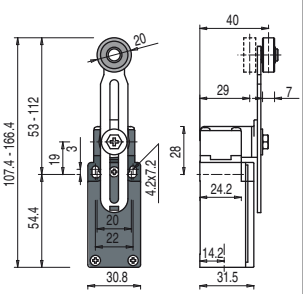
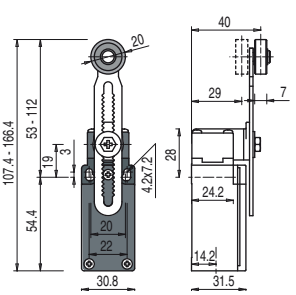
Items with code on **green** background are stock items

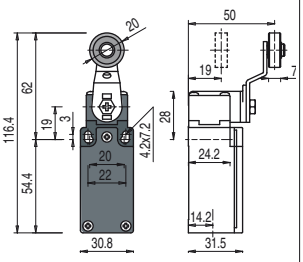
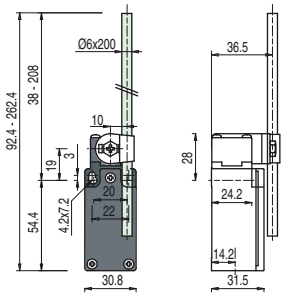
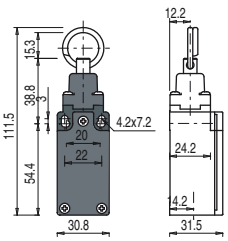
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Porcelain roller	Other rollers available. See on page 78	Other rollers available. See on page 78	Other rollers available. See on page 78
					
5	R	FM 553-E0M2V9 1NO+1NC	FM 554-M2 1NO+1NC	FM 555-M2 (1) 1NO+1NC	FM 556-M2 1NO+1NC
6	L	FM 653-E0M2V9 1NO+1NC	FM 654-M2 1NO+1NC	FM 655-M2 (1) 1NO+1NC	FM 656-M2 1NO+1NC
7	LO	FM 753-E0M2V9 1NO+1NC	FM 754-M2 1NO+1NC	FM 755-M2 (1) 1NO+1NC	FM 756-M2 1NO+1NC
9	L	FM 953-E0M2V9 2NC	FM 954-M2 2NC	FM 955-M2 (1) 2NC	FM 956-M2 2NC
10	L	FM 1053-E0M2V9 2NO	FM 1054-M2 2NO	FM 1055-M2 2NO	FM 1056-M2 2NO
11	R		FM 1154-M2 2NC	FM 1155-M2 (1) 2NC	FM 1156-M2 2NC
12	R	FM 1253-E0M2V9 2NO	FM 1254-M2 2NO	FM 1255-M2 2NO	FM 1256-M2 2NO
13	LV	FM 1353-E0M2V9 2NC	FM 1354-M2 2NC	FM 1355-M2 (1) 2NC	FM 1356-M2 2NC
14	LS	FM 1453-E0M2V9 2NC	FM 1454-M2 2NC	FM 1455-M2 (1) 2NC	FM 1456-M2 2NC
15	LS	FM 1553-E0M2V9 2NO	FM 1554-M2 2NO	FM 1555-M2 2NO	FM 1556-M2 2NO
16	LI		FM 1654-M2 2NC	FM 1655-M2 (1) 2NC	FM 1656-M2 2NC
18	LA	FM 1853-E0M2V9 1NO+1NC	FM 1854-M2 1NO+1NC	FM 1855-M2 (1) 1NO+1NC	FM 1856-M2 1NO+1NC
20	L	FM 2053-E0M2V9 1NO+2NC	FM 2054-M2 1NO+2NC	FM 2055-M2 (1) 1NO+2NC	FM 2056-M2 1NO+2NC
21	L	FM 2153-E0M2V9 3NC	FM 2154-M2 3NC	FM 2155-M2 (1) 3NC	FM 2156-M2 3NC
22	L	FM 2253-E0M2V9 2NO+1NC	FM 2254-M2 2NO+1NC	FM 2255-M2 (1) 2NO+1NC	FM 2256-M2 2NO+1NC
2	R	FM 253-E0M2 2x(1NO-1NC)	FM 254-M2 2x(1NO-1NC)	FM 255-M2 2x(1NO-1NC)	FM 256-M2 2x(1NO-1NC)
E1		FM E153-E0M2V9 1NO-1NC	FM E154-M2 1NO-1NC	FM E155-M2 1NO-1NC	FM E156-M2 1NO-1NC
Max. speed		0.5 m/s	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.03 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)
Travel diagrams		page 216 - group 6	page 216 - group 5	page 216 - group 5	page 216 - group 5

Contact block		Other rollers available. See on page 78	Glass fibre rod	Rope switch for signalling	
					
5	R	FM 557-M2 1NO+1NC	FM 569-M2 1NO+1NC	FM 576-M2 1NO+1NC	
6	L	FM 657-M2 1NO+1NC	FM 669-M2 1NO+1NC	FM 676-M2 1NO+1NC	
7	LO	FM 757-M2 1NO+1NC	FM 769-M2 1NO+1NC	FM 776-M2 1NO+1NC	
9	L	FM 957-M2 2NC	FM 969-M2 2NC	FM 976-M2 2NO	
10	L	FM 1057-M2 2NO	FM 1069-M2 2NO	FM 1076-M2 2NC	
11	R	FM 1157-M2 2NC	FM 1169-M2 2NC	FM 1176-M2 2NO	
12	R	FM 1257-M2 2NO	FM 1269-M2 2NO	FM 1276-M2 2NC	
13	LV	FM 1357-M2 2NC	FM 1369-M2 2NC	FM 1376-M2 2NO	
14	LS	FM 1457-M2 2NC	FM 1469-M2 2NC	FM 1476-M2 2NO	
15	LS	FM 1557-M2 2NO	FM 1569-M2 2NO	FM 1576-M2 2NC	
16	LI	FM 1657-M2 2NC	FM 1669-M2 2NC		
18	LA	FM 1857-M2 1NO+1NC	FM 1869-M2 1NO+1NC	FM 1876-M2 1NO+1NC	
20	L	FM 2057-M2 1NO+2NC	FM 2069-M2 1NO+2NC	FM 2076-M2 2NO+1NC	
21	L	FM 2157-M2 3NC	FM 2169-M2 3NC	FM 2176-M2 3NO	
22	L	FM 2257-M2 2NO+1NC	FM 2269-M2 2NO+1NC	FM 2276-M2 1NO+2NC	
2	R	FM 257-M2 2x(1NO-1NC)	FM 269-M2 2x(1NO-1NC)	FM 276-M2 2x(1NO-1NC)	
E1		FM E157-M2 1NO-1NC	FM E169-M2 1NO-1NC		
Max. speed		page 215 - type 1	1.5 m/s	0.5 m/s	
Actuating force		0.06 Nm (0.25 Nm)	0.06 Nm	initial 20 N - final 40 N	
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 7	

(1) Positive opening only with actuator set to max. See page 77.

All values in the drawings are in mm

Accessories See page 197

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

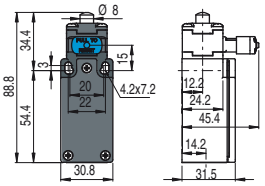
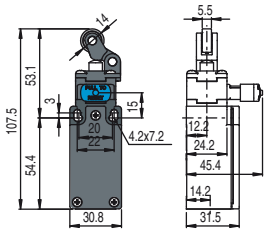
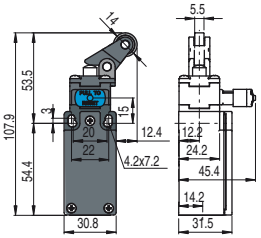
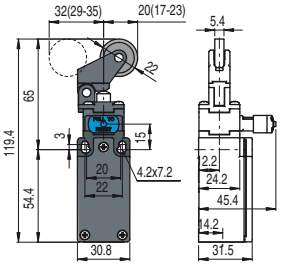
FM series position switches with reset

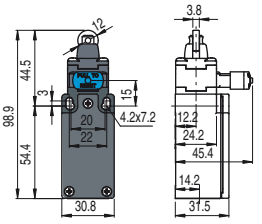
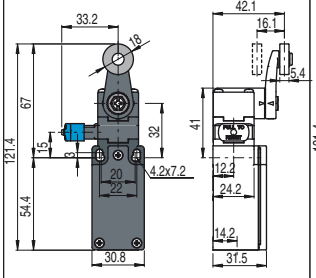
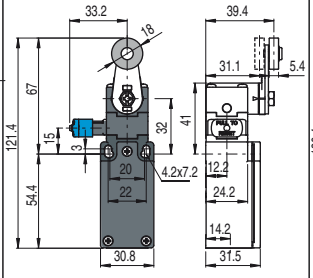
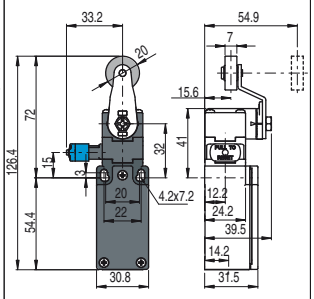
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. This new device consists in a block to be mounted between the body and the head of the switch that can be rotated independently from the head. This new device offers the following advantages:

- The reset device can be integrated into almost all standard actuator heads
- Contact blocks with snap action are no more necessary because the tripping movement is executed by the reset device itself
- The reset device can be rotated independently from the head ensuring maximum flexibility during installation
- Two actuating forces: standard and increased for vibration applications
- Mechanical endurance: 1 million operating cycles.

Contact type:

R = snap action
L = slow action

Contact block					
			With stainless steel roller on request 	With stainless steel roller on request 	
6	L	FM 601-W3M2 → 1NO+1NC	FM 602-W3M2 → 1NO+1NC	FM 605-W3M2 → 1NO+1NC	FM 607-W3M2 → 1NO+1NC
9	L	FM 901-W3M2 → 2NC	FM 902-W3M2 → 2NC	FM 905-W3M2 → 2NC	FM 907-W3M2 → 2NC
10	L	FM 1001-W3M2 2NO	FM 1002-W3M2 2NO	FM 1005-W3M2 2NO	FM 1007-W3M2 2NO
20	L	FM 2001-W3M2 → 1NO+2NC	FM 2002-W3M2 → 1NO+2NC	FM 2005-W3M2 → 1NO+2NC	FM 2007-W3M2 → 1NO+2NC
21	L	FM 2101-W3M2 → 3NC	FM 2102-W3M2 → 3NC	FM 2105-W3M2 → 3NC	FM 2107-W3M2 → 3NC
22	L	FM 2201-W3M2 → 2NO+1NC	FM 2202-W3M2 → 2NO+1NC	FM 2205-W3M2 → 2NO+1NC	FM 2207-W3M2 → 2NO+1NC
2	R	FM 201-W3M2 2NO+2NC	FM 202-W3M2 2NO+2NC	FM 205-W3M2 2NO+2NC	FM 207-W3M2 2NO+2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		4.5 N (25 N →)	4 N (25 N →)	4 N (25 N →)	2.5 N (25 N →)
Travel diagrams		page 217 - group 1	page 217 - group 2	page 217 - group 2	page 217 - group 3

Contact block					
			With Ø 20 mm stainless steel roller on request 	Other rollers available. See on page 78 	Other rollers available. See on page 78 
6	L	FM 615-W3M2R28 →1NO+1NC	FM 630-W3M2 → 1NO+1NC	FM 631-W3M2 → 1NO+1NC	FM 651-W3M2 → 1NO+1NC
9	L	FM 915-W3M2R28 →2NC	FM 930-W3M2 → 2NC	FM 931-W3M2 → 2NC	FM 951-W3M2 → 2NC
10	L	FM 1015-W3M2R28 2NO	FM 1030-W3M2 2NO	FM 1031-W3M2 2NO	FM 1051-W3M2 2NO
20	L	FM 2015-W3M2R28 →1NO+2NC	FM 2030-W3M2 → 1NO+2NC	FM 2031-W3M2 → 1NO+2NC	FM 2051-W3M2 → 1NO+2NC
21	L	FM 2115-W3M2R28 →3NC	FM 2130-W3M2 → 3NC	FM 2131-W3M2 → 3NC	FM 2151-W3M2 → 3NC
22	L	FM 2215-W3M2R28 →2NO+1NC	FM 2230-W3M2 → 2NO+1NC	FM 2231-W3M2 → 2NO+1NC	FM 2251-W3M2 → 2NO+1NC
2	R	FM 215-W3M2R28 2NO+2NC	FM 230-W3M2 2NO+2NC	FM 231-W3M2 2NO+2NC	FM 251-W3M2 2NO+2NC
Max. speed		page 215 - type 2	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		4.5 N (25 N →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 1	page 217 - group 4	page 217 - group 4	page 217 - group 4

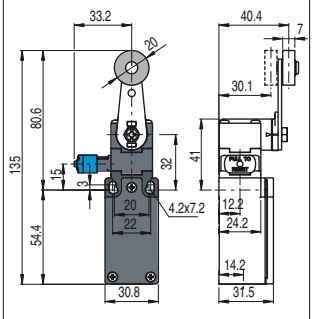
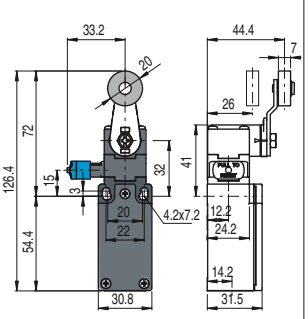
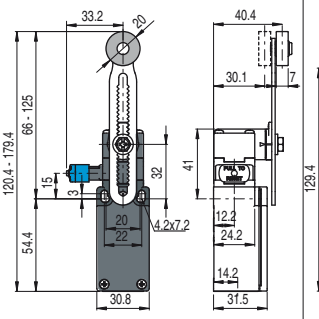
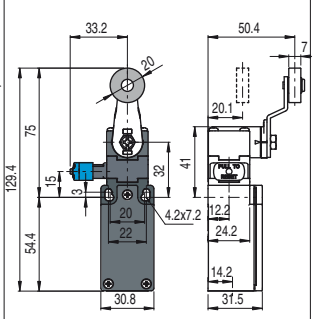
All values in the drawings are in mm

Accessories See page 197

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

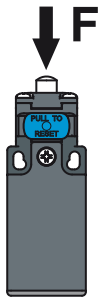
Contact type:

R = snap action
L = slow action

Contact block		Other rollers available. See on page 78	Other rollers available. See on page 78	Other rollers available. See on page 78	Other rollers available. See on page 78
					
6	L	FM 652-W3M2 → 1NO+1NC	FM 654-W3M2 → 1NO+1NC	FM 656-W3M2 → 1NO+1NC	FM 657-W3M2 → 1NO+1NC
9	L	FM 952-W3M2 → 2NC	FM 954-W3M2 → 2NC	FM 956-W3M2 → 2NC	FM 957-W3M2 → 2NC
10	L	FM 1052-W3M2 2NO	FM 1054-W3M2 2NO	FM 1056-W3M2 2NO	FM 1057-W3M2 2NO
20	L	FM 2052-W3M2 → 1NO+2NC	FM 2054-W3M2 → 1NO+2NC	FM 2056-W3M2 → 1NO+2NC	FM 2057-W3M2 → 1NO+2NC
21	L	FM 2152-W3M2 → 3NC	FM 2154-W3M2 → 3NC	FM 2156-W3M2 → 3NC	FM 2157-W3M2 → 3NC
22	L	FM 2252-W3M2 → 2NO+1NC	FM 2254-W3M2 → 2NO+1NC	FM 2256-W3M2 → 2NO+1NC	FM 2257-W3M2 → 2NO+1NC
2	R	FM 252-W3M2 2NO+2NC	FM 254-W3M2 2NO+2NC	FM 256-W3M2 2NO+2NC	FM 257-W3M2 2NO+2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

All values in the drawings are in mm

Increased actuating force



The switch can be delivered with increased actuating force (option W4). Ideal for vibration applications.

Actuators	Actuating force
01, 14, 15, 16	7 N
02, 05	6 N
07	3.5 N
30 … 57	0.08 Nm

To order the switch with reset and increased actuating force, replace the -W3 option with -W4 in the order code.
Example: FM 601-**W3**M2 → FM 601-**W4**M2

Accessories See page 197

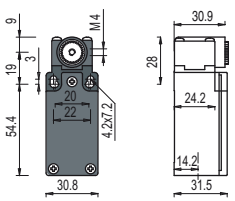
→ The 2D and 3D files are available at **www.pizzato.com**

Position switches with swivelling lever without actuator

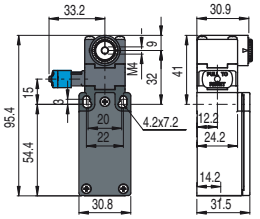
All values in the drawings are in mm

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP



With manual reset knob



Contact block				With manual reset knob	
5	R	FM 538-M2	1NO+1NC		
6	L	FM 638-M2	1NO+1NC	FM 638-W3M2	1NO+1NC
7	LO	FM 738-M2	1NO+1NC		
9	L	FM 938-M2	2NC	FM 938-W3M2	2NC
10	L	FM 1038-M2	2NO	FM 1038-W3M2	2NO
11	R	FM 1138-M2	2NC		
12	R	FM 1238-M2	2NO		
13	LV	FM 1338-M2	2NC		
14	LS	FM 1438-M2	2NC		
15	LS	FM 1538-M2	2NO		
16	LI	FM 1638-M2	2NC		
18	LA	FM 1838-M2	1NO+1NC		
20	L	FM 2038-M2	1NO+2NC	FM 2038-W3M2	1NO+2NC
21	L	FM 2138-M2	3NC	FM 2138-W3M2	3NC
22	L	FM 2238-M2	2NO+1NC	FM 2238-W3M2	2NO+1NC
2	R	FM 238-M2	2x(1NO-1NC)	FM 238-W3M2	2NO+2NC
E1		FM E138-M2	1NO-1NC		
Actuating force		0.06 Nm (0.25 Nm ⊖)		0.07 Nm (0.25 Nm ⊖)	
Travel diagrams		page 216 - group 5		page 217 - group 4	

IMPORTANT

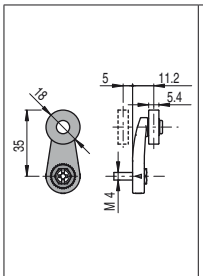
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

All values in the drawings are in mm

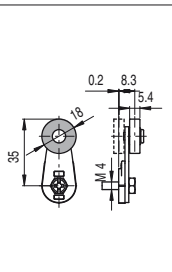
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Technopolymer roller Ø 18 mm



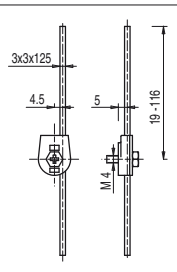
VF LE30 ⊖

Technopolymer roller Ø 18 mm



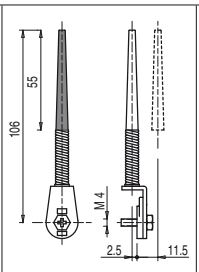
VF LE31 ⊖

Adjustable square rod, 3x3x125 mm



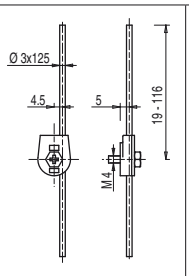
VF LE33

Flexible rod with pointed end



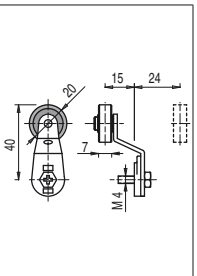
VF LE34

Adjustable round rod Ø 3 x 125 mm



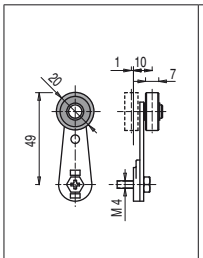
VF LE50

Technopolymer roller Ø 20 mm



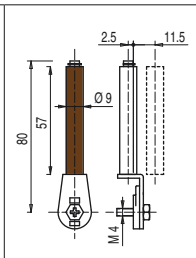
VF LE51 ⊖

Technopolymer roller Ø 20 mm



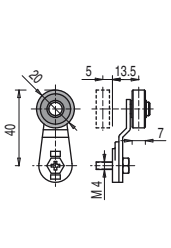
VF LE52 ⊖

Porcelain roller



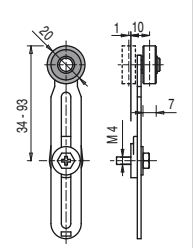
VF LE53 ⊖ (2)

Technopolymer roller Ø 20 mm



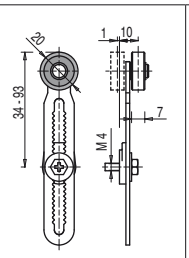
VF LE54 ⊖

Adjustable actuator with technopolymer roller



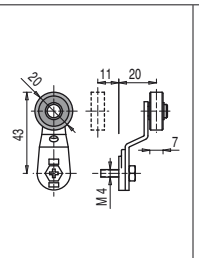
VF LE55 ⊖ (1)

Adjustable safety actuator with technopolymer roller



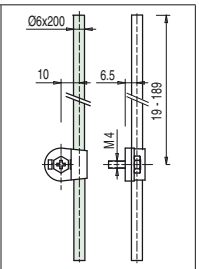
VF LE56 ⊖

Technopolymer roller Ø 20 mm



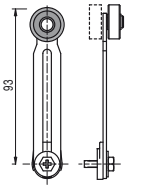
VF LE57 ⊖

Adjustable glass fibre rod



VF LE69

- (1) Actuator VF LE55 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 LE56 adjustable safety lever.
- (2) The position switch obtained by assembling switch FM •38-M2 (e.g. FM 538-M2, FM 638-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FM •53-E0M2V9 (e.g. FM 553-E0M2V9, FM 653-E0M2V9…).
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

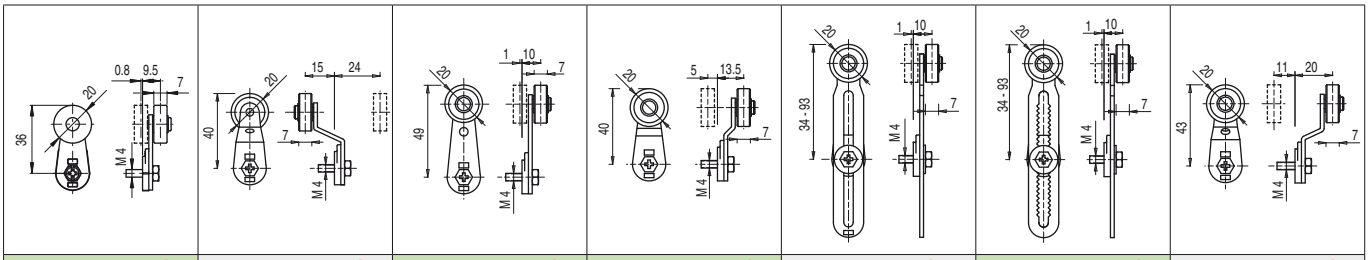
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

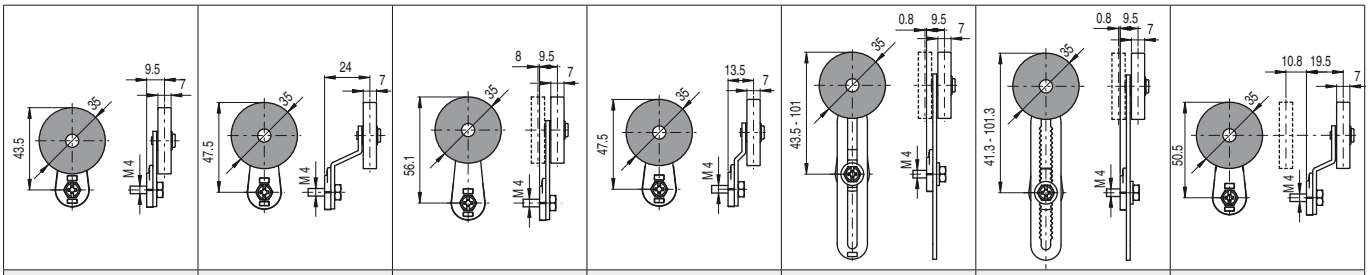
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Stainless steel rollers, Ø 20 mm



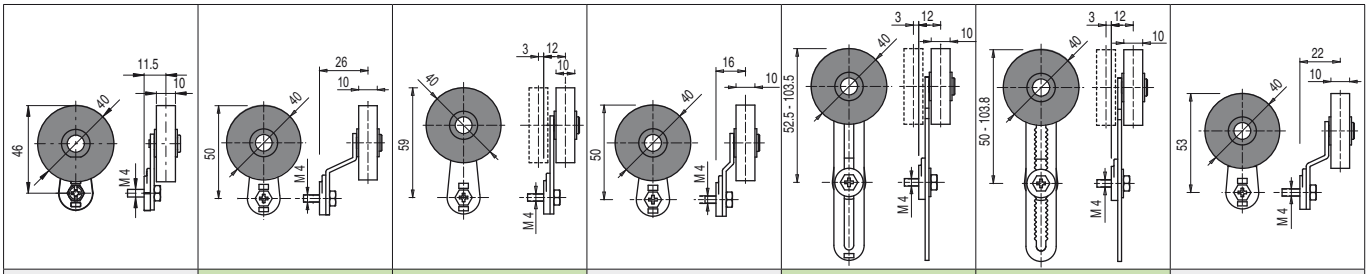
VF LE31-R24 | VF LE51-R24 | VF LE52-R24 | VF LE54-R24 | VF LE55-R24 (1) | VF LE56-R24 | VF LE57-R24

Technopolymer rollers, Ø 35 mm



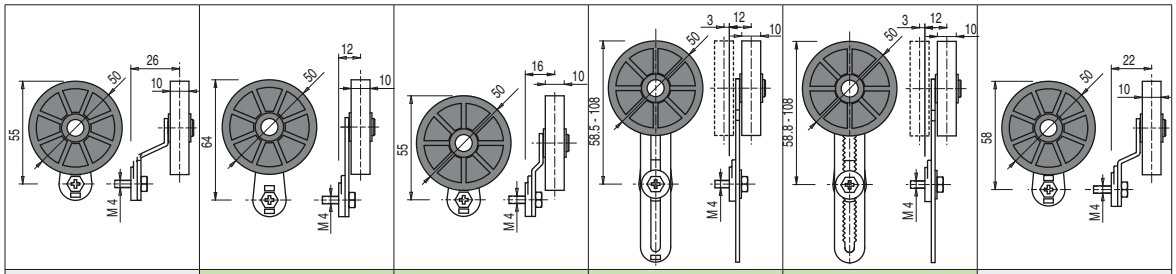
VF LE31-R25 (4) | VF LE51-R25 (4) | VF LE52-R25 | VF LE54-R25 (4) | VF LE55-R25 (1) | VF LE56-R25 | VF LE57-R25

Rubber rollers, Ø 40 mm



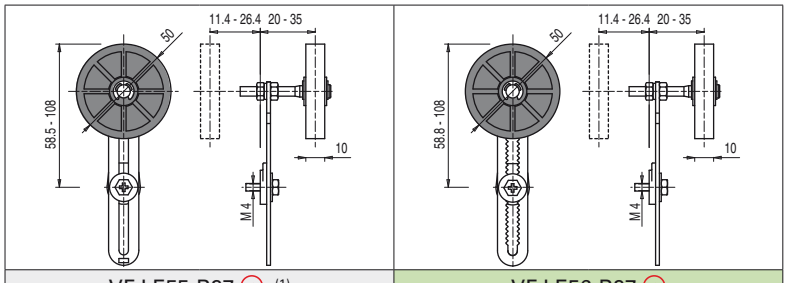
VF LE31-R5 (4) | VF LE51-R5 (4) | VF LE52-R5 | VF LE54-R5 (4) | VF LE55-R5 (1) | VF LE56-R5 | VF LE57-R5 (4)

Rubber rollers, Ø 50 mm



VF LE51-R26 (4) | VF LE52-R26 (4) | VF LE54-R26 (4) | VF LE55-R26 (1) | VF LE56-R26 | VF LE57-R26 (4)

Protruding rubber rollers, Ø 50 mm



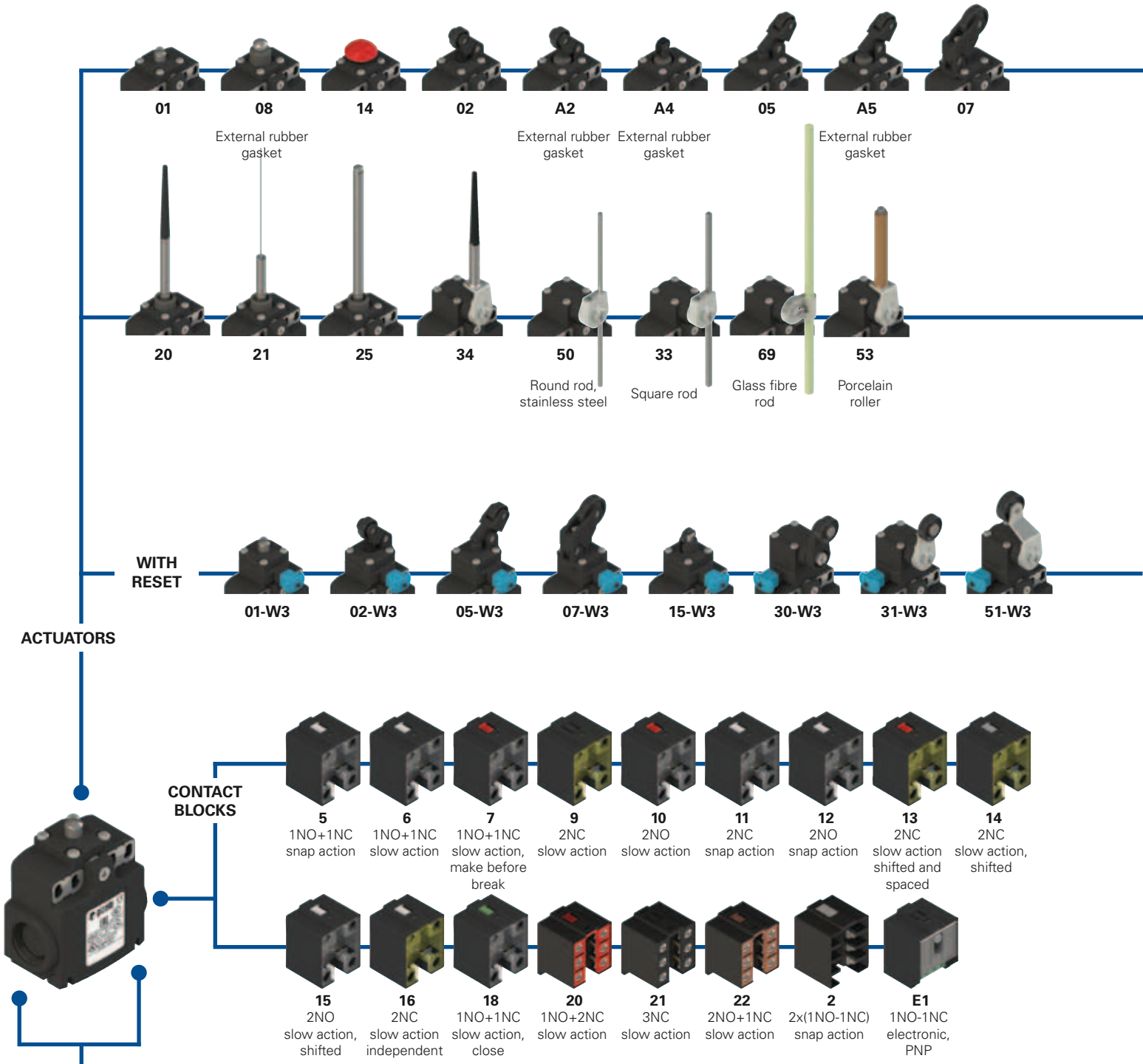
VF LE55-R27 (1) | VF LE56-R27

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

Accessories See page 197

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

Selection diagram



Threaded conduit entry	
M2	M20x1.5 (standard)
M1	M16x1.5
	PG 13.5
A	PG 11

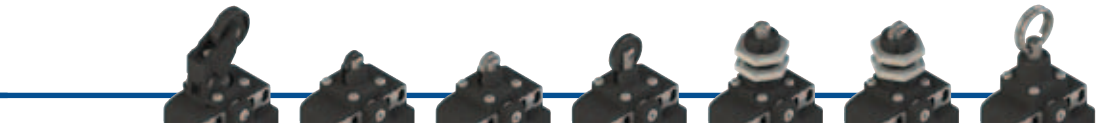
With cable gland	
K123	for cables Ø 6 … 12 mm on the right
K223	for cables Ø 6 … 12 mm on the left
K127	for cables Ø 3 … 7 mm on the right
K227	for cables Ø 3 … 7 mm on the left

With M12 plastic connector	
K71	4-pole, right
K72	4-pole, left
K46	8-pole, right
K47	8-pole, left

With M12 metal connector	
K41	8-pole, right
K42	8-pole, left
K61	4-pole, right
K62	4-pole, left

product options

Sold separately as accessory



A7 External rubber gasket

15 Roller Ø 11 mm

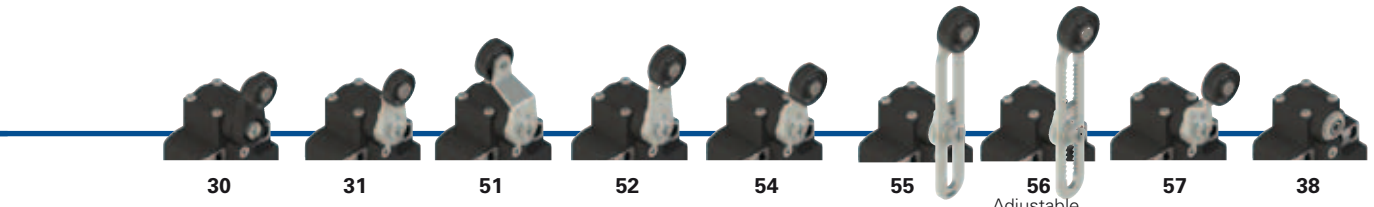
15-R28 Roller Ø 12 mm, stainless steel

16 Roller Ø 20 mm

12

13 Roller Ø 12 mm, stainless steel

76 Rope switch for signalling



30

31

51

52

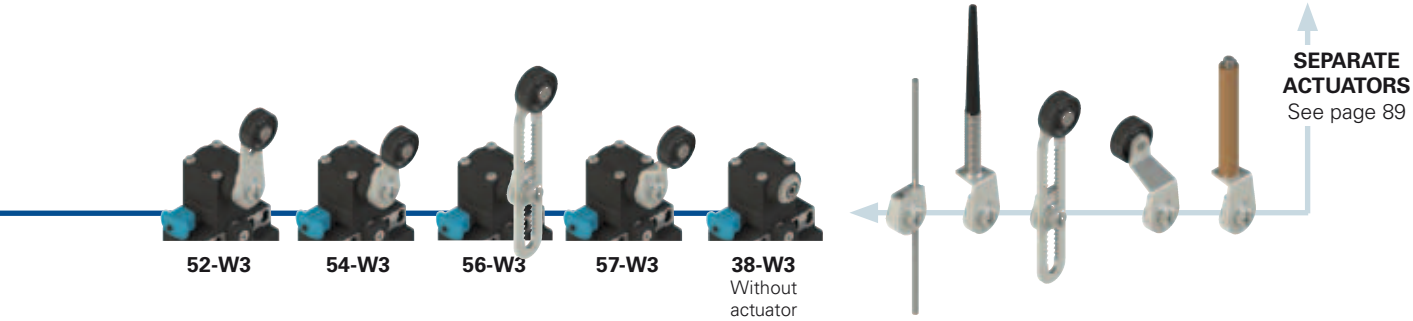
54

55 Adjustable lever

56 Adjustable safety lever

57

38 Without actuator



52-W3

54-W3

56-W3

57-W3

38-W3 Without actuator

SEPARATE ACTUATORS See page 89

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

FX 502-W3XGM2K71R23T6

Housing

FX	technopolymer, two 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
05	angled lever with roller
...	.....

Reset

	without reset (standard)
W3	simultaneous reset
W4	simultaneous reset, increased force

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Contact type

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

Threaded conduit entry

M2	M20x1.5 (standard)
M1	M16x1.5
	PG 13.5
A	PG11

Pre-installed cable glands or connectors

	no cable gland or connector (standard)
K123	cable gland for cables Ø 6 ... 12 mm on the right
K71	M12 plastic connector, 4-pole, right

For the complete list of possible combinations please contact our technical department.

Ambient temperature

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

Rollers

	standard roller
R28	stainless steel Ø 12 mm (for actuators A4, 15)
R23	stainless steel Ø 14 mm (for actuators A2, 02, A5, 05, 30, 31, 51, 52, 54, 55, 56, 57)
R24	stainless steel Ø 20 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R5	rubber, Ø 40 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R26	rubber, Ø 50 mm (for actuators 51, 52, 54, 55, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 55, 56)

Main features

- Technopolymer housing, two conduit entries
- Protection degree IP67
- 17 contact blocks available
- 43 actuators available
- Versions with external parts in stainless steel
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈

Two knock-out threaded conduit entries.	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2007010305230013
EAC approval:	RU C-IT.АД35.В.00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 216. 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 on pages 211 to 222.**

	Electrical data		Utilization category
without connector	Thermal current (I_{th}):	10 A	
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 20, 21, 22, 33, 34)	Alternating current: AC15 (50÷60 Hz) 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 Ue (V) 24 125 250 Ie (A) 6 1.1 0.4
	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	
with M12 connector 4-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 120 250 Ie (A) 4 4 4
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	
	Protection against short circuits:	type gG fuse 4 A 500 V	Direct current: DC13 Ue (V) 24 125 250 Ie (A) 4 1.1 0.4
	Pollution degree:	3	
with M12 connector 8-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 Ie (A) 2
	Rated insulation voltage (U_i):	30 Vac 36 Vdc	
	Protection against short circuits:	type gG fuse 2 A 500 V	Direct current: DC13 Ue (V) 24 Ie (A) 2
	Pollution degree:	3	

Features approved by IMQ

Rated insulation voltage (U_i):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 20, 21,22, 33, 34)
Conventional free air thermal current (I_{th}):	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 (U_e):	400 Vac (50 Hz)
Operating current (I_e):	3 A

Forms of the contact element: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

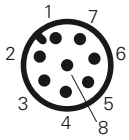
Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 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).

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

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

Wiring diagram for M12 connectors

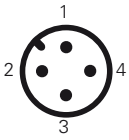
Contact block 2 — 1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

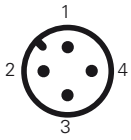
Contact block 5 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

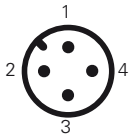
Contact block 6 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

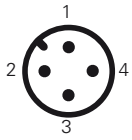
Contact block 7 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NC	3-4

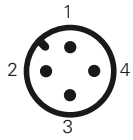
Contact block 9 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

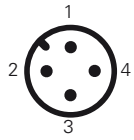
Contact block 10 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

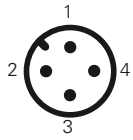
Contact block 11 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

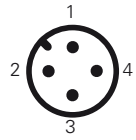
Contact block 12 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

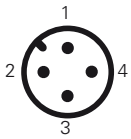
Contact block 13 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

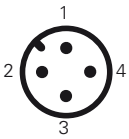
Contact block 14 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

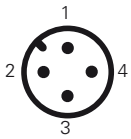
Contact block 15 — 2NO



M12 connector, 4-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4

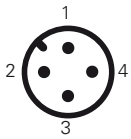
Contact block 16 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4

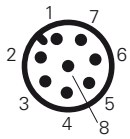
Contact block 18 — 1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

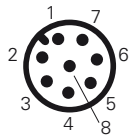
Contact block 20 — 2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8

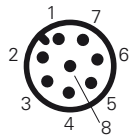
Contact block 21 — 3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8

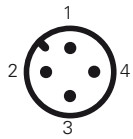
Contact block 22 — 1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8

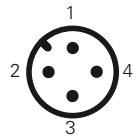
Contact block 33 — 1NC+1NO



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

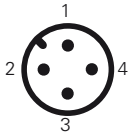
Contact block 34 — 2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

Contact block E1 — PNP



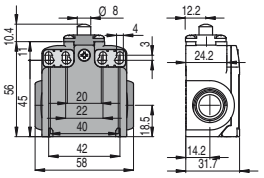
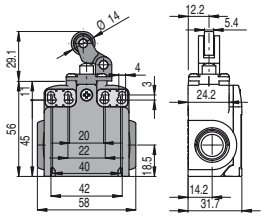
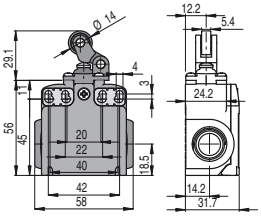
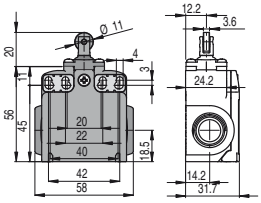
M12 connector, 4-pole

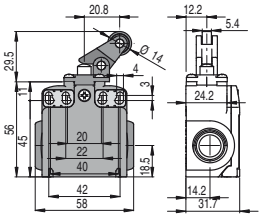
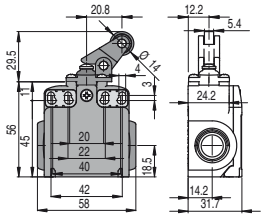
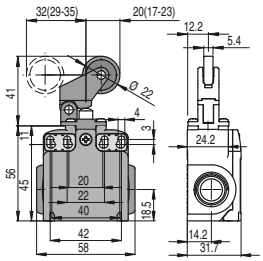
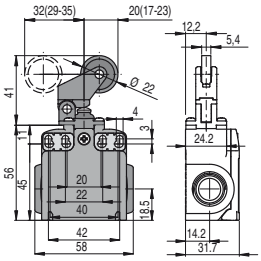
Contacts	Pin no.
+	1
-	3
NC	2
NO	4

FX series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block					
			With stainless steel roller on request	With external rubber gasket With stainless steel roller on request	With external rubber gasket With Ø 12 mm stainless steel roller on request
					
5	R	FX 501-M2 1NO+1NC	FX 502-M2 1NO+1NC	FX 5A2-M2 1NO+1NC	FX 5A4-M2 1NO+1NC
6	L	FX 601-M2 1NO+1NC	FX 602-M2 1NO+1NC	FX 6A2-M2 1NO+1NC	FX 6A4-M2 1NO+1NC
7	LO	FX 701-M2 1NO+1NC	FX 702-M2 1NO+1NC	FX 7A2-M2 1NO+1NC	FX 7A4-M2 1NO+1NC
9	L	FX 901-M2 2NC	FX 902-M2 2NC	FX 9A2-M2 2NC	FX 9A4-M2 2NC
10	L	FX 1001-M2 2NO	FX 1002-M2 2NO	FX 10A2-M2 2NO	FX 10A4-M2 2NO
11	R	FX 1101-M2 2NC	FX 1102-M2 2NC	FX 11A2-M2 2NC	FX 11A4-M2 2NC
12	R	FX 1201-M2 2NO	FX 1202-M2 2NO	FX 12A2-M2 2NO	FX 12A4-M2 2NO
13	LV	FX 1301-M2 2NC	FX 1302-M2 2NC	FX 13A2-M2 2NC	FX 13A4-M2 2NC
14	LS	FX 1401-M2 2NC	FX 1402-M2 2NC	FX 14A2-M2 2NC	FX 14A4-M2 2NC
15	LS	FX 1501-M2 2NO	FX 1502-M2 2NO	FX 15A2-M2 2NO	FX 15A4-M2 2NO
18	LA	FX 1801-M2 1NO+1NC	FX 1802-M2 1NO+1NC	FX 18A2-M2 1NO+1NC	FX 18A4-M2 1NO+1NC
20	L	FX 2001-M2 1NO+2NC	FX 2002-M2 1NO+2NC	FX 20A2-M2 1NO+2NC	FX 20A4-M2 1NO+2NC
21	L	FX 2101-M2 3NC	FX 2102-M2 3NC	FX 21A2-M2 3NC	FX 21A4-M2 3NC
22	L	FX 2201-M2 2NO+1NC	FX 2202-M2 2NO+1NC	FX 22A2-M2 2NO+1NC	FX 22A4-M2 2NO+1NC
2	R	FX 201-M2 2x(1NO-1NC)	FX 202-M2 2x(1NO-1NC)	FX 2A2-M2 2x(1NO-1NC)	FX 2A4-M2 2x(1NO-1NC)
E1		FX E101-M2 1NO-1NC	FX E102-M2 1NO-1NC	FX E1A2-M2 1NO-1NC	FX E1A4-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 5
Actuating force		8 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 1

Contact block			With stainless steel roller on request	With external rubber gasket With stainless steel roller on request		With external rubber gasket
						
5	R	FX 505-M2 1NO+1NC	FX 5A5-M2 1NO+1NC	FX 507-M2 1NO+1NC		FX 5A7-M2 1NO+1NC
6	L	FX 605-M2 1NO+1NC	FX 6A5-M2 1NO+1NC	FX 607-M2 1NO+1NC		FX 6A7-M2 1NO+1NC
7	LO	FX 705-M2 1NO+1NC	FX 7A5-M2 1NO+1NC	FX 707-M2 1NO+1NC		FX 7A7-M2 1NO+1NC
9	L	FX 905-M2 2NC	FX 9A5-M2 2NC	FX 907-M2 2NC		FX 9A7-M2 2NC
10	L	FX 1005-M2 2NO	FX 10A5-M2 2NO	FX 1007-M2 2NO		FX 10A7-M2 2NO
11	R	FX 1105-M2 2NC	FX 11A5-M2 2NC	FX 1107-M2 2NC		FX 11A7-M2 2NC
12	R	FX 1205-M2 2NO	FX 12A5-M2 2NO	FX 1207-M2 2NO		FX 12A7-M2 2NO
13	LV	FX 1305-M2 2NC	FX 13A5-M2 2NC	FX 1307-M2 2NC		FX 13A7-M2 2NC
14	LS	FX 1405-M2 2NC	FX 14A5-M2 2NC	FX 1407-M2 2NC		FX 14A7-M2 2NC
15	LS	FX 1505-M2 2NO	FX 15A5-M2 2NO	FX 1507-M2 2NO		FX 15A7-M2 2NO
18	LA	FX 1805-M2 1NO+1NC	FX 18A5-M2 1NO+1NC	FX 1807-M2 1NO+1NC		FX 18A7-M2 1NO+1NC
20	L	FX 2005-M2 1NO+2NC	FX 20A5-M2 1NO+2NC	FX 2007-M2 1NO+2NC		FX 20A7-M2 1NO+2NC
21	L	FX 2105-M2 3NC	FX 21A5-M2 3NC	FX 2107-M2 3NC		FX 21A7-M2 3NC
22	L	FX 2205-M2 2NO+1NC	FX 22A5-M2 2NO+1NC	FX 2207-M2 2NO+1NC		FX 22A7-M2 2NO+1NC
2	R	FX 205-M2 2x(1NO-1NC)	FX 2A5-M2 2x(1NO-1NC)	FX 207-M2 2x(1NO-1NC)		FX 2A7-M2 2x(1NO-1NC)
E1		FX E105-M2 1NO-1NC	FX E1A5-M2 1NO-1NC	FX E107-M2 1NO-1NC		FX E1A7-M2 1NO-1NC
Max. speed		page 215 - type 3	page 215 - type 3	page 215 - type 3		page 215 - type 3
Actuating force		6 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)		3 N (25 N →)
Travel diagrams		page 216 - group 2	page 216 - group 2	page 216 - group 3		page 216 - group 3

All values in the drawings are in mm

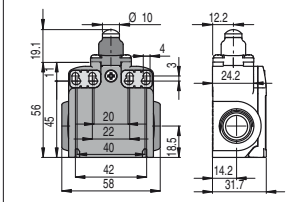
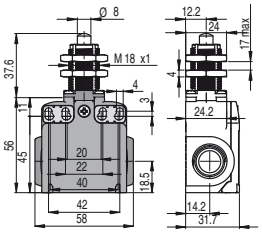
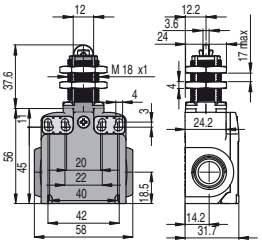
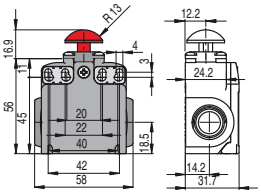
Items with code on **green** background are stock items

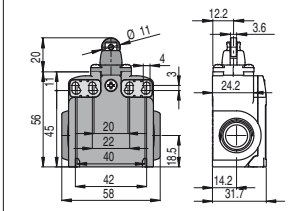
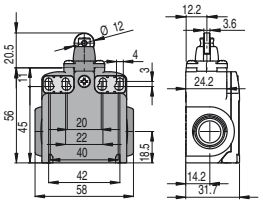
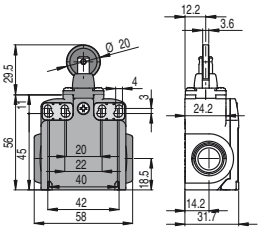
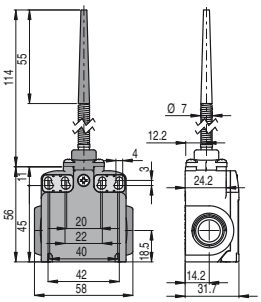
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		With external rubber gasket			
					
5	R	FX 508-M2 → 1NO+1NC	FX 512-M2 → 1NO+1NC	FX 513-M2 → 1NO+1NC	FX 514-M2 → 1NO+1NC
6	L	FX 608-M2 → 1NO+1NC	FX 612-M2 → 1NO+1NC	FX 613-M2 → 1NO+1NC	FX 614-M2 → 1NO+1NC
7	LO	FX 708-M2 → 1NO+1NC	FX 712-M2 → 1NO+1NC	FX 713-M2 → 1NO+1NC	FX 714-M2 → 1NO+1NC
9	L	FX 908-M2 → 2NC	FX 912-M2 → 2NC	FX 913-M2 → 2NC	FX 914-M2 → 2NC
10	L	FX 1008-M2 2NO	FX 1012-M2 2NO	FX 1013-M2 2NO	FX 1014-M2 2NO
11	R	FX 1108-M2 → 2NC	FX 1112-M2 → 2NC	FX 1113-M2 → 2NC	FX 1114-M2 → 2NC
12	R	FX 1208-M2 2NO	FX 1212-M2 2NO	FX 1213-M2 2NO	FX 1214-M2 2NO
13	LV	FX 1308-M2 → 2NC	FX 1312-M2 → 2NC	FX 1313-M2 → 2NC	FX 1314-M2 → 2NC
14	LS	FX 1408-M2 → 2NC	FX 1412-M2 → 2NC	FX 1413-M2 → 2NC	FX 1414-M2 → 2NC
15	LS	FX 1508-M2 2NO	FX 1512-M2 2NO	FX 1513-M2 2NO	FX 1514-M2 2NO
18	LA	FX 1808-M2 → 1NO+1NC	FX 1812-M2 → 1NO+1NC	FX 1813-M2 → 1NO+1NC	FX 1814-M2 → 1NO+1NC
20	L	FX 2008-M2 → 1NO+2NC	FX 2012-M2 → 1NO+2NC	FX 2013-M2 → 1NO+2NC	FX 2014-M2 → 1NO+2NC
21	L	FX 2108-M2 → 3NC	FX 2112-M2 → 3NC	FX 2113-M2 → 3NC	FX 2114-M2 → 3NC
22	L	FX 2208-M2 → 2NO+1NC	FX 2212-M2 → 2NO+1NC	FX 2213-M2 → 2NO+1NC	FX 2214-M2 → 2NO+1NC
2	R	FX 208-M2 2x(1NO-1NC)	FX 212-M2 2x(1NO-1NC)	FX 213-M2 2x(1NO-1NC)	FX 214-M2 2x(1NO-1NC)
E1		FX E108-M2 1NO-1NC	FX E112-M2 1NO-1NC	FX E113-M2 1NO-1NC	FX E114-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 4	page 215 - type 2	page 215 - type 4
Actuating force		8 N (25 N →)	8 N (25 N →)	8 N (25 N →)	8 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

Contact block		Roller, Ø 11 mm, technopolymer	Roller, Ø 12 mm, stainless steel		With external rubber gasket
					
5	R	FX 515-M2 → 1NO+1NC	FX 515-M2R28 → 1NO+1NC	FX 516-M2 → 1NO+1NC	FX 520-M2 1NO+1NC
6	L	FX 615-M2 → 1NO+1NC	FX 615-M2R28 → 1NO+1NC	FX 616-M2 → 1NO+1NC	
7	LO	FX 715-M2 → 1NO+1NC	FX 715-M2R28 → 1NO+1NC	FX 716-M2 → 1NO+1NC	
9	L	FX 915-M2 → 2NC	FX 915-M2R28 → 2NC	FX 916-M2 → 2NC	
10	L	FX 1015-M2 2NO	FX 1015-M2R28 2NO	FX 1016-M2 2NO	FX 1020-M2 2NO
11	R	FX 1115-M2 → 2NC	FX 1115-M2R28 → 2NC	FX 1116-M2 → 2NC	
12	R	FX 1215-M2 2NO	FX 1215-M2R28 2NO	FX 1216-M2 2NO	FX 1220-M2 2NO
13	LV	FX 1315-M2 → 2NC	FX 1315-M2R28 → 2NC	FX 1316-M2 → 2NC	
14	LS	FX 1415-M2 → 2NC	FX 1415-M2R28 → 2NC	FX 1416-M2 → 2NC	
15	LS	FX 1515-M2 2NO	FX 1515-M2R28 2NO	FX 1516-M2 2NO	
18	LA	FX 1815-M2 → 1NO+1NC	FX 1815-M2R28 → 1NO+1NC	FX 1816-M2 → 1NO+1NC	FX 1820-M2 1NO+1NC
20	L	FX 2015-M2 → 1NO+2NC	FX 2015-M2R28 → 1NO+2NC	FX 2016-M2 → 1NO+2NC	FX 2020-M2 1NO+2NC
21	L	FX 2115-M2 → 3NC	FX 2115-M2R28 → 3NC	FX 2116-M2 → 3NC	FX 2120-M2 3NC
22	L	FX 2215-M2 → 2NO+1NC	FX 2215-M2R28 → 2NO+1NC	FX 2216-M2 → 2NO+1NC	FX 2220-M2 2NO+1NC
2	R	FX 215-M2 2x(1NO-1NC)	FX 215-M2R28 2x(1NO-1NC)	FX 216-M2 2x(1NO-1NC)	FX 220-M2 2x(1NO-1NC)
E1		FX E115-M2 1NO-1NC	FX E115-M2R28 1NO-1NC	FX E116-M2 1NO-1NC	FX E120-M2 1NO-1NC
Max. speed		page 215 - type 2	page 215 - type 2	page 215 - type 2	1 m/s
Actuating force		8 N (25 N →)	8 N (25 N →)	8 N (25 N →)	0.07 Nm
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 4

All values in the drawings are in mm

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

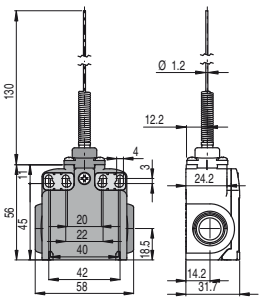
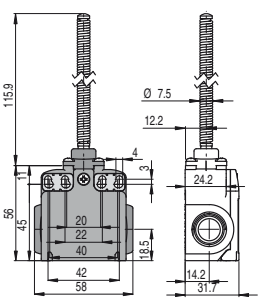
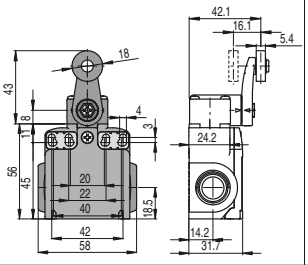
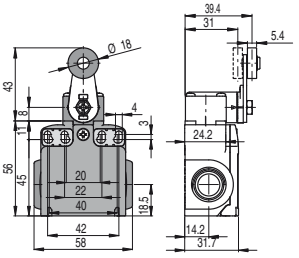
Accessories See page 197

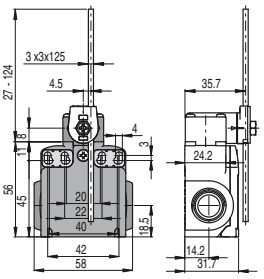
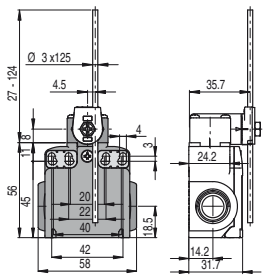
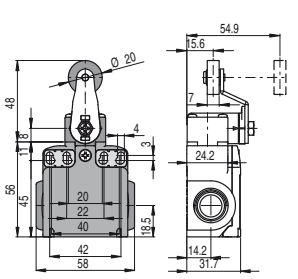
→ The 2D and 3D files are available at **www.pizzato.com**

FX series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		With external rubber gasket		With external rubber gasket		With Ø 20 mm stainless steel roller on request		Other rollers available. See on page 90	
									
5	R	FX 521-M2	1NO+1NC	FX 525-M2	1NO+1NC	FX 530-M2 →	1NO+1NC	FX 531-M2 →	1NO+1NC
6	L					FX 630-M2 →	1NO+1NC	FX 631-M2 →	1NO+1NC
7	LO					FX 730-M2 →	1NO+1NC	FX 731-M2 →	1NO+1NC
9	L					FX 930-M2 →	2NC	FX 931-M2 →	2NC
10	L	FX 1021-M2	2NO	FX 1025-M2	2NO	FX 1030-M2	2NO	FX 1031-M2	2NO
11	R					FX 1130-M2 →	2NC	FX 1131-M2 →	2NC
12	R	FX 1221-M2	2NO	FX 1225-M2	2NO	FX 1230-M2	2NO	FX 1231-M2	2NO
13	LV					FX 1330-M2 →	2NC	FX 1331-M2 →	2NC
14	LS					FX 1430-M2 →	2NC	FX 1431-M2 →	2NC
15	LS					FX 1530-M2	2NO	FX 1531-M2	2NO
16	LI					FX 1630-M2 →	2NC	FX 1631-M2 →	2NC
18	LA	FX 1821-M2	1NO+1NC	FX 1825-M2	1NO+1NC	FX 1830-M2 →	1NO+1NC	FX 1831-M2 →	1NO+1NC
20	L	FX 2021-M2	1NO+2NC	FX 2025-M2	1NO+2NC	FX 2030-M2 →	1NO+2NC	FX 2031-M2 →	1NO+2NC
21	L	FX 2121-M2	3NC	FX 2125-M2	3NC	FX 2130-M2 →	3NC	FX 2131-M2 →	3NC
22	L	FX 2221-M2	2NO+1NC	FX 2225-M2	2NO+1NC	FX 2230-M2 →	2NO+1NC	FX 2231-M2 →	2NO+1NC
2	R	FX 221-M2	2x(1NO-1NC)	FX 225-M2	2x(1NO-1NC)	FX 230-M2	2x(1NO-1NC)	FX 231-M2	2x(1NO-1NC)
E1		FX E121-M2	1NO-1NC	FX E125-M2	1NO-1NC	FX E130-M2	1NO-1NC	FX E131-M2	1NO-1NC
Max. speed		1 m/s		1 m/s		page 215 - type 1		page 215 - type 1	
Actuating force		0.07 Nm		0.12 Nm		0.06 Nm (0.25 Nm →)		0.06 Nm (0.25 Nm →)	
Travel diagrams		page 216 - group 4		page 216 - group 4		page 216 - group 5		page 216 - group 5	

Contact block		Square rod, 3x3 mm		Round rod, Ø 3 mm, stainless steel		Other rollers available. See on page 90	
							
5	R	FX 533-M2	1NO+1NC	FX 534-M2	1NO+1NC	FX 550-M2	1NO+1NC	FX 551-M2 →	1NO+1NC
6	L	FX 633-M2	1NO+1NC	FX 634-M2	1NO+1NC	FX 650-M2	1NO+1NC	FX 651-M2 →	1NO+1NC
7	LO	FX 733-M2	1NO+1NC	FX 734-M2	1NO+1NC	FX 750-M2	1NO+1NC	FX 751-M2 →	1NO+1NC
9	L	FX 933-M2	2NC	FX 934-M2	2NC	FX 950-M2	2NC	FX 951-M2 →	2NC
10	L	FX 1033-M2	2NO	FX 1034-M2	2NO	FX 1050-M2	2NO	FX 1051-M2	2NO
11	R	FX 1133-M2	2NC	FX 1134-M2	2NC	FX 1150-M2	2NC	FX 1151-M2 →	2NC
12	R	FX 1233-M2	2NO	FX 1234-M2	2NO	FX 1250-M2	2NO	FX 1251-M2	2NO
13	LV	FX 1333-M2	2NC	FX 1334-M2	2NC	FX 1350-M2	2NC	FX 1351-M2 →	2NC
14	LS	FX 1433-M2	2NC	FX 1434-M2	2NC	FX 1450-M2	2NC	FX 1451-M2 →	2NC
15	LS	FX 1533-M2	2NO	FX 1534-M2	2NO	FX 1550-M2	2NO	FX 1551-M2	2NO
16	LI	FX 1633-M2	2NC	FX 1634-M2	2NC	FX 1650-M2	2NC	FX 1651-M2 →	2NC
18	LA	FX 1833-M2	1NO+1NC	FX 1834-M2	1NO+1NC	FX 1850-M2	1NO+1NC	FX 1851-M2 →	1NO+1NC
20	L	FX 2033-M2	1NO+2NC	FX 2034-M2	1NO+2NC	FX 2050-M2	1NO+2NC	FX 2051-M2 →	1NO+2NC
21	L	FX 2133-M2	3NC	FX 2134-M2	3NC	FX 2150-M2	3NC	FX 2151-M2 →	3NC
22	L	FX 2233-M2	2NO+1NC	FX 2234-M2	2NO+1NC	FX 2250-M2	2NO+1NC	FX 2251-M2 →	2NO+1NC
2	R	FX 233-M2	2x(1NO-1NC)	FX 234-M2	2x(1NO-1NC)	FX 250-M2	2x(1NO-1NC)	FX 251-M2	2x(1NO-1NC)
E1		FX E133-M2	1NO-1NC	FX E134-M2	1NO-1NC	FX E150-M2	1NO-1NC	FX E151-M2	1NO-1NC
Max. speed		1.5 m/s		1.5 m/s		1.5 m/s		page 215 - type 1	
Actuating force		0.06 Nm		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm →)	
Travel diagrams		page 216 - group 5		page 216 - group 5		page 216 - group 5		page 216 - group 5	

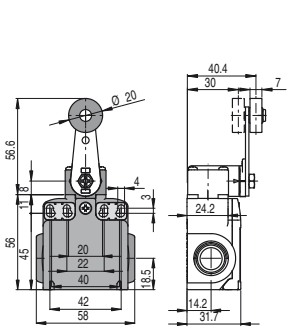
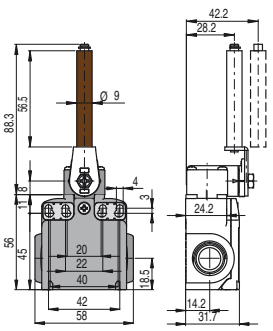
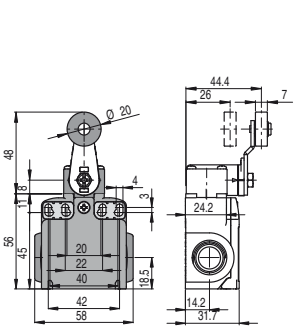
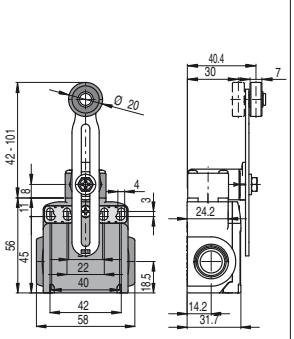
All values in the drawings are in mm

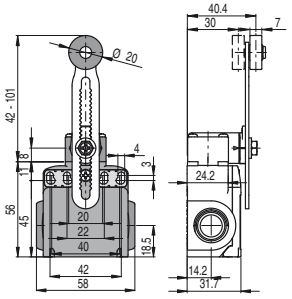
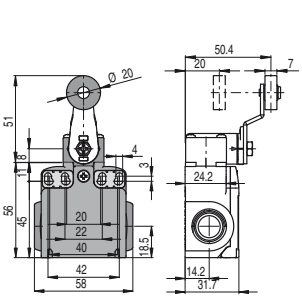
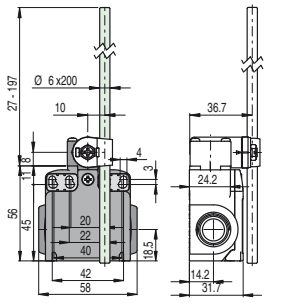
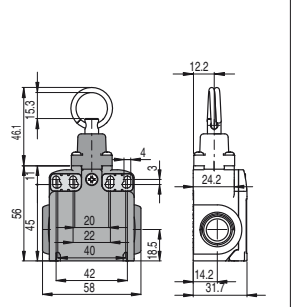
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Other rollers available. See on page 90	Porcelain roller	Other rollers available. See on page 90	Other rollers available. See on page 90
					
5	R	FX 552-M2 → 1NO+1NC	FX 553-E0M2V9 → 1NO+1NC	FX 554-M2 → 1NO+1NC	FX 555-M2 → (1) 1NO+1NC
6	L	FX 652-M2 → 1NO+1NC	FX 653-E0M2V9 → 1NO+1NC	FX 654-M2 → 1NO+1NC	FX 655-M2 → (1) 1NO+1NC
7	LO	FX 752-M2 → 1NO+1NC	FX 753-E0M2V9 → 1NO+1NC	FX 754-M2 → 1NO+1NC	FX 755-M2 → (1) 1NO+1NC
9	L	FX 952-M2 → 2NC	FX 953-E0M2V9 → 2NC	FX 954-M2 → 2NC	FX 955-M2 → (1) 2NC
10	L	FX 1052-M2 2NO	FX 1053-E0M2V9 2NO	FX 1054-M2 2NO	FX 1055-M2 2NO
11	R	FX 1152-M2 → 2NC		FX 1154-M2 → 2NC	FX 1155-M2 → (1) 2NC
12	R	FX 1252-M2 2NO	FX 1253-E0M2V9 2NO	FX 1254-M2 2NO	FX 1255-M2 2NO
13	LV	FX 1352-M2 → 2NC	FX 1353-E0M2V9 → 2NC	FX 1354-M2 → 2NC	FX 1355-M2 → (1) 2NC
14	LS	FX 1452-M2 → 2NC	FX 1453-E0M2V9 → 2NC	FX 1454-M2 → 2NC	FX 1455-M2 → (1) 2NC
15	LS	FX 1552-M2 2NO	FX 1553-E0M2V9 2NO	FX 1554-M2 2NO	FX 1555-M2 2NO
16	LI	FX 1652-M2 → 2NC		FX 1654-M2 → 2NC	FX 1655-M2 → (1) 2NC
18	LA	FX 1852-M2 → 1NO+1NC	FX 1853-E0M2V9 → 1NO+1NC	FX 1854-M2 → 1NO+1NC	FX 1855-M2 → (1) 1NO+1NC
20	L	FX 2052-M2 → 1NO+2NC	FX 2053-E0M2V9 → 1NO+2NC	FX 2054-M2 → 1NO+2NC	FX 2055-M2 → (1) 1NO+2NC
21	L	FX 2152-M2 → 3NC	FX 2153-E0M2V9 → 3NC	FX 2154-M2 → 3NC	FX 2155-M2 → (1) 3NC
22	L	FX 2252-M2 → 2NO+1NC	FX 2253-E0M2V9 → 2NO+1NC	FX 2254-M2 → 2NO+1NC	FX 2255-M2 → (1) 2NO+1NC
2	R	FX 252-M2 2x(1NO-1NC)	FX 253-E0M2 2x(1NO-1NC)	FX 254-M2 2x(1NO-1NC)	FX 255-M2 2x(1NO-1NC)
E1		FX E152-M2 1NO-1NC	FX E153-E0M2V9 1NO-1NC	FX E154-M2 1NO-1NC	FX E155-M2 1NO-1NC
Max. speed		page 215 - type 1	0.5 m/s	page 215 - type 1	page 215 - type 1
Actuating force		0.06 Nm (0.25 Nm →)	0.03 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 216 - group 6	page 216 - group 5	page 216 - group 5

Contact block		Other rollers available. See on page 90	Other rollers available. See on page 90	Glass fibre rod	Rope switch for signalling
					
5	R	FX 556-M2 → 1NO+1NC	FX 557-M2 → 1NO+1NC	FX 569-M2 1NO+1NC	FX 576-M2 1NO+1NC
6	L	FX 656-M2 → 1NO+1NC	FX 657-M2 → 1NO+1NC	FX 669-M2 1NO+1NC	FX 676-M2 1NO+1NC
7	LO	FX 756-M2 → 1NO+1NC	FX 757-M2 → 1NO+1NC	FX 769-M2 1NO+1NC	FX 776-M2 1NO+1NC
9	L	FX 956-M2 → 2NC	FX 957-M2 → 2NC	FX 969-M2 2NC	FX 976-M2 2NO
10	L	FX 1056-M2 2NO	FX 1057-M2 2NO	FX 1069-M2 2NO	FX 1076-M2 2NC
11	R	FX 1156-M2 → 2NC	FX 1157-M2 → 2NC	FX 1169-M2 2NC	FX 1176-M2 2NO
12	R	FX 1256-M2 2NO	FX 1257-M2 2NO	FX 1269-M2 2NO	FX 1276-M2 2NC
13	LV	FX 1356-M2 → 2NC	FX 1357-M2 → 2NC	FX 1369-M2 2NC	FX 1376-M2 2NO
14	LS	FX 1456-M2 → 2NC	FX 1457-M2 → 2NC	FX 1469-M2 2NC	FX 1476-M2 2NO
15	LS	FX 1556-M2 2NO	FX 1557-M2 2NO	FX 1569-M2 2NO	FX 1576-M2 2NC
16	LI	FX 1656-M2 → 2NC	FX 1657-M2 → 2NC	FX 1669-M2 2NC	
18	LA	FX 1856-M2 → 1NO+1NC	FX 1857-M2 → 1NC+1NO	FX 1869-M2 1NC+1NO	FX 1876-M2 1NO+1NC
20	L	FX 2056-M2 → 1NO+2NC	FX 2057-M2 → 1NO+2NC	FX 2069-M2 1NO+2NC	FX 2076-M2 2NO+1NC
21	L	FX 2156-M2 → 3NC	FX 2157-M2 → 3NC	FX 2169-M2 3NC	FX 2176-M2 3NO
22	L	FX 2256-M2 → 2NO+1NC	FX 2257-M2 → 2NO+1NC	FX 2269-M2 2NO+1NC	FX 2276-M2 1NO+2NC
2	R	FX 256-M2 2x(1NO-1NC)	FX 257-M2 2x(1NO-1NC)	FX 269-M2 2x(1NO-1NC)	FX 276-M2 2x(1NO-1NC)
E1		FX E156-M2 1NO-1NC	FX E157-M2 1NO-1NC	FX E169-M2 1NO-1NC	
Max. speed		page 215 - type 1	page 215 - type 1	1.5 m/s	0.5 m/s
Actuating force		0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm	initial 20 N - final 40 N
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 7

(1) Positive opening only with actuator set to max. See page 89.

All values in the drawings are in mm

Accessories See page 197

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

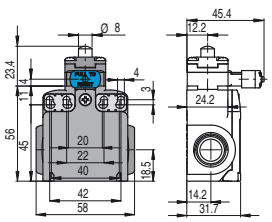
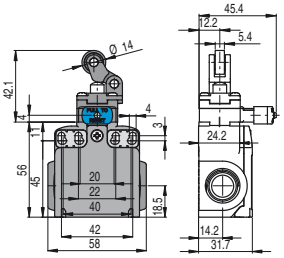
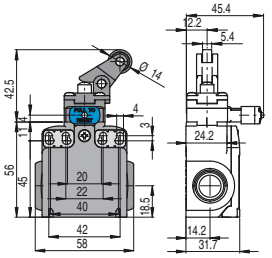
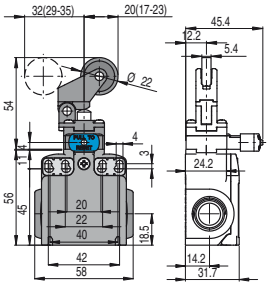
FX series position switches with reset

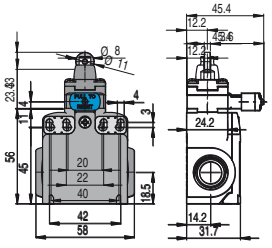
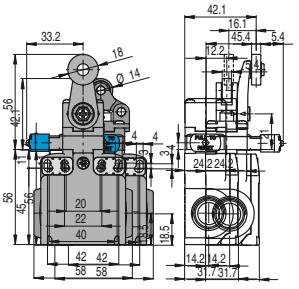
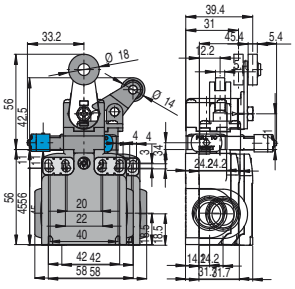
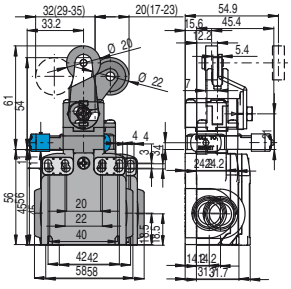
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. This new device consists in a block to be mounted between the body and the head of the switch that can be rotated independently from the head. This new device offers the following advantages:

- The reset device can be integrated into almost all standard actuator heads
- Contact blocks with snap action are no more necessary because the tripping movement is executed by the reset device itself
- The reset device can be rotated independently from the head ensuring maximum flexibility during installation
- Two actuating forces: standard and increased for vibration applications
- Mechanical endurance: 1 million operating cycles.

Contact type:

R = snap action
L = slow action

Contact block					
			With stainless steel roller on request 	With stainless steel roller on request 	
6	L	FX 601-W3M2 → 1NO+1NC	FX 602-W3M2 → 1NO+1NC	FX 605-W3M2 → 1NO+1NC	FX 607-W3M2 → 1NO+1NC
9	L	FX 901-W3M2 → 2NC	FX 902-W3M2 → 2NC	FX 905-W3M2 → 2NC	FX 907-W3M2 → 2NC
10	L	FX 1001-W3M2 2NO	FX 1002-W3M2 2NO	FX 1005-W3M2 2NO	FX 1007-W3M2 2NO
20	L	FX 2001-W3M2 → 1NO+2NC	FX 2002-W3M2 → 1NO+2NC	FX 2005-W3M2 → 1NO+2NC	FX 2007-W3M2 → 1NO+2NC
21	L	FX 2101-W3M2 → 3NC	FX 2102-W3M2 → 3NC	FX 2105-W3M2 → 3NC	FX 2107-W3M2 → 3NC
22	L	FX 2201-W3M2 → 2NO+1NC	FX 2202-W3M2 → 2NO+1NC	FX 2205-W3M2 → 2NO+1NC	FX 2207-W3M2 → 2NO+1NC
2	R	FX 201-W3M2 2NO+2NC	FX 202-W3M2 2NO+2NC	FX 205-W3M2 2NO+2NC	FX 207-W3M2 2NO+2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		4.5 N (25 N →)	4 N (25 N →)	4 N (25 N →)	2.5 N (25 N →)
Travel diagrams		page 217 - group 1	page 217 - group 2	page 217 - group 2	page 217 - group 3

Contact block					
		With Ø 12 mm stainless steel roller on request 	With Ø 20 mm stainless steel roller on request 	Other rollers available. See on page 90 	Other rollers available. See on page 90 
6	L	FX 615-W3M2 → 1NO+1NC	FX 630-W3M2 → 1NO+1NC	FX 631-W3M2 → 1NO+1NC	FX 651-W3M2 → 1NO+1NC
9	L	FX 915-W3M2 → 2NC	FX 930-W3M2 → 2NC	FX 931-W3M2 → 2NC	FX 951-W3M2 → 2NC
10	L	FX 1015-W3M2 2NO	FX 1030-W3M2 2NO	FX 1031-W3M2 2NO	FX 1051-W3M2 2NO
20	L	FX 2015-W3M2 → 1NO+2NC	FX 2030-W3M2 → 1NO+2NC	FX 2031-W3M2 → 1NO+2NC	FX 2051-W3M2 → 1NO+2NC
21	L	FX 2115-W3M2 → 3NC	FX 2130-W3M2 → 3NC	FX 2131-W3M2 → 3NC	FX 2151-W3M2 → 3NC
22	L	FX 2215-W3M2 → 2NO+1NC	FX 2230-W3M2 → 2NO+1NC	FX 2231-W3M2 → 2NO+1NC	FX 2251-W3M2 → 2NO+1NC
2	R	FX 215-W3M2 2NO+2NC	FX 230-W3M2 2NO+2NC	FX 231-W3M2 2NO+2NC	FX 251-W3M2 2NO+2NC
Max. speed		page 215 - type 2	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		4.5 N (25 N →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 1	page 217 - group 4	page 217 - group 4	page 217 - group 4

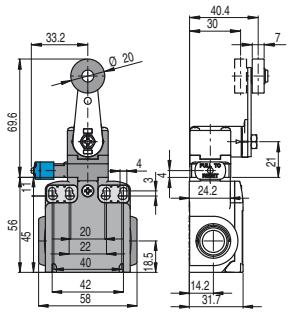
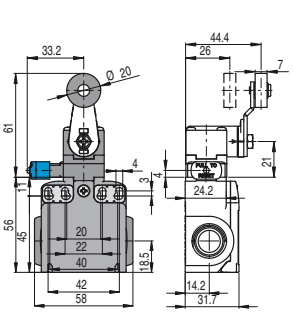
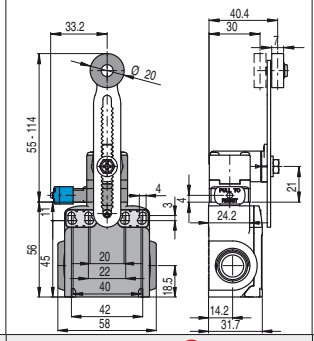
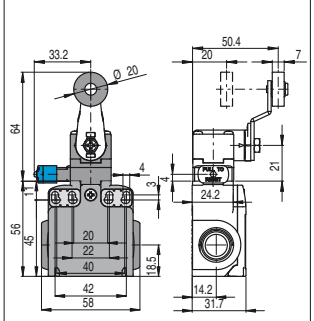
All values in the drawings are in mm

Accessories See page 197

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

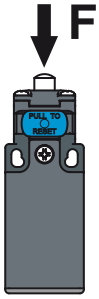
Contact type:

R = snap action
L = slow action

Contact block		Other rollers available. See on page 90	Other rollers available. See on page 90	Other rollers available. See on page 90	Other rollers available. See on page 90
					
6	L	FX 652-W3M2 → 1NO+1NC	FX 654-W3M2 → 1NO+1NC	FX 656-W3M2 → 1NO+1NC	FX 657-W3M2 → 1NO+1NC
9	L	FX 952-W3M2 → 2NC	FX 954-W3M2 → 2NC	FX 956-W3M2 → 2NC	FX 957-W3M2 → 2NC
10	L	FX 1052-W3M2 2NO	FX 1054-W3M2 2NO	FX 1056-W3M2 2NO	FX 1057-W3M2 2NO
20	L	FX 2052-W3M2 → 1NO+2NC	FX 2054-W3M2 → 1NO+2NC	FX 2056-W3M2 → 1NO+2NC	FX 2057-W3M2 → 1NO+2NC
21	L	FX 2152-W3M2 → 3NC	FX 2154-W3M2 → 3NC	FX 2156-W3M2 → 3NC	FX 2157-W3M2 → 3NC
22	L	FX 2252-W3M2 → 2NO+1NC	FX 2254-W3M2 → 2NO+1NC	FX 2256-W3M2 → 2NO+1NC	FX 2257-W3M2 → 2NO+1NC
2	R	FX 252-W3M2 2NO+2NC	FX 254-W3M2 2NO+2NC	FX 256-W3M2 2NO+2NC	FX 257-W3M2 2NO+2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

All values in the drawings are in mm

Increased actuating force



The switch can be delivered with increased actuating force (option W4). Ideal for vibration applications.

Actuators	Actuating force
01, 14, 15, 16	7 N
02, 05	6 N
07	3.5 N
30 … 57	0.08 Nm

To order the switch with reset and increased actuating force, replace the -W3 option with -W4 in the order code.
Example: FX 601-**W3**M2 → FX 601-**W4**M2

Accessories See page 197

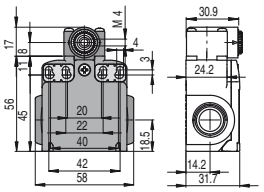
→ The 2D and 3D files are available at **www.pizzato.com**

Position switches with swivelling lever without actuator

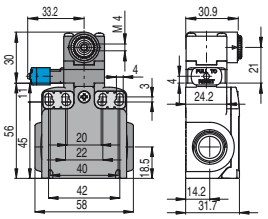
All values in the drawings are in mm

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP



With manual reset knob



Contact block			
5	R	FX 538-M2 → 1NO+1NC	
6	L	FX 638-M2 → 1NO+1NC	FX 638-W3M2 → 1NO+1NC
7	LO	FX 738-M2 → 1NO+1NC	
9	L	FX 938-M2 → 2NC	FX 938-W3M2 → 2NC
10	L	FX 1038-M2 2NO	FX 1038-W3M2 2NO
11	R	FX 1138-M2 → 2NC	
12	R	FX 1238-M2 2NO	
13	LV	FX 1338-M2 → 2NC	
14	LS	FX 1438-M2 → 2NC	
15	LS	FX 1538-M2 2NO	
16	LI	FX 1638-M2 → 2NC	
18	LA	FX 1838-M2 → 1NO+1NC	
20	L	FX 2038-M2 → 1NO+2NC	FX 2038-W3M2 → 1NO+2NC
21	L	FX 2138-M2 → 3NC	FX 2138-W3M2 → 3NC
22	L	FX 2238-M2 → 2NO+1NC	FX 2238-W3M2 → 2NO+1NC
2	R	FX 238-M2 2x(1NO-1NC)	FX 238-W3M2 2NO+2NC
E1		FX E138-M2 1NO-1NC	
Actuating force		0.06 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 217 - group 4

IMPORTANT

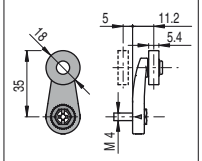
For safety applications: join only switches and actuators marked with symbol → next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

All values in the drawings are in mm

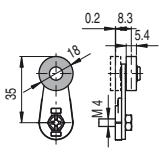
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Technopolymer roller Ø 18 mm



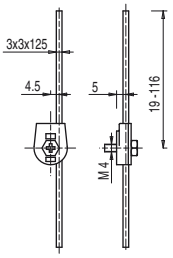
VF LE30 →

Technopolymer roller Ø 18 mm



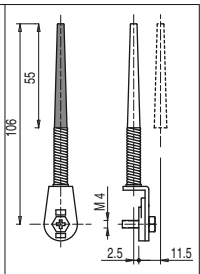
VF LE31 →

Adjustable square rod, 3x3x125 mm



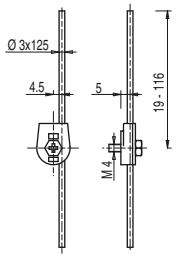
VF LE33

Flexible rod with pointed end



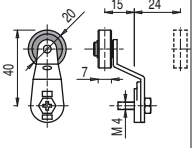
VF LE34

Adjustable round rod Ø 3x125 mm



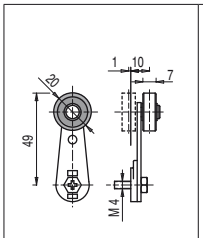
VF LE50

Technopolymer roller Ø 20 mm



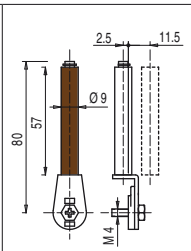
VF LE51 →

Technopolymer roller Ø 20 mm



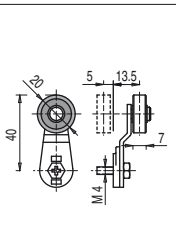
VF LE52 →

Porcelain roller



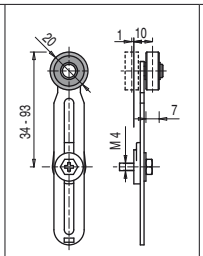
VF LE53 → (2)

Technopolymer roller Ø 20 mm



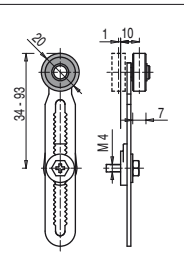
VF LE54 →

Adjustable actuator with technopolymer roller



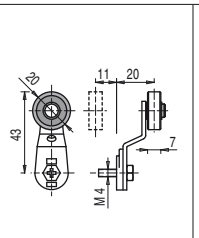
VF LE55 → (1)

Adjustable safety actuator with technopolymer roller



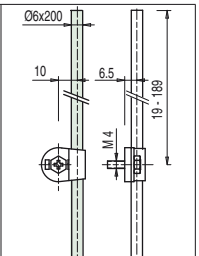
VF LE56 →

Technopolymer roller Ø 20 mm



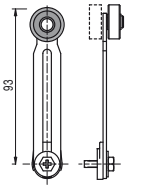
VF LE57 →

Adjustable glass fibre rod



VF LE69

- (1) Actuator VF LE55 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 LE56 adjustable safety lever.
- (2) The position switch obtained by assembling switch FX •38-M2 (e.g. FX 538-M2, FX 638-M2…) with actuator VF L53 will not present the same travel diagrams and actuating forces as switch FX •53-E0M2V9 (e.g. FX 553-E0M2V9, FX 653-E0M2V9…).
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

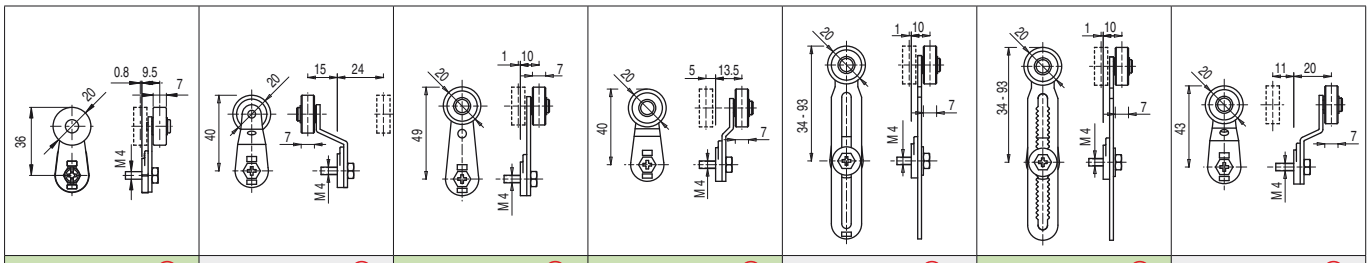
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

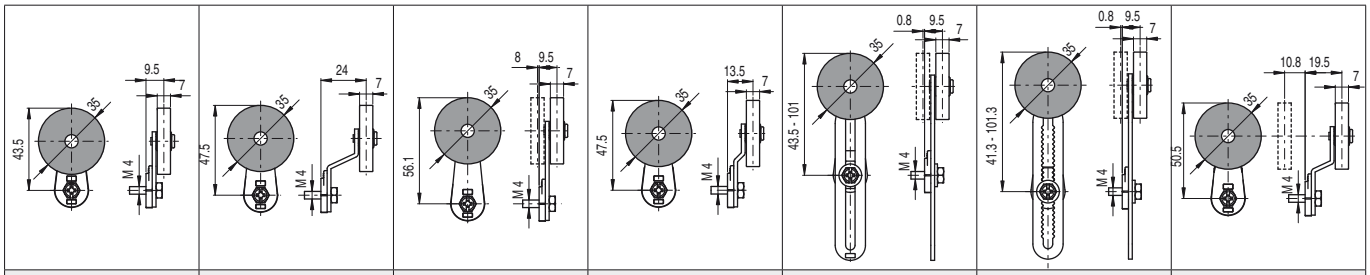
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Stainless steel rollers, Ø 20 mm



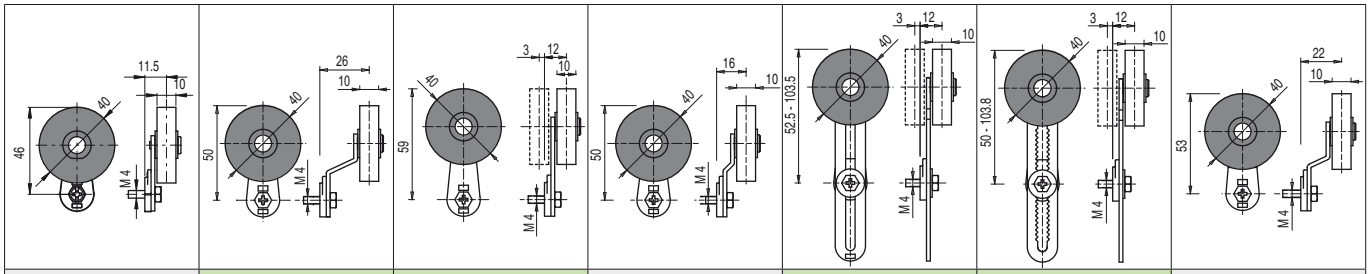
VF LE31-R24 | VF LE51-R24 | VF LE52-R24 | VF LE54-R24 | VF LE55-R24 (1) | VF LE56-R24 | VF LE57-R24

Technopolymer rollers, Ø 35 mm



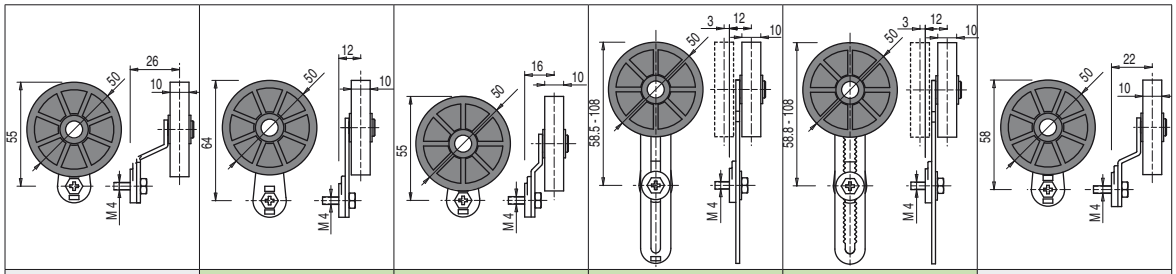
VF LE31-R25 (4) | VF LE51-R25 (4) | VF LE52-R25 | VF LE54-R25 (4) | VF LE55-R25 (1) | VF LE56-R25 | VF LE57-R25

Rubber rollers, Ø 40 mm



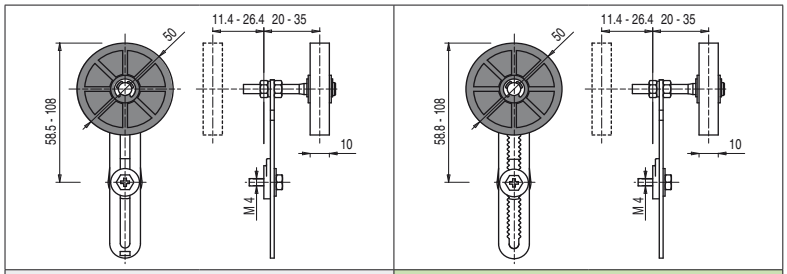
VF LE31-R5 (4) | VF LE51-R5 (4) | VF LE52-R5 | VF LE54-R5 (4) | VF LE55-R5 (1) | VF LE56-R5 | VF LE57-R5 (4)

Rubber rollers, Ø 50 mm



VF LE51-R26 (4) | VF LE52-R26 (4) | VF LE54-R26 (4) | VF LE55-R26 (1) | VF LE56-R26 | VF LE57-R26 (4)

Protruding rubber rollers, Ø 50 mm



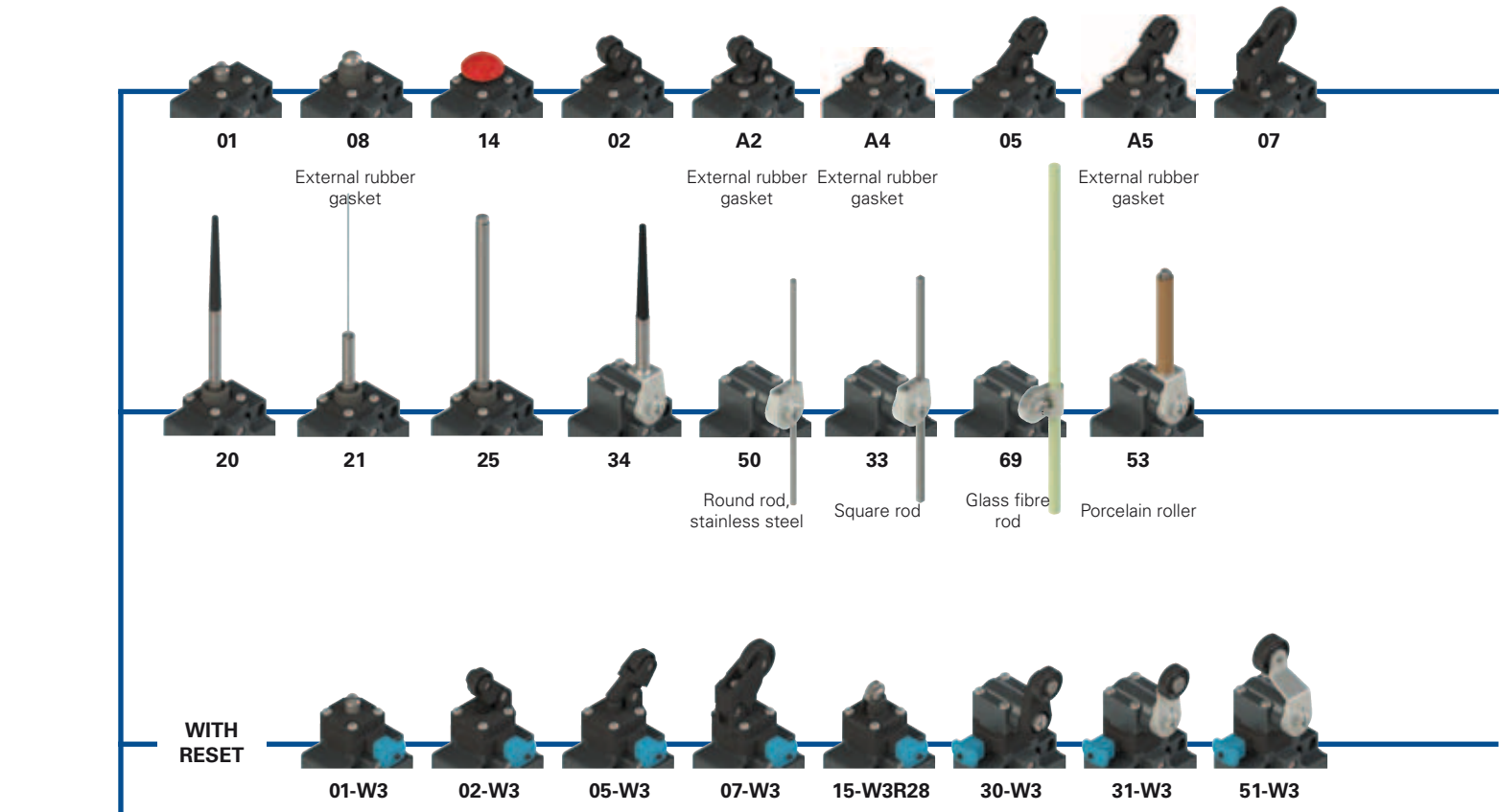
VF LE55-R27 (1) | VF LE56-R27

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

Accessories See page 197

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

Selection diagram



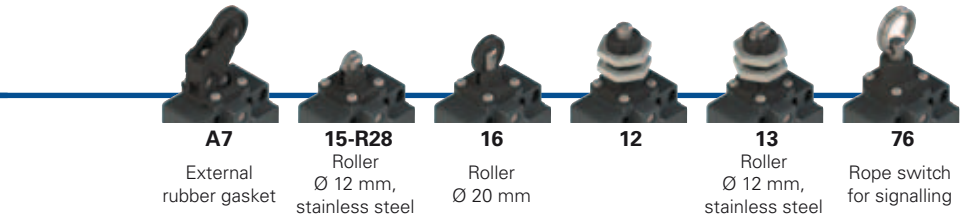
Threaded conduit entries	
M2	M20x1.5 (standard)
	PG 13.5

With cable gland	
K123	for cables Ø 6 … 12 mm on the right
K223	for cables Ø 6 … 12 mm on the left
K127	for cables Ø 3 … 7 mm on the right
K227	for cables Ø 3 … 7 mm on the left

With M12 metal connector	
K41	8-pole, right
K42	8-pole, left
K51	5-pole, right
K52	5-pole, left

product options

Sold separately as accessory



A7
External rubber gasket

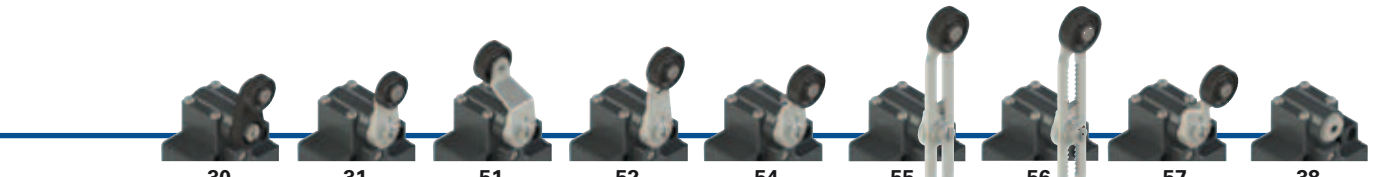
15-R28
Roller Ø 12 mm, stainless steel

16
Roller Ø 20 mm

12

13
Roller Ø 12 mm, stainless steel

76
Rope switch for signalling

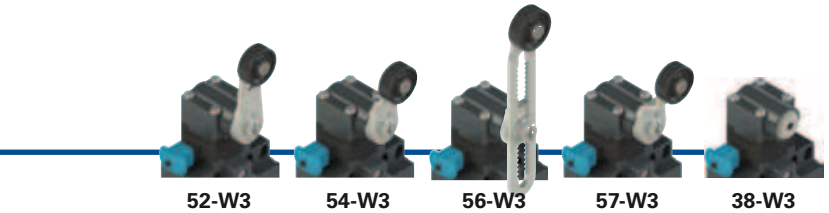


30 **31** **51** **52** **54** **55** **56** **57** **38**

55 Adjustable lever

56 Adjustable safety lever

38 Without actuator



52-W3 **54-W3** **56-W3** **57-W3**

38-W3
Without actuator

SEPARATE ACTUATORS
See page 101

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

FZ 502-W3GM2K51R23T6

Housing	
FZ	metal, two 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
05	angled lever with roller
...	.....

Reset	
	without reset (standard)
W3	simultaneous reset
W4	simultaneous reset, increased force

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

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

Pre-installed cable glands or connectors	
	no cable gland or connector (standard)
K123	cable gland for cables Ø 6 … 12 mm on the right
K51	M12 metal connector, 5-pole, right

For the complete list of possible combinations please contact our technical department.

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

Rollers	
	standard roller
R28	stainless steel Ø 12 mm (for actuators A4, 15)
R23	stainless steel Ø 14 mm (for actuators A2, 02, A5, 05, 30, 31, 51, 52, 54, 55, 56, 57)
R24	stainless steel Ø 20 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R5	rubber, Ø 40 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R26	rubber, Ø 50 mm (for actuators 51, 52, 54, 55, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 55, 56)

FZ series position switches

Main features
- Metal housing, two conduit entries
- Protection degree IP67
- 17 contact blocks available
- 42 actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

Metal housing, powder-coated	
Two threaded conduit entries:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

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, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Quality marks:

IMQ approval:	EG609
UL approval:	E131787
CCC approval:	2007010305229998
EAC approval:	RU C-IT.АД35.В.00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 216. 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 on pages 211 to 222.**

Electrical data			Utilization category
without connector	Thermal current (I_{th}):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 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
	Protection against short circuits:	type aM fuse 10 A 500 V	Ie (A) 6 1.1 0.4
	Pollution degree:	3	
with M12 connector 5-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Protection against short circuits:	type gG fuse 4 A 500 V	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24 125 250
			Ie (A) 4 1.1 0.4
with M12 connector 8-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	30 Vac 36 Vdc	Ue (V) 24
	Protection against short circuits:	type gG fuse 2 A 500 V	Ie (A) 2
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 2

Features approved by IMQ

Rated insulation voltage (U_i): 500 Vac
400 Vac (for contact blocks 2, 11, 12, 20, 21,22, 33, 34)
Conventional free air thermal current (I_{th}): 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 (U_e): 400 Vac (50 Hz)
Operating current (I_e): 3 A

Forms of the contact element: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 33, 34
In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

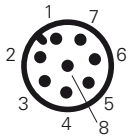
Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X, 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductors, rigid or flexible, wire size 12, 14 AWG. Tightening torque for terminal screws of 7.1 lb in (0.8 Nm).
For contact 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).

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

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

Wiring diagram for M12 connectors

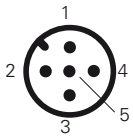
Contact block 2 — 1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

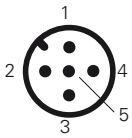
Contact block 5 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

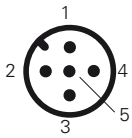
Contact block 6 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

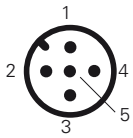
Contact block 7 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

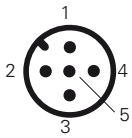
Contact block 9 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

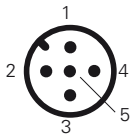
Contact block 10 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

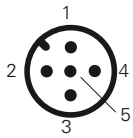
Contact block 11 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

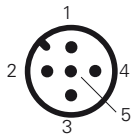
Contact block 12 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

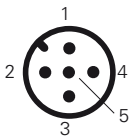
Contact block 13 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

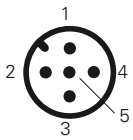
Contact block 14 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

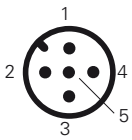
Contact block 15 — 2NO



M12 connector, 5-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4
ground	5

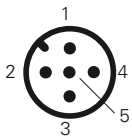
Contact block 16 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4
ground	5

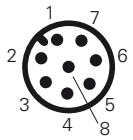
Contact block 18 — 1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

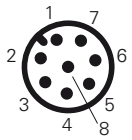
Contact block 20 — 2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8
ground	1

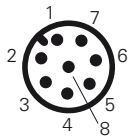
Contact block 21 — 3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

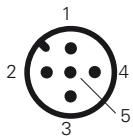
Contact block 22 — 1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8
ground	1

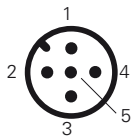
Contact block 33 — 1NC+1NO



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

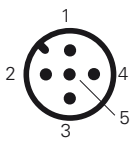
Contact block 34 — 2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

Contact block E1 — PNP



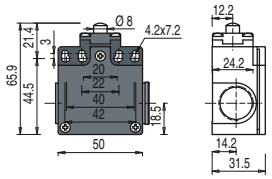
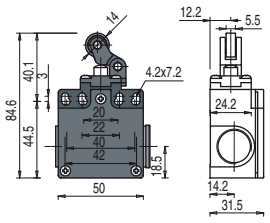
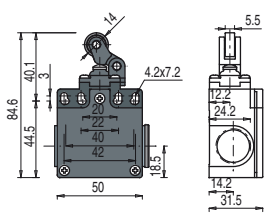
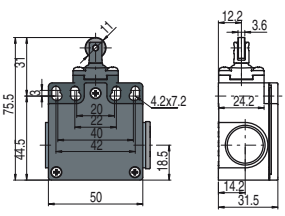
M12 connector, 5-pole

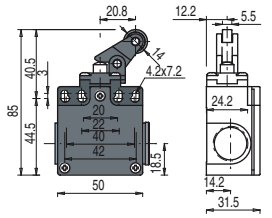
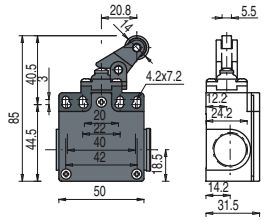
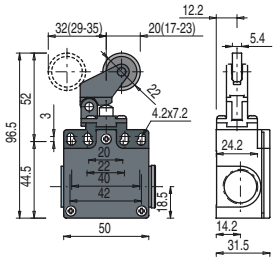
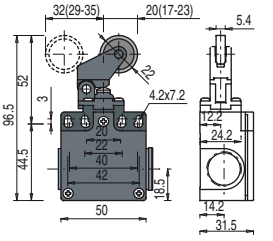
Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

FZ series position switches

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP

Contact block					
			With stainless steel roller on request 	With external rubber gasket With stainless steel roller on request 	With external rubber gasket 
5	R	FZ 501-M2 1NO+1NC	FZ 502-M2 1NO+1NC	FZ 5A2-M2 1NO+1NC	FZ 5A4-M2 1NO+1NC
6	L	FZ 601-M2 1NO+1NC	FZ 602-M2 1NO+1NC	FZ 6A2-M2 1NO+1NC	FZ 6A4-M2 1NO+1NC
7	LO	FZ 701-M2 1NO+1NC	FZ 702-M2 1NO+1NC	FZ 7A2-M2 1NO+1NC	FZ 7A4-M2 1NO+1NC
9	L	FZ 901-M2 2NC	FZ 902-M2 2NC	FZ 9A2-M2 2NC	FZ 9A4-M2 2NC
10	L	FZ 1001-M2 2NO	FZ 1002-M2 2NO	FZ 10A2-M2 2NO	FZ 10A4-M2 2NO
11	R	FZ 1101-M2 2NC	FZ 1102-M2 2NC	FZ 11A2-M2 2NC	FZ 11A4-M2 2NC
12	R	FZ 1201-M2 2NO	FZ 1202-M2 2NO	FZ 12A2-M2 2NO	FZ 12A4-M2 2NO
13	LV	FZ 1301-M2 2NC	FZ 1302-M2 2NC	FZ 13A2-M2 2NC	FZ 13A4-M2 2NC
14	LS	FZ 1401-M2 2NC	FZ 1402-M2 2NC	FZ 14A2-M2 2NC	FZ 14A4-M2 2NC
15	LS	FZ 1501-M2 2NO	FZ 1502-M2 2NO	FZ 15A2-M2 2NO	FZ 15A4-M2 2NO
18	LA	FZ 1801-M2 1NO+1NC	FZ 1802-M2 1NO+1NC	FZ 18A2-M2 1NO+1NC	FZ 18A4-M2 1NO+1NC
20	L	FZ 2001-M2 1NO+2NC	FZ 2002-M2 1NO+2NC	FZ 20A2-M2 1NO+2NC	FZ 20A4-M2 1NO+2NC
21	L	FZ 2101-M2 3NC	FZ 2102-M2 3NC	FZ 21A2-M2 3NC	FZ 21A4-M2 3NC
22	L	FZ 2201-M2 2NO+1NC	FZ 2202-M2 2NO+1NC	FZ 22A2-M2 2NO+1NC	FZ 22A4-M2 2NO+1NC
2	R	FZ 201-M2 2x(1NO-1NC)	FZ 202-M2 2x(1NO-1NC)	FZ 2A2-M2 2x(1NO-1NC)	FZ 2A4-M2 2x(1NO-1NC)
E1		FZ E101-M2 1NO-1NC	FZ E102-M2 1NO-1NC	FZ E1A2-M2 1NO-1NC	FZ E1A4-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 5
Actuating force		8 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 1

Contact block					
		With stainless steel roller on request 	With external rubber gasket With stainless steel roller on request 		With external rubber gasket 
5	R	FZ 505-M2 1NO+1NC	FZ 5A5-M2 1NO+1NC	FZ 507-M2 1NO+1NC	FZ 5A7-M2 1NO+1NC
6	L	FZ 605-M2 1NO+1NC	FZ 6A5-M2 1NO+1NC	FZ 607-M2 1NO+1NC	FZ 6A7-M2 1NO+1NC
7	LO	FZ 705-M2 1NO+1NC	FZ 7A5-M2 1NO+1NC	FZ 707-M2 1NO+1NC	FZ 7A7-M2 1NO+1NC
9	L	FZ 905-M2 2NC	FZ 9A5-M2 2NC	FZ 907-M2 2NC	FZ 9A7-M2 2NC
10	L	FZ 1005-M2 2NO	FZ 10A5-M2 2NO	FZ 1007-M2 2NO	FZ 10A7-M2 2NO
11	R	FZ 1105-M2 2NC	FZ 11A5-M2 2NC	FZ 1107-M2 2NC	FZ 11A7-M2 2NC
12	R	FZ 1205-M2 2NO	FZ 12A5-M2 2NO	FZ 1207-M2 2NO	FZ 12A7-M2 2NO
13	LV	FZ 1305-M2 2NC	FZ 13A5-M2 2NC	FZ 1307-M2 2NC	FZ 13A7-M2 2NC
14	LS	FZ 1405-M2 2NC	FZ 14A5-M2 2NC	FZ 1407-M2 2NC	FZ 14A7-M2 2NC
15	LS	FZ 1505-M2 2NO	FZ 15A5-M2 2NO	FZ 1507-M2 2NO	FZ 15A7-M2 2NO
18	LA	FZ 1805-M2 1NO+1NC	FZ 18A5-M2 1NO+1NC	FZ 1807-M2 1NO+1NC	FZ 18A7-M2 1NO+1NC
20	L	FZ 2005-M2 1NO+2NC	FZ 20A5-M2 1NO+2NC	FZ 2007-M2 1NO+2NC	FZ 20A7-M2 1NO+2NC
21	L	FZ 2105-M2 3NC	FZ 21A5-M2 3NC	FZ 2107-M2 3NC	FZ 21A7-M2 3NC
22	L	FZ 2205-M2 2NO+1NC	FZ 22A5-M2 2NO+1NC	FZ 2207-M2 2NO+1NC	FZ 22A7-M2 2NO+1NC
2	R	FZ 205-M2 2x(1NO-1NC)	FZ 2A5-M2 2x(1NO-1NC)	FZ 207-M2 2x(1NO-1NC)	FZ 2A7-M2 2x(1NO-1NC)
E1		FZ E105-M2 1NO-1NC	FZ E1A5-M2 1NO-1NC	FZ E107-M2 1NO-1NC	FZ E1A7-M2 1NO-1NC
Max. speed		page 215 - type 3	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		6 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)	3 N (25 N →)
Travel diagrams		page 216 - group 2	page 216 - group 2	page 216 - group 3	page 216 - group 3

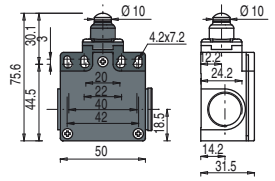
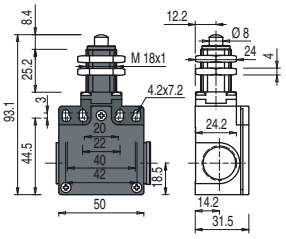
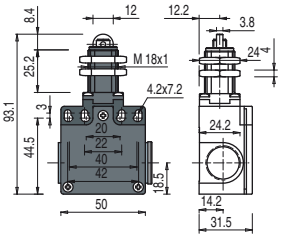
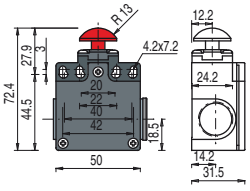
All values in the drawings are in mm

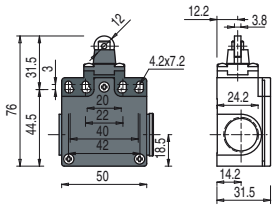
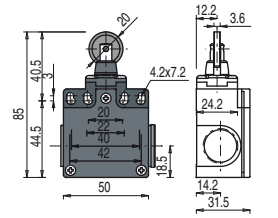
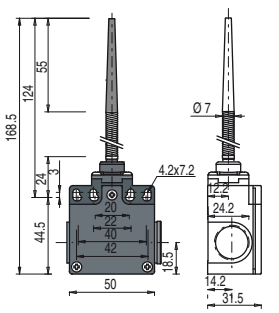
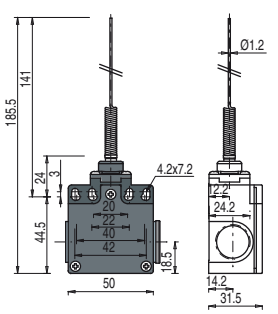
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		With external rubber gasket			
					
5	R	FZ 508-M2 → 1NO+1NC	FZ 512-M2 → 1NO+1NC	FZ 513-M2 → 1NO+1NC	FZ 514-M2 → 1NO+1NC
6	L	FZ 608-M2 → 1NO+1NC	FZ 612-M2 → 1NO+1NC	FZ 613-M2 → 1NO+1NC	FZ 614-M2 → 1NO+1NC
7	LO	FZ 708-M2 → 1NO+1NC	FZ 712-M2 → 1NO+1NC	FZ 713-M2 → 1NO+1NC	FZ 714-M2 → 1NO+1NC
9	L	FZ 908-M2 → 2NC	FZ 912-M2 → 2NC	FZ 913-M2 → 2NC	FZ 914-M2 → 2NC
10	L	FZ 1008-M2 2NO	FZ 1012-M2 2NO	FZ 1013-M2 2NO	FZ 1014-M2 2NO
11	R	FZ 1108-M2 → 2NC	FZ 1112-M2 → 2NC	FZ 1113-M2 → 2NC	FZ 1114-M2 → 2NC
12	R	FZ 1208-M2 2NO	FZ 1212-M2 2NO	FZ 1213-M2 2NO	FZ 1214-M2 2NO
13	LV	FZ 1308-M2 → 2NC	FZ 1312-M2 → 2NC	FZ 1313-M2 → 2NC	FZ 1314-M2 → 2NC
14	LS	FZ 1408-M2 → 2NC	FZ 1412-M2 → 2NC	FZ 1413-M2 → 2NC	FZ 1414-M2 → 2NC
15	LS	FZ 1508-M2 2NO	FZ 1512-M2 2NO	FZ 1513-M2 2NO	FZ 1514-M2 2NO
18	LA	FZ 1808-M2 → 1NO+1NC	FZ 1812-M2 → 1NO+1NC	FZ 1813-M2 → 1NO+1NC	FZ 1814-M2 → 1NO+1NC
20	L	FZ 2008-M2 → 1NO+2NC	FZ 2012-M2 → 1NO+2NC	FZ 2013-M2 → 1NO+2NC	FZ 2014-M2 → 1NO+2NC
21	L	FZ 2108-M2 → 3NC	FZ 2112-M2 → 3NC	FZ 2113-M2 → 3NC	FZ 2114-M2 → 3NC
22	L	FZ 2208-M2 → 2NO+1NC	FZ 2212-M2 → 2NO+1NC	FZ 2213-M2 → 2NO+1NC	FZ 2214-M2 → 2NO+1NC
2	R	FZ 208-M2 2x(1NO-1NC)	FZ 212-M2 2x(1NO-1NC)	FZ 213-M2 2x(1NO-1NC)	FZ 214-M2 2x(1NO-1NC)
E1		FZ E108-M2 1NO-1NC	FZ E112-M2 1NO-1NC	FZ E113-M2 1NO-1NC	FZ E114-M2 1NO-1NC
Max. speed		page 215 - type 4	page 215 - type 4	page 215 - type 2	page 215 - type 4
Actuating force		8 N (25 N →)	8 N (25 N →)	8 N (25 N →)	8 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

Contact block				With external rubber gasket	With external rubber gasket
					
5	R	FZ 515-M2R28 → 1NO+1NC	FZ 516-M2 → 1NO+1NC	FZ 520-M2 1NO+1NC	FZ 521-M2 1NO+1NC
6	L	FZ 615-M2R28 → 1NO+1NC	FZ 616-M2 → 1NO+1NC		
7	LO	FZ 715-M2R28 → 1NO+1NC	FZ 716-M2 → 1NO+1NC		
9	L	FZ 915-M2R28 → 2NC	FZ 916-M2 → 2NC		
10	L	FZ 1015-M2R28 2NO	FZ 1016-M2 2NO	FZ 1020-M2 2NO	FZ 1021-M2 2NO
11	R	FZ 1115-M2R28 → 2NC	FZ 1116-M2 → 2NC		
12	R	FZ 1215-M2R28 2NO	FZ 1216-M2 2NO	FZ 1220-M2 2NO	FZ 1221-M2 2NO
13	LV	FZ 1315-M2R28 → 2NC	FZ 1316-M2 → 2NC		
14	LS	FZ 1415-M2R28 → 2NC	FZ 1416-M2 → 2NC		
15	LS	FZ 1515-M2R28 2NO	FZ 1516-M2 2NO		
18	LA	FZ 1815-M2R28 → 1NO+1NC	FZ 1816-M2 → 1NO+1NC	FZ 1820-M2 1NO+1NC	FZ 1821-M2 1NO+1NC
20	L	FZ 2015-M2R28 → 1NO+2NC	FZ 2016-M2 → 1NO+2NC	FZ 2020-M2 1NO+2NC	FZ 2021-M2 1NO+2NC
21	L	FZ 2115-M2R28 → 3NC	FZ 2116-M2 → 3NC	FZ 2120-M2 3NC	FZ 2121-M2 3NC
22	L	FZ 2215-M2R28 → 2NO+1NC	FZ 2216-M2 → 2NO+1NC	FZ 2220-M2 2NO+1NC	FZ 2221-M2 2NO+1NC
2	R	FZ 215-M2R28 2x(1NO-1NC)	FZ 216-M2 2x(1NO-1NC)	FZ 220-M2 2x(1NO-1NC)	FZ 221-M2 2x(1NO-1NC)
E1		FZ E115-M2R28 1NO-1NC	FZ E116-M2 1NO-1NC	FZ E120-M2 1NO-1NC	FZ E121-M2 1NO-1NC
Max. speed		page 215 - type 2	page 215 - type 2	1 m/s	1 m/s
Actuating force		8 N (25 N →)	8 N (25 N →)	0.07 Nm	0.07 Nm
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 4	page 216 - group 4

All values in the drawings are in mm

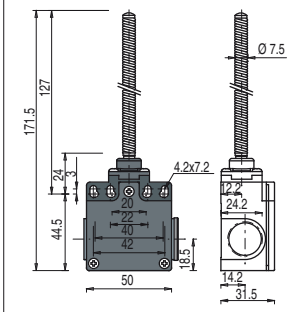
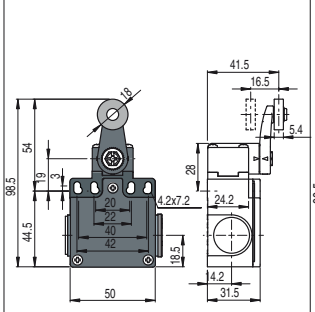
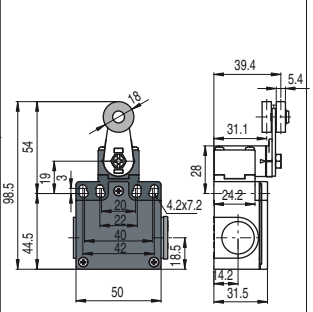
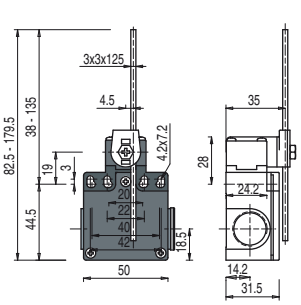
Accessories See page 197

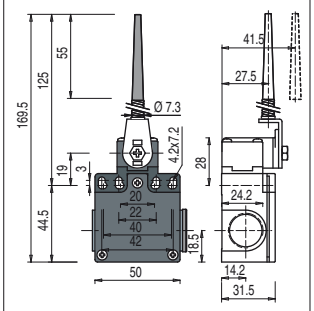
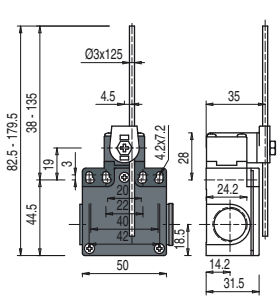
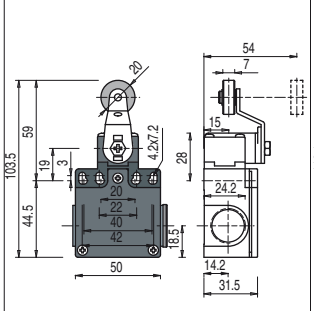
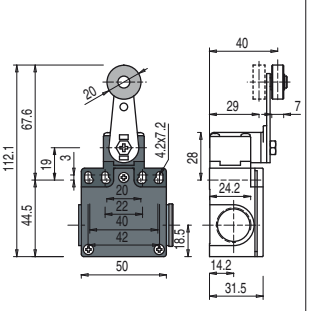
→ The 2D and 3D files are available at **www.pizzato.com**

FZ series position switches

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		With external rubber gasket		With Ø 20 mm stainless steel roller on request		Other rollers available. See on page 102		Square rod, 3x3 mm	
									
5	R	FZ 525-M2	1NO+1NC	FZ 530-M2	1NO+1NC	FZ 531-M2	1NO+1NC	FZ 533-M2	1NO+1NC
6	L			FZ 630-M2	1NO+1NC	FZ 631-M2	1NO+1NC	FZ 633-M2	1NO+1NC
7	LO			FZ 730-M2	1NO+1NC	FZ 731-M2	1NO+1NC	FZ 733-M2	1NO+1NC
9	L			FZ 930-M2	2NC	FZ 931-M2	2NC	FZ 933-M2	2NC
10	L	FZ 1025-M2	2NO	FZ 1030-M2	2NO	FZ 1031-M2	2NO	FZ 1033-M2	2NO
11	R			FZ 1130-M2	2NC	FZ 1131-M2	2NC	FZ 1133-M2	2NC
12	R	FZ 1225-M2	2NO	FZ 1230-M2	2NO	FZ 1231-M2	2NO	FZ 1233-M2	2NO
13	LV			FZ 1330-M2	2NC	FZ 1331-M2	2NC	FZ 1333-M2	2NC
14	LS			FZ 1430-M2	2NC	FZ 1431-M2	2NC	FZ 1433-M2	2NC
15	LS			FZ 1530-M2	2NO	FZ 1531-M2	2NO	FZ 1533-M2	2NO
16	LI			FZ 1630-M2	2NC	FZ 1631-M2	2NC	FZ 1633-M2	2NC
18	LA	FZ 1825-M2	1NO+1NC	FZ 1830-M2	1NO+1NC	FZ 1831-M2	1NO+1NC	FZ 1833-M2	1NO+1NC
20	L	FZ 2025-M2	1NO+2NC	FZ 2030-M2	1NO+2NC	FZ 2031-M2	1NO+2NC	FZ 2033-M2	1NO+2NC
21	L	FZ 2125-M2	3NC	FZ 2130-M2	3NC	FZ 2131-M2	3NC	FZ 2133-M2	3NC
22	L	FZ 2225-M2	2NO+1NC	FZ 2230-M2	2NO+1NC	FZ 2231-M2	2NO+1NC	FZ 2233-M2	2NO+1NC
2	R	FZ 225-M2	2x(1NO-1NC)	FZ 230-M2	2x(1NO-1NC)	FZ 231-M2	2x(1NO-1NC)	FZ 233-M2	2x(1NO-1NC)
E1		FZ E125-M2	1NO-1NC	FZ E130-M2	1NO-1NC	FZ E131-M2	1NO-1NC	FZ E133-M2	1NO-1NC
Max. speed		1 m/s		page 215 - type 1		page 215 - type 1		1.5 m/s	
Actuating force		0.12 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)		0.06 Nm	
Travel diagrams		page 216 - group 4		page 216 - group 5		page 216 - group 5		page 216 - group 5	

Contact block				Round rod, Ø 3 mm, stainless steel		Other rollers available. See on page 102		Other rollers available. See on page 102	
									
5	R	FZ 534-M2	1NO+1NC	FZ 550-M2	1NO+1NC	FZ 551-M2	1NO+1NC	FZ 552-M2	1NO+1NC
6	L	FZ 634-M2	1NO+1NC	FZ 650-M2	1NO+1NC	FZ 651-M2	1NO+1NC	FZ 652-M2	1NO+1NC
7	LO	FZ 734-M2	1NO+1NC	FZ 750-M2	1NO+1NC	FZ 751-M2	1NO+1NC	FZ 752-M2	1NO+1NC
9	L	FZ 934-M2	2NC	FZ 950-M2	2NC	FZ 951-M2	2NC	FZ 952-M2	2NC
10	L	FZ 1034-M2	2NO	FZ 1050-M2	2NO	FZ 1051-M2	2NO	FZ 1052-M2	2NO
11	R	FZ 1134-M2	2NC	FZ 1150-M2	2NC	FZ 1151-M2	2NC	FZ 1152-M2	2NC
12	R	FZ 1234-M2	2NO	FZ 1250-M2	2NO	FZ 1251-M2	2NO	FZ 1252-M2	2NO
13	LV	FZ 1334-M2	2NC	FZ 1350-M2	2NC	FZ 1351-M2	2NC	FZ 1352-M2	2NC
14	LS	FZ 1434-M2	2NC	FZ 1450-M2	2NC	FZ 1451-M2	2NC	FZ 1452-M2	2NC
15	LS	FZ 1534-M2	2NO	FZ 1550-M2	2NO	FZ 1551-M2	2NO	FZ 1552-M2	2NO
16	LI	FZ 1634-M2	2NC	FZ 1650-M2	2NC	FZ 1651-M2	2NC	FZ 1652-M2	2NC
18	LA	FZ 1834-M2	1NO+1NC	FZ 1850-M2	1NO+1NC	FZ 1851-M2	1NO+1NC	FZ 1852-M2	1NO+1NC
20	L	FZ 2034-M2	1NO+2NC	FZ 2050-M2	1NO+2NC	FZ 2051-M2	1NO+2NC	FZ 2052-M2	1NO+2NC
21	L	FZ 2134-M2	3NC	FZ 2150-M2	3NC	FZ 2151-M2	3NC	FZ 2152-M2	3NC
22	L	FZ 2234-M2	2NO+1NC	FZ 2250-M2	2NO+1NC	FZ 2251-M2	2NO+1NC	FZ 2252-M2	2NO+1NC
2	R	FZ 234-M2	2x(1NO-1NC)	FZ 250-M2	2x(1NO-1NC)	FZ 251-M2	2x(1NO-1NC)	FZ 252-M2	2x(1NO-1NC)
E1		FZ E134-M2	1NO-1NC	FZ E150-M2	1NO-1NC	FZ E151-M2	1NO-1NC	FZ E152-M2	1NO-1NC
Max. speed		1.5 m/s		1.5 m/s		page 215 - type 1		page 215 - type 1	
Actuating force		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)	
Travel diagrams		page 216 - group 5		page 216 - group 5		page 216 - group 5		page 216 - group 5	

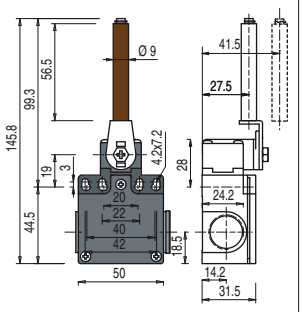
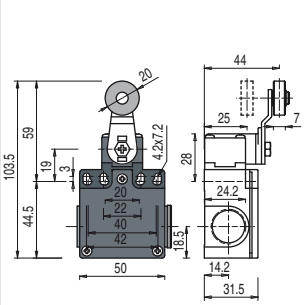
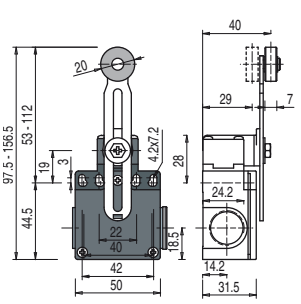
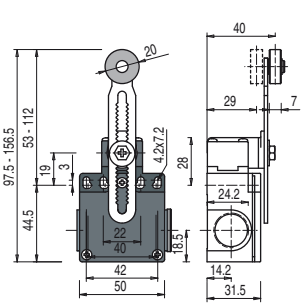
All values in the drawings are in mm

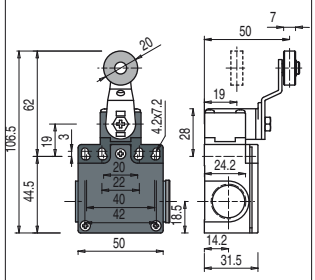
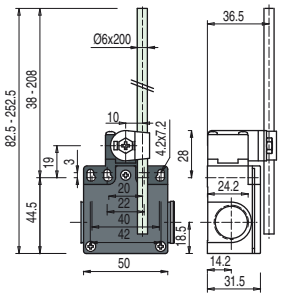
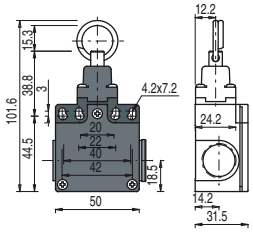
Accessories See page 197

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

Contact type:

R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LI = slow action independent
LA = slow action close
= electronic PNP

Contact block		Porcelain roller	Other rollers available. See on page 102	Other rollers available. See on page 102	Other rollers available. See on page 102
					
5	R	FZ 553-E0M2V9 → 1NO+1NC	FZ 554-M2 → 1NO+1NC	FZ 555-M2 → (1) 1NO+1NC	FZ 556-M2 → 1NO+1NC
6	L	FZ 653-E0M2V9 → 1NO+1NC	FZ 654-M2 → 1NO+1NC	FZ 655-M2 → (1) 1NO+1NC	FZ 656-M2 → 1NO+1NC
7	LO	FZ 753-E0M2V9 → 1NO+1NC	FZ 754-M2 → 1NO+1NC	FZ 755-M2 → (1) 1NO+1NC	FZ 756-M2 → 1NO+1NC
9	L	FZ 953-E0M2V9 → 2NC	FZ 954-M2 → 2NC	FZ 955-M2 → (1) 2NC	FZ 956-M2 → 2NC
10	L	FZ 1053-E0M2V9 2NO	FZ 1054-M2 2NO	FZ 1055-M2 2NO	FZ 1056-M2 2NO
11	R		FZ 1154-M2 → 2NC	FZ 1155-M2 → (1) 2NC	FZ 1156-M2 → 2NC
12	R	FZ 1253-E0M2V9 2NO	FZ 1254-M2 2NO	FZ 1255-M2 2NO	FZ 1256-M2 2NO
13	LV	FZ 1353-E0M2V9 → 2NC	FZ 1354-M2 → 2NC	FZ 1355-M2 → (1) 2NC	FZ 1356-M2 → 2NC
14	LS	FZ 1453-E0M2V9 → 2NC	FZ 1454-M2 → 2NC	FZ 1455-M2 → (1) 2NC	FZ 1456-M2 → 2NC
15	LS	FZ 1553-E0M2V9 2NO	FZ 1554-M2 2NO	FZ 1555-M2 2NO	FZ 1556-M2 2NO
16	LI		FZ 1654-M2 → 2NC	FZ 1655-M2 → (1) 2NC	FZ 1656-M2 → 2NC
18	LA	FZ 1853-E0M2V9 → 1NO+1NC	FZ 1854-M2 → 1NO+1NC	FZ 1855-M2 → (1) 1NO+1NC	FZ 1856-M2 → 1NO+1NC
20	L	FZ 2053-E0M2V9 → 1NO+2NC	FZ 2054-M2 → 1NO+2NC	FZ 2055-M2 → (1) 1NO+2NC	FZ 2056-M2 → 1NO+2NC
21	L	FZ 2153-E0M2V9 → 3NC	FZ 2154-M2 → 3NC	FZ 2155-M2 → (1) 3NC	FZ 2156-M2 → 3NC
22	L	FZ 2253-E0M2V9 → 2NO+1NC	FZ 2254-M2 → 2NO+1NC	FZ 2255-M2 → (1) 2NO+1NC	FZ 2256-M2 → 2NO+1NC
2	R	FZ 253-E0M2 2x(1NO-1NC)	FZ 254-M2 2x(1NO-1NC)	FZ 255-M2 2x(1NO-1NC)	FZ 256-M2 2x(1NO-1NC)
E1		FZ E153-E0M2V9 1NO-1NC	FZ E154-M2 1NO-1NC	FZ E155-M2 1NO-1NC	FZ E156-M2 1NO-1NC
Max. speed		0.5 m/s	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.03 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 6	page 216 - group 5	page 216 - group 5	page 216 - group 5

Contact block		Other rollers available. See on page 102	Glass fibre rod	Rope switch for signalling	
					
5	R	FZ 557-M2 → 1NO+1NC	FZ 569-M2 1NO+1NC	FZ 576-M2 1NO+1NC	
6	L	FZ 657-M2 → 1NO+1NC	FZ 669-M2 1NO+1NC	FZ 676-M2 1NO+1NC	
7	LO	FZ 757-M2 → 1NO+1NC	FZ 769-M2 1NO+1NC	FZ 776-M2 1NO+1NC	
9	L	FZ 957-M2 → 2NC	FZ 969-M2 2NC	FZ 976-M2 2NO	
10	L	FZ 1057-M2 2NO	FZ 1069-M2 2NO	FZ 1076-M2 2NC	
11	R	FZ 1157-M2 → 2NC	FZ 1169-M2 2NC	FZ 1176-M2 2NO	
12	R	FZ 1257-M2 2NO	FZ 1269-M2 2NO	FZ 1276-M2 2NC	
13	LV	FZ 1357-M2 → 2NC	FZ 1369-M2 2NC	FZ 1376-M2 2NO	
14	LS	FZ 1457-M2 → 2NC	FZ 1469-M2 2NC	FZ 1476-M2 2NO	
15	LS	FZ 1557-M2 2NO	FZ 1569-M2 2NO	FZ 1576-M2 2NC	
16	LI	FZ 1657-M2 → 2NC	FZ 1669-M2 2NC		
18	LA	FZ 1857-M2 → 1NO+1NC	FZ 1869-M2 1NO+1NC	FZ 1876-M2 1NO+1NC	
20	L	FZ 2057-M2 → 1NO+2NC	FZ 2069-M2 1NO+2NC	FZ 2076-M2 2NO+1NC	
21	L	FZ 2157-M2 → 3NC	FZ 2169-M2 3NC	FZ 2176-M2 3NO	
22	L	FZ 2257-M2 → 2NO+1NC	FZ 2269-M2 2NO+1NC	FZ 2276-M2 1NO+2NC	
2	R	FZ 257-M2 2x(1NO-1NC)	FZ 269-M2 2x(1NO-1NC)	FZ 276-M2 2x(1NO-1NC)	
E1		FZ E157-M2 1NO-1NC	FZ E169-M2 1NO-1NC		
Max. speed		page 215 - type 1	1.5 m/s	0.5 m/s	
Actuating force		0.06 Nm (0.25 Nm →)	0.06 Nm	initial 20 N - final 40 N	
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 7	

(1) Positive opening only with actuator set to max. See page 101.

All values in the drawings are in mm

Accessories See page 197

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

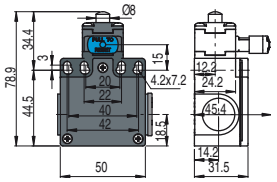
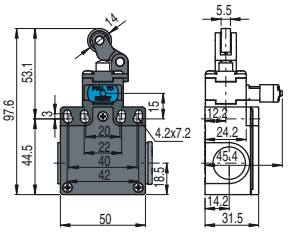
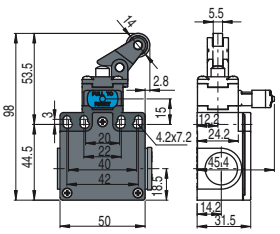
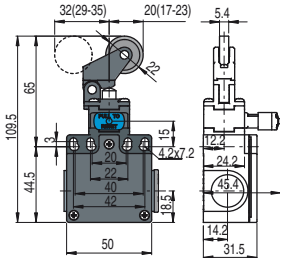
FZ series position switches with reset

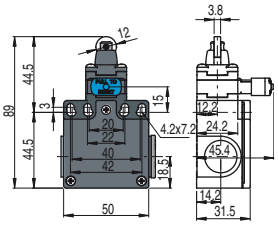
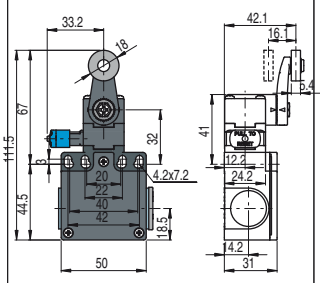
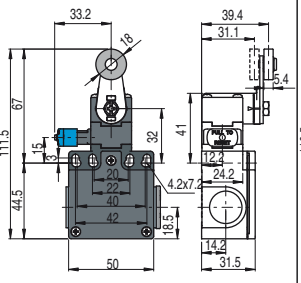
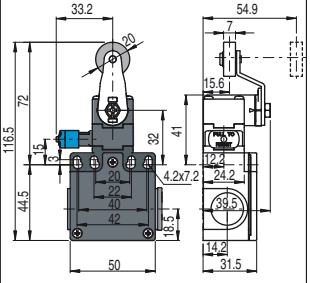
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. This device consists in a block to be mounted between the body and the head of the switch that can be rotated independently from the head. This new device offers the following advantages:

- The reset device can be integrated into almost all standard actuator heads
- Contact blocks with snap action are no more necessary because the tripping movement is executed by the reset device itself
- The reset device can be rotated independently from the head ensuring maximum flexibility during installation
- Two actuating forces: standard and increased for vibration applications
- Mechanical endurance: 1 million operating cycles.

Contact type:

R = snap action
L = slow action

Contact block					
			With stainless steel roller on request 	With stainless steel roller on request 	
6	L	FZ 601-W3M2 → 1NO+1NC	FZ 602-W3M2 → 1NO+1NC	FZ 605-W3M2 → 1NO+1NC	FZ 607-W3M2 → 1NO+1NC
9	L	FZ 901-W3M2 → 2NC	FZ 902-W3M2 → 2NC	FZ 905-W3M2 → 2NC	FZ 907-W3M2 → 2NC
10	L	FZ 1001-W3M2 2NO	FZ 1002-W3M2 2NO	FZ 1005-W3M2 2NO	FZ 1007-W3M2 2NO
20	L	FZ 2001-W3M2 → 1NO+2NC	FZ 2002-W3M2 → 1NO+2NC	FZ 2005-W3M2 → 1NO+2NC	FZ 2007-W3M2 → 1NO+2NC
21	L	FZ 2101-W3M2 → 3NC	FZ 2102-W3M2 → 3NC	FZ 2105-W3M2 → 3NC	FZ 2107-W3M2 → 3NC
22	L	FZ 2201-W3M2 → 2NO+1NC	FZ 2202-W3M2 → 2NO+1NC	FZ 2205-W3M2 → 2NO+1NC	FZ 2207-W3M2 → 2NO+1NC
2	R	FZ 201-W3M2 2NO+2NC	FZ 202-W3M2 2NO+2NC	FZ 205-W3M2 2NO+2NC	FZ 207-W3M2 2NO+2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		4.5 N (25 N →)	4 N (25 N →)	4 N (25 N →)	2.5 N (25 N →)
Travel diagrams		page 217 - group 1	page 217 - group 2	page 217 - group 2	page 217 - group 3

Contact block					
			With Ø 20 mm stainless steel roller on request 	Other rollers available. See on page 102 	Other rollers available. See on page 102 
6	L	FZ 615-W3M2R28 → 1NO+1NC	FZ 630-W3M2 → 1NO+1NC	FZ 631-W3M2 → 1NO+1NC	FZ 651-W3M2 → 1NO+1NC
9	L	FZ 915-W3M2R28 → 2NC	FZ 930-W3M2 → 2NC	FZ 931-W3M2 → 2NC	FZ 951-W3M2 → 2NC
10	L	FZ 1015-W3M2R28 2NO	FZ 1030-W3M2 2NO	FZ 1031-W3M2 2NO	FZ 1051-W3M2 2NO
20	L	FZ 2015-W3M2R28 → 1NO+2NC	FZ 2030-W3M2 → 1NO+2NC	FZ 2031-W3M2 → 1NO+2NC	FZ 2051-W3M2 → 1NO+2NC
21	L	FZ 2115-W3M2R28 → 3NC	FZ 2130-W3M2 → 3NC	FZ 2131-W3M2 → 3NC	FZ 2151-W3M2 → 3NC
22	L	FZ 2215-W3M2R28 → 2NO+1NC	FZ 2230-W3M2 → 2NO+1NC	FZ 2231-W3M2 → 2NO+1NC	FZ 2251-W3M2 → 2NO+1NC
2	R	FZ 215-W3M2R28 2NO+2NC	FZ 230-W3M2 2NO+2NC	FZ 231-W3M2 2NO+2NC	FZ 251-W3M2 2NO+2NC
Max. speed		page 215 - type 2	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		4.5 N (25 N →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 1	page 217 - group 4	page 217 - group 4	page 217 - group 4

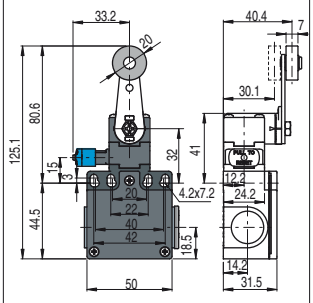
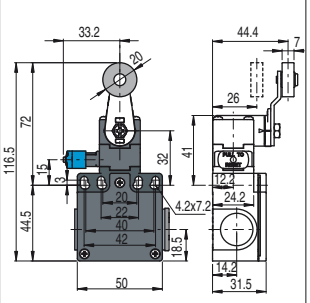
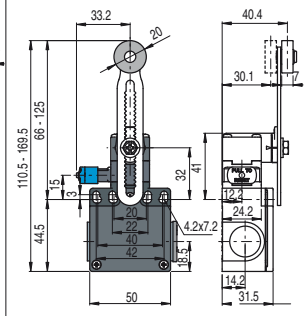
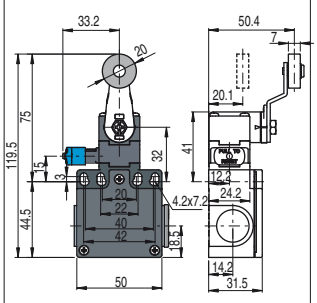
All values in the drawings are in mm

Accessories See page 197

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

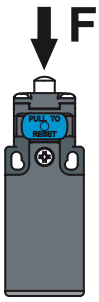
Contact type:

R = snap action
L = slow action

Contact block		Other rollers available. See on page 102	Other rollers available. See on page 102	Other rollers available. See on page 102	Other rollers available. See on page 102
					
6	L	FZ 652-W3M2 ⊖ 1NO+1NC	FZ 654-W3M2 ⊖ 1NO+1NC	FZ 656-W3M2 ⊖ 1NO+1NC	FZ 657-W3M2 ⊖ 1NO+1NC
9	L	FZ 952-W3M2 ⊖ 2NC	FZ 954-W3M2 ⊖ 2NC	FZ 956-W3M2 ⊖ 2NC	FZ 957-W3M2 ⊖ 2NC
10	L	FZ 1052-W3M2 2NO	FZ 1054-W3M2 2NO	FZ 1056-W3M2 2NO	FZ 1057-W3M2 2NO
20	L	FZ 2052-W3M2 ⊖ 1NO+2NC	FZ 2054-W3M2 ⊖ 1NO+2NC	FZ 2056-W3M2 ⊖ 1NO+2NC	FZ 2057-W3M2 ⊖ 1NO+2NC
21	L	FZ 2152-W3M2 ⊖ 3NC	FZ 2154-W3M2 ⊖ 3NC	FZ 2156-W3M2 ⊖ 3NC	FZ 2157-W3M2 ⊖ 3NC
22	L	FZ 2252-W3M2 ⊖ 2NO+1NC	FZ 2254-W3M2 ⊖ 2NO+1NC	FZ 2256-W3M2 ⊖ 2NO+1NC	FZ 2257-W3M2 ⊖ 2NO+1NC
2	R	FZ 252-W3M2 2NO+2NC	FZ 254-W3M2 2NO+2NC	FZ 256-W3M2 2NO+2NC	FZ 257-W3M2 2NO+2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.07 Nm (0.25 Nm ⊖)	0.07 Nm (0.25 Nm ⊖)	0.07 Nm (0.25 Nm ⊖)	0.07 Nm (0.25 Nm ⊖)
Travel diagrams		page 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

All values in the drawings are in mm

Increased actuating force



The switch can be delivered with increased actuating force (option W4). Ideal for vibration applications.

Actuators	Actuating force
01, 14, 15, 16	7 N
02, 05	6 N
07	3.5 N
30 … 57	0.08 Nm

To order the switch with reset and increased actuating force, replace the -W3 option with -W4 in the order code.
Example: FZ 601-**W3**M2 ➔ FZ 601-**W4**M2

Accessories See page 197

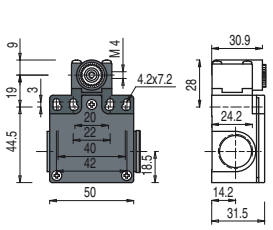
➔ The 2D and 3D files are available at **www.pizzato.com**

Position switches with swivelling lever without actuator

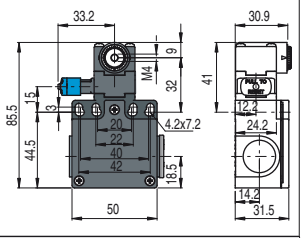
All values in the drawings are in mm

Contact type:

- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action close
- = electronic PNP



With manual reset knob



Contact block				With manual reset knob	
5	R	FZ 538-M2	1NO+1NC		
6	L	FZ 638-M2	1NO+1NC	FZ 638-W3M2	1NO+1NC
7	LO	FZ 738-M2	1NO+1NC		
9	L	FZ 938-M2	2NC	FZ 938-W3M2	2NC
10	L	FZ 1038-M2	2NO	FZ 1038-W3M2	2NO
11	R	FZ 1138-M2	2NC		
12	R	FZ 1238-M2	2NO		
13	LV	FZ 1338-M2	2NC		
14	LS	FZ 1438-M2	2NC		
15	LS	FZ 1538-M2	2NO		
16	LI	FZ 1638-M2	2NC		
18	LA	FZ 1838-M2	1NO+1NC		
20	L	FZ 2038-M2	1NO+2NC	FZ 2038-W3M2	1NO+2NC
21	L	FZ 2138-M2	3NC	FZ 2138-W3M2	3NC
22	L	FZ 2238-M2	2NO+1NC	FZ 2238-W3M2	2NO+1NC
2	R	FZ 238-M2	2x(1NO-1NC)	FZ 238-W3M2	2NO+2NC
E1		FZ E138-M2	1NO-1NC		
Actuating force		0.06 Nm (0.25 Nm)		0.07 Nm (0.25 Nm)	
Travel diagrams		page 216 - group 5		page 217 - group 4	

IMPORTANT

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

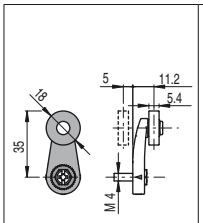
For more information about safety applications see details on page 211.

Separate actuators

All values in the drawings are in mm

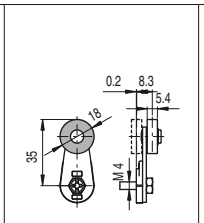
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Technopolymer roller Ø 18 mm



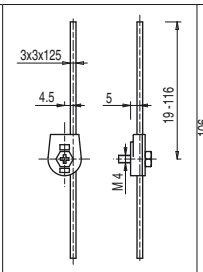
VF LE30

Technopolymer roller Ø 18 mm



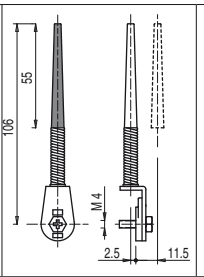
VF LE31

Adjustable square rod, 3x3x125 mm



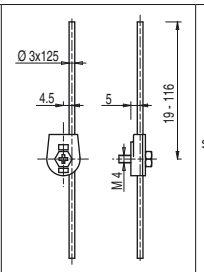
VF LE33

Flexible rod with pointed end



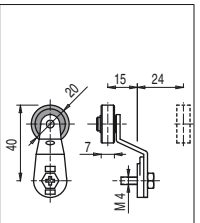
VF LE34

Adjustable round rod Ø 3x125 mm



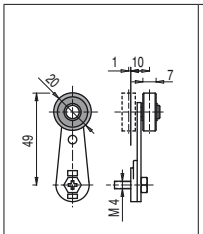
VF LE50

Technopolymer roller Ø 20 mm



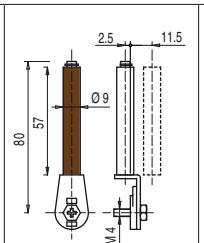
VF LE51

Technopolymer roller Ø 20 mm



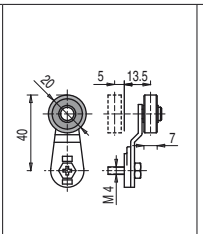
VF LE52

Porcelain roller



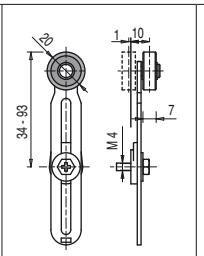
VF LE53 (2)

Technopolymer roller Ø 20 mm



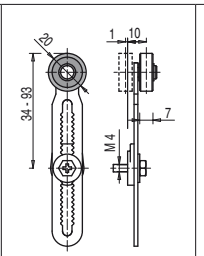
VF LE54

Adjustable actuator with technopolymer roller



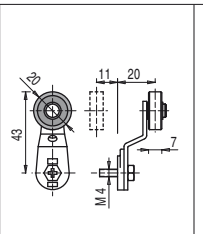
VF LE55 (1)

Adjustable safety actuator with technopolymer roller



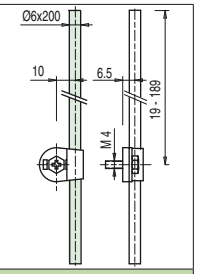
VF LE56

Technopolymer roller Ø 20 mm



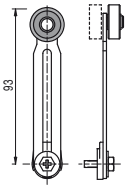
VF LE57

Adjustable glass fibre rod



VF LE69

- (1) Actuator VF LE55 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 LE56 adjustable safety lever.
- (2) The position switch obtained by assembling switch FZ •38-M2 (e.g. FZ 538-M2, FZ 638-M2…) with actuator VF LE53 will not present the same travel diagrams and actuating forces as switch FZ •53 E0M2V9 (e.g. FZ 553-E0M2V9, FZ 653-E0M2V9…).
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

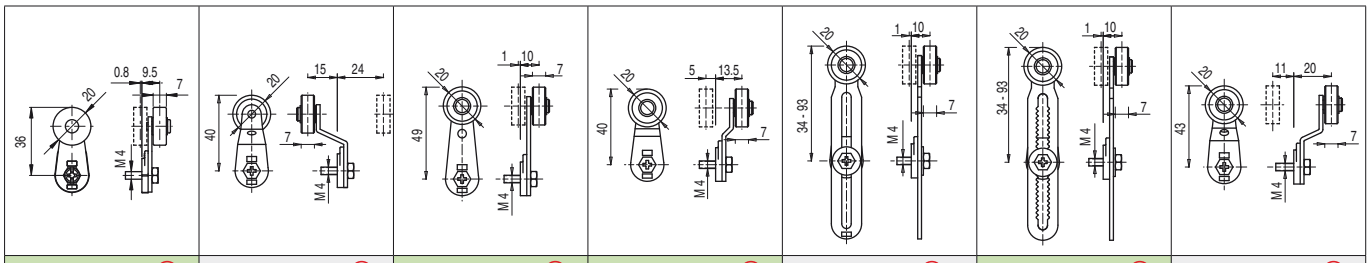
→ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

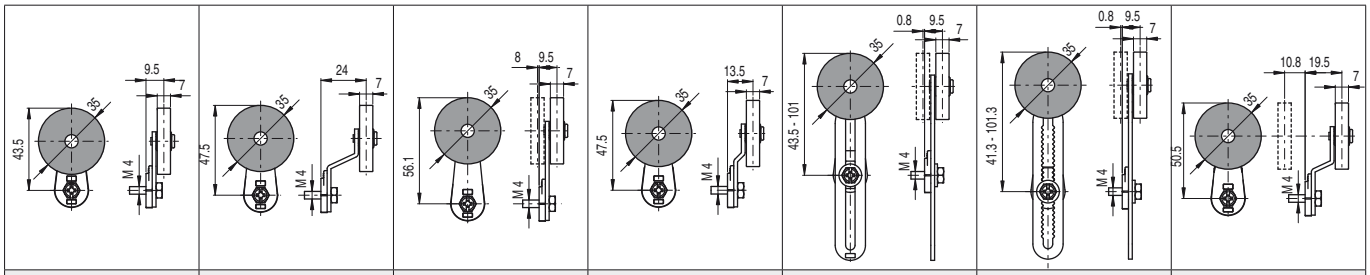
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Stainless steel rollers, Ø 20 mm



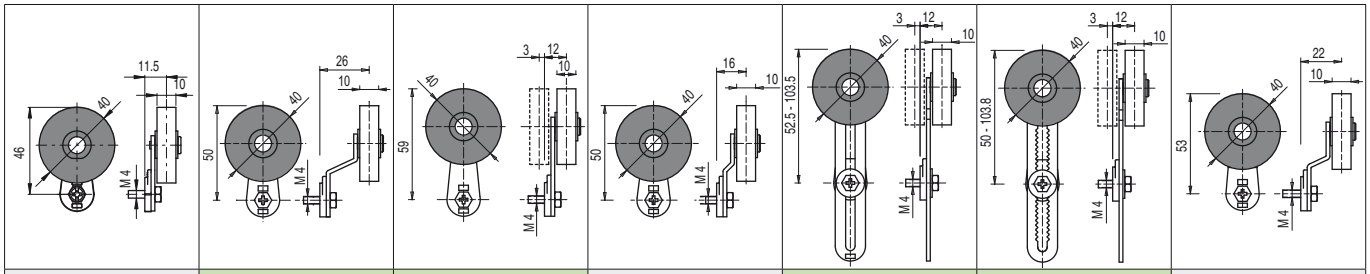
VF LE31-R24 | VF LE51-R24 | VF LE52-R24 | VF LE54-R24 | VF LE55-R24 (1) | VF LE56-R24 | VF LE57-R24

Technopolymer rollers, Ø 35 mm



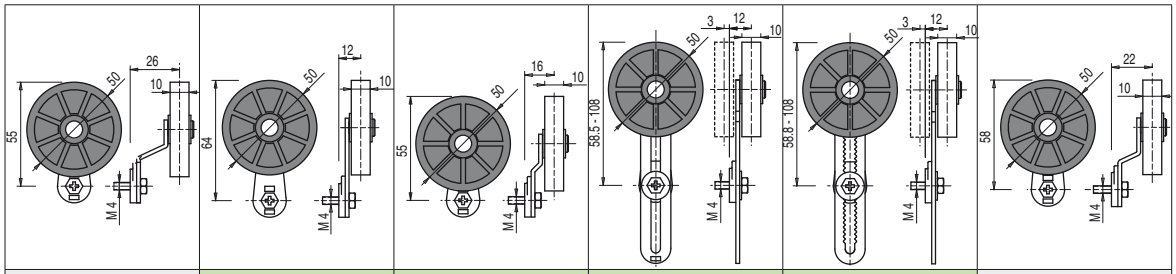
VF LE31-R25 (4) | VF LE51-R25 (4) | VF LE52-R25 | VF LE54-R25 (4) | VF LE55-R25 (1) | VF LE56-R25 | VF LE57-R25

Rubber rollers, Ø 40 mm



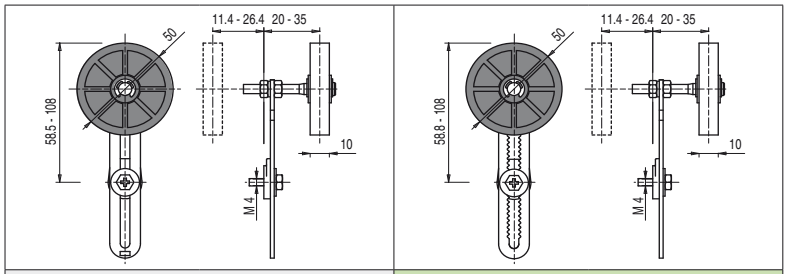
VF LE31-R5 (4) | VF LE51-R5 (4) | VF LE52-R5 | VF LE54-R5 (4) | VF LE55-R5 (1) | VF LE56-R5 | VF LE57-R5 (4)

Rubber rollers, Ø 50 mm



VF LE51-R26 (4) | VF LE52-R26 (4) | VF LE54-R26 (4) | VF LE55-R26 (1) | VF LE56-R26 | VF LE57-R26 (4)

Protruding rubber rollers, Ø 50 mm



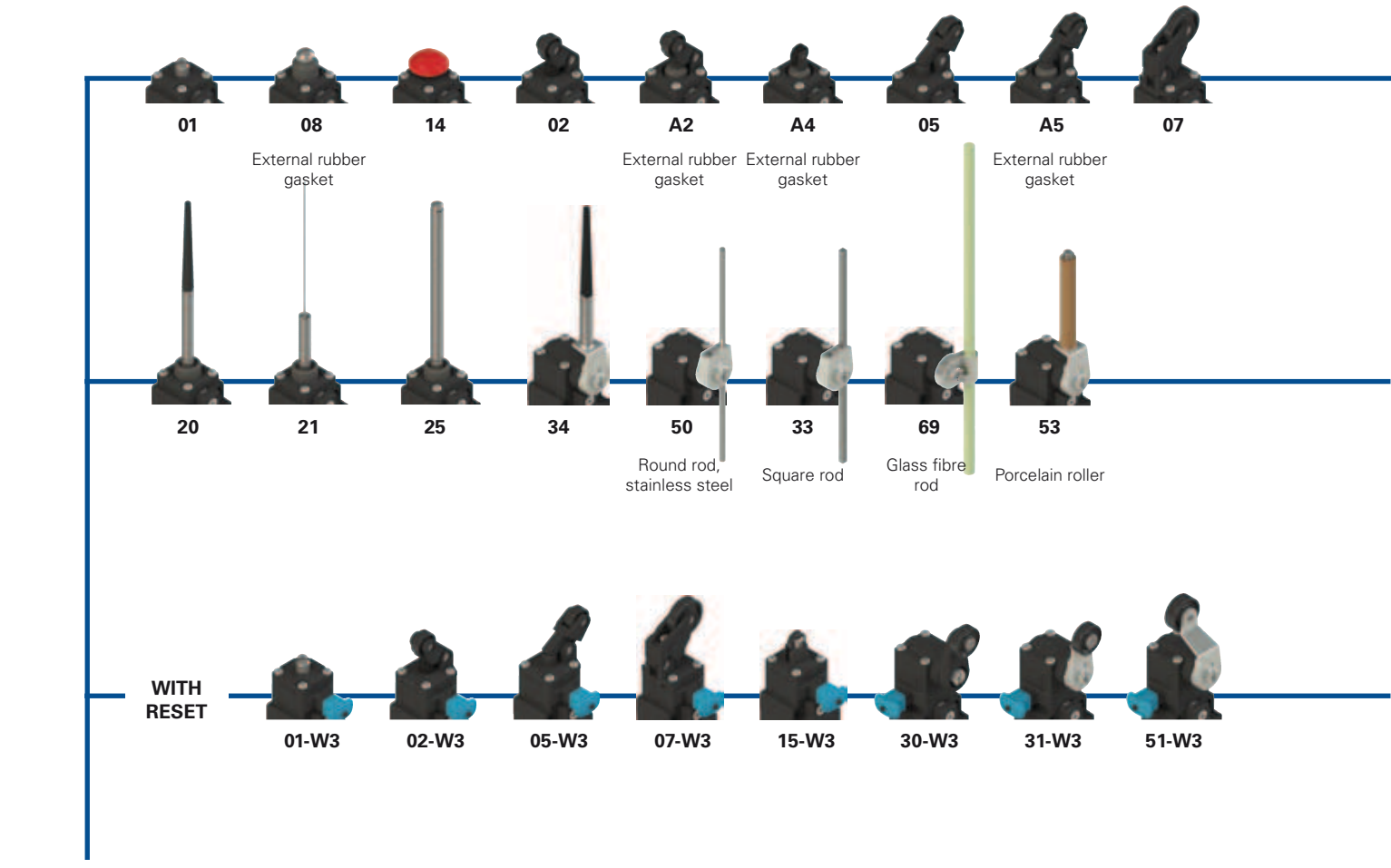
VF LE55-R27 (1) | VF LE56-R27

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

Accessories See page 197

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

Selection diagram



CONTACT BLOCKS

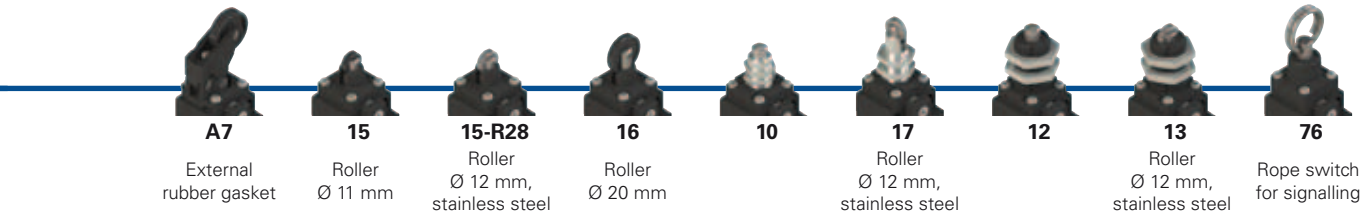
3	33	34
1NO-1NC snap action	1NO+1NC slow action	2NC slow action

CONDUIT ENTRY

Threaded conduit entry		With cable gland	
M1	M16x1.5 (standard)	K24	for cables Ø 5 … 10 mm
	PG 11	K28	for cables Ø 3 … 7 mm

product options

Sold separately as accessory



A7 External rubber gasket

15 Roller Ø 11 mm

15-R28 Roller Ø 12 mm, stainless steel

16 Roller Ø 20 mm

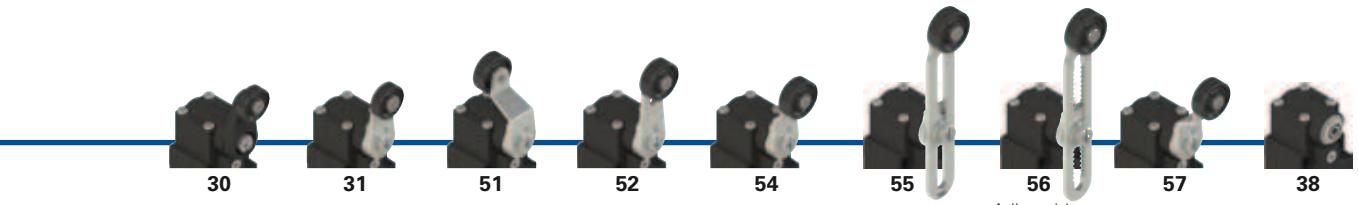
10

17 Roller Ø 12 mm, stainless steel

12

13 Roller Ø 12 mm, stainless steel

76 Rope switch for signalling

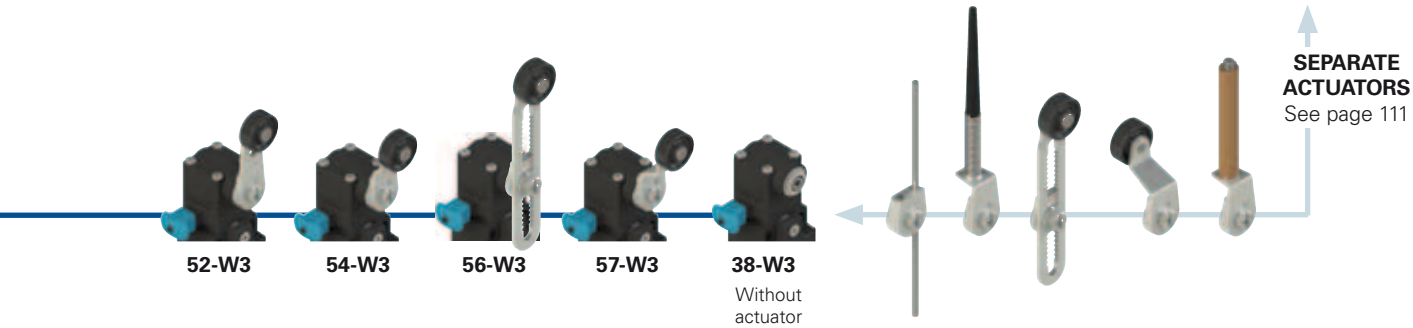


30 **31** **51** **52** **54**

55 Adjustable lever

56 Adjustable safety lever

57 **38** Without actuator



52-W3 **54-W3** **56-W3** **57-W3**

38-W3 Without actuator

SEPARATE ACTUATORS See page 111

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

FK 302-W3XGM1K24R23T6

Housing

FK	technopolymer, one conduit entry

Contact block

3	1NO+1NC, snap action
33	1NO+1NC, slow action
34	2NC, slow action

Actuators

01	short plunger
02	roller lever
05	angled lever with roller
...	.....

Reset

	without reset (standard)
W3	simultaneous reset
W4	simultaneous reset, increased force

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Contact type

	silver contacts (standard)
G	silver contacts, 1 µm gold coating (not for contact block 3)

Threaded conduit entry

M1	M16x1.5 (standard)
	PG 11

Pre-installed cable glands

	no cable gland (standard)
K24	cable gland for cables Ø 5 … 10°mm
K28	cable gland for cables Ø 3 … 7°mm

For the complete list of possible combinations please contact our technical department.

Ambient temperature

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

Rollers

	standard roller
R28	stainless steel Ø 12 mm (for actuators A4, 15)
R23	stainless steel Ø 14 mm (for actuators A2, 02, A5, 05, 30, 31, 51, 52, 54, 55, 56, 57)
R24	stainless steel Ø 20 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R25	technopolymer, Ø 35 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R5	rubber, Ø 40 mm (for actuators 30, 31, 51, 52, 54, 55, 56, 57)
R26	rubber, Ø 50 mm (for actuators 51, 52, 54, 55, 56, 57)
R27	rubber, protruding, Ø 50 mm (for actuators 55, 56)

Main features

- Technopolymer housing, one conduit entry
- Protection degree IP67
- 3 contact blocks available
- 46 actuators available
- Versions with external parts in stainless steel
- Versions with gold-plated silver contacts

Quality marks:

IMQ approval: EG610
UL approval: E131787
CCC approval: 2007010305230013
EAC approval: RU C-IT.АД35.B.00454

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈
One threaded conduit entry: M16x1.5 (standard)
Protection degree: IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

Cable cross section (flexible copper strands)

Contact blocks 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 3:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 216. 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 on pages 211 to 222.**

Electrical data

without connector

Thermal current (I_{th}):	10 A
Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 33, 34)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact block 33, 34)
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)

Ue (V)	250	400	500
Ie (A)	6	4	1

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	6	1.1	0.4

Features approved by IMQ

Rated insulation voltage (U_i):	500 Vac 400 Vac (for contact blocks 33, 34)
Conventional free air thermal current (I_{th}):	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 33, 34)
Protection degree of the housing:	IP67
MV terminals (screw terminals)	
Pollution degree:	3
Utilization category:	AC15
Operating voltage (U_e):	400 Vac (50 Hz)
Operating current (I_e):	3 A

Forms of the contact element: Zb, Y+Y
Positive opening of contacts on contact blocks 33, 34

In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 1, 4X "indoor use only", 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).

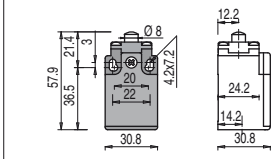
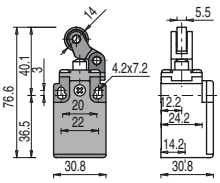
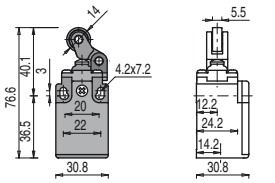
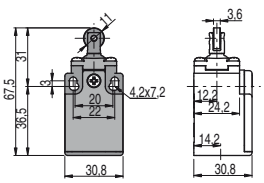
In compliance with standard: UL 508, CSA 22.2 No.14

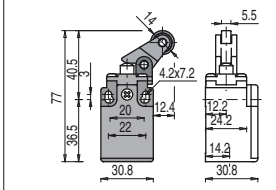
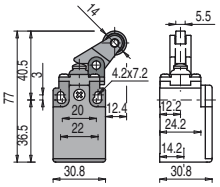
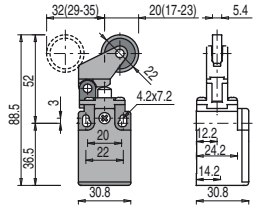
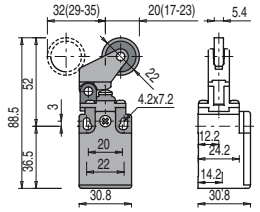
Please contact our technical department for the list of approved products.

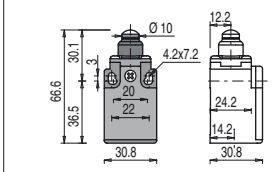
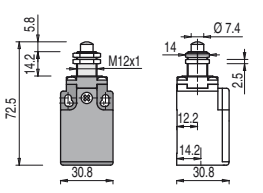
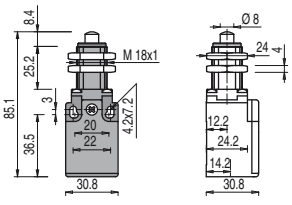
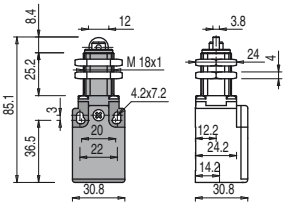
FK series position switches

Contact type:

R = snap action
L = slow action

Contact block					
			With stainless steel roller on request 	With external rubber gasket With stainless steel roller on request 	With external rubber gasket With Ø 12 mm stainless steel roller on request 
3	R	FK 301-M1 1NO-1NC	FK 302-M1 1NO-1NC	FK 3A2-M1 1NO-1NC	FK 3A4-M1 1NO-1NC
33	L	FK 3301-M1 → 1NO+1NC	FK 3302-M1 → 1NO+1NC	FK 33A2-M1 → 1NO+1NC	FK 33A4-M1 → 1NO+1NC
34	L	FK 3401-M1 → 2NC	FK 3402-M1 → 2NC	FK 34A2-M1 → 2NC	FK 34A4-M1 → 2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 5
Actuating force		5 N (25 N →)	4 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 1

Contact block					
		With stainless steel roller on request 	With external rubber gasket With stainless steel roller on request 		With external rubber gasket 
3	R	FK 305-M1 1NO-1NC	FK 3A5-M1 1NO-1NC	FK 307-M1 1NO-1NC	FK 3A7-M1 1NO-1NC
33	L	FK 3305-M1 → 1NO+1NC	FK 33A5-M1 → 1NO+1NC	FK 3307-M1 → 1NO+1NC	FK 33A7-M1 → 1NO+1NC
34	L	FK 3405-M1 → 2NC	FK 34A5-M1 → 2NC	FK 3407-M1 → 2NC	FK 34A7-M1 → 2NC
Max. speed		page 215 - type 3	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		4 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)	3 N (25 N →)
Travel diagrams		page 216 - group 2	page 216 - group 2	page 216 - group 3	page 216 - group 3

Contact block					
		With external rubber gasket 	Secured only by means of threaded head in vertical position 		
3	R	FK 308-M1 1NO-1NC	FK 310-M1 1NO-1NC	FK 312-M1 1NO-1NC	FK 313-M1 1NO-1NC
33	L	FK 3308-M1 → 1NO+1NC	FK 3310-M1 → 1NO+1NC	FK 3312-M1 → 1NO+1NC	FK 3313-M1 → 1NO+1NC
34	L	FK 3408-M1 → 2NC	FK 3410-M1 → 2NC	FK 3412-M1 → 2NC	FK 3413-M1 → 2NC
Max. speed		page 215 - type 4	page 215 - type 4	page 215 - type 4	page 215 - type 2
Actuating force		5 N (25 N →)	5 N (25 N →)	5 N (25 N →)	5 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

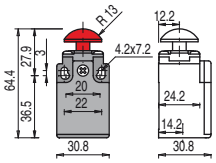
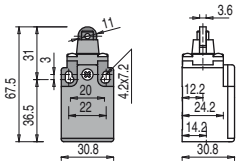
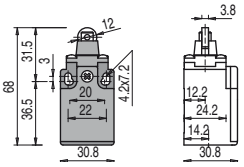
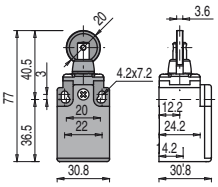
All values in the drawings are in mm

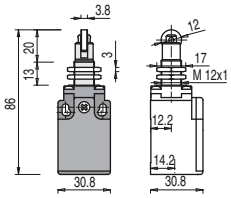
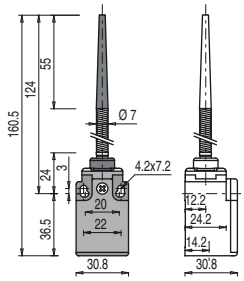
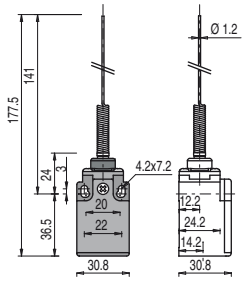
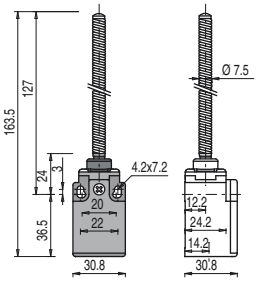
Accessories See page 197

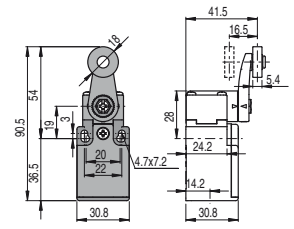
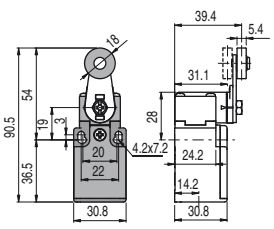
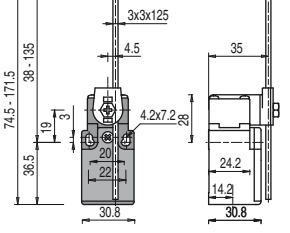
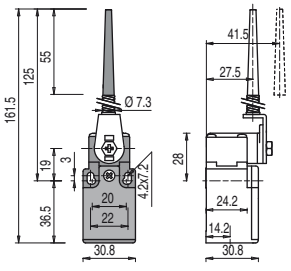
→ The 2D and 3D files are available at **www.pizzato.com**

Contact type:

R = snap action
L = slow action

Contact block					
			 Roller, Ø 11 mm, technopolymer	 Roller, Ø 12 mm, stainless steel	
3	R	FK 314-M1 1NO-1NC	FK 315-M1 1NO-1NC	FK 315-M1R28 1NO-1NC	FK 316-M1 1NO-1NC
33	L	FK 3314-M1 ⊖ 1NO+1NC	FK 3315-M1 ⊖ 1NO+1NC	FK 3315-M1R28 ⊖ 1NO+1NC	FK 3316-M1 ⊖ 1NO+1NC
34	L	FK 3414-M1 ⊖ 2NC	FK 3415-M1 ⊖ 2NC	FK 3415-M1R28 ⊖ 2NC	FK 3416-M1 ⊖ 2NC
Max. speed		page 215 - type 4	page 215 - type 2	page 215 - type 2	page 215 - type 2
Actuating force		6 N (25 N ⊖)	5 N (25 N ⊖)	5 N (25 N ⊖)	5 N (25 N ⊖)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

Contact block					
		 Secured only by means of threaded head in vertical position	 With external rubber gasket	 With external rubber gasket	 With external rubber gasket
3	R	FK 317-M1 1NO-1NC	FK 320-M1 1NO-1NC	FK 321-M1 1NO-1NC	FK 325-M1 1NO-1NC
33	L	FK 3317-M1 ⊖ 1NO+1NC	FK 3320-M1 1NO+1NC	FK 3321-M1 1NO+1NC	FK 3325-M1 1NO+1NC
34	L	FK 3417-M1 ⊖ 2NC	FK 3420-M1 2NC	FK 3421-M1 2NC	FK 3425-M1 2NC
Max. speed		page 215 - type 2	1 m/s	1 m/s	1 m/s
Actuating force		5 N (25 N ⊖)	0.05 Nm	0.05 Nm	0.1 Nm
Travel diagrams		page 216 - group 1	page 216 - group 4	page 216 - group 4	page 216 - group 4

Contact block					
		 With Ø 20 mm stainless steel roller on request	 Other rollers available. See on page 112	 Square rod, 3x3 mm	
3	R	FK 330-M1 1NO-1NC	FK 331-M1 1NO-1NC	FK 333-M1 1NO-1NC	FK 334-M1 1NO-1NC
33	L	FK 3330-M1 ⊖ 1NO+1NC	FK 3331-M1 ⊖ 1NO+1NC	FK 3333-M1 1NO+1NC	FK 3334-M1 1NO+1NC
34	L	FK 3430-M1 ⊖ 2NC	FK 3431-M1 ⊖ 2NC	FK 3433-M1 2NC	FK 3434-M1 2NC
Max. speed		page 215 - type 1	page 215 - type 1	1.5 m/s	1.5 m/s
Actuating force		0.05 Nm (0.25 Nm ⊖)	0.05 Nm (0.25 Nm ⊖)	0.05 Nm	0.05 Nm
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 5

All values in the drawings are in mm

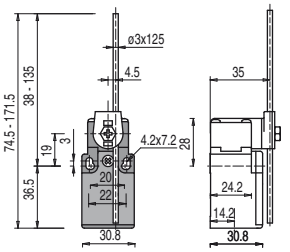
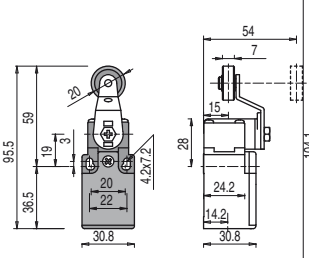
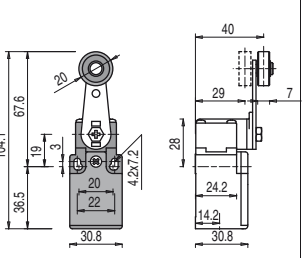
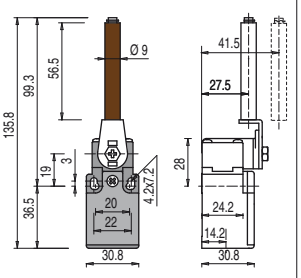
Accessories See page 197

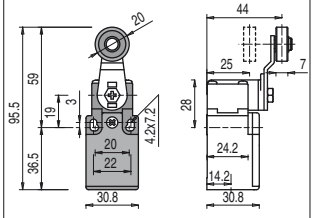
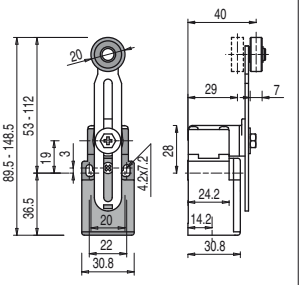
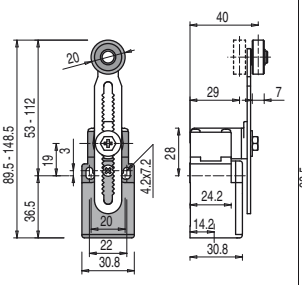
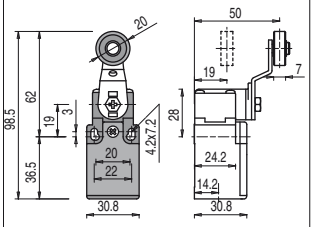
➔ The 2D and 3D files are available at **www.pizzato.com**

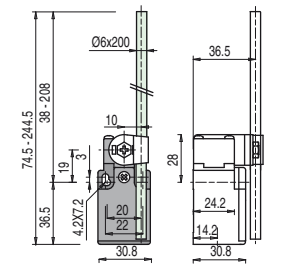
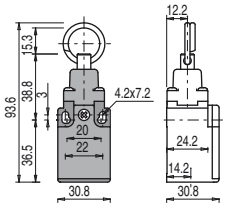
FK series position switches

Contact type:

R = snap action
L = slow action

Contact block		Round rod, Ø 3 mm, stainless steel	Other rollers available. See on page 112	Other rollers available. See on page 112	Porcelain roller
					
3	R	FK 350-M1 1NO-1NC	FK 351-M1 1NO-1NC	FK 352-M1 1NO-1NC	FK 353-E0M1 1NO-1NC
33	L	FK 3350-M1 1NO+1NC	FK 3351-M1 → 1NO+1NC	FK 3352-M1 → 1NO+1NC	FK 3353-E0M1V9 → 1NO+1NC
34	L	FK 3450-M1 2NC	FK 3451-M1 → 2NC	FK 3452-M1 → 2NC	FK 3453-E0M1V9 → 2NC
Max. speed		1.5 m/s	page 215 - type 1	page 215 - type 1	0.5 m/s
Actuating force		0.05 Nm	0.05 Nm (0.25 Nm →)	0.05 Nm (0.25 Nm →)	0.02 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 6

Contact block		Other rollers available. See on page 112	Other rollers available. See on page 112	Other rollers available. See on page 112	Other rollers available. See on page 112
					
3	R	FK 354-M1 1NO-1NC	FK 355-M1 1NO-1NC	FK 356-M1 1NO-1NC	FK 357-M1 1NO-1NC
33	L	FK 3354-M1 → 1NO+1NC	FK 3355-M1 → (1) 1NO+1NC	FK 3356-M1 → 1NO+1NC	FK 3357-M1 → 1NO+1NC
34	L	FK 3454-M1 → 2NC	FK 3455-M1 → (1) 2NC	FK 3456-M1 → 2NC	FK 3457-M1 → 2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.05 Nm (0.25 Nm →)	0.05 Nm (0.25 Nm →)	0.05 Nm (0.25 Nm →)	0.05 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 5

Contact block		Glass fibre rod	Rope switch for signalling		
					
3	R	FK 369-M1 1NO-1NC	FK 376-M1 1NO-1NC		
33	L	FK 3369-M1 1NO+1NC	FK 3376-M1 1NO+1NC		
34	L	FK 3469-M1 2NC	FK 3476-M1 2NO		
Max. speed		1.5 m/s	0.5 m/s		
Actuating force		0.05 Nm	initial 20 N - final 40 N		
Travel diagrams		page 216 - group 5	page 216 - group 7		

(1) Positive opening only with actuator set to max. See page 111.

All values in the drawings are in mm

Accessories See page 197

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

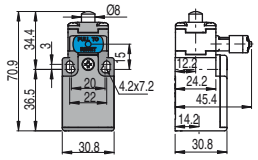
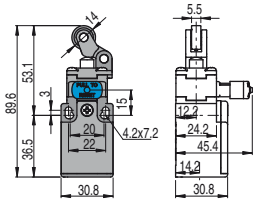
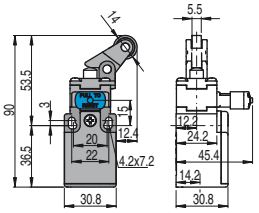
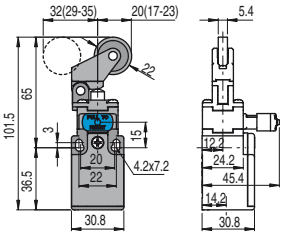
FK series position switches with reset

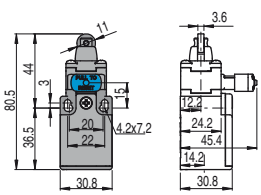
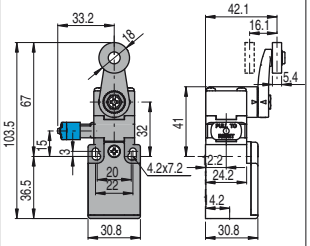
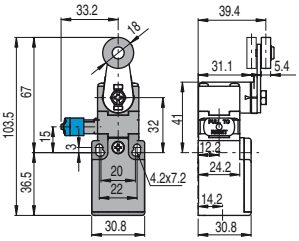
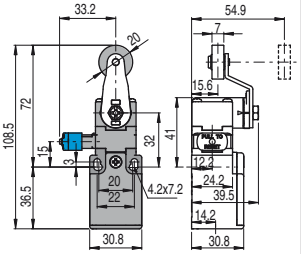
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. This new device consists in a block to be mounted between the body and the head of the switch that can be rotated independently from the head. This new device offers the following advantages:

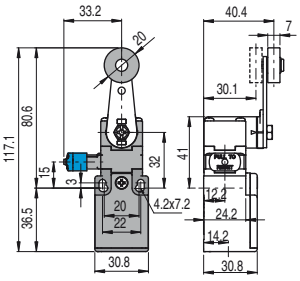
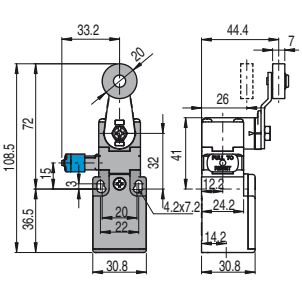
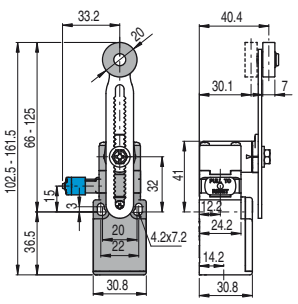
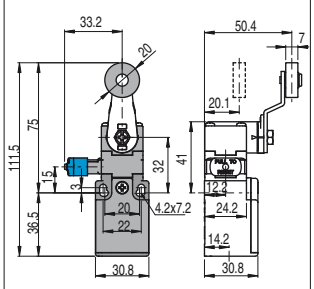
- The reset device can be integrated into almost all standard actuator heads
- Contact blocks with snap action are no more necessary because the tripping movement is executed by the reset device itself
- The reset device can be rotated independently from the head ensuring maximum flexibility during installation
- Two actuating forces: standard and increased for vibration applications
- Mechanical endurance: 1 million operating cycles.

Contact type:

L = slow action

Contact block					
			With stainless steel roller on request 	With stainless steel roller on request 	
33	L	FK 3301-W3M1 → 1NO+1NC	FK 3302-W3M1 → 1NO+1NC	FK 3305-W3M1 → 1NO+1NC	FK 3307-W3M1 → 1NO+1NC
34	L	FK 3401-W3M1 → 2NC	FK 3402-W3M1 → 2NC	FK 3405-W3M1 → 2NC	FK 3407-W3M1 → 2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		4.5 N (25 N →)	4 N (25 N →)	4 N (25 N →)	2.5 N (25 N →)
Travel diagrams		page 217 - group 1	page 217 - group 2	page 217 - group 2	page 217 - group 3

Contact block					
		With Ø 12 mm stainless steel roller on request 	With Ø 20 mm stainless steel roller on request 	Other rollers available. See on page 112 	Other rollers available. See on page 112 
33	L	FK 3315-W3M1 → 1NO+1NC	FK 3330-W3M1 → 1NO+1NC	FK 3331-W3M1 → 1NO+1NC	FK 3351-W3M1 → 1NO+1NC
34	L	FK 3415-W3M1 → 2NC	FK 3430-W3M1 → 2NC	FK 3431-W3M1 → 2NC	FK 3451-W3M1 → 2NC
Max. speed		page 215 - type 2	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		4.5 N (25 N →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 1	page 217 - group 4	page 217 - group 4	page 217 - group 4

Contact block					
		Other rollers available. See on page 112 	Other rollers available. See on page 112 	Other rollers available. See on page 112 	Other rollers available. See on page 112 
33	L	FK 3352-W3M1 → 1NO+1NC	FK 3354-W3M1 → 1NO+1NC	FK 3356-W3M1 → 1NO+1NC	FK 3357-W3M1 → 1NO+1NC
34	L	FK 3452-W3M1 → 2NC	FK 3454-W3M1 → 2NC	FK 3456-W3M1 → 2NC	FK 3457-W3M1 → 2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)	0.07 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

All values in the drawings are in mm

Accessories See page 197

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

Position switches with swivelling lever without actuator

All values in the drawings are in mm

Contact type:

R = snap action
L = slow action

Contact block			With manual reset knob
3	R	FK 338-M1 1NO-1NC	
33	L	FK 3338-M1 ➔ 1NO+1NC	FK 3338-W3M1 ➔ 1NO+1NC
34	L	FK 3438-M1 ➔ 2NC	FK 3438-W3M1 ➔ 2NC
Actuating force		0.05 Nm (0.25 Nm ➔)	0.07 Nm (0.25 Nm ➔)
Travel diagrams		page 216 - group 5	page 217 - 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 211.

Increased actuating force

The switch can be delivered with increased actuating force (option W4). Ideal for vibration applications.

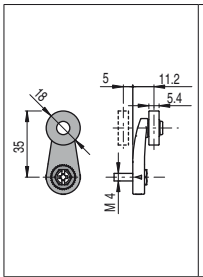
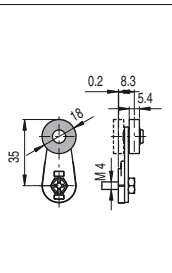
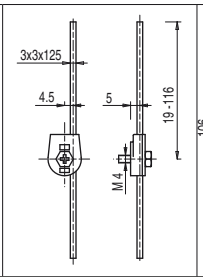
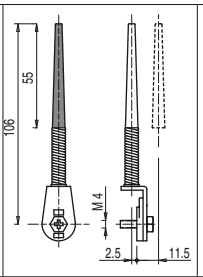
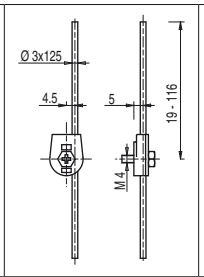
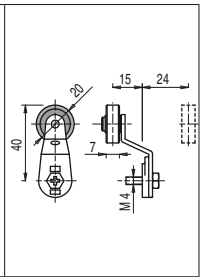
Actuators	Actuating force
01, 14, 15, 16	7 N
02, 05	6 N
07	3.5 N
30 … 57	0.08 Nm

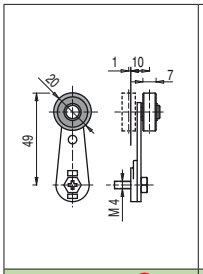
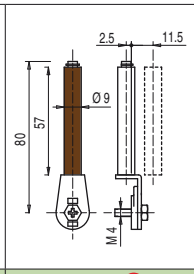
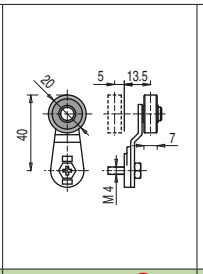
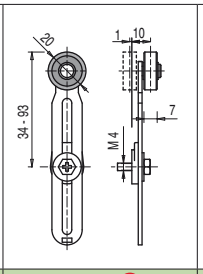
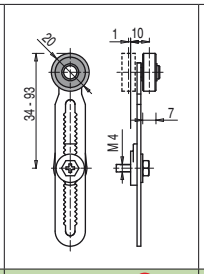
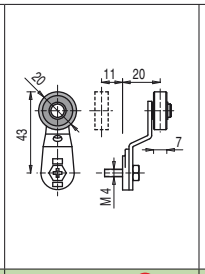
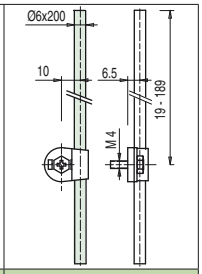
To order the switch with reset and increased actuating force, replace the -W3 option with -W4 in the order code.
Example: FK 3301-**W3**M1 ➔ FK 3301-**W4**M1

Separate actuators

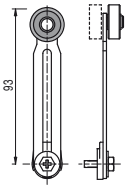
All values in the drawings are in mm

IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Technopolymer roller Ø 18 mm	Technopolymer roller Ø 18 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable round rod Ø 3x125 mm	Technopolymer roller Ø 20 mm
					
VF LE30 ➔	VF LE31 ➔	VF LE33	VF LE34	VF LE50	VF LE51 ➔

Technopolymer roller Ø 20 mm	Porcelain roller	Technopolymer roller Ø 20 mm	Adjustable actuator with technopolymer roller	Adjustable safety actuator with technopolymer roller	Technopolymer roller Ø 20 mm	Adjustable glass fibre rod
						
VF LE52 ➔	VF LE53 ➔ (2)	VF LE54 ➔	VF LE55 ➔ (1)	VF LE56 ➔	VF LE57 ➔	VF LE69

- (1) Actuator VF LE55 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 LE56 adjustable safety lever.
- (2) The position switch obtained by assembling switch FK •38-M1 (e.g. FK 338-M1, FK 3338-M1…) with actuator VF LE53 will not present the same travel diagrams and actuating forces as switch FK •53-E0M1V9 (e.g. FK 353-E0M1, FK 3353-E0M1V9…).
- (4) The actuator cannot be rotated to the inside because it will hit the switch head upon actuation.



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

Accessories See page 197

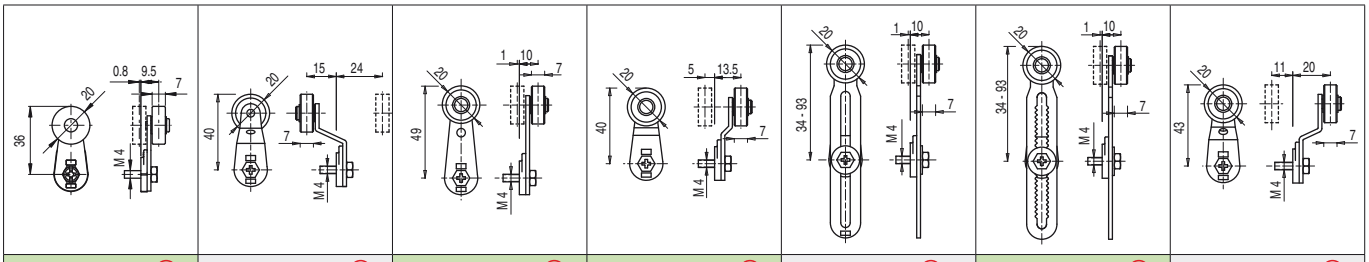
➔ The 2D and 3D files are available at **www.pizzato.com**

Special separate actuators

All values in the drawings are in mm

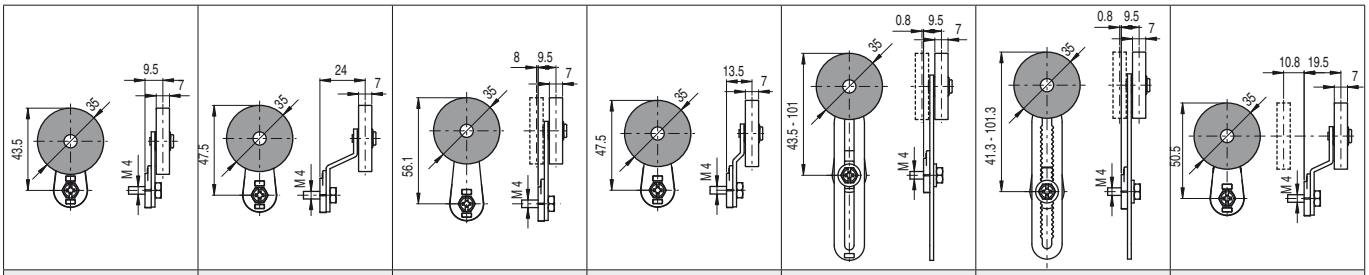
IMPORTANT: These separate actuators can be used only with items of the FR, FM, FX, FZ and FK series.

Stainless steel rollers, Ø 20 mm



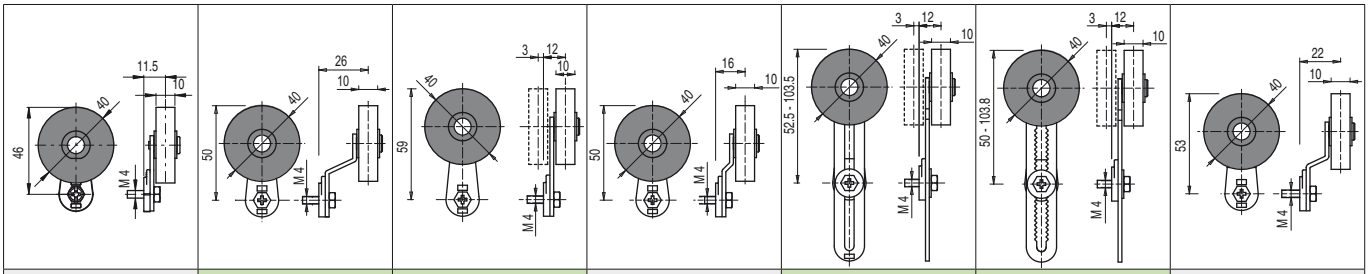
VF LE31-R24 | VF LE51-R24 | VF LE52-R24 | VF LE54-R24 | VF LE55-R24 (1) | VF LE56-R24 | VF LE57-R24

Technopolymer rollers, Ø 35 mm



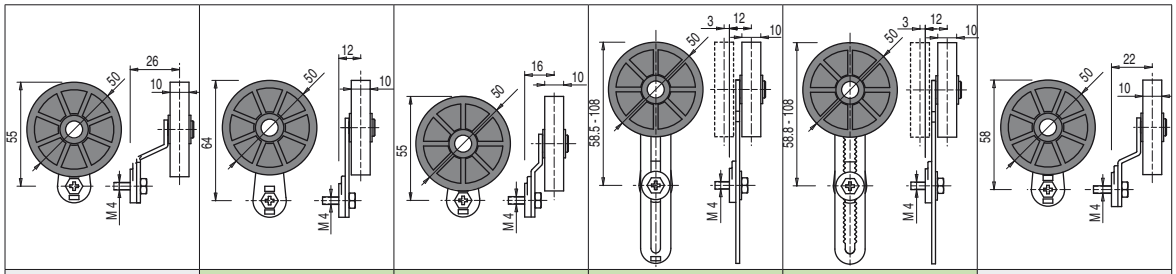
VF LE31-R25 (4) | VF LE51-R25 (4) | VF LE52-R25 | VF LE54-R25 (4) | VF LE55-R25 (1) | VF LE56-R25 | VF LE57-R25

Rubber rollers, Ø 40 mm



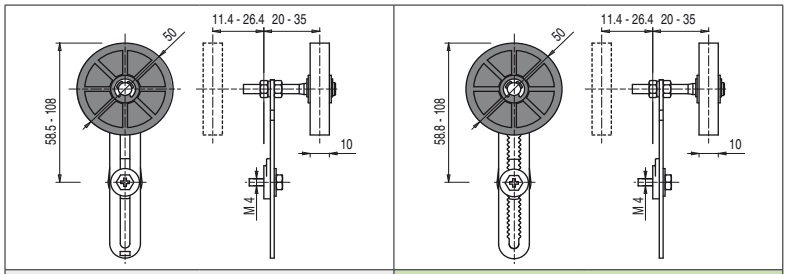
VF LE31-R5 (4) | VF LE51-R5 (4) | VF LE52-R5 | VF LE54-R5 (4) | VF LE55-R5 (1) | VF LE56-R5 | VF LE57-R5 (4)

Rubber rollers, Ø 50 mm



VF LE51-R26 (4) | VF LE52-R26 (4) | VF LE54-R26 (4) | VF LE55-R26 (1) | VF LE56-R26 | VF LE57-R26 (4)

Protruding rubber rollers, Ø 50 mm



VF LE55-R27 (1) | VF LE56-R27

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

Accessories See page 197

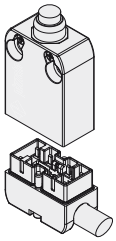
➔ The 2D and 3D files are available at **www.pizzato.com**

NA-NB-NF series modular pre-wired switches

Description

The result of the long-standing expertise of Pizzato Elettrica in the creation of position switches, the NA, NB, NF series achieve the highest standard of flexibility and depth of range present today on the pre-wired switches market. Configurable, adjustable, pivotable and, not least, customisable with special cables or custom wiring - these are features that today make these series unique in the European panorama, ideal for easily providing our customers with customised switches.

Switches with connectors



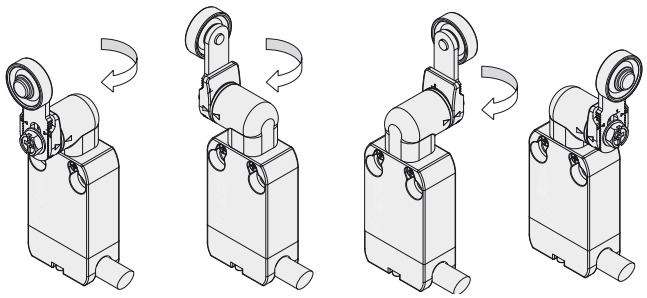
The new fundamental feature of this series of pre-wired switches is that the switch body and the wired connector are separated.

Using the connector the end-user can replace a product on field without having to disconnect the complete wiring.

Moreover in this way it is easier to combine products with different cable types and lengths.

Head with variable orientation

All heads can be turned in 90° steps. The new head for swivelling levers has been designed with compact dimensions so that it does not protrude over the switch profile. Therefore, it is also possible to install the switches on the wall.

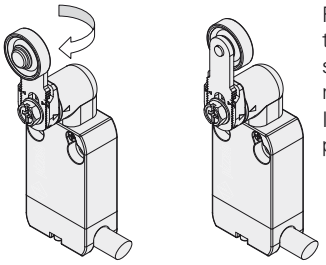


Protection degrees IP67 and IP69K

IP69K
IP67

These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to EN 60529. They can therefore be used in all environments where maximum protection degree of the housing is required. Due to their special design, these devices are suitable for use in equipment subjected to cleaning with high pressure hot water jets. These devices meet the IP69K test requirements according to ISO 20653 (water jets with 100 bar and 80°C).

Reversible levers



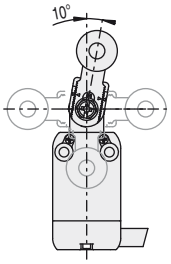
For switches with swivelling lever, the lever can be fastened on straight or reverse side maintaining the positive coupling.

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

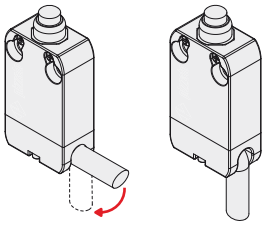
Adjustable levers

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.



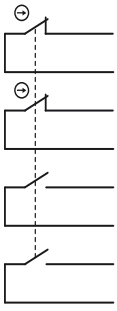
Orientable cable outputs



The connector with cable is provided with a cavity to allow cable bending up to 90°.

In this way a flush wall mounting is also possible as well as an easier adjustment of the cable to the supporting flange.

Positive opening contact blocks with 1, 2, 3 or 4 poles



These series of contact blocks are versatile and compact. They have the same dimensions of the previous versions, but now it is possible to have up to 4 different contacts which are galvanically separated and provided with positive opening (NC contacts).

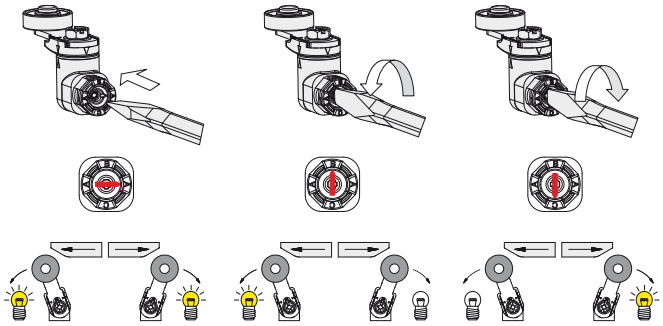
The allowed standard combinations are: 1NO+1NC, 2NC, 1NO+2NC, 2NO+2NC. Other combinations available on request.

The contact blocks have been designed so that they keep the same pin assignment on the connector independently of the action type (slow or snap action) and the number of contacts. In this way, the same cables with connector can be used for units with slow action and snap action as well.

Unidirectional heads

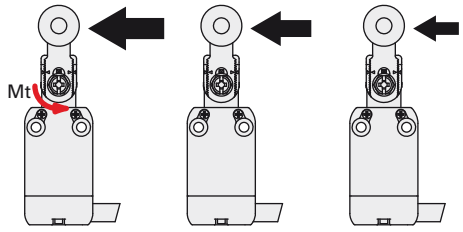
All switches with swivelling lever are supplied with a selector for choosing the lever operating direction.

The following operations are possible: right/left (standard factory setting), only from the right or only from the left. The operating direction can be selected by rotating the dedicated ring mounted on all heads of this kind.



Increased or reduced actuating force

For actuators with swivelling lever, versions with increased or reduced actuating force are available upon request, in order to have a switch perfectly tailored for the application. For further information contact our technical department.

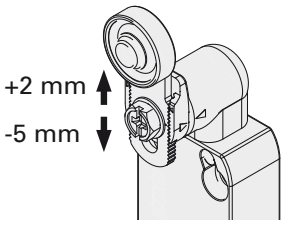


Increased force Mt = 0,09 Nm (E25 option NA NB series)

Standard force Mt = 0,07 Nm

Reduced force Mt = 0,04 Nm (E24 option)

Adjustable levers with anti-unscrewing washer



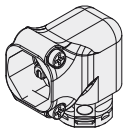
In some applications during the installation of the switches problems are encountered due to the variability of the fastenings and the folds of the structural work.

In other cases, small finishing adjustments are required due to the application. Nearly all swivelling levers for switches of the NA, NB and NF series can be adjusted in 1 mm steps along the switch length.

This feature, combined with the additional possibility of the radial adjustment of the actuator, provides the installer with a never before achieved flexibility in the final adjustment of the product.

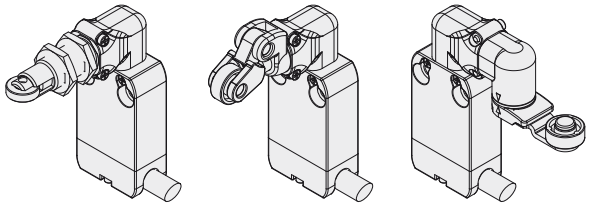
All this while maintaining the positive geometric locking between lever and swivel shaft as prescribed for safety applications.

90° redirection for actuators



This component highly extends the application possibilities of this product range.

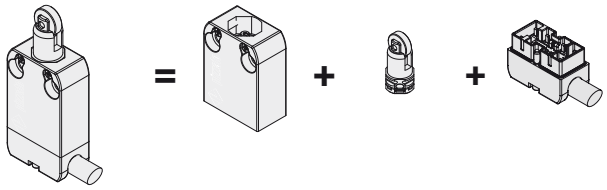
All the actuators that can be attached directly to the body of the switch can also be fastened on this transmission, thus making feasible applications and positioning of the switch that were previously impossible. The redirection piece can also be used in case of heads for swivelling levers. Although possible, the use of multiple transmissions in series is not recommended.



Switch components available separately

This product series has been provided with a modular design so that single parts can also be ordered separately. This is an asset both for distributors and for final customers of electrical material in the procurement of spare parts as well as for custom combinations.

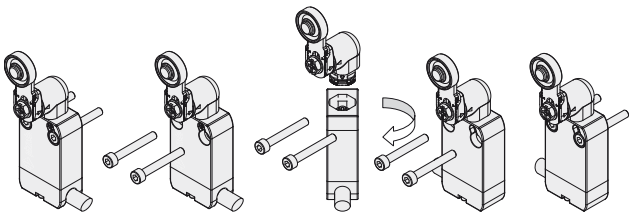
NA B110BB-DN2 **NA B11000** **VN AA0BB** **VN CM11DN2**



Reversible housing

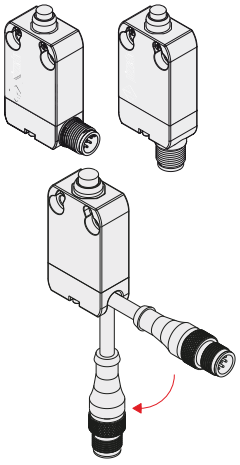
Thanks to the shape of the fixing holes and of the switch body, as well as the possibility of rotating the head, make this switch perfectly symmetrical.

If a switch with cable output on the left (since the connector cannot be rotated) is required, it is possible to rotate the complete device by maintaining the final position of the actuator unchanged.



M12 connectors

All contact configurations are available with M12 connector both with two contacts (with 5-pin M12 connector) as well as 3 or 4 contacts (with 8-pin M12 connector). With exit direction below or to the right, these make application in narrow spaces possible, as, with the simple rotation of the switch, the reversible housing also easily allows the exit direction to the left. The M12 connector is also available at the end of the cable, whose length can be tailored to the customer, and the cable can be bent at 90°, allowing installation on walls.



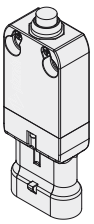
Extended temperature range

-40°C

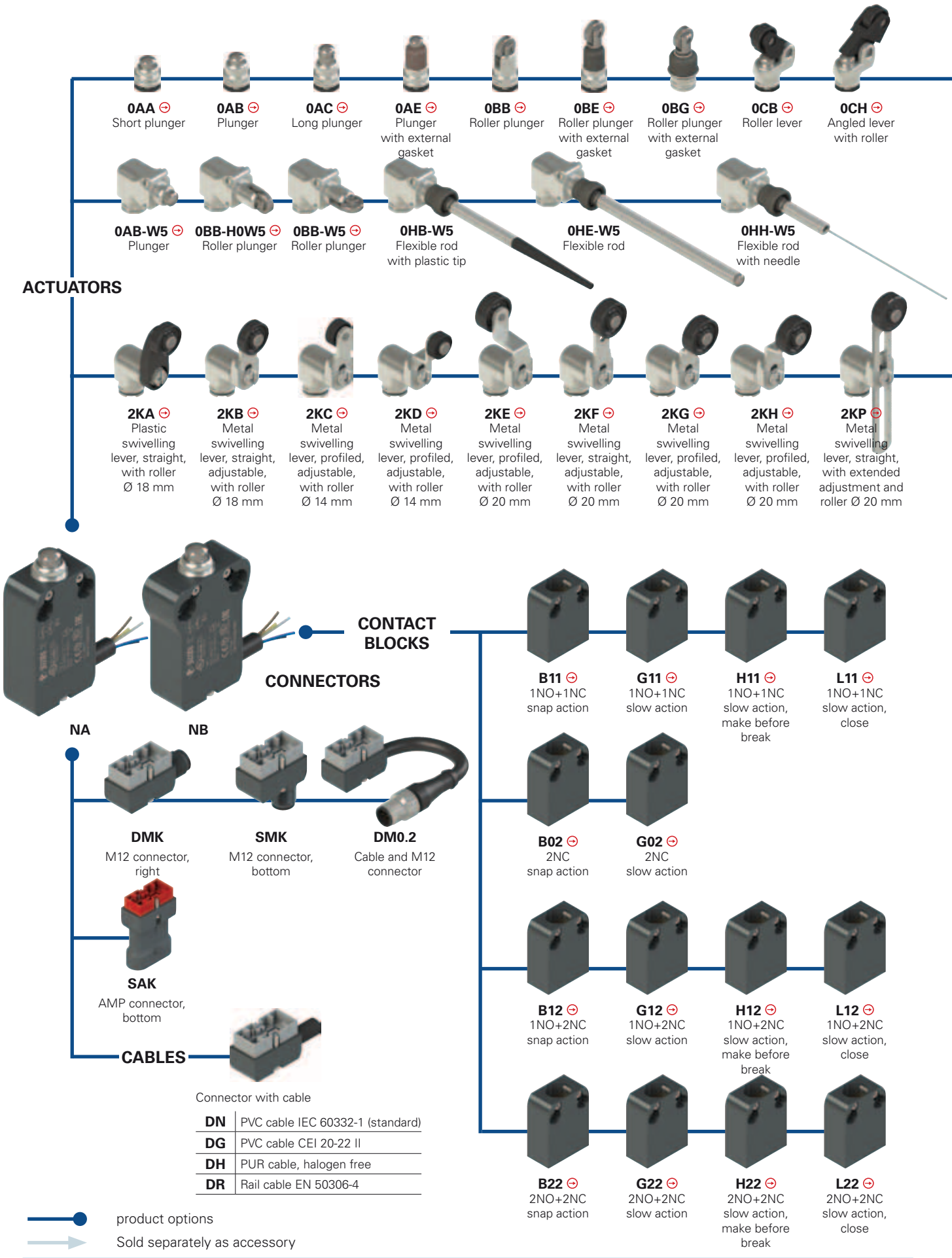
These devices are also available in a special version suitable for an ambient operating temperature range from -40°C up to +80°C. They can therefore be used for applications in cold stores, sterilisers and other equipment with low temperature environments. The special materials used to produce these versions retain their characteristics even under these conditions, thereby expanding the installation possibilities.

AMP connectors

Furthermore, AMP connectors for 2-contact versions are available too. These connectors, specially developed for the automotive industry, are immune to vibration due to the quick coupling.



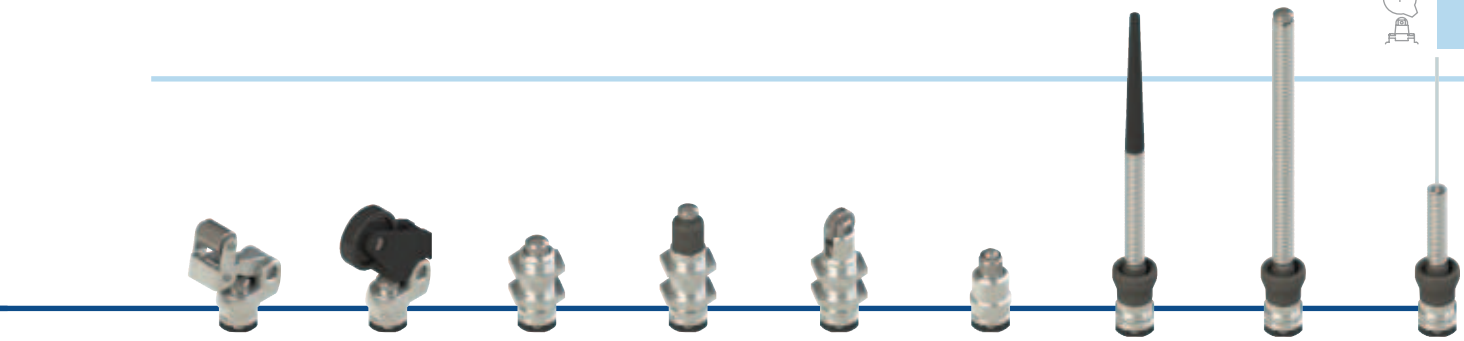
Selection diagram for item combinations of the NA-NB series



DN	PVC cable IEC 60332-1 (standard)
DG	PVC cable CEI 20-22 II
DH	PUR cable, halogen free
DR	Rail cable EN 50306-4

product options

Sold separately as accessory



0CP Unidirectional roller lever

0CV Adjustable angled roller lever

0EB Plunger with M12 threaded fitting

0EE Plunger with M12 threaded fitting, external gasket

0FB Roller plunger with M12 threaded fitting

0GB Plunger with Ø 6 mm ball

0HB Flexible rod with plastic tip

0HE Flexible rod

0HH Flexible rod with needle

2LB Metal swivelling lever with stainless steel rod 3 x 3 x 125 mm, adjustable

2LE Metal swivelling lever with stainless steel rod Ø 3 x 125 mm, adjustable

2LH Metal swivelling lever with glass fibre rod Ø 6 x 200 mm, adjustable

2LL Metal swivelling lever with flexible rod, adjustable

2LP Metal swivelling lever with porcelain roll, adjustable

200 Metal head for swivelling lever actuators

SEPARATE ACTUATORS
See page 135

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

NA B110AB-DN2 GR7T6W5

Housing

NA	metal, hole spacing 20 mm (standard)
NB	metal, hole spacing 25 mm

Contact block

B11	1NO+1NC, snap action (standard)
B02	2NC, snap action (standard)
B12	1NO+2NC, snap action (standard)
B22	2NO+2NC, snap action (standard)
BA1	1NO+1NC, snap action, change-over (available with M connector only)
G11	1NO+1NC, slow action (standard)
G02	2NC, slow action (standard)
G12	1NO+2NC, slow action (standard)
G22	2NO+2NC, slow action
H11	1NO+1NC, slow action, make before break
H12	1NO+2NC, slow action, make before break
H22	2NO+2NC, slow action, make before break
L11	1NO+1NC, slow action, close
L12	1NO+2NC, slow action, close
L22	2NO+2NC, slow action, close

Other contact blocks on request.

Actuator heads

0	without head
2	head for swivelling lever actuators

Actuators

00	without actuator
AA	short plunger
AB	plunger
...	.....

Output direction

D	cable or connector, right
S	connector, bottom

Redirection

	without redirection
W5	90° redirection

Ambient temperature

	-25 °C ... +80 °C
T6	-40 °C ... +80 °C

Rollers

	standard roller
R30	stainless steel Ø 10.6 mm
R29	stainless steel Ø 13 mm
R18	technopolymer, Ø 14 mm
R23	stainless steel Ø 14 mm
R7	technopolymer, Ø 18 mm
R22	technopolymer, Ø 20 mm
R24	stainless steel Ø 20 mm
R19	technopolymer, Ø 22 mm
R25	technopolymer, Ø 35 mm

Contact type

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

Connection type

0.2	cable, length: 0.2 m with M12 connector (available for DM0.2 versions only)
2	cable, length: 2 m (standard)
5	cable, length 5 m (other cable lengths available on request)
K	integrated connector

Cable or connector type

N	PVC cable IEC 60332-1 (standard)
G	PVC cable CEI 20-22 II
H	PUR cable, halogen free
R	Rail cable EN 50306-4
M	M12 connector
A	AMP Superseal 1.5 connector

NA-NB series modular metal pre-wired switches

Main features

- Metal housing, right or bottom cable output
- Protection degrees IP67 and IP69K
- 4 types of integrated cable available
- Versions with M12 connector suitable for safety applications ⊖
- Versions with AMP connector
- 14 contact blocks available
- 36 actuators available

Quality marks:

IMQ approval:	CA02.04562
UL approval:	E131787
CCC approval:	2013010305653520
EAC approval:	RU C-IT.АД35.B.00454

Technical data

Housing

Metal housing, baked with UV resistant powder coating.
Versions with integrated cable, standard length 2 m, other lengths 0.5 … 10 m on request.
Versions with integrated M12 connector.
Versions with 0.2 m cable length and M12 connector, other lengths 0.1 … 3 m available on request.

Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Corrosion resistance in saline mist:	≥ 300 hours in NSS acc. to ISO 9227

General data

Ambient temperature for switches without cable:	-25°C … + 80°C (standard) -40°C … + 80°C (extended T6)
Ambient temperature for switches with cable:	See table on page 118
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Vibration resistance (0BB, 2KB, 2KC, 2KD actuators):	5 … 150 Hz (7.9 m/s²) acc. to EN 61373 cl. 9
Tightening torques for installation:	see page 211-222

Electrical data

Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Pollution degree:	3

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, 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.

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: see "Internal cable wiring" on page 118) 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 (failure exclusions)** for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 220. 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 on pages 211 to 222.**

⚠ **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-pole M12 (2NO+2NC) and AMP connector can be used only in PELV circuits.**

Features approved by IMQ

Rated insulation voltage (U_i):	250 Vac
Conventional free air thermal current (I_{th}):	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 5-pole M12 connector)
Protection against short circuits (fuse):	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 5-pole M12 connector) type gG
Rated impulse withstand voltage (U_{imp}):	4 kV
Protection degree of the housing:	IP67
MA terminals (crimped terminals) Pollution degree:	3
Utilization category:	AC15 / DC13 (with connector)
Operating voltage (U_e):	250 Vac (50 Hz) / 24 Vdc (with connector)
Operating current (I_e):	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, Zb
Positive opening of contacts on contact blocks B01, B11, B02, B12, B21, B22, G01, G11, G02, G12, G21, G22, L01, L11, L02, L12, L21, L22, H01, H11, H02, H12, H21, H22
In compliance with standards: EN 60947-1, EN 60947-5-1 + A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features 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.)

Housing features type 1, 4X "indoor use only", 12.
Housing features for the version with 1-2 contacts and type N cable Type 1, 4X "indoor use only"

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

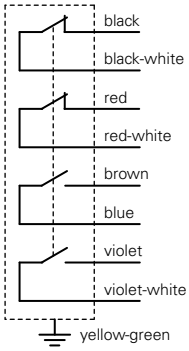
Please contact our technical department for the list of approved products.

Ambient temperatures for switches with cable and electrical data

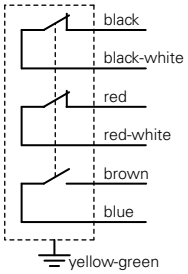
	Connection type	Output with cable								Output with M12 connector		Output with AMP connector
	Contact block	2 contacts				3 contacts		4 contacts		2 contacts	3 or 4 contacts	2 contacts
Cable features	Cable or connector type	N	G	H	R	N	H	N	R	M12 connector, 5-pole	M12 connector, 8-pole	AMP Superseal 1.5 connector
	Conductors	5x0.75 mm²	5x0.75 mm²	5x0.75 mm²	5x0.5 mm²	7x0.5 mm²	7x0.5 mm²	9x0.34 mm²	9x0.5 mm²	5x0.25 mm²	8x0.25 mm²	
	Application field	General	General	General, mobile installation	Rail	General	General, mobile installation	General	Rail	General	General	General
	In compliance with standards	05VV-F	05VV-F	05EQ-H	EN50306-4 1E-300V 5G0.5 mm² MM-90 EN 50306-4 EN 45545	03VV-F	03E7Q-H	03VV-F	EN50306-4 1P-300V- 9G0.5 mm² MM-90 EN 50306-4 EN 45545	03VV-H	03VV-H	/
	Sheath	PVC	PVC	PUR HALOGEN FREE	/	PVC	PUR HALOGEN FREE	PVC	/	PVC	PVC	/
	Self-extinguishing	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1-2 IEC 60332-1-3 IEC 60332-3 CEI 20-22 II	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1 EN 50305 EN 50306-1	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1 EN 50305 EN 50306-1	IEC 60332-3 CEI 20-22 II	IEC 60332-3 CEI 20-22 II	/
	Oil resistant	/	/	UL 758	/	/	UL 758	/	/	ISO 6722-1	ISO 6722-1	/
	Max. speed	/	/	100 m/min	/	/	300 m/min	/	/	50m/min	50m/min	/
	Max. acceleration	/	/	2 m/s²	/	/	25 m/s²	/	/	5m/s²	5m/s²	/
	Minimum bending radius	80 mm	80 mm	80 mm	60 mm	108 mm	108 mm	94 mm	65 mm	75 mm	90 mm	/
	Outer diameter	8 mm	8 mm	8 mm	6 mm	7 mm	7 mm	7 mm	6.5 mm	5 mm	6 mm	/
	End stripped	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm	/	/	/
	Copper conductors IEC 60228	Class 5	Class 5	Class 6	Class 5	Class 5	Class 6	Class 5	Class 5	Class 6	Class 6	/
Ambient temperature with cable 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	-25°C +80°C	/
	Cable, flexible installation	+5°C +70°C	-25°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	-25°C +80°C	-25°C +80°C	/
	Cable, mobile installation	/	/	-25°C +80°C	/	/	-25°C +80°C	/	/	-15°C +80°C	-15°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	/	/	/
	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	10 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	250 Vac 300 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 500V type gG	10 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	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	/	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	/	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	4 A
	Utilization category AC15 – 120 V	4 A	4 A	4 A	4 A	4 A	4 A	3 A	4 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	/	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	CE cULus EAC CCC

Internal cable wiring

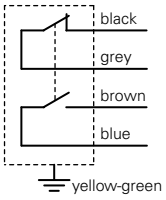
2NO+2NC



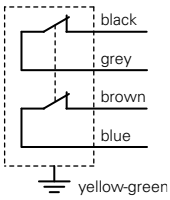
1NO+2NC



1NO+1NC



2NC



Connector pin assignment

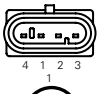
2NO+2NC

1-2 NC
3-4 NC
5-6 NO
7-8 NO

1NO+2NC

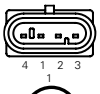
3-4 NC
5-6 NC
7-8 NO
1 ⏚

1NO+1NC



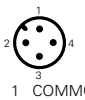
1-2 NC
3-4 NO
5 ⏚

2NC



1-2 NC
3-4 NC
5 ⏚

1NO+1NC change-over



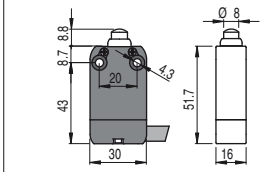
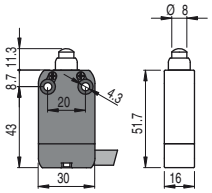
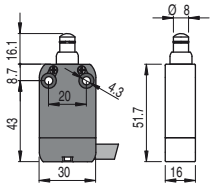
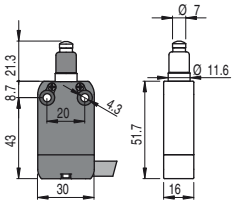
1 COMMON
2 NC
3 ⏚
4 NO

Female connectors see page 198

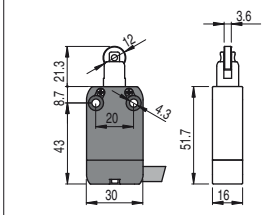
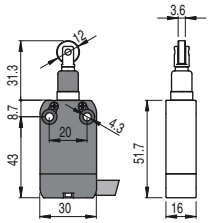
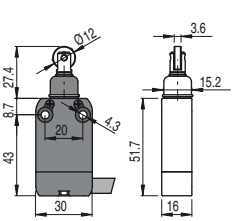
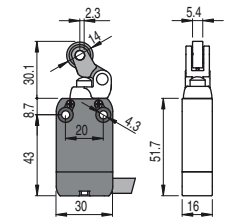
NA-NB series modular metal pre-wired switches

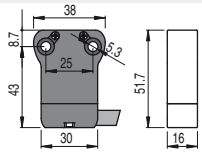
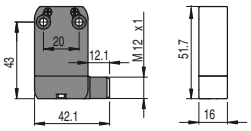
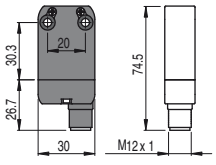
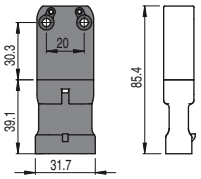
Contact type:
R = snap action
L = slow action

Contact block

								With external rubber gasket 	
B11	R	NA B110AA-DN2	1NO+1NC	NA B110AB-DN2	1NO+1NC	NA B110AC-DN2	1NO+1NC	NA B110AE-DN2	1NO+1NC
B02	R	NA B020AA-DN2	2NC	NA B020AB-DN2	2NC	NA B020AC-DN2	2NC	NA B020AE-DN2	2NC
B12	R	NA B120AA-DN2	1NO+2NC	NA B120AB-DN2	1NO+2NC	NA B120AC-DN2	1NO+2NC	NA B120AE-DN2	1NO+2NC
B22	R	NA B220AA-DN2	2NO+2NC	NA B220AB-DN2	2NO+2NC	NA B220AC-DN2	2NO+2NC	NA B220AE-DN2	2NO+2NC
G11	L	NA G110AA-DN2	1NO+1NC	NA G110AB-DN2	1NO+1NC	NA G110AC-DN2	1NO+1NC	NA G110AE-DN2	1NO+1NC
G02	L	NA G020AA-DN2	2NC	NA G020AB-DN2	2NC	NA G020AC-DN2	2NC	NA G020AE-DN2	2NC
G12	L	NA G120AA-DN2	1NO+2NC	NA G120AB-DN2	1NO+2NC	NA G120AC-DN2	1NO+2NC	NA G120AE-DN2	1NO+2NC
G22	L	NA G220AA-DN2	2NO+2NC	NA G220AB-DN2	2NO+2NC	NA G220AC-DN2	2NO+2NC	NA G220AE-DN2	2NO+2NC
Max. speed		page 219 - type 4		page 219 - type 4		page 219 - type 4		page 219 - type 4	
Actuating force		7 N (25 N →)		7 N (25 N →)		7 N (25 N →)		7 N (25 N →)	
Travel diagrams		page 220 - group 1		page 220 - group 1		page 220 - group 1		page 220 - group 1	

Contact block

				With external rubber gasket 		With external rubber gasket 		With stainless steel roller on request 	
B11	R	NA B110BB-DN2	1NO+1NC	NA B110BE-DN2	1NO+1NC	NA B110BG-DN2	1NO+1NC	NA B110CB-DN2	1NO+1NC
B02	R	NA B020BB-DN2	2NC	NA B020BE-DN2	2NC	NA B020BG-DN2	2NC	NA B020CB-DN2	2NC
B12	R	NA B120BB-DN2	1NO+2NC	NA B120BE-DN2	1NO+2NC	NA B120BG-DN2	1NO+2NC	NA B120CB-DN2	1NO+2NC
B22	R	NA B220BB-DN2	2NO+2NC	NA B220BE-DN2	2NO+2NC	NA B220BG-DN2	2NO+2NC	NA B220CB-DN2	2NO+2NC
G11	L	NA G110BB-DN2	1NO+1NC	NA G110BE-DN2	1NO+1NC	NA G110BG-DN2	1NO+1NC	NA G110CB-DN2	1NO+1NC
G02	L	NA G020BB-DN2	2NC	NA G020BE-DN2	2NC	NA G020BG-DN2	2NC	NA G020CB-DN2	2NC
G12	L	NA G120BB-DN2	1NO+2NC	NA G120BE-DN2	1NO+2NC	NA G120BG-DN2	1NO+2NC	NA G120CB-DN2	1NO+2NC
G22	L	NA G220BB-DN2	2NO+2NC	NA G220BE-DN2	2NO+2NC	NA G220BG-DN2	2NO+2NC	NA G220CB-DN2	2NO+2NC
Max. speed		page 219 - type 2		page 219 - type 5		page 219 - type 5		page 219 - type 3	
Actuating force		7 N (25 N →)		7 N (25 N →)		7 N (25 N →)		5 N (25 N →)	
Travel diagrams		page 220 - group 1		page 220 - group 1		page 220 - group 1		page 220 - group 2	

NB series housing	M12 connector, right	M12 connector, bottom	AMP Superseal 1.5 connector
			

To order a product of the NB series, replace NA with NB in the codes shown above. Example:
NA B110AA-DN2 → **NB** B110AA-DN2

To order a product with M12 right connector, replace DN2 with DMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DMK**

To order a product with M12 bottom connector, replace DN2 with SMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SMK**

To order a product with AMP connector, replace DN2 with SAK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SAK**

All values in the drawings are in mm

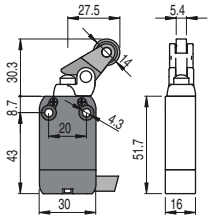
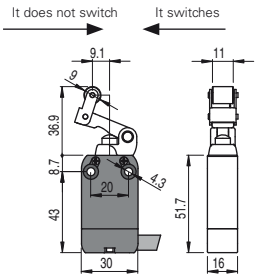
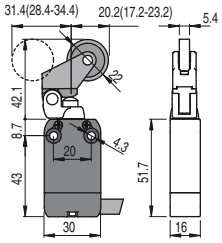
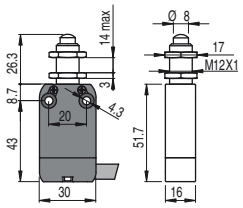
Items with code on **green** background are stock items

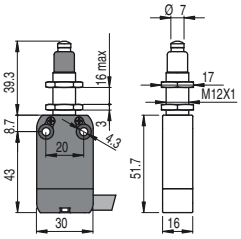
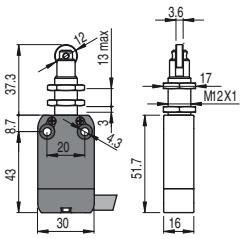
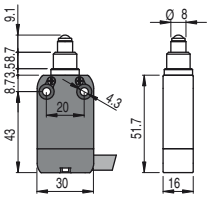
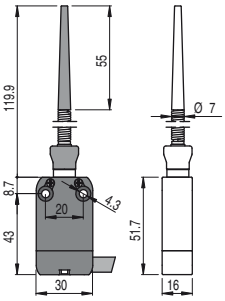
Accessories See page 197

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

Contact type:

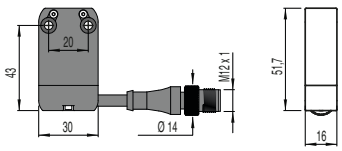
R = snap action
L = slow action

Contact block		With stainless steel roller on request	Unidirectional operation		Secured only by means of threaded head
					
B11	R	NA B110CH-DN2 1NO+1NC	NA B110CP-DN2 1NO+1NC	NA B110CV-DN2 1NO+1NC	NA B110EB-DN2 1NO+1NC
B02	R	NA B020CH-DN2 2NC	NA B020CP-DN2 2NC	NA B020CV-DN2 2NC	NA B020EB-DN2 2NC
B12	R	NA B120CH-DN2 1NO+2NC	NA B120CP-DN2 1NO+2NC	NA B120CV-DN2 1NO+2NC	NA B120EB-DN2 1NO+2NC
B22	R	NA B220CH-DN2 2NO+2NC	NA B220CP-DN2 2NO+2NC	NA B220CV-DN2 2NO+2NC	NA B220EB-DN2 2NO+2NC
G11	L	NA G110CH-DN2 1NO+1NC	NA G110CP-DN2 1NO+1NC	NA G110CV-DN2 1NO+1NC	NA G110EB-DN2 1NO+1NC
G02	L	NA G020CH-DN2 2NC	NA G020CP-DN2 2NC	NA G020CV-DN2 2NC	NA G020EB-DN2 2NC
G12	L	NA G120CH-DN2 1NO+2NC	NA G120CP-DN2 1NO+2NC	NA G120CV-DN2 1NO+2NC	NA G120EB-DN2 1NO+2NC
G22	L	NA G220CH-DN2 2NO+2NC	NA G220CP-DN2 2NO+2NC	NA G220CV-DN2 2NO+2NC	NA G220EB-DN2 2NO+2NC
Max. speed		page 219 - type 3	page 219 - type 3	page 219 - type 3	page 219 - type 4
Actuating force		5 N (25 N →)	3 N (25 N →)	3 N (25 N →)	7 N (25 N →)
Travel diagrams		page 220 - group 2	page 220 - group 6	page 220 - group 3	page 220 - group 1

Contact block		Secured only by means of threaded head With external rubber gasket	Secured only by means of threaded head	Plunger with Ø 6 mm ball	With external rubber gasket
					
B11	R	NA B110EE-DN2 1NO+1NC	NA B110FB-DN2 1NO+1NC	NA B110GB-DN2 1NO+1NC	NA B110HB-DN2 1NO+1NC
B02	R	NA B020EE-DN2 2NC	NA B020FB-DN2 2NC	NA B020GB-DN2 2NC	NA B020HB-DN2 2NC
B12	R	NA B120EE-DN2 1NO+2NC	NA B120FB-DN2 1NO+2NC	NA B120GB-DN2 1NO+2NC	NA B120HB-DN2 1NO+2NC
B22	R	NA B220EE-DN2 2NO+2NC	NA B220FB-DN2 2NO+2NC	NA B220GB-DN2 2NO+2NC	NA B220HB-DN2 2NO+2NC
G11	L	NA G110EE-DN2 1NO+1NC	NA G110FB-DN2 1NO+1NC	NA G110GB-DN2 1NO+1NC	
G02	L	NA G020EE-DN2 2NC	NA G020FB-DN2 2NC	NA G020GB-DN2 2NC	NA G020HB-DN2 2NC
G12	L	NA G120EE-DN2 1NO+2NC	NA G120FB-DN2 1NO+2NC	NA G120GB-DN2 1NO+2NC	
G22	L	NA G220EE-DN2 2NO+2NC	NA G220FB-DN2 2NO+2NC	NA G220GB-DN2 2NO+2NC	
Max. speed		page 219 - type 4	page 219 - type 2	page 219 - type 2	1 m/s
Actuating force		7 N (25 N →)	7 N (25 N →)	7 N (25 N →)	0.03 Nm
Travel diagrams		page 220 - group 1	page 220 - group 1	page 220 - group 1	page 220 - group 4

Cable and M12 connector

All values in the drawings are in mm



To order a product with cable and M12 connector:
replace DN2 with DM0.2 in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DM0.2**

NA-NB series modular metal pre-wired switches

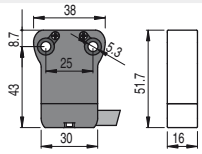
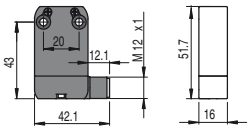
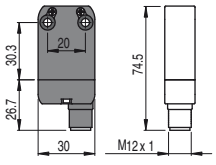
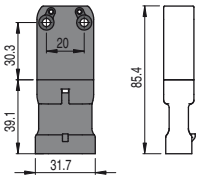
Contact type:
R = snap action
L = slow action

Contact block

		With external rubber gasket		With external rubber gasket		With stainless steel roller on request		With stainless steel roller on request	
B11	R	NA B110HE-DN2	1NO+1NC	NA B110HH-DN2	1NO+1NC	NA B112KA-DN2	1NO+1NC	NA B112KB-DN2	1NO+1NC
B02	R	NA B020HE-DN2	2NC	NA B020HH-DN2	2NC	NA B022KA-DN2	2NC	NA B022KB-DN2	2NC
B12	R	NA B120HE-DN2	1NO+2NC	NA B120HH-DN2	1NO+2NC	NA B122KA-DN2	1NO+2NC	NA B122KB-DN2	1NO+2NC
B22	R	NA B220HE-DN2	2NO+2NC	NA B220HH-DN2	2NO+2NC	NA B222KA-DN2	2NO+2NC	NA B222KB-DN2	2NO+2NC
G11	L					NA G112KA-DN2	1NO+1NC	NA G112KB-DN2	1NO+1NC
G02	L	NA G020HE-DN2	2NC	NA G020HH-DN2	2NC	NA G022KA-DN2	2NC	NA G022KB-DN2	2NC
G12	L					NA G122KA-DN2	1NO+2NC	NA G122KB-DN2	1NO+2NC
G22	L					NA G222KA-DN2	2NO+2NC	NA G222KB-DN2	2NO+2NC
Max. speed		1 m/s		1 m/s		page 219 - type 1		page 219 - type 1	
Actuating force		0.07 Nm		0.03 Nm		0.07 Nm (0.25 Nm →)		0.07 Nm (0.25 Nm →)	
Travel diagrams		page 220 - group 4		page 220 - group 4		page 220 - group 5		page 220 - group 5	

Contact block

		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request	
B11	R	NA B112KC-DN2	1NO+1NC	NA B112KD-DN2	1NO+1NC	NA B112KE-DN2	1NO+1NC	NA B112KF-DN2	1NO+1NC
B02	R	NA B022KC-DN2	2NC	NA B022KD-DN2	2NC	NA B022KE-DN2	2NC	NA B022KF-DN2	2NC
B12	R	NA B122KC-DN2	1NO+2NC	NA B122KD-DN2	1NO+2NC	NA B122KE-DN2	1NO+2NC	NA B122KF-DN2	1NO+2NC
B22	R	NA B222KC-DN2	2NO+2NC	NA B222KD-DN2	2NO+2NC	NA B222KE-DN2	2NO+2NC	NA B222KF-DN2	2NO+2NC
G11	L	NA G112KC-DN2	1NO+1NC	NA G112KD-DN2	1NO+1NC	NA G112KE-DN2	1NO+1NC	NA G112KF-DN2	1NO+1NC
G02	L	NA G022KC-DN2	2NC	NA G022KD-DN2	2NC	NA G022KE-DN2	2NC	NA G022KF-DN2	2NC
G12	L	NA G122KC-DN2	1NO+2NC	NA G122KD-DN2	1NO+2NC	NA G122KE-DN2	1NO+2NC	NA G122KF-DN2	1NO+2NC
G22	L	NA G222KC-DN2	2NO+2NC	NA G222KD-DN2	2NO+2NC	NA G222KE-DN2	2NO+2NC	NA G222KF-DN2	2NO+2NC
Max. speed		page 219 - type 1		page 219 - type 1		page 219 - type 1		page 219 - type 1	
Actuating force		0.07 Nm (0.25 Nm →)		0.07 Nm (0.25 Nm →)		0.07 Nm (0.25 Nm →)		0.07 Nm (0.25 Nm →)	
Travel diagrams		page 220 - group 5		page 220 - group 5		page 220 - group 5		page 220 - group 5	

NB series housing	M12 connector, right	M12 connector, bottom	AMP Superseal 1.5 connector
			

To order a product of the NB series, replace NA with NB in the codes shown above. Example:
NA B110AA-DN2 → **NB** B110AA-DN2

To order a product with M12 right connector, replace DN2 with DMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DMK**

To order a product with M12 bottom connector, replace DN2 with SMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SMK**

To order a product with AMP connector, replace DN2 with SAK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SAK**

All values in the drawings are in mm

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

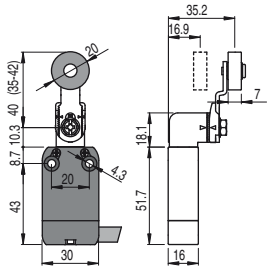
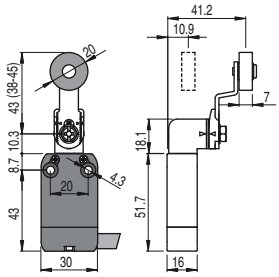
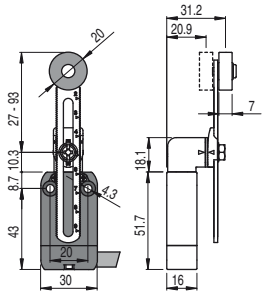
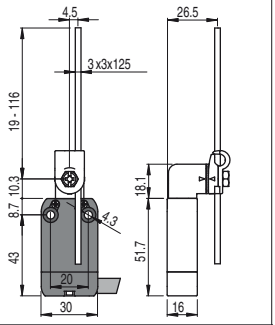
Accessories See page 197

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

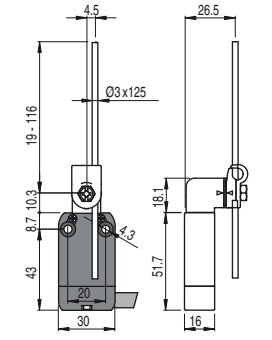
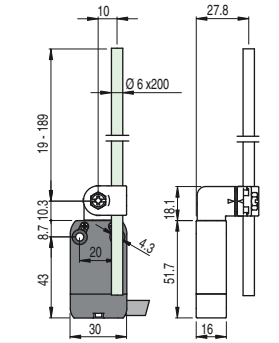
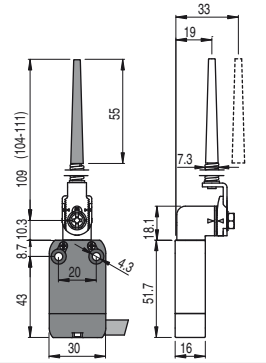
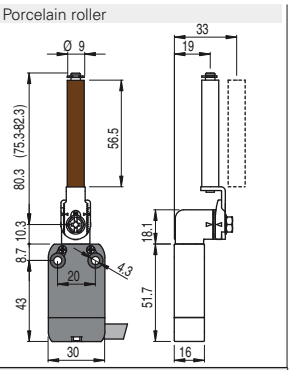
Contact type:

R = snap action
L = slow action

Contact block

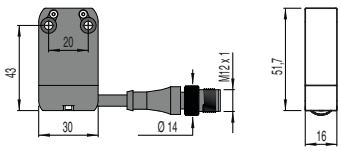
		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request		Square rod, 3x3 mm, stainless steel	
									
B11	R	NA B112KG-DN2	1NO+1NC	NA B112KH-DN2	1NO+1NC	NA B112KP-DN2	1NO+1NC	NA B112LB-DN2	1NO+1NC
B02	R	NA B022KG-DN2	2NC	NA B022KH-DN2	2NC	NA B022KP-DN2	2NC	NA B022LB-DN2	2NC
B12	R	NA B122KG-DN2	1NO+2NC	NA B122KH-DN2	1NO+2NC	NA B122KP-DN2	1NO+2NC	NA B122LB-DN2	1NO+2NC
B22	R	NA B222KG-DN2	2NO+2NC	NA B222KH-DN2	2NO+2NC	NA B222KP-DN2	2NO+2NC	NA B222LB-DN2	2NO+2NC
G11	L	NA G112KG-DN2	1NO+1NC	NA G112KH-DN2	1NO+1NC	NA G112KP-DN2	1NO+1NC	NA G112LB-DN2	1NO+1NC
G02	L	NA G022KG-DN2	2NC	NA G022KH-DN2	2NC	NA G022KP-DN2	2NC	NA G022LB-DN2	2NC
G12	L	NA G122KG-DN2	1NO+2NC	NA G122KH-DN2	1NO+2NC	NA G122KP-DN2	1NO+2NC	NA G122LB-DN2	1NO+2NC
G22	L	NA G222KG-DN2	2NO+2NC	NA G222KH-DN2	2NO+2NC	NA G222KP-DN2	2NO+2NC	NA G222LB-DN2	2NO+2NC
Max. speed		page 219 - type 1		page 219 - type 1		page 219 - type 1		1.5 m/s	
Actuating force		0.07 Nm (0.25 Nm)		0.07 Nm (0.25 Nm)		0.07 Nm (0.25 Nm)		0.07 Nm	
Travel diagrams		page 220 - group 5		page 220 - group 5		page 220 - group 5		page 220 - group 5	

Contact block

		Round rod, Ø 3 mm, stainless steel		Glass fibre rod				Porcelain roller	
									
B11	R	NA B112LE-DN2	1NO+1NC	NA B112LH-DN2	1NO+1NC	NA B112LL-DN2	1NO+1NC	NA B112LP-DN2E24	1NO+1NC
B02	R	NA B022LE-DN2	2NC	NA B022LH-DN2	2NC	NA B022LL-DN2	2NC	NA B022LP-DN2E24	2NC
B12	R	NA B122LE-DN2	1NO+2NC	NA B122LH-DN2	1NO+2NC	NA B122LL-DN2	1NO+2NC	NA B122LP-DN2E24	1NO+2NC
B22	R	NA B222LE-DN2	2NO+2NC	NA B222LH-DN2	2NO+2NC	NA B222LL-DN2	2NO+2NC	NA B222LP-DN2E24	2NO+2NC
G11	L	NA G112LE-DN2	1NO+1NC	NA G112LH-DN2	1NO+1NC	NA G112LL-DN2	1NO+1NC	NA G112LP-DN2E24	1NO+1NC
G02	L	NA G022LE-DN2	2NC	NA G022LH-DN2	2NC	NA G022LL-DN2	2NC	NA G022LP-DN2E24	2NC
G12	L	NA G122LE-DN2	1NO+2NC	NA G122LH-DN2	1NO+2NC	NA G122LL-DN2	1NO+2NC	NA G122LP-DN2E24	1NO+2NC
G22	L	NA G222LE-DN2	2NO+2NC	NA G222LH-DN2	2NO+2NC	NA G222LL-DN2	2NO+2NC	NA G222LP-DN2E24	2NO+2NC
Max. speed		1.5 m/s		1.5 m/s		1.5 m/s		0.5 m/s	
Actuating force		0.07 Nm		0.07 Nm		0.07 Nm		0.04 Nm	
Travel diagrams		page 220 - group 5		page 220 - group 5		page 220 - group 5		page 220 - group 5	

Cable and M12 connector

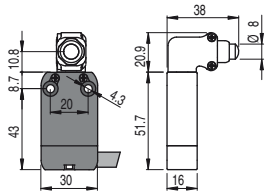
All values in the drawings are in mm

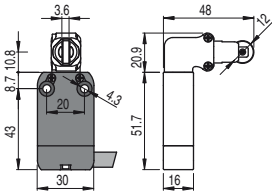


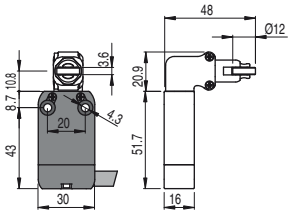
To order a product with cable and M12 connector:
replace DN2 with DM0.2 in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DM0.2**

NA-NB series modular metal pre-wired switches

Contact type:
R = snap action
L = slow action

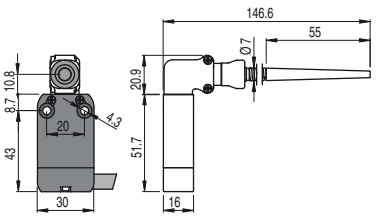




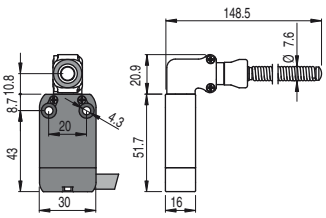


Contact block						
B11	R	NA B110AB-DN2W5	1NO+1NC	NA B110BB-DN2H0W5	1NO+1NC	NA B110BB-DN2W5	1NO+1NC
B02	R	NA B020AB-DN2W5	2NC	NA B020BB-DN2H0W5	2NC	NA B020BB-DN2W5	2NC
B12	R	NA B120AB-DN2W5	1NO+2NC	NA B120BB-DN2H0W5	1NO+2NC	NA B120BB-DN2W5	1NO+2NC
B22	R	NA B220AB-DN2W5	2NO+2NC	NA B220BB-DN2H0W5	2NO+2NC	NA B220BB-DN2W5	2NO+2NC
G11	L	NA G110AB-DN2W5	1NO+1NC	NA G110BB-DN2H0W5	1NO+1NC	NA G110BB-DN2W5	1NO+1NC
G02	L	NA G020AB-DN2W5	2NC	NA G020BB-DN2H0W5	2NC	NA G020BB-DN2W5	2NC
G12	L	NA G120AB-DN2W5	1NO+2NC	NA G120BB-DN2H0W5	1NO+2NC	NA G120BB-DN2W5	1NO+2NC
G22	L	NA G220AB-DN2W5	2NO+2NC	NA G220BB-DN2H0W5	2NO+2NC	NA G220BB-DN2W5	2NO+2NC
Max. speed		page 219 - type 4		page 219 - type 2		page 219 - type 2	
Actuating force		9.5 N (25 N ⊖)		9.5 N (25 N ⊖)		9.5 N (25 N ⊖)	
Travel diagrams		page 220 - group 1		page 220 - group 1		page 220 - group 1	

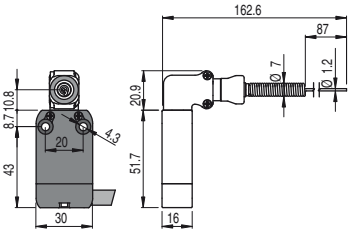
With external gasket



With external gasket

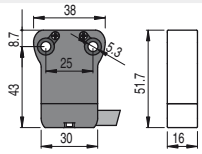


With external gasket



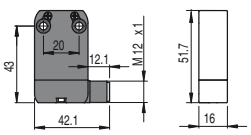
Contact block							
B11	R	NA B110HB-DN2W5	1NO+1NC	NA B110HE-DN2W5	1NO+1NC	NA B110HH-DN2W5	1NO+1NC
B02	R	NA B020HB-DN2W5	2NC	NA B020HE-DN2W5	2NC	NA B020HH-DN2W5	2NC
B12	R	NA B120HB-DN2W5	1NO+2NC	NA B120HE-DN2W5	1NO+2NC	NA B120HH-DN2W5	1NO+2NC
B22	R	NA B220HB-DN2W5	2NO+2NC	NA B220HE-DN2W5	2NO+2NC	NA B220HH-DN2W5	2NO+2NC
G11	L						
G02	L	NA G020HB-DN2W5	2NC	NA G020HE-DN2W5	2NC	NA G020HH-DN2W5	2NC
G12	L						
G22	L						
Max. speed		1 m/s		1 m/s		1 m/s	
Actuating force		0.08 Nm		0.12 Nm		0.08 Nm	
Travel diagrams		page 220 - group 4		page 220 - group 4		page 220 - group 4	

NB series housing



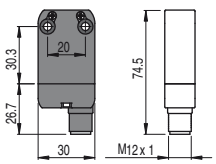
To order a product of the NB series, replace NA with NB in the codes shown above. Example:
NA B110AA-DN2 → **NB** B110AA-DN2

M12 connector, right



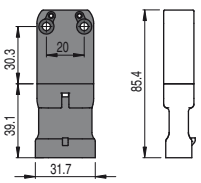
To order a product with M12 right connector, replace DN2 with DMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DMK**

M12 connector, bottom



To order a product with M12 bottom connector, replace DN2 with SMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SMK**

AMP Superseal 1.5 connector



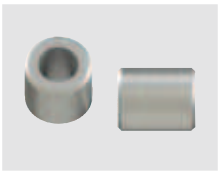
To order a product with AMP connector, replace DN2 with SAK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SAK**

All values in the drawings are in mm

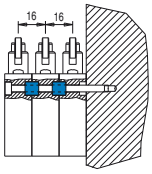
Accessories

Packs of **10 pcs.**

Article	Description
VN DT1F	Spacer for NA and NF series
VF D16B	Spacer for NB series



By installing spacers between two switches, it is possible to have 2 or more pre-wired switches, preventing them from slipping.



M12 female connectors with cable

For details see page 198

Technical data:

- Polyurethane connector body
- Class 6 copper conductors acc. to IEC 60228 - mobile installation
- Gold-plated contacts (resistance < 5 mΩ)
- Self-locking ring nut
- High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II. With polyurethane sheath on request.

Code structure

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

VF CA4PD3M

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Cable sheath	
P	PVC (standard)
U	PUR

Connector type	
D	straight (standard)
G	angled

Connection type	
M	M12x1

		No. of poles			
Cable length (L)		4	5	8	12
1	1 metre				
2	2 metres				
3	3 metres (standard)	•	•		
4	4 metres				
5	5 metres (standard)	•	•	•	•
...					
0	10 metres (standard)	•	•	•	•

Other lengths on request

Stock items

VF CA4PD3M
VF CA4PD5M
VF CA4PD0M
VF CA5PD3M
VF CA5PD5M
VF CA5PD0M
VF CA8PD5M
VF CA8PD0M
VF CA12PD5M
VF CA12PD0M

Attention! No stock items, minimum order quantity 100 pcs.

Field wireable M12 female connectors

General data

Technopolymer connector body
Gold-plated contacts
Screw terminals for cable screw fittings

Max. operating voltages	250 Vac/dc (4 and 5-pole) 30 Vac/dc (8-pole)
Maximum current	4 A
Protection degree	IP67 acc. to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	0.25 mm² (24 AWG) … 0.5 mm² (20 AWG)

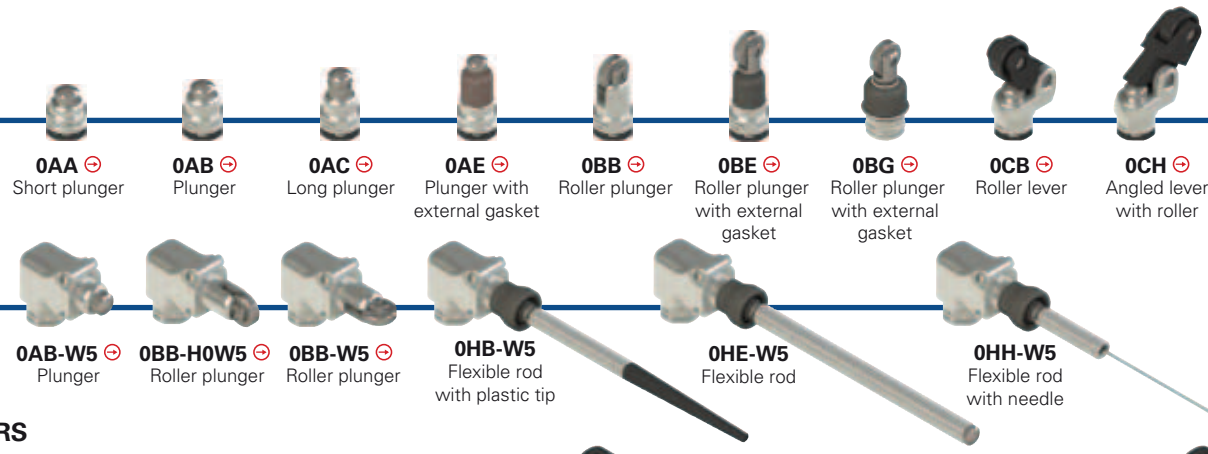
Article	Description	no. of poles
VF CBMP4DM04	Field wireable M12 female connector, straight, for Ø 4 … 6.5 mm multipolar cables	4
VF CBMP5DM04	Field wireable M12 female connector, straight, for Ø 4 … 6.5 mm multipolar cables	5
VF CBMP8DM04	Field wireable M12 female connector, straight, for Ø 4 … 7 mm multipolar cables	8

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

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

Selection diagram for item combinations of the NF series

ACTUATORS



0AA Short plunger

0AB Plunger

0AC Long plunger

0AE Plunger with external gasket

0BB Roller plunger

0BE Roller plunger with external gasket

0BG Roller plunger with external gasket

0CB Roller lever

0CH Angled lever with roller

0AB-W5 Plunger

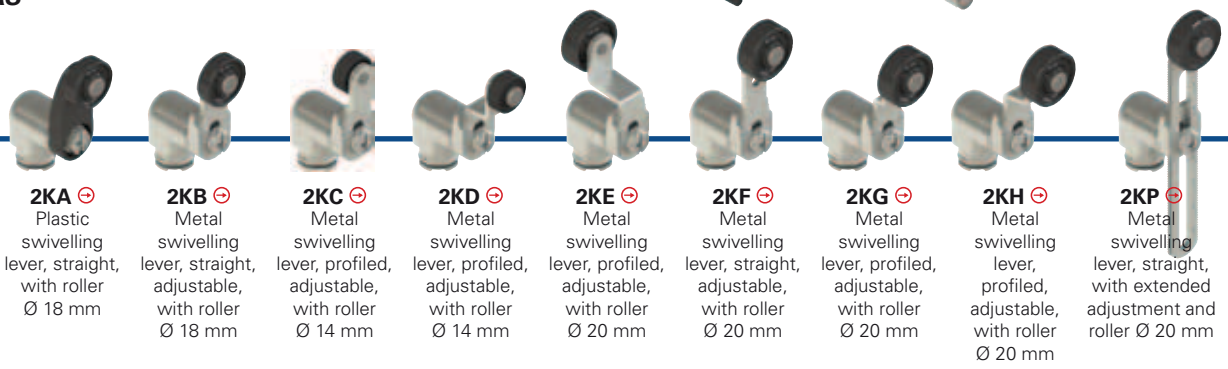
0BB-H0W5 Roller plunger

0BB-W5 Roller plunger

0HB-W5 Flexible rod with plastic tip

0HE-W5 Flexible rod

0HH-W5 Flexible rod with needle



2KA Plastic swivelling lever, straight, with roller Ø 18 mm

2KB Metal swivelling lever, straight, adjustable, with roller Ø 18 mm

2KC Metal swivelling lever, profiled, adjustable, with roller Ø 14 mm

2KD Metal swivelling lever, profiled, adjustable, with roller Ø 14 mm

2KE Metal swivelling lever, profiled, adjustable, with roller Ø 20 mm

2KF Metal swivelling lever, straight, adjustable, with roller Ø 20 mm

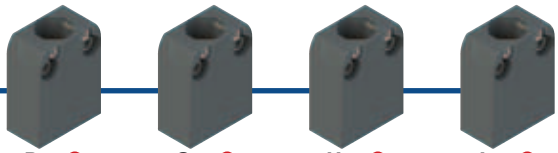
2KG Metal swivelling lever, profiled, adjustable, with roller Ø 20 mm

2KH Metal swivelling lever, profiled, adjustable, with roller Ø 20 mm

2KP Metal swivelling lever, straight, with extended adjustment and roller Ø 20 mm

NF

CONTACT BLOCKS

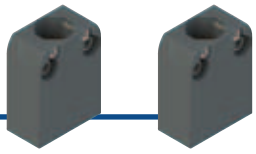


B11 1NO+1NC snap action

G11 1NO+1NC slow action

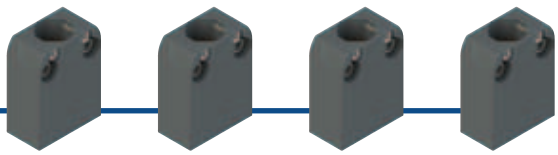
H11 1NO+1NC slow action, make before break

L11 1NO+1NC slow action, close



B02 2NC snap action

G02 2NC slow action

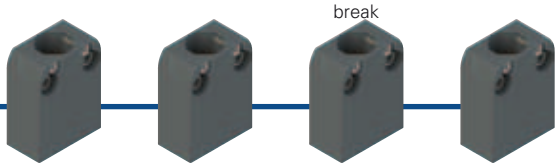


B12 1NO+2NC snap action

G12 1NO+2NC slow action

H12 1NO+2NC slow action, make before break

L12 1NO+2NC slow action, close



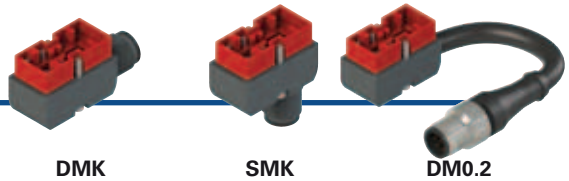
B22 2NO+2NC snap action

G22 2NO+2NC slow action

H22 2NO+2NC slow action, make before break

L22 2NO+2NC slow action, close

CONNECTORS



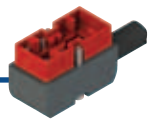
DMK M12 connector, right

SMK M12 connector, bottom

DM0.2 cable and M12 connector

SAK AMP connector, bottom

CABLES

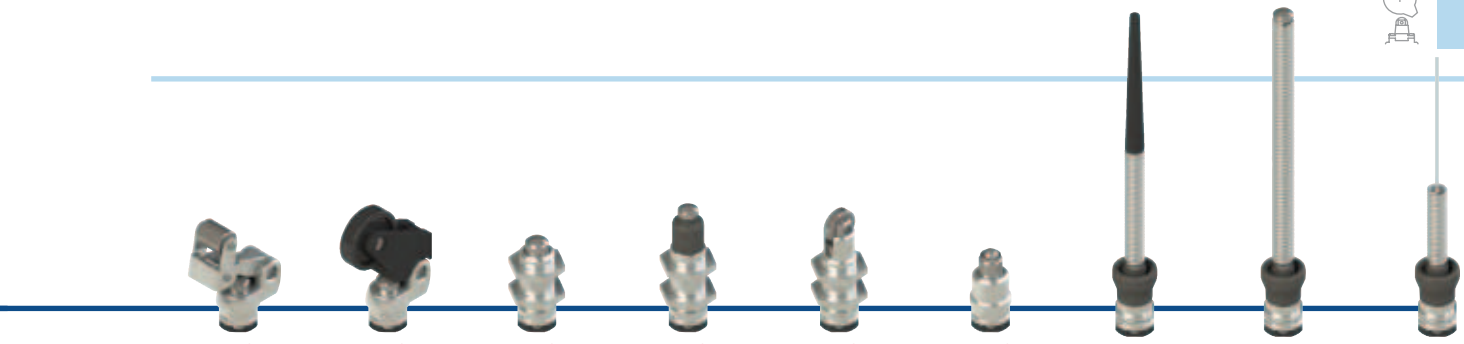


connector with cable

DN	PVC cable IEC 60332-1 (standard)
DG	PVC cable CEI 20-22 II
DH	PUR cable, halogen free

product options

Sold separately as accessory



0CP Unidirectional roller lever

0CV Adjustable angled roller lever

0EB Plunger with M12 threaded fitting

0EE Plunger with M12 threaded fitting, external gasket

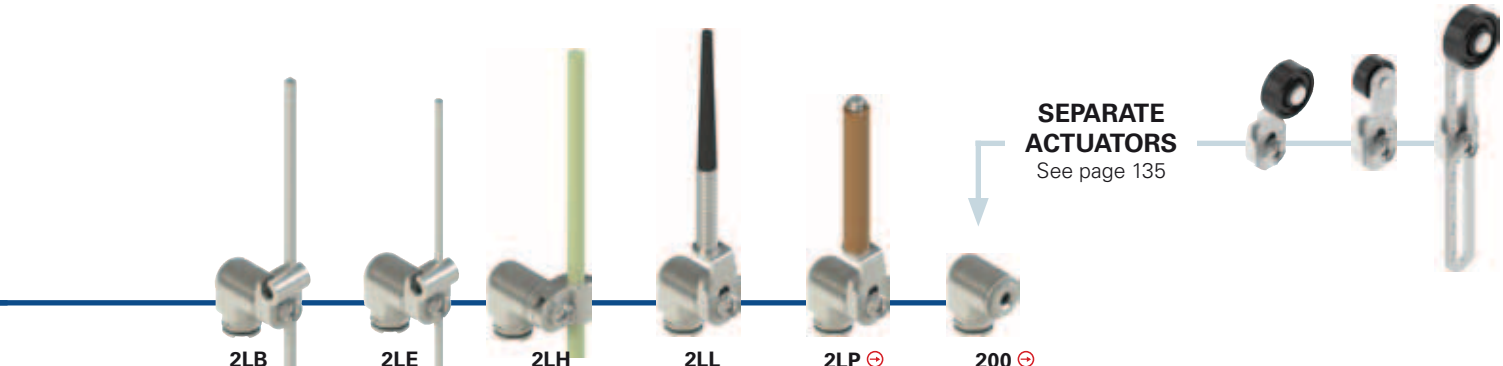
0FB Roller plunger with M12 threaded fitting

0GB Plunger with Ø 6 mm ball

0HB Flexible rod with plastic tip

0HE Flexible rod

0HH Flexible rod with needle



2LB Metal swivelling lever with stainless steel rod 3 x 3 x 125 mm, adjustable

2LE Metal swivelling lever with stainless steel rod Ø 3 x 125 mm, adjustable

2LH Metal swivelling lever with glass fibre rod Ø 6 x 200 mm, adjustable

2LL Metal swivelling lever with flexible rod, adjustable

2LP Metal swivelling lever with porcelain roll, adjustable

200 Metal head for swivelling lever actuators

SEPARATE ACTUATORS
See page 135

Code structure

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

article: **NF B110AB-DN2** options: **GR7T6W5**

Housing

NF	technopolymer, hole spacing 20 mm

Contact block

B11	1NO+1NC, snap action (standard)
B02	2NC, snap action (standard)
B12	1NO+2NC, snap action (standard)
B22	2NO+2NC, snap action (standard)
G11	1NO+1NC, slow action (standard)
G02	2NC, slow action (standard)
G12	1NO+2NC, slow action (standard)
G22	2NO+2NC, slow action
H11	1NO+1NC, slow action, make before break
H12	1NO+2NC, slow action, make before break
H22	2NO+2NC, slow action, make before break
L11	1NO+1NC, slow action, close
L12	1NO+2NC, slow action, close
L22	2NO+2NC, slow action, close

Other contact blocks on request.

Actuator heads

0	without head
2	head for swivelling lever actuators

Actuators

AA	short plunger
AB	plunger
...	.....

Output direction

D	cable or connector, right
S	connector, bottom

Redirection

	without redirection
W5	90° redirection

Ambient temperature

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

Rollers

	standard roller
R30	stainless steel Ø 10.6 mm
R29	stainless steel Ø 13 mm
R18	technopolymer, Ø 14 mm
R23	stainless steel Ø 14 mm
R7	technopolymer, Ø 18 mm
R22	technopolymer, Ø 20 mm
R24	stainless steel Ø 20 mm
R19	technopolymer, Ø 22 mm
R25	technopolymer, Ø 35 mm

Contact type

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

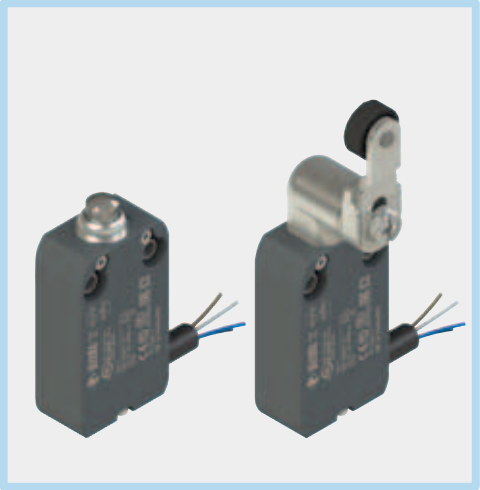
Connection type

0.2	cable, length: 0.2 m with M12 connector (available for DM0.2 versions only)
2	cable, length: 2 m (standard)
5	cable, length 5 m (other cable lengths available on request)
K	integrated connector

Cable or connector type

N	PVC cable IEC 60332-1 (standard)
G	PVC cable CEI 20-22 II
H	PUR cable, halogen free
M	M12 connector
A	AMP Superseal 1.5 connector

NF series modular pre-wired technopolymer switches



Main features

- Technopolymer housing, right or bottom cable output
- Protection degrees IP67 and IP69K
- 2 types of integrated cable available
- Versions with M12 connector suitable for safety applications ⊖
- Versions with AMP connector
- 14 contact blocks available
- 37 actuators available

Quality marks:

IMQ approval:	CA02.04562
UL approval:	E131787
CCC approval:	2013010305653520
EAC approval:	RU C-IT.АД35.В.00454

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation ⧈.
Versions with integrated cable, standard length 2 m. Other lengths 0.5 … 10 m or special cables available on request.
Versions with integrated M12 connector.
Versions with 0.2 m cable length and M12 connector, other lengths 0.1 … 3 m available on request

Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Corrosion resistance in saline mist:	≥ 300 hours in NSS acc. to ISO 9227

General data

Ambient temperature for switches without cable:	-25°C … + 80°C (standard) -40°C … + 80°C (extended T6)
Ambient temperature for switches with cable:	See table on page 128
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

Electrical data

Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Pollution degree:	3

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, EN 60529, ISO 20653, UL 508, CSA 22.2 No.14.

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: see "Internal cable wiring" on page 128) 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** (failure exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 220. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value. All applicable standards must be respected too.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

⚠ **Important: Switch off the circuit voltage before disconnecting the connector from the switch. The connector is not suitable for separation of electrical loads.**

Features approved by IMQ

Rated insulation voltage (U_i):	250 Vac
Conventional free air thermal current (I_{th}):	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 4-pole M12 connector)
Protection against short circuits (fuse):	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 4-pole M12 connector) type gG
Rated impulse withstand voltage (U_{imp}):	4 kV
Protection degree of the housing:	IP67
MA terminals (crimped terminals) Pollution degree:	3
Utilization category:	AC15 / DC13 (with connector)
Operating voltage (U_e):	250 Vac (50 Hz) / 24 Vdc (with connector)
Operating current (I_e):	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, Zb
Positive opening of contacts on contact blocks B01, B11, B02, B12, B21, B22, G01, G11, G02, G12, G21, G22, L01, L11, L02, L12, L21, L22, H01, H11, H02, H12, H21, H22
In compliance with standards: EN 60947-1, EN 60947-5-1 + A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features 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.)

Housing features type 1, 4X "indoor use only", 12.
Housing features for the version with 1-2 contacts and type N cable Type 1, 4X "indoor use only"

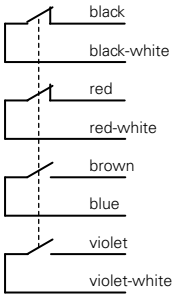
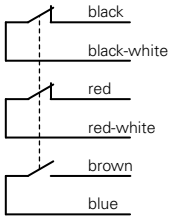
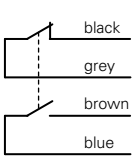
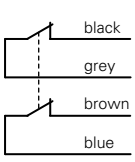
In compliance with standard: UL 508, CSA 22.2 No.14

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

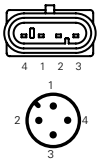
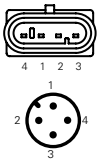
Ambient temperatures for switches with cable and electrical data

	Connection type	Output with cable						Output with M12 connector		Output with AMP connector
	Contact block	2 contacts			3 contacts	4 contacts		2 contacts	3 or 4 contacts	2 contacts
Cable features	Cable or connector type	N	G	H	N	N	H	M12 connector, 5-pole	M12 connector, 8-pole	AMP Superseal 1.5 connector
	Conductors	4x0.75 mm²	4x0.75 mm²	4x0.75 mm²	6x0.5 mm²	8x0.34 mm²	8x0.34 mm²	4x0.25 mm2	8x0.25mm2	
	Application field	General	General	General, mobile installation	General	General	General, mobile installation	General	General	General
	In compliance with standards	05VV-F	05VV-F	05EQ-H	03VV-F	03VV-F	03E7Q-H	03VV-H	03VV-H	/
	Sheath	PVC	PVC	PUR HALOGEN FREE	PVC	PVC	PUR HALOGEN FREE	PVC	PVC	/
	Self-extinguishing	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1-2 IEC 60332-1-3 IEC 60332-3 CEI 20-22 II	IEC60332-1-2 IEC60332-1-3	IEC 60332-1-2 IEC 60332-1-3	IEC 60332-1-2 IEC 60332-1-3	IEC60332-1-2 IEC60332-1-3	IEC60332-3 CEI 20-22 II	IEC60332-3 CEI 20-22 II	/
	Oil resistant	/	/	UL 758	/	/	UL 758	ISO 6722-1	ISO 6722-1	/
	Max. speed	/	/	300m/min	/	/	300m/min	50m/min	50m/min	/
	Max. acceleration	/	/	30m/s²	/	/	30m/s²	5m/s²	5m/s²	/
	Minimum bending radius	70 mm	70 mm	70 mm	108 mm	94mm	70 mm	75 mm	90 mm	/
	Outer diameter	7 mm	7 mm	7 mm	7 mm	7 mm	7 mm	5 mm	5 mm	/
	End stripped	80 mm	80 mm	80 mm	80 mm	80 mm	80 mm	/	/	/
	Copper conductors IEC 60228	Class 5	Class 5	Class 6	Class 5	Class 5	Class 6	Class 6	Class 6	/
Ambient temperature with cable 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	/
	Cable, flexible installation	+5°C +70°C	+5°C +70°C	-25°C +80°C	-5°C +80°C	-5°C +80°C	-25°C +80°C	-25°C +80°C	-25°C +80°C	/
	Cable, mobile installation	/	/	-25°C +80°C	/	/	-25°C +80°C	-15°C +80°C	-15°C +80°C	/
Ambient temperature extended (T6)	Cable, fixed installation	/	/	-40°C +80°C	/	/	-40°C +80°C	/	/	/
	Cable, flexible installation	/	/	-40°C +80°C	/	/	-40°C +80°C	/	/	/
	Cable, mobile installation	/	/	-40°C +80°C	/	/	-40°C +80°C	/	/	/
Electrical data	Thermal current Ith	10 A	10 A	10 A	6 A	3 A	3 A	4 A	2 A	10 A
	Rated insulation voltage Ui	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac	250 Vac 300 Vdc	30 Vac 36 Vdc	250 Vac 300 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	3 A 500 V type gG	3 A 500 V type gG	4 A 500 V type gG	2 A 500 V type gG	10 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
	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
	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
	Utilization category AC15 24 V	4 A	4 A	4 A	4 A	3 A	3 A	4 A	2 A	4 A
	Utilization category AC15 120 V	4 A	4 A	4 A	4 A	3 A	3 A	4 A	/	4 A
	Utilization category AC15 250 V	4 A	4 A	4 A	4 A	3 A	3 A	4 A	/	4 A
	Approvals	CE cULus IMQ EAC CCC	CE EAC CCC	CE EAC	CE cULus IMQ EAC CCC	CE cULus IMQ EAC CCC	CE EAC	CE cULus IMQ EAC CCC	CE cULus EAC CCC	CE cULus EAC CCC

Internal cable wiring

2NO+2NC	1NO+2NC	1NO+1NC	2NC
			

Connector pin assignment

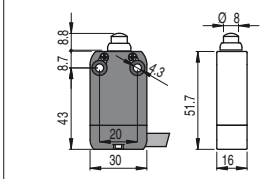
2NO+2NC	1NO+2NC	1NO+1NC	2NC
			
1-2 NC 3-4 NC 5-6 NO 7-8 NO	3-4 NC 5-6 NC 7-8 NO	1-2 NC 3-4 NO	1-2 NC 3-4 NC

Female connectors see page 198

NF series modular pre-wired technopolymer switches

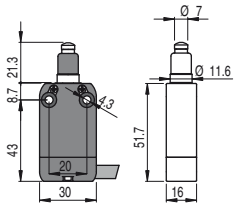
Contact type:
R = snap action
L = slow action

Contact block

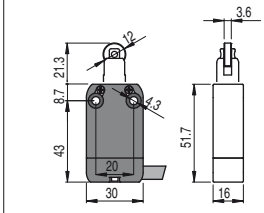


B11	R	NF B110AA-DN2	1NO+1NC	NF B110AB-DN2	1NO+1NC	NF B110AC-DN2	1NO+1NC	NF B110AE-DN2	1NO+1NC
B02	R	NF B020AA-DN2	2NC	NF B020AB-DN2	2NC	NF B020AC-DN2	2NC	NF B020AE-DN2	2NC
B12	R	NF B120AA-DN2	1NO+2NC	NF B120AB-DN2	1NO+2NC	NF B120AC-DN2	1NO+2NC	NF B120AE-DN2	1NO+2NC
B22	R	NF B220AA-DN2	2NO+2NC	NF B220AB-DN2	2NO+2NC	NF B220AC-DN2	2NO+2NC	NF B220AE-DN2	2NO+2NC
G11	L	NF G110AA-DN2	1NO+1NC	NF G110AB-DN2	1NO+1NC	NF G110AC-DN2	1NO+1NC	NF G110AE-DN2	1NO+1NC
G02	L	NF G020AA-DN2	2NC	NF G020AB-DN2	2NC	NF G020AC-DN2	2NC	NF G020AE-DN2	2NC
G12	L	NF G120AA-DN2	1NO+2NC	NF G120AB-DN2	1NO+2NC	NF G120AC-DN2	1NO+2NC	NF G120AE-DN2	1NO+2NC
G22	L	NF G220AA-DN2	2NO+2NC	NF G220AB-DN2	2NO+2NC	NF G220AC-DN2	2NO+2NC	NF G220AE-DN2	2NO+2NC
Max. speed		page 219 - type 4		page 219 - type 4		page 219 - type 4		page 219 - type 4	
Actuating force		7 N (25 N ⊖)		7 N (25 N ⊖)		7 N (25 N ⊖)		7 N (25 N ⊖)	
Travel diagrams		page 220 - group 1		page 220 - group 1		page 220 - group 1		page 220 - group 1	

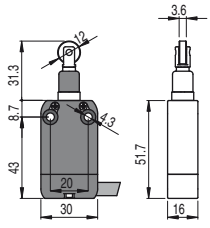
With external rubber gasket



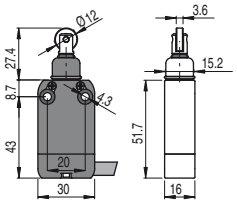
Contact block



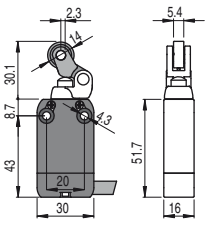
With external rubber gasket



With external rubber gasket

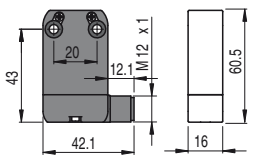


With stainless steel roller on request

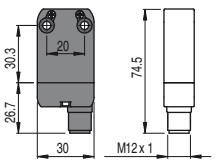


B11	R	NF B110BB-DN2	1NO+1NC	NF B110BE-DN2	1NO+1NC	NF B110BG-DN2	1NO+1NC	NF B110CB-DN2	1NO+1NC
B02	R	NF B020BB-DN2	2NC	NF B020BE-DN2	2NC	NF B020BG-DN2	2NC	NF B020CB-DN2	2NC
B12	R	NF B120BB-DN2	1NO+2NC	NF B120BE-DN2	1NO+2NC	NF B120BG-DN2	1NO+2NC	NF B120CB-DN2	1NO+2NC
B22	R	NF B220BB-DN2	2NO+2NC	NF B220BE-DN2	2NO+2NC	NF B220BG-DN2	2NO+2NC	NF B220CB-DN2	2NO+2NC
G11	L	NF G110BB-DN2	1NO+1NC	NF G110BE-DN2	1NO+1NC	NF G110BG-DN2	1NO+1NC	NF G110CB-DN2	1NO+1NC
G02	L	NF G020BB-DN2	2NC	NF G020BE-DN2	2NC	NF G020BG-DN2	2NC	NF G020CB-DN2	2NC
G12	L	NF G120BB-DN2	1NO+2NC	NF G120BE-DN2	1NO+2NC	NF G120BG-DN2	1NO+2NC	NF G120CB-DN2	1NO+2NC
G22	L	NF G220BB-DN2	2NO+2NC	NF G220BE-DN2	2NO+2NC	NF G220BG-DN2	2NO+2NC	NF G220CB-DN2	2NO+2NC
Max. speed		page 219 - type 2		page 219 - type 5		page 219 - type 5		page 219 - type 3	
Actuating force		7 N (25 N ⊖)		7 N (25 N ⊖)		7 N (25 N ⊖)		5 N (25 N ⊖)	
Travel diagrams		page 220 - group 1		page 220 - group 1		page 220 - group 1		page 220 - group 2	

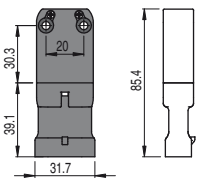
M12 connector, right



M12 connector, bottom



AMP Superseal 1.5 connector



To order a product with M12 right connector, replace DN2 with DMK in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**DMK**

To order a product with M12 bottom connector, replace DN2 with SMK in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**SMK**

To order a product with AMP connector, replace DN2 with SAK in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**SAK**

All values in the drawings are in mm

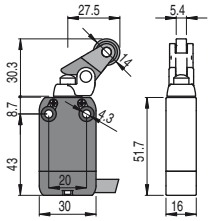
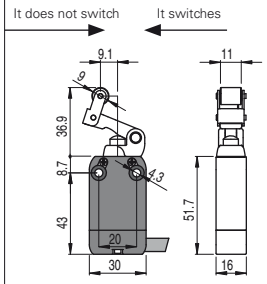
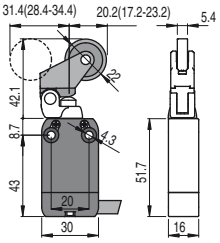
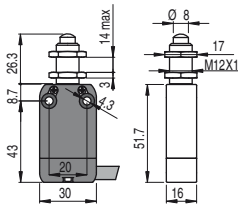
Items with code on **green** background are stock items

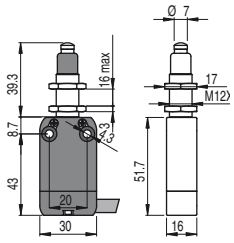
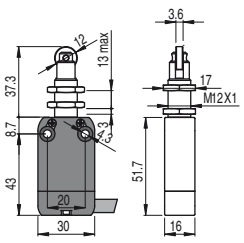
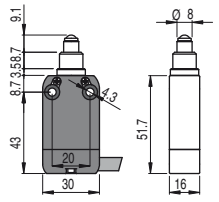
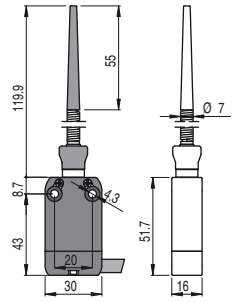
Accessories See page 197

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

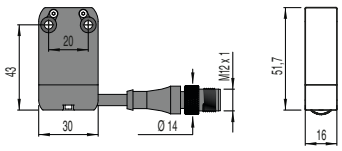
Contact type:

R = snap action
L = slow action

Contact block		With stainless steel roller on request	Unidirectional operation		Secured only by means of threaded head
					
B11	R	NF B110CH-DN2 → 1NO+1NC	NF B110CP-DN2 → 1NO+1NC	NF B110CV-DN2 → 1NO+1NC	NF B110EB-DN2 → 1NO+1NC
B02	R	NF B020CH-DN2 → 2NC	NF B020CP-DN2 → 2NC	NF B020CV-DN2 → 2NC	NF B020EB-DN2 → 2NC
B12	R	NF B120CH-DN2 → 1NO+2NC	NF B120CP-DN2 → 1NO+2NC	NF B120CV-DN2 → 1NO+2NC	NF B120EB-DN2 → 1NO+2NC
B22	R	NF B220CH-DN2 → 2NO+2NC	NF B220CP-DN2 → 2NO+2NC	NF B220CV-DN2 → 2NO+2NC	NF B220EB-DN2 → 2NO+2NC
G11	L	NF G110CH-DN2 → 1NO+1NC	NF G110CP-DN2 → 1NO+1NC	NF G110CV-DN2 → 1NO+1NC	NF G110EB-DN2 → 1NO+1NC
G02	L	NF G020CH-DN2 → 2NC	NF G020CP-DN2 → 2NC	NF G020CV-DN2 → 2NC	NF G020EB-DN2 → 2NC
G12	L	NF G120CH-DN2 → 1NO+2NC	NF G120CP-DN2 → 1NO+2NC	NF G120CV-DN2 → 1NO+2NC	NF G120EB-DN2 → 1NO+2NC
G22	L	NF G220CH-DN2 → 2NO+2NC	NF G220CP-DN2 → 2NO+2NC	NF G220CV-DN2 → 2NO+2NC	NF G220EB-DN2 → 2NO+2NC
Max. speed		page 219 - type 3	page 219 - type 3	page 219 - type 3	page 219 - type 4
Actuating force		5 N (25 N →)	3 N (25 N →)	3 N (25 N →)	7 N (25 N →)
Travel diagrams		page 220 - group 2	page 220 - group 6	page 220 - group 3	page 220 - group 1

Contact block		Secured only by means of threaded head With external rubber gasket	Secured only by means of threaded head	Plunger with Ø 6 mm ball	With external rubber gasket
					
B11	R	NF B110EE-DN2 → 1NO+1NC	NF B110FB-DN2 → 1NO+1NC	NF B110GB-DN2 → 1NO+1NC	NF B110HB-DN2 1NO+1NC
B02	R	NF B020EE-DN2 → 2NC	NF B020FB-DN2 → 2NC	NF B020GB-DN2 → 2NC	NF B020HB-DN2 2NC
B12	R	NF B120EE-DN2 → 1NO+2NC	NF B120FB-DN2 → 1NO+2NC	NF B120GB-DN2 → 1NO+2NC	NF B120HB-DN2 1NO+2NC
B22	R	NF B220EE-DN2 → 2NO+2NC	NF B220FB-DN2 → 2NO+2NC	NF B220GB-DN2 → 2NO+2NC	NF B220HB-DN2 2NO+2NC
G11	L	NF G110EE-DN2 → 1NO+1NC	NF G110FB-DN2 → 1NO+1NC	NF G110GB-DN2 → 1NO+1NC	
G02	L	NF G020EE-DN2 → 2NC	NF G020FB-DN2 → 2NC	NF G020GB-DN2 → 2NC	NF G020HB-DN2 2NC
G12	L	NF G120EE-DN2 → 1NO+2NC	NF G120FB-DN2 → 1NO+2NC	NF G120GB-DN2 → 1NO+2NC	
G22	L	NF G220EE-DN2 → 2NO+2NC	NF G220FB-DN2 → 2NO+2NC	NF G220GB-DN2 → 2NO+2NC	
Max. speed		page 219 - type 4	page 219 - type 2	page 219 - type 2	1 m/s
Actuating force		7 N (25 N →)	7 N (25 N →)	7 N (25 N →)	0.03 Nm
Travel diagrams		page 220 - group 1	page 220 - group 1	page 220 - group 1	page 220 - group 4

Cable and M12 connector



All values in the drawings are in mm

To order a product with cable and M12 connector:
replace DN2 with DM0.2 in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**DM0.2**

NF series modular pre-wired technopolymer switches

Contact type:
R = snap action
L = slow action

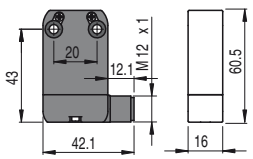
Contact block

		With external rubber gasket		With external rubber gasket		With stainless steel roller on request		With stainless steel roller on request	
B11	R	NF B110HE-DN2	1NO+1NC	NF B110HH-DN2	1NO+1NC	NF B112KA-DN2	1NO+1NC	NF B112KB-DN2	1NO+1NC
B02	R	NF B020HE-DN2	2NC	NF B020HH-DN2	2NC	NF B022KA-DN2	2NC	NF B022KB-DN2	2NC
B12	R	NF B120HE-DN2	1NO+2NC	NF B120HH-DN2	1NO+2NC	NF B122KA-DN2	1NO+2NC	NF B122KB-DN2	1NO+2NC
B22	R	NF B220HE-DN2	2NO+2NC	NF B220HH-DN2	2NO+2NC	NF B222KA-DN2	2NO+2NC	NF B222KB-DN2	2NO+2NC
G11	L					NF G112KA-DN2	1NO+1NC	NF G112KB-DN2	1NO+1NC
G02	L	NF G020HE-DN2	2NC	NF G020HH-DN2	2NC	NF G022KA-DN2	2NC	NF G022KB-DN2	2NC
G12	L					NF G122KA-DN2	1NO+2NC	NF G122KB-DN2	1NO+2NC
G22	L					NF G222KA-DN2	2NO+2NC	NF G222KB-DN2	2NO+2NC
Max. speed		1 m/s		1 m/s		page 219 - type 1		page 219 - type 1	
Actuating force		0.07 Nm		0.03 Nm		0.07 Nm (0.25 Nm ⊖)		0.07 Nm (0.25 Nm ⊖)	
Travel diagrams		page 220 - group 4		page 220 - group 4		page 220 - group 5		page 220 - group 5	

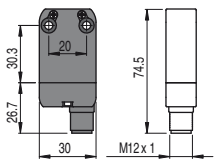
Contact block

		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request	
B11	R	NF B112KC-DN2	1NO+1NC	NF B112KD-DN2	1NO+1NC	NF B112KE-DN2	1NO+1NC	NF B112KF-DN2	1NO+1NC
B02	R	NF B022KC-DN2	2NC	NF B022KD-DN2	2NC	NF B022KE-DN2	2NC	NF B022KF-DN2	2NC
B12	R	NF B122KC-DN2	1NO+2NC	NF B122KD-DN2	1NO+2NC	NF B122KE-DN2	1NO+2NC	NF B122KF-DN2	1NO+2NC
B22	R	NF B222KC-DN2	2NO+2NC	NF B222KD-DN2	2NO+2NC	NF B222KE-DN2	2NO+2NC	NF B222KF-DN2	2NO+2NC
G11	L	NF G112KC-DN2	1NO+1NC	NF G112KD-DN2	1NO+1NC	NF G112KE-DN2	1NO+1NC	NF G112KF-DN2	1NO+1NC
G02	L	NF G022KC-DN2	2NC	NF G022KD-DN2	2NC	NF G022KE-DN2	2NC	NF G022KF-DN2	2NC
G12	L	NF G122KC-DN2	1NO+2NC	NF G122KD-DN2	1NO+2NC	NF G122KE-DN2	1NO+2NC	NF G122KF-DN2	1NO+2NC
G22	L	NF G222KC-DN2	2NO+2NC	NF G222KD-DN2	2NO+2NC	NF G222KE-DN2	2NO+2NC	NF G222KF-DN2	2NO+2NC
Max. speed		page 219 - type 1		page 219 - type 1		page 219 - type 1		page 219 - type 1	
Actuating force		0.07 Nm (0.25 Nm ⊖)		0.07 Nm (0.25 Nm ⊖)		0.07 Nm (0.25 Nm ⊖)		0.07 Nm (0.25 Nm ⊖)	
Travel diagrams		page 220 - group 5		page 220 - group 5		page 220 - group 5		page 220 - group 5	

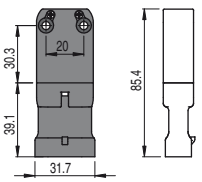
M12 connector, right



M12 connector, bottom



AMP Superseal 1.5 connector



To order a product with M12 right connector, replace DN2 with DMK in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**DMK**

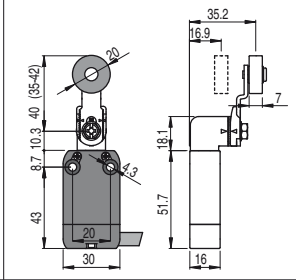
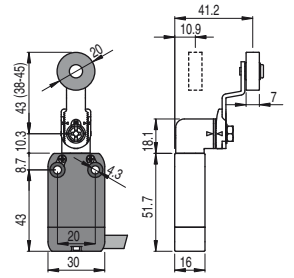
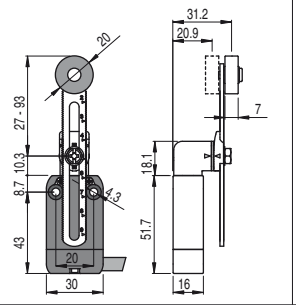
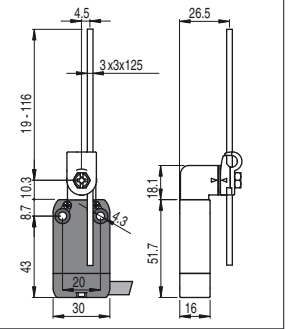
To order a product with M12 bottom connector, replace DN2 with SMK in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**SMK**

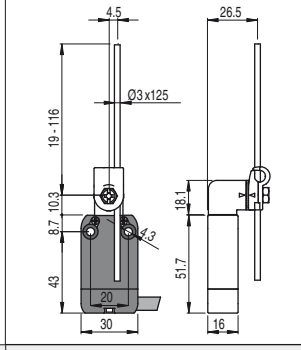
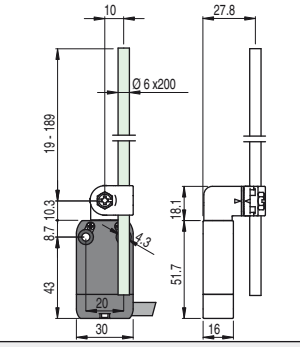
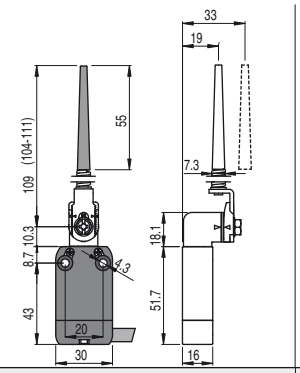
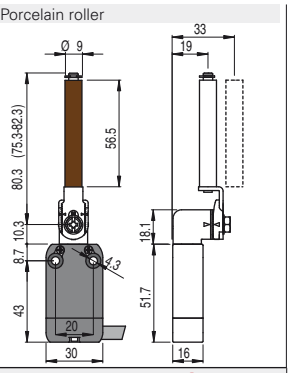
To order a product with AMP connector, replace DN2 with SAK in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**SAK**

All values in the drawings are in mm

Contact type:

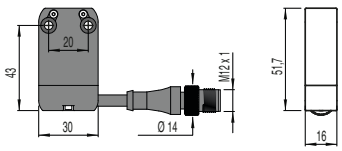
R = snap action
L = slow action

Contact block		With stainless steel roller on request	With stainless steel roller on request	With stainless steel roller on request	Square rod, 3x3 mm, stainless steel
					
B11	R	NF B112KG-DN2 1NO+1NC	NF B112KH-DN2 1NO+1NC	NF B112KP-DN2 1NO+1NC	NF B112LB-DN2 1NO+1NC
B02	R	NF B022KG-DN2 2NC	NF B022KH-DN2 2NC	NF B022KP-DN2 2NC	NF B022LB-DN2 2NC
B12	R	NF B122KG-DN2 1NO+2NC	NF B122KH-DN2 1NO+2NC	NF B122KP-DN2 1NO+2NC	NF B122LB-DN2 1NO+2NC
B22	R	NF B222KG-DN2 2NO+2NC	NF B222KH-DN2 2NO+2NC	NF B222KP-DN2 2NO+2NC	NF B222LB-DN2 2NO+2NC
G11	L	NF G112KG-DN2 1NO+1NC	NF G112KH-DN2 1NO+1NC	NF G112KP-DN2 1NO+1NC	NF G112LB-DN2 1NO+1NC
G02	L	NF G022KG-DN2 2NC	NF G022KH-DN2 2NC	NF G022KP-DN2 2NC	NF G022LB-DN2 2NC
G12	L	NF G122KG-DN2 1NO+2NC	NF G122KH-DN2 1NO+2NC	NF G122KP-DN2 1NO+2NC	NF G122LB-DN2 1NO+2NC
G22	L	NF G222KG-DN2 2NO+2NC	NF G222KH-DN2 2NO+2NC	NF G222KP-DN2 2NO+2NC	NF G222LB-DN2 2NO+2NC
Max. speed		page 219 - type 1	page 219 - type 1	page 219 - type 1	1.5 m/s
Actuating force		0.07 Nm (0.25 Nm)	0.07 Nm (0.25 Nm)	0.07 Nm (0.25 Nm)	0.07 Nm
Travel diagrams		page 220 - group 5	page 220 - group 5	page 220 - group 5	page 220 - group 5

Contact block		Round rod, Ø 3 mm, stainless steel	Glass fibre rod		Porcelain roller
					
B11	R	NF B112LE-DN2 1NO+1NC	NF B112LH-DN2 1NO+1NC	NF B112LL-DN2 1NO+1NC	NF B112LP-DN2E24 1NO+1NC
B02	R	NF B022LE-DN2 2NC	NF B022LH-DN2 2NC	NF B022LL-DN2 2NC	NF B022LP-DN2E24 2NC
B12	R	NF B122LE-DN2 1NO+2NC	NF B122LH-DN2 1NO+2NC	NF B122LL-DN2 1NO+2NC	NF B122LP-DN2E24 1NO+2NC
B22	R	NF B222LE-DN2 2NO+2NC	NF B222LH-DN2 2NO+2NC	NF B222LL-DN2 2NO+2NC	NF B222LP-DN2E24 2NO+2NC
G11	L	NF G112LE-DN2 1NO+1NC	NF G112LH-DN2 1NO+1NC	NF G112LL-DN2 1NO+1NC	NF G112LP-DN2E24 1NO+1NC
G02	L	NF G022LE-DN2 2NC	NF G022LH-DN2 2NC	NF G022LL-DN2 2NC	NF G022LP-DN2E24 2NC
G12	L	NF G122LE-DN2 1NO+2NC	NF G122LH-DN2 1NO+2NC	NF G122LL-DN2 1NO+2NC	NF G122LP-DN2E24 1NO+2NC
G22	L	NF G222LE-DN2 2NO+2NC	NF G222LH-DN2 2NO+2NC	NF G222LL-DN2 2NO+2NC	NF G222LP-DN2E24 2NO+2NC
Max. speed		1.5 m/s	1.5 m/s	1.5 m/s	0.5 m/s
Actuating force		0.07 Nm	0.07 Nm	0.07 Nm	0.04 Nm
Travel diagrams		page 220 - group 5	page 220 - group 5	page 220 - group 5	page 220 - group 5

Cable and M12 connector

All values in the drawings are in mm

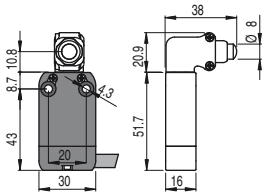


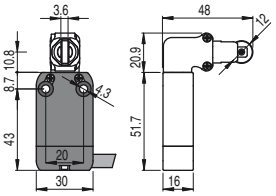
To order a product with cable and M12 connector:
replace DN2 with DM0.2 in the codes shown above.
Example:
NF B110AA-**DN2** → NF B110AA-**DM0.2**

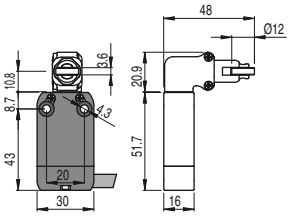
Contact type:

R = snap action
L = slow action

Contact block

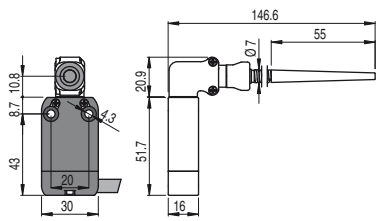




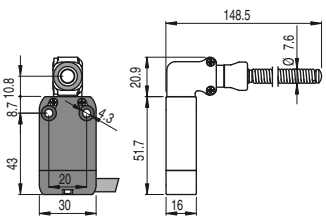


B11	R	NF B110AB-DN2W5 ⊖ 1NO+1NC	NF B110BB-DN2H0W5 ⊖ 1NO+1NC	NF B110BB-DN2W5 ⊖ 1NO+1NC
B02	R	NF B020AB-DN2W5 ⊖ 2NC	NF B020BB-DN2H0W5 ⊖ 2NC	NF B020BB-DN2W5 ⊖ 2NC
B12	R	NF B120AB-DN2W5 ⊖ 1NO+2NC	NF B120BB-DN2H0W5 ⊖ 1NO+2NC	NF B120BB-DN2W5 ⊖ 1NO+2NC
B22	R	NF B220AB-DN2W5 ⊖ 2NO+2NC	NF B220BB-DN2H0W5 ⊖ 2NO+2NC	NF B220BB-DN2W5 ⊖ 2NO+2NC
G11	L	NF G110AB-DN2W5 ⊖ 1NO+1NC	NF G110BB-DN2H0W5 ⊖ 1NO+1NC	NF G110BB-DN2W5 ⊖ 1NO+1NC
G02	L	NF G020AB-DN2W5 ⊖ 2NC	NF G020BB-DN2H0W5 ⊖ 2NC	NF G020BB-DN2W5 ⊖ 2NC
G12	L	NF G120AB-DN2W5 ⊖ 1NO+2NC	NF G120BB-DN2H0W5 ⊖ 1NO+2NC	NF G120BB-DN2W5 ⊖ 1NO+2NC
G22	L	NF G220AB-DN2W5 ⊖ 2NO+2NC	NF G220BB-DN2H0W5 ⊖ 2NO+2NC	NF G220BB-DN2W5 ⊖ 2NO+2NC
Max. speed		page 219 - type 4	page 219 - type 2	page 219 - type 2
Actuating force		9.5 N (25 N ⊖)	9.5 N (25 N ⊖)	9.5 N (25 N ⊖)
Travel diagrams		page 220 - group 1	page 220 - group 1	page 220 - group 1

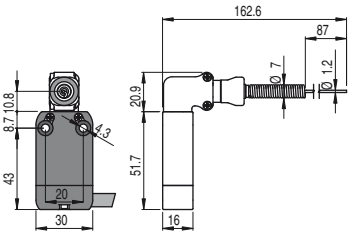
With external gasket



With external gasket



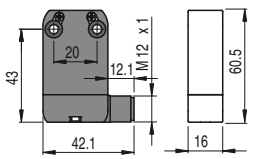
With external gasket



Contact block

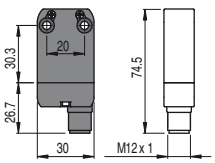
B11	R	NF B110HB-DN2W5 1NO+1NC	NF B110HE-DN2W5 1NO+1NC	NF B110HH-DN2W5 1NO+1NC
B02	R	NF B020HB-DN2W5 2NC	NF B020HE-DN2W5 2NC	NF B020HH-DN2W5 2NC
B12	R	NF B120HB-DN2W5 1NO+2NC	NF B120HE-DN2W5 1NO+2NC	NF B120HH-DN2W5 1NO+2NC
B22	R	NF B220HB-DN2W5 2NO+2NC	NF B220HE-DN2W5 2NO+2NC	NF B220HH-DN2W5 2NO+2NC
G11	L			
G02	L	NF G020HB-DN2W5 2NC	NF G020HE-DN2W5 2NC	NF G020HH-DN2W5 2NC
G12	L			
G22	L			
Max. speed		1 m/s	1 m/s	1 m/s
Actuating force		0.08 Nm	0.12 Nm	0.08 Nm
Travel diagrams		page 220 - group 4	page 220 - group 4	page 220 - group 4

M12 connector, right



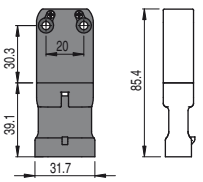
To order a product with M12 right connector, replace DN2 with DMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**DMK**

M12 connector, bottom



To order a product with M12 bottom connector, replace DN2 with SMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SMK**

AMP Superseal 1.5 connector



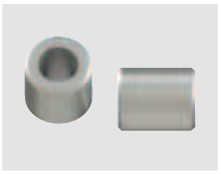
To order a product with AMP connector, replace DN2 with SAK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SAK**

All values in the drawings are in mm

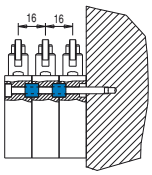
Accessories

Packs of **10 pcs.**

Article	Description
VN DT1F	Spacer for NA and NF series
VF D16B	Spacer for NB series



By installing spacers between two switches, it is possible to have 2 or more pre-wired switches, preventing them from slipping.



M12 female connectors with cable

For details see page 198

Technical data:

- Polyurethane connector body
- Class 6 copper conductors acc. to IEC 60228 - mobile installation
- Gold-plated contacts (resistance < 5 mΩ)
- Self-locking ring nut
- High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II. With polyurethane sheath on request

Code structure

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

VF CA4PD3M

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Cable sheath	
P	PVC (standard)
U	PUR

Connector type	
D	straight (standard)
G	angled

Connection type	
M	M12x1

Cable length (L)		No. of poles 4	5	8	12
1	1 metre				
2	2 metres				
3	3 metres (standard)	•	•		
4	4 metres				
5	5 metres (standard)	•	•	•	•
...					
0	10 metres (standard)	•	•	•	•

Other lengths on request

Stock items

VF CA4PD3M
VF CA4PD5M
VF CA4PD0M
VF CA5PD3M
VF CA5PD5M
VF CA5PD0M
VF CA8PD5M
VF CA8PD0M
VF CA12PD5M
VF CA12PD0M

Attention! No stock items, minimum order quantity 100 pcs.

Field wireable M12 female connectors

General data

Technopolymer connector body
Gold-plated contacts
Screw terminals for cable screw fittings

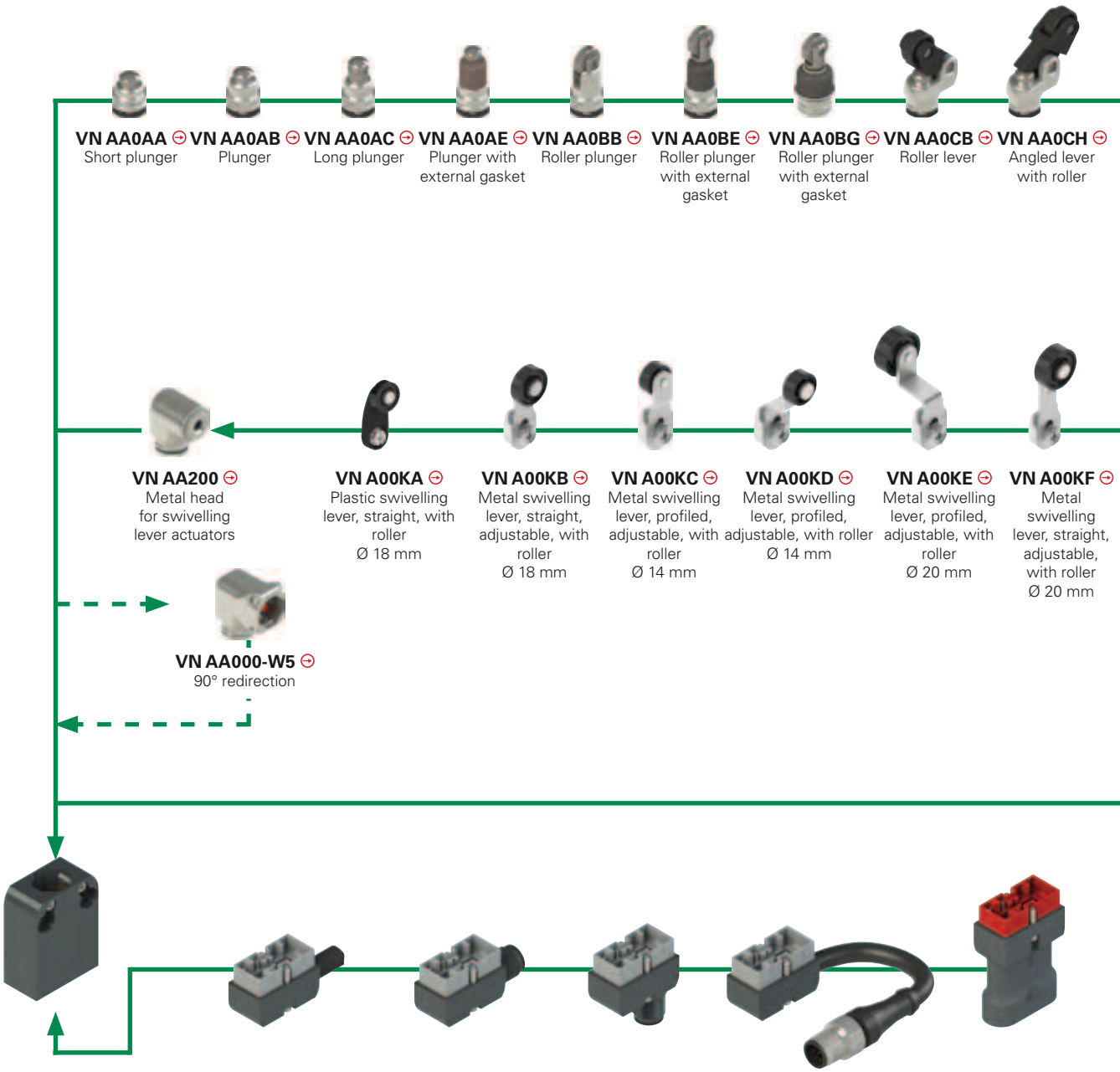
Max. operating voltages	250 Vac/dc (4 and 5-pole) 30 Vac/dc (8-pole)
Maximum current	4 A
Protection degree	IP67 acc. to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	0.25 mm² (24 AWG) … 0.5 mm² (20 AWG)

Article	Description	no. of poles
VF CBMP4DM04	Field wireable M12 female connector, straight, for Ø 4 … 6.5 mm multipolar cables	4
VF CBMP5DM04	Field wireable M12 female connector, straight, for Ø 4 … 6.5 mm multipolar cables	5
VF CBMP8DM04	Field wireable M12 female connector, straight, for Ø 4 … 7 mm multipolar cables	8

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

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

Selection diagram for item combinations of the NA - NB - NF series



VN AA0AA Short plunger
VN AA0AB Plunger
VN AA0AC Long plunger
VN AA0AE Plunger with external gasket
VN AA0BB Roller plunger
VN AA0BE Roller plunger with external gasket
VN AA0BG Roller plunger with external gasket
VN AA0CB Roller lever
VN AA0CH Angled lever with roller

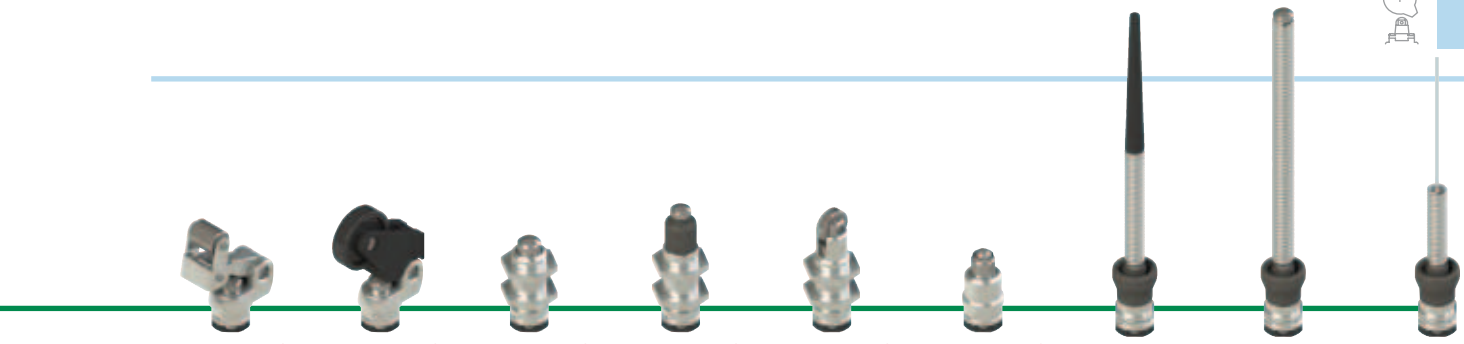
VN AA200 Metal head for swivelling lever actuators
VN A00KA Plastic swivelling lever, straight, with roller Ø 18 mm
VN A00KB Metal swivelling lever, straight, adjustable, with roller Ø 18 mm
VN A00KC Metal swivelling lever, profiled, adjustable, with roller Ø 14 mm
VN A00KD Metal swivelling lever, profiled, adjustable, with roller Ø 14 mm
VN A00KE Metal swivelling lever, profiled, adjustable, with roller Ø 20 mm
VN A00KF Metal swivelling lever, straight, adjustable, with roller Ø 20 mm

VN AA000-W5 90° redirection

METAL housing, NA hole spacing 20 mm	Metal connector with cable	Cable length (m)	M12 metal connector, right	M12 metal connector, bottom	Metal connector with cable and M12 connector	Cable length (m)	AMP technopolymer connector, bottom
NA B11000 1NO+1NC R	**VN CM11DN2**	**2**	**VN CM11DMK**	**VN CM11SMK**	**VN CM11DM0.2**	**0,2**	**VN CM11SAK**
NA G11000 1NO+1NC L							
NA L11000 1NO+1NC LA	**VN CM11DN5**	**5**					
NA H11000 1NO+1NC LO							
NA B02000 2NC R	**VN CM02DN2**	**2**	**VN CM02DMK**	**VN CM02SMK**	**VN CM02DM0.2**	**0,2**	**VN CM02SAK**
NA G02000 2NC L	**VN CM02DN5**	**5**					
NA B20000 2NO R	/		**VN CM20DMK**	**VN CM20SMK**	**VN CM20DM0.2**	**0,2**	**VN CM20SAK**
NA G20000 2NO L	/						
NA B12000 1NO+2NC R	**VN CM12DN2**	**2**	**VN CM12DMK**	**VN CM12SMK**	**VN CM12DM0.2**	**0,2**	
NA G12000 1NO+2NC L							
NA L12000 1NO+2NC LA	**VN CM12DN5**	**5**					
NA H12000 1NO+2NC LO							
NA B22000 2NO+2NC R	**VN CM22DN2**	**2**	**VN CM22DMK**	**VN CM22SMK**	**VN CM22DM0.2**	**0,2**	
NA G22000 2NO+2NC L							
NA L22000 2NO+2NC LA	**VN CM22DN5**	**5**					
NA H22000 2NO+2NC LO							

To order a NB series housing, replace NA with NB in the codes shown above. Example:
NA B11000 → **NB** B11000

⚠ **It is not allowed to install VN CM••••• connectors on technopolymer housings**



VN AA0CP Unidirectional roller lever

VN AA0CV Adjustable angled roller lever

VN AA0EB Plunger with M12 threaded fitting

VN AA0EE Plunger with M12 threaded fitting, external gasket

VN AA0FB Roller plunger with M12 threaded fitting

VN AA0GB Plunger with Ø 6 mm ball

VN AA0HB Flexible rod with plastic tip

VN AA0HE Flexible rod

VN AA0HH Flexible rod with needle

VN A00KG Metal swivelling lever, profiled, adjustable, with roller Ø 20 mm

VN A00KH Metal swivelling lever, profiled, adjustable, with roller Ø 20 mm

VN A00KP Metal swivelling lever, straight, with extended adjustment and roller Ø 20 mm

VN A00LB Metal swivelling lever with stainless steel rod 3 x 3 x 125, adjustable

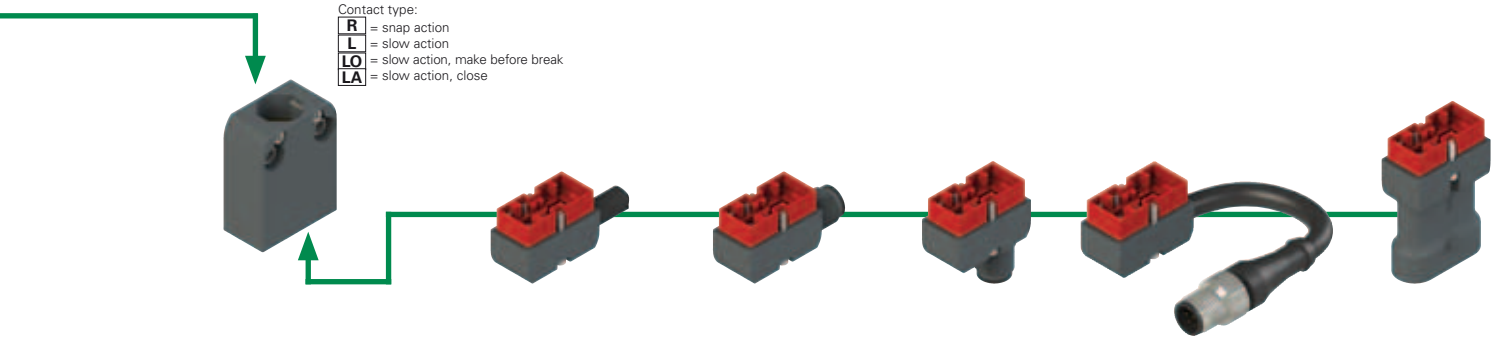
VN A00LE Metal swivelling lever with stainless steel rod Ø 3 x 125, adjustable

VN A00LH Metal swivelling lever with glass fibre rod Ø 6 x 200, adjustable

VN A00LL Metal swivelling lever with flexible rod, adjustable

VN A00LP Metal swivelling lever with porcelain roll, adjustable

Contact type:
R = snap action
L = slow action
LO = slow action, make before break
LA = slow action, close



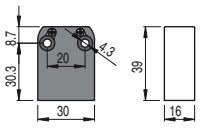
NF TECHNOPOLYMER housing, 20 mm hole spacing		Technopolymer connector with cable	Cable length (m)	M12 technopolymer connector, right	M12 technopolymer connector, bottom	Technopolymer connector with cable and M12 connector	Cable length (m)	AMP technopolymer connector, bottom
NF B11000	1NO+1NC R	VN CP11DN2	2	VN CP11DMK	VN CP11SMK	VN CP11DM0.2	0,2	VN CP11SAK
NF G11000	1NO+1NC L	VN CP11DN5	5					
NF L11000	1NO+1NC LA							
NF H11000	1NO+1NC LO							
NF B02000	2NC R	VN CP02DN2	2	VN CP02DMK	VN CP02SMK	VN CP02DM0.2	0,2	VN CP02SAK
NF G02000	2NC L	VN CP02DN5	5					
NF B20000	2NO R	VN CP20DN2	2	VN CP20DMK	VN CP20SMK	VN CP20DM0.2	0,2	VN CP20SAK
NF G20000	2NO L	VN CP20DN5	5					
NF B12000	1NO+2NC R	VN CP12DN2	2	VN CP22DMK	VN CP22SMK	VN CP22DM0.2	0,2	
NF G12000	1NO+2NC L	VN CP12DN5	5					
NF L12000	1NO+2NC LA							
NF H12000	1NO+2NC LO							
NF B22000	2NO+2NC R	VN CP22DN2	2					
NF G22000	2NO+2NC L	VN CP22DN5	5					
NF L22000	2NO+2NC LA							
NF H22000	2NO+2NC LO							

⚠ It is not allowed to install VN CP••••• connectors on metal housings

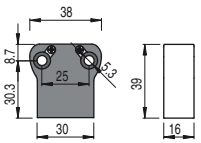
Housings

All values in the drawings are in mm

NA metal housings



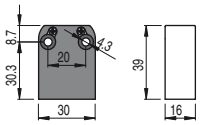
NB metal housings



Contact type:
R = snap action
L = slow action
LO = slow action, make before break
LA = slow action, close

Quality marks:

NF technopolymer housings



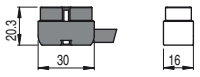
NA metal housings	NB metal housings	NF technopolymer housings
NA B11000 1NO+1NC R	NB B11000 1NO+1NC R	NF B11000 1NO+1NC R
NA G11000 1NO+1NC L	NB G11000 1NO+1NC L	NF G11000 1NO+1NC L
NA L11000 1NO+1NC LA	NB L11000 1NO+1NC LA	NF L11000 1NO+1NC LA
NA H11000 1NO+1NC LO	NB H11000 1NO+1NC LO	NF H11000 1NO+1NC LO
NA B12000 1NO+2NC R	NB B12000 1NO+2NC R	NF B12000 1NO+2NC R
NA G12000 1NO+2NC L	NB G12000 1NO+2NC L	NF G12000 1NO+2NC L
NA L12000 1NO+2NC LA	NB L12000 1NO+2NC LA	NF L12000 1NO+2NC LA
NA H12000 1NO+2NC LO	NB H12000 1NO+2NC LO	NF H12000 1NO+2NC LO
NA B22000 2NO+2NC R	NB B22000 2NO+2NC R	NF B22000 2NO+2NC R
NA G22000 2NO+2NC L	NB G22000 2NO+2NC L	NF G22000 2NO+2NC L
NA L22000 2NO+2NC LA	NB L22000 2NO+2NC LA	NF L22000 2NO+2NC LA
NA H22000 2NO+2NC LO	NB H22000 2NO+2NC LO	NF H22000 2NO+2NC LO

Connectors with cable

All values in the drawings are in mm

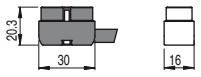
Other cable lengths on request

metal connectors for NA and NB housings



	Cable length (m)	Cable type N = PVC H = PUR HALOGEN FREE
VN CM11DN2 1NO+1NC	2	N
VN CM11DN5 1NO+1NC	5	
VN CM12DN2 1NO+2NC	2	
VN CM12DN5 1NO+2NC	5	
VN CM22DN2 2NO+2NC	2	
VN CM22DN5 2NO+2NC	5	
VN CM11DH2 1NO+1NC	2	H
VN CM11DH5 1NO+1NC	5	
VN CM12DH2 1NO+2NC	2	
VN CM12DH5 1NO+2NC	5	

technopolymer connectors for NF housings



	Cable length (m)	Cable type N = PVC H = PUR HALOGEN FREE
VN CP11DN2 1NO+1NC	2	N
VN CP11DN5 1NO+1NC	5	
VN CP12DN2 1NO+2NC	2	
VN CP12DN5 1NO+2NC	5	
VN CP22DN2 2NO+2NC	2	
VN CP22DN5 2NO+2NC	5	
VN CP11DH2 1NO+1NC	2	H
VN CP11DH5 1NO+1NC	5	
VN CP22DH2 2NO+2NC	2	
VN CP22DH5 2NO+2NC	5	

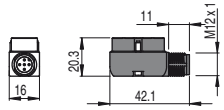
M12 or AMP connectors

All values in the drawings are in mm

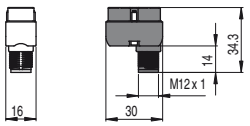
Important: **Always check that the applied electric load is within the voltage and current limits defined for the connectors. See tables on page 118 and 128.**

metal connectors for NA and NB housings

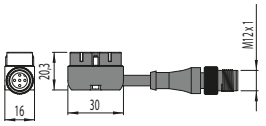
M12 connector, right



M12 connector, bottom



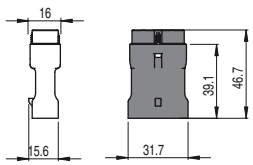
with cable and M12 connector



M12 connector, right	M12 connector, bottom	with cable and M12 connector
VN CM11DMK 1NO+1NC	VN CM11SMK 1NO+1NC	VN CM11DM0.2 1NO+1NC
VN CM02DMK 2NC	VN CM02SMK 2NC	VN CM02DM0.2 2NC
VN CM22DMK 2NO+2NC	VN CM22SMK 2NO+2NC	VN CM22DM0.2 2NO+2NC

technopolymer connectors for NA and NB housings

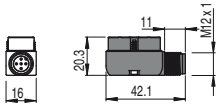
AMP superseal 1.5



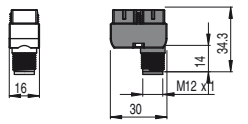
AMP superseal 1.5
VN CM11SAK 1NO+1NC
VN CM02SAK 2NC
VN CM20SAK 2NO

technopolymer connectors for NF housings

M12 connector, right

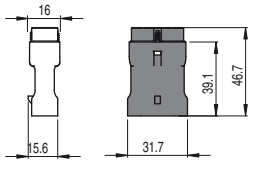


M12 connector, bottom

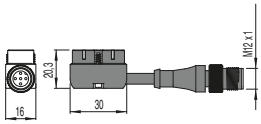


M12 connector, right	M12 connector, bottom
VN CP11DMK 1NO+1NC	VN CP11SMK 1NO+1NC
VN CP02DMK 2NC	VN CP02SMK 2NC
VN CP22DMK 2NO+2NC	VN CP22SMK 2NO+2NC

AMP superseal 1.5



with cable and M12 connector



AMP superseal 1.5	with cable and M12 connector
VN CP11SAK 1NO+1NC	VN CP11DM0.2 1NO+1NC
VN CP02SAK 2NC	VN CP02DM0.2 2NC
VN CP20SAK 2NO	VN CP22DM0.2 2NO+2NC

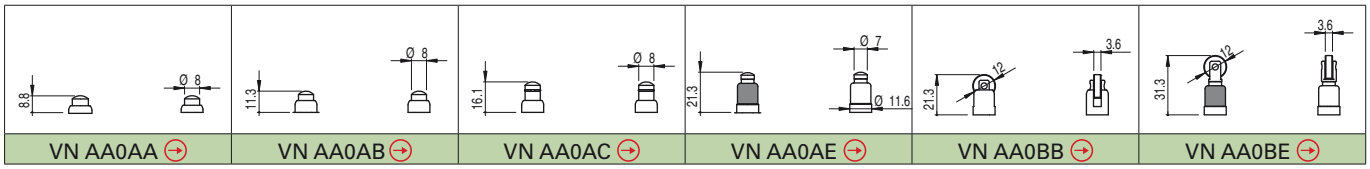
Items with code on **green** background are stock items

Accessories See page 197

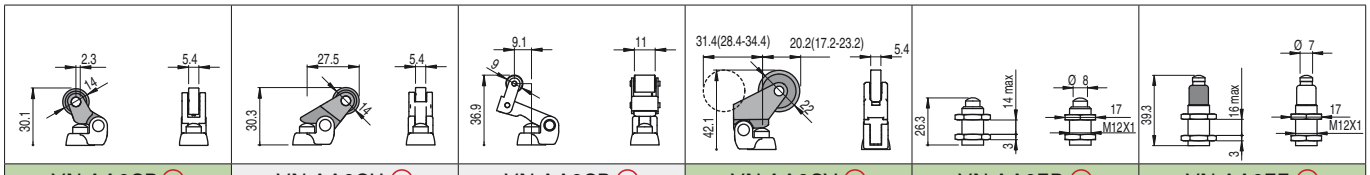
→ The 2D and 3D files are available at **www.pizzato.com**

Actuators

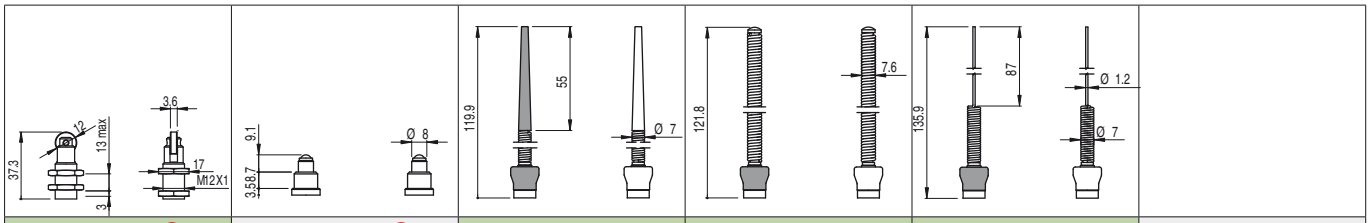
All values in the drawings are in mm



VN AA0AA | VN AA0AB | VN AA0AC | VN AA0AE | VN AA0BB | VN AA0BE



VN AA0CB | VN AA0CH | VN AA0CP | VN AA0CV | VN AA0EB | VN AA0EE

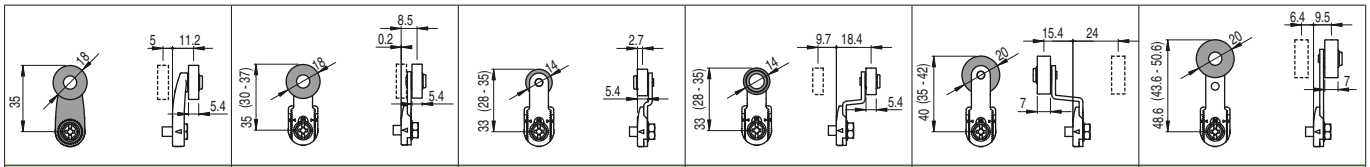


VN AA0FB | VN AA0GB | VN AA0HB | VN AA0HE | VN AA0HH

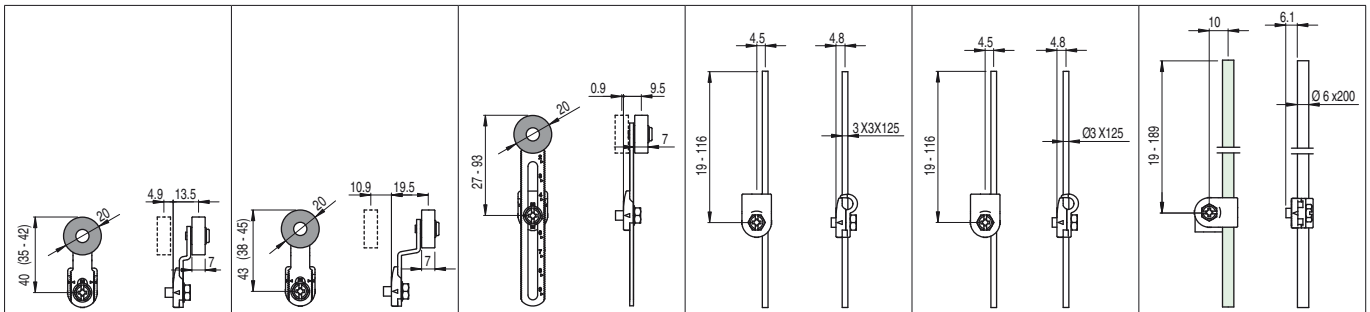
Levers

All values in the drawings are in mm

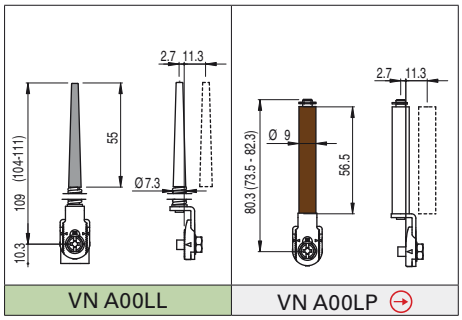
ATTENTION: These separate actuators can be used only with items of the NA, NB and NF series.



VN A00KA | VN A00KB | VN A00KC | VN A00KD | VN A00KE | VN A00KF

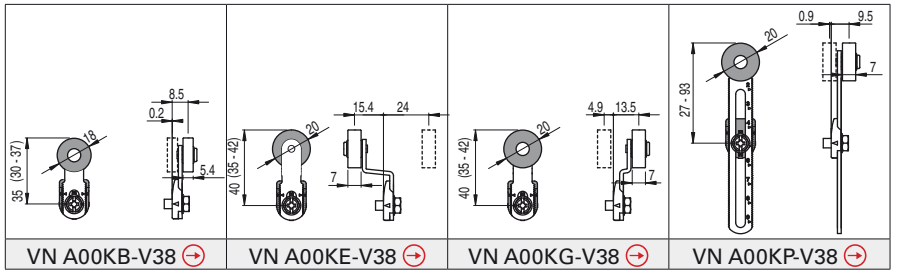


VN A00KG | VN A00KH | VN A00KP | VN A00LB | VN A00LE | VN A00LH



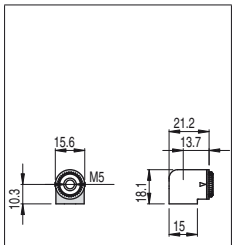
VN A00LL | VN A00LP

Levers with external metallic parts in stainless steel



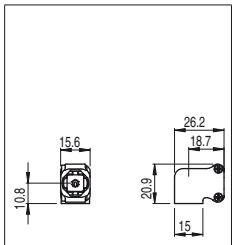
VN A00KB-V38 | VN A00KE-V38 | VN A00KG-V38 | VN A00KP-V38

Heads



VN AA200

90° redirection



VN AA000-W5

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

Accessories See page 197

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

MK series microswitches

Description

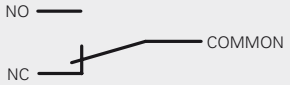
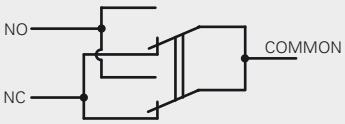
The microswitches of MK series have been designed to add new features to traditional and tested microswitches by Pizzato Elettrica.
The shapes and mounting methods of these products are identical with their predecessor models, but have been provided with additional functions, wedining their application fields.

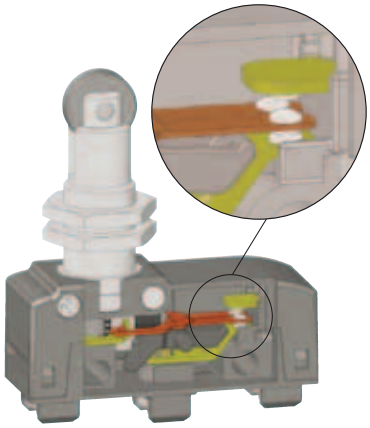
The absolute new feature of this series is the enhanced and state-of-the-art trigger mechanism, whose design features are of higher quality in comparison to other solutions available on the market.
Thanks to the double and redundant execution, the electrical contact of the new microswitch has been designed with a technology providing increased reliability, and is able to carry out switching operations with positive opening. Inside the housing of the new microswitch it is possible to insert gaskets to protect the mechanism against fine dusts or liquids up to the protection degree IP65. Conductor fixing terminals are more practical, allowing for cables of different diameters to be fixed or the choice of different bends for the Faston contacts. For high-volume part orders, the microswitch can be also supplied with the NO or NC contact only, in order to reduce the costs.

Contact reliability

In the following table a typical contact structure for a microswitch normally used in the industry (type A) is shown compared with the innovative solution implemented by Pizzato Elettrica in the new MK series microswitches: mobile contact with single interruption and double contacts (type B). As you can see from the table below, in the latter contact structure (type B) the contact resistance (R) is only half in comparison to the mobile contact with single interruption (type A), and presents a very low failure probability (fe) as well.
With a failure probability of x for a single switching operation, the failure probability for type A is fe=x, for type B fe $=\cong x^2$. This means that if the probability of a switching failure is x in a given situation, e.g., $1x10^{-4}$, (1 switching failure in 10,000), the result is as follows:

- for type A one failed commutation every 10,000.
- for type B one failed commutation every 100,000,000.

Type	Diagram	Description	Contact resistance R	Probability of errors fe
A Common micro-switch		mobile contact with single interruption	R=Rc	fe=x
B Pizzato's micro-switch MK series		mobile contact with single interruption and double contacts	R=Rc/2	fe ≅ x^2

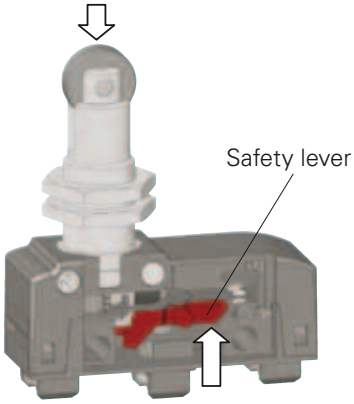


Extended temperature range

-40°C

The new MK series includes versions with extended temperature range available upon request. Compared to the standard MK microswitches with temperature ranges from +85 C° to -25 C°, these special versions are suitable for environments with temperature ranges from +85 C° to -40 °C. They can therefore be installed inside cold stores, sterilizers or other equipment with very low ambient temperature. The special materials used to produce these versions retain their characteristics even under these conditions, thereby expanding the installation possibilities.

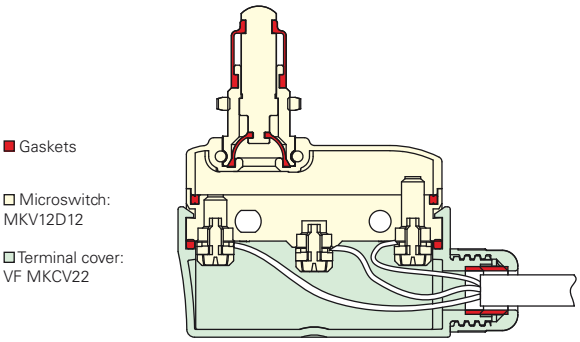
Microswitches for safety applications



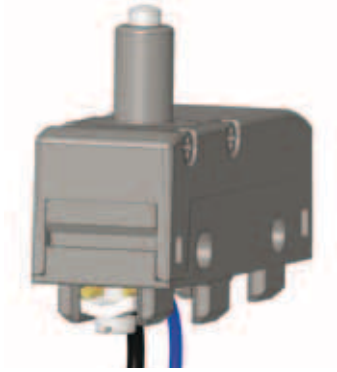
All microswitches showing the symbol ⊖ besides the product code are with positive opening and therefore suitable for safety applications. These microswitches are provided with a rigid connection between the plunger and the NC contacts, which are forcibly actuated by a internal sturdy safety lever.
The positive opening has been designed in compliance with the standard EN 60947-5-1, Annex K. Therefore, these microswitches are suitable for safety applications.

Protection degree IP65

By installing microswitches MK ••2••• with terminal covers VF MKC•22 or terminal covers VF MKC•23, a microswitch fully protected against water and dust is obtained. Thanks to their special oil resistant rubber gaskets the protection degree IP65 is provided. For applications in very dirty environments there are also versions with integrated double gasket for the plunger (internal + external). e.g. MK ••2•12 or MK ••2•13.



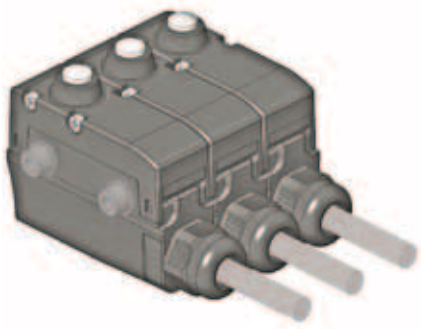
Clamping screw plates for cables of different diameters (MK V•)

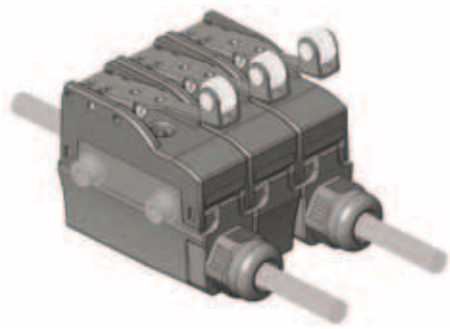


The clamping screw plates are provided with a particular "roofing tile" structure and are loosely coupled to the clamping screw. The design causes connection wires of different diameter to be pulled towards the screw when tightening the screw (see figure), preventing the wires from escaping towards the outside.

Terminal covers with side-by-side strain relief cable gland

The new terminal covers are provided with strain relief cable gland and protection degree up to IP65. These are snap-on terminal covers and have reduced dimensions contained in the profile of the microswitch so that these can be installed on microswitches fixed side by side as well.





Actuators with variable orientation

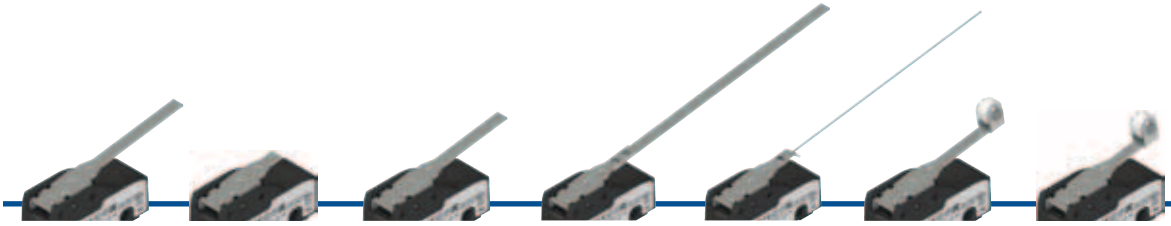
Thanks to our new patented lateral fixing system, the roller of the microswitches MK •••15 and MK •••17 can be now rotated in 90° steps.

The lateral fixing allows to disconnect the actuator from the switch body even when the actuator is already fixed to the support bracket. The flexibility of the product also allows for products to be unified in the warehouse for applications that require castors both in the longitudinal or transverse direction.

PLUNGER
DIRECT
ACTUATION

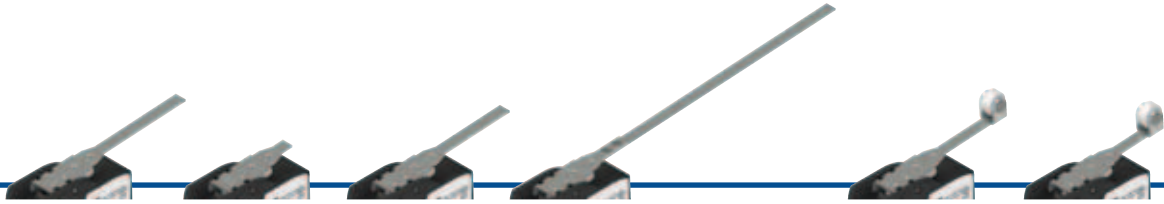
D01 D02 D03 D04 D05 D06 D08

LEVER
DIRECT
ACTUATION



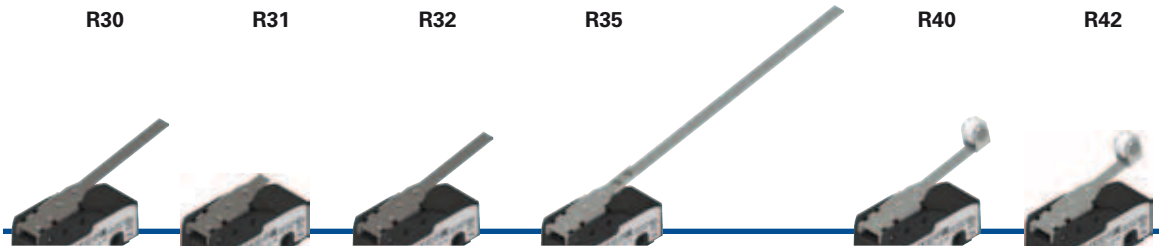
D30 D31 D32 D35 D37 D40 D42

LEVER
INVERTED
ACTUATION



R30 R31 R32 R35 R40 R42

LEVER
DIRECT
ACTUATION
ATTHE BACK



F30 F31 F32 F35 F40 F42

ACTUATORS

product options

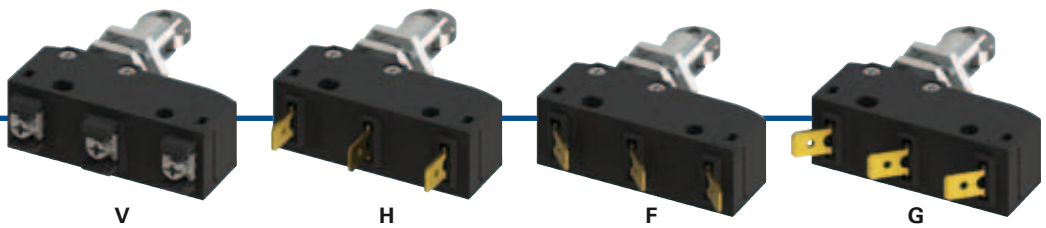
Sold separately as accessory

1
1NO+1NC, snap action

2
1NO, snap action
(on request)

3
1NC, snap action
(on request)

TERMINALS



V
Screw with
self-lifting plate

H
Faston 6.3 mm, vertical

F
Faston 6.3 mm
45° bend to the right

G
Faston 6.3 mm
45° bend to the left
(on request)

D09 D10 D12 external rubber gasket D13 external rubber gasket D15 D17 D18 D19

D45 D46 D47 D53 D59 D49

R45 R46 R47 R53 R59 R60

F45 F46 F47 F53 F59 F49

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

MK V12D40-GR16T6

Terminal type	
V	screw with self-lifting plate
H	vertical faston
F	Faston, 45° bend to the right
G	Faston, 45° bend to the left (on request)

Contact block	
1	1NO+1NC, snap action, change-over
2	1NO, snap action (on request)
3	1NC, snap action (on request)

Maximum protection degree	
1	IP40 (with terminal cover)
2	IP65 (with terminal cover)

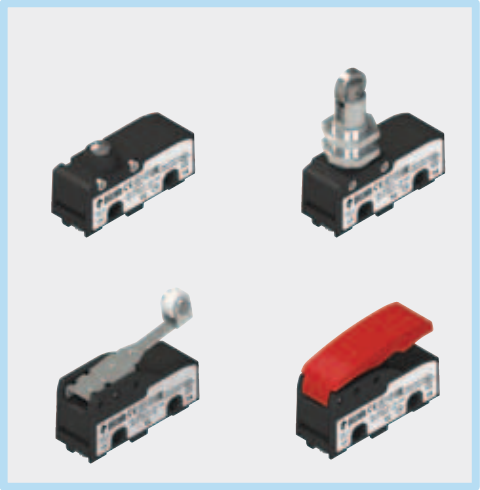
Type of actuation	
D	direct actuation
R	inverted actuation
F	direct actuation at the back

Actuator	
01	pin
02	pin
03	narrow plunger
..	.....

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

Rollers	
	standard roller
R16	metal roller Ø 9.5x4 mm (for actuators 40, 42,45, 47, 53, 59 only)
R10	large plastic roller Ø 9.8x8.4 mm (for actuators 40, 42, 45, 53 only)

Ambient temperature	
	-25°C … +85°C (standard)
T6	-40°C … +85°C



Main features

- Technopolymer housing
- High reliability contacts
- Protection degree up to IP65
- 4 terminal types available
- 47 actuators available
- Versions with positive opening ⊖
- Versions with gold-plated silver contacts
- Terminal covers with strain relief cable gland

Quality marks:

IMQ approval: CA02.05772
UL approval: E131787
CCC approval: 2013010305604291
EAC approval: RU C-IT.АД35.B.00454

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing and shock-proof.

Protection degree acc. to EN 60529:	IP00 without terminal cover IP20 (with terminal covers VF C01, VF C03) IP40 (with terminal covers VF MKC•1•, VF C02) IP65 (with terminal covers VF MKC•22 + MK V•2••• or VF MKC•23 + MK H•2•••)

General data

Ambient temperature:	-25°C … +85°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	10 million operating cycles
Safety parameter B_{10D}:	20,000,000 for NC contacts
Tightening torques for installation:	see page 211-222

Cable cross section (flexible copper strands)

MK series:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max	2 x 1.5 mm²	(2 x AWG 16)

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529, EN 60947-1, IEC 60947-1.
Approvals:
UL 508, CSA 22.2 No.14, EN 60947-1, EN 60947-5-1.

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only microswitches marked with the symbol ⊖ next to the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts) 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 (failure exclusions) for safety applications in general**. Actuate the switch **at least up to the positive opening travel (CAP)** reported next to the article code. Actuate the switch **at least with the positive opening force (FAP)** reported next to the article code.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

Electrical data

Thermal current (I_{th}):	16 A
Rated insulation voltage (U_i):	250 Vac 300 Vdc
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Protection against short circuits:	type gG fuse 16 A 250 V
Pollution degree:	3
Dielectric strength	2000 Vac/min.

Utilization category

Alternating current: AC15 (50 … 60 Hz)

Ue (V)	120	250
Ie (A)	4	5

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	5	0.6	0.3

Characteristics approved by IMQ and CCC

Rated insulation voltage (U_i): 250 Vac
Conventional free air thermal current (I_{th}): 16 A
Protection against short circuits: type gG fuse 16 A 250 V
Rated impulse withstand voltage (U_{imp}): 4 kV
Conditional short circuit current: 1000 A
Protection degree of the housing: IP00
Terminals: screw terminals / faston

Pollution degree: 3
Utilization category: AC15
Operating voltage (Ue): 250 Vac (50 Hz)
Operating current (Ie): 5 A

Forms of the contact element: X; Y; C
Positive opening of contacts on contact blocks: 1, 3

In compliance with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2014/35/EU.
Please contact our technical department for the list of approved products.

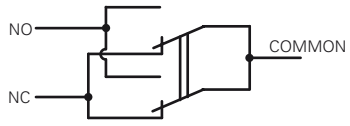
Features approved by UL

Utilization categories Q300 (69 VA, 125-250 Vdc)
A300 (720 VA, 120-300 Vac)

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

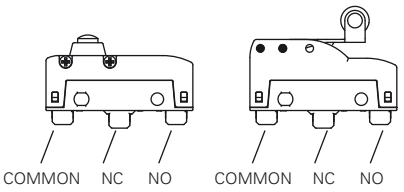
Please contact our technical department for the list of approved products.

Circuit diagram

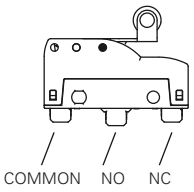


Mobile contact with single interruption and double contacts

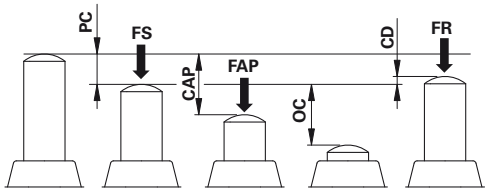
With direct actuation and direct actuation at the back (F, D)

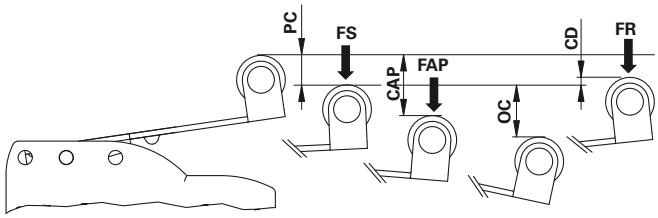


With inverted actuation (R)



Actuation forces and travels

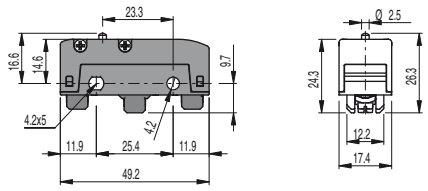




PC pre-travel
CAP positive opening travel
OC over-travel
CD differential travel
FS Trigger force
FR release force
FAP positive opening force

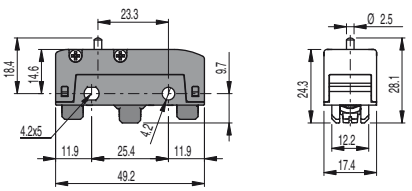
Microswitches with direct actuation

All values in the drawings are in mm



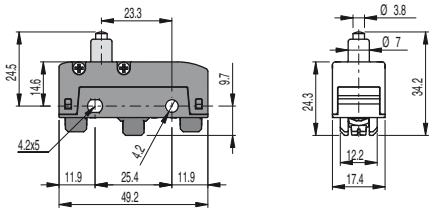
MK V11D01 1NO+1NC
PC 0,5 mm
OC 1,5 mm
CD 0,05 mm
FS 4 N
FR 3 N

Maximum and minimum speed see page 221 - type 1



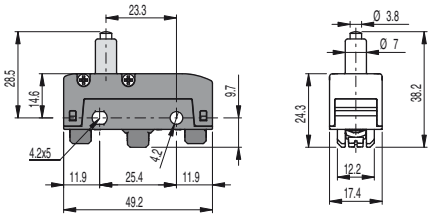
MK V11D02 1NO+1NC
PC 0,5 mm
OC 2 mm
CD 0,05 mm
FS 4 N
FR 3 N

Maximum and minimum speed see page 221 - type 1



MK V11D03 1NO+1NC
PC 0,5 mm
OC 2 mm
CD 0,05 mm
FS 4 N
FR 3 N

Maximum and minimum speed see page 221 - type 1



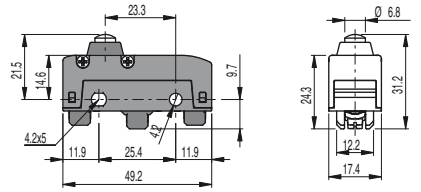
MK V11D04 1NO+1NC
PC 0,5 mm
OC 2 mm
CD 0,05 mm
FS 4 N
FR 3 N

Maximum and minimum speed see page 221 - type 1

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

Accessories See page 197

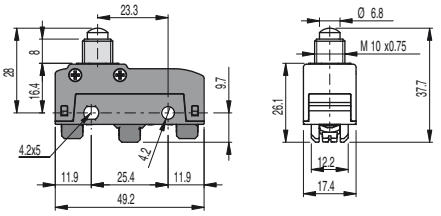
➔ The 2D and 3D files are available at **www.pizzato.com**



MK V11D05 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	2 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

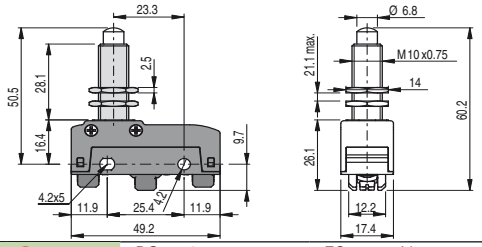
Maximum and minimum speed see page 221 - type 1



MK V11D06 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	3 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

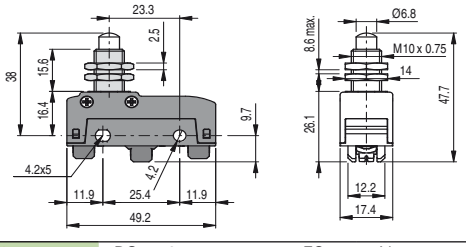
Maximum and minimum speed see page 221 - type 1



MK V11D08 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

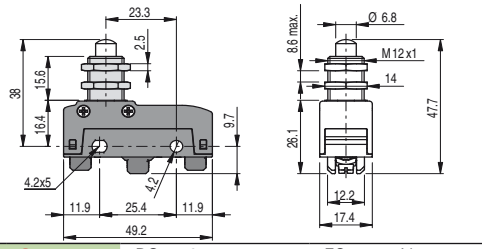
Maximum and minimum speed see page 221 - type 1



MK V11D09 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

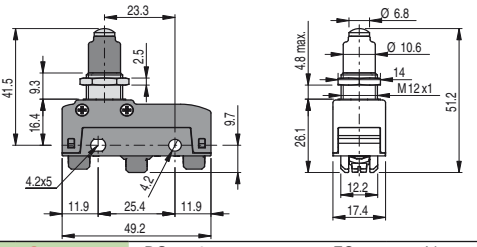
Maximum and minimum speed see page 221 - type 1



MK V11D10 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

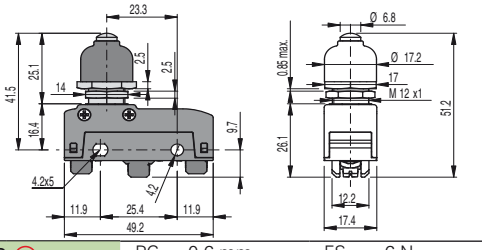
Maximum and minimum speed see page 221 - type 1



MK V11D12 → 1NO+1NC

PC	0,5 mm	FS	4,5 N
OC	5,5 mm	FR	3 N .
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 1

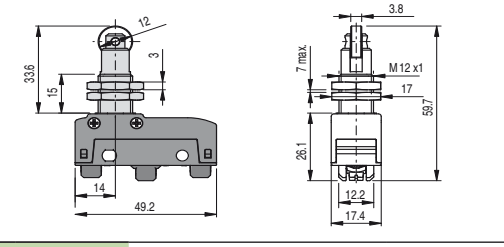


MK V11D13 → 1NO+1NC

PC	0,6 mm	FS	6 N .
OC	5,4 mm	FR	4 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 1

Mounting only through threaded fitting

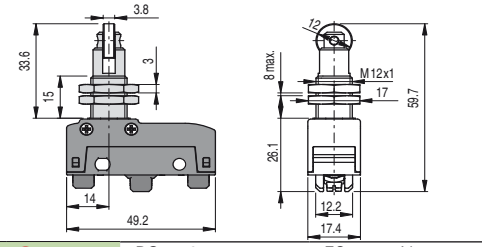


MK V11D15 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N .
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 2

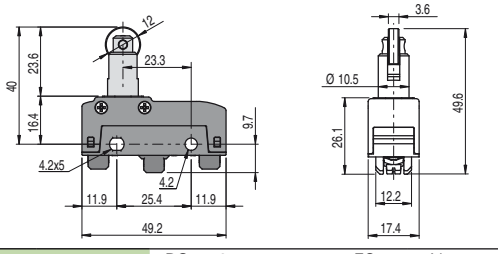
Mounting only through threaded fitting



MK V11D17 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 2



MK V11D18 → 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N .
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

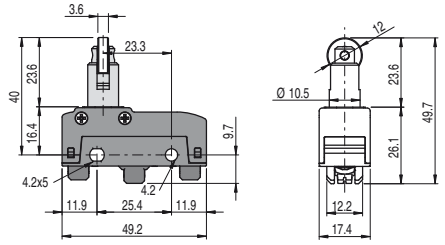
Maximum and minimum speed see page 221 - type 2

All values in the drawings are in mm

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

Accessories See page 197

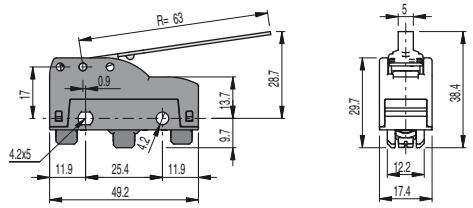
→ The 2D and 3D files are available at **www.pizzato.com**



MK V11D19 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N .
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

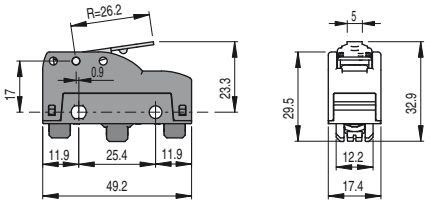
Maximum and minimum speed see page 221 - type 2



MK V11D30 1NO+1NC

PC	11,5 mm	FS	0,65 N
OC	7,6 mm	FR	0,5 N
CD	1,1 mm		

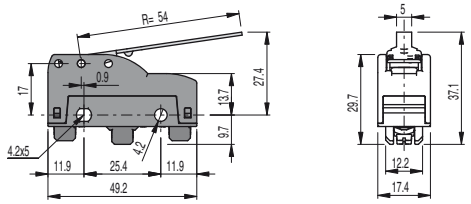
Maximum and minimum speed see page 221 - type 3



MK V11D31 1NO+1NC

PC	4,6 mm	FS	1,66 N
OC	3,8 mm	FR	1,32 N
CD	0,4 mm		

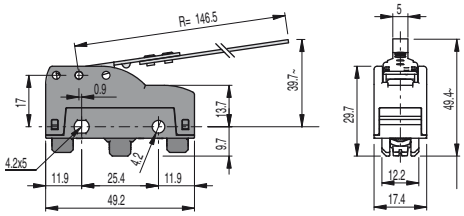
Maximum and minimum speed see page 221 - type 3



MK V11D32 1NO+1NC

PC	9,1 mm	FS	0,76 N
OC	7,1 mm	FR	0,58 N
CD	0,9 mm		

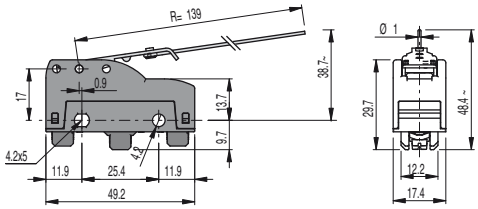
Maximum and minimum speed see page 221 - type 3



MK V11D35 1NO+1NC

PC	26,2 mm	FS	0,28 N
OC	13,7 mm	FR	0,22 N
CD	2,5 mm		

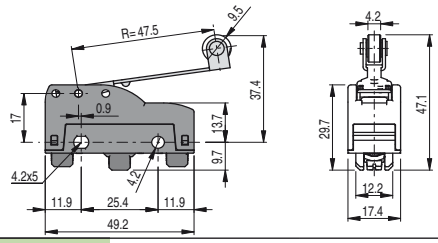
Maximum and minimum speed see page 221 - type 3



MK V11D37 1NO+1NC

PC	24,8 mm	FS	0,08 N
OC	3,8 mm	FR	0,04 N
CD	4,1 mm		

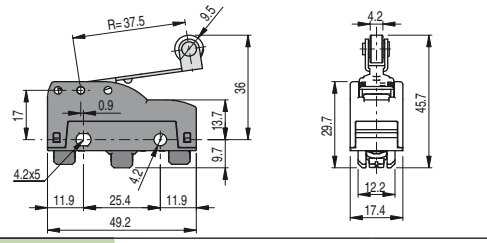
Maximum and minimum speed see page 221 - type 3



MK V11D40 1NO+1NC

PC	8,2 mm	FS	0,86 N
OC	6,1 mm	FR	0,66 N
CD	0,8 mm		

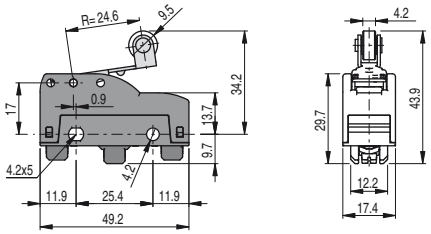
Maximum and minimum speed see page 221 - type 6



MK V11D42 1NO+1NC

PC	6,5 mm	FS	1,09 N
OC	4,8 mm	FR	0,84 N
CD	0,6 mm		

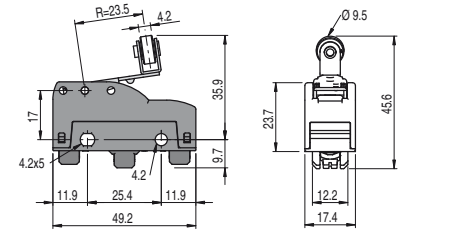
Maximum and minimum speed see page 221 - type 6



MK V11D45 1NO+1NC

PC	4,5 mm	FS	1,66 N
OC	3,2 mm	FR	1,28 N
CD	0,4 mm		

Maximum and minimum speed see page 221 - type 6



MK V11D46 1NO+1NC

PC	4,1 mm	FS	1,66 N
OC	3,8 mm	FR	1,28 N
CD	0,4 mm		

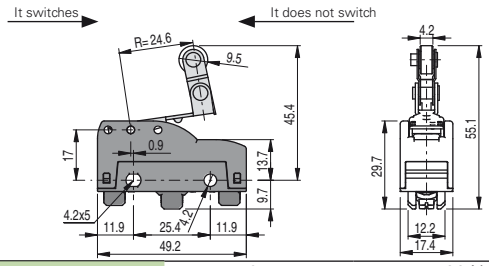
Maximum and minimum speed see page 221 - type 6

All values in the drawings are in mm

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

Accessories See page 197

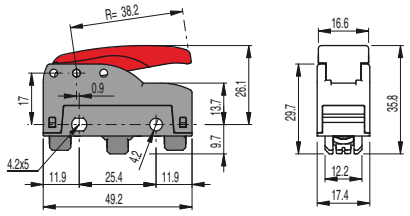
➔ The 2D and 3D files are available at **www.pizzato.com**



MK V11D47 1NO+1NC

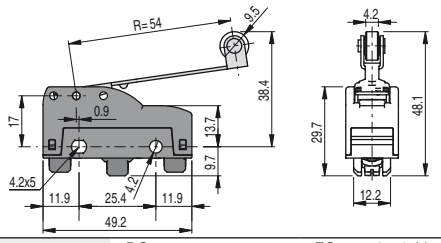
PC	4,2 mm	FS	1,66 N
OC	2,8 mm	FR	1,28 N
CD	0,4 mm		

Maximum and minimum speed see page 221 - type 6



MK V11D49 1NO+1NC Hand operated

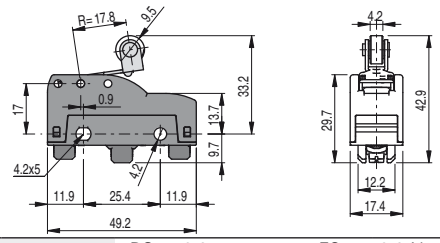
Maximum and minimum speed see page 221 - type 3



MK V11D53 1NO+1NC

PC	7,7 mm	FS	0,76 N
OC	7,8 mm	FR	0,58 N
CD	0,9 mm		

Maximum and minimum speed see page 221 - type 6

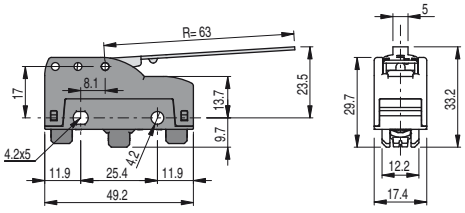


MK V11D59 1NO+1NC

PC	2,3 mm	FS	2,3 N
OC	4,5 mm	FR	1,77 N
CD	0,2 mm		

Maximum and minimum speed see page 221 - type 6

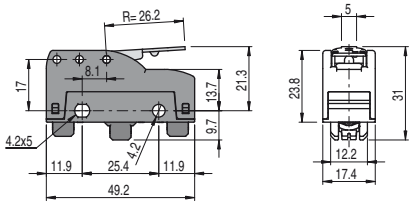
Microswitches with inverted actuation



MK V11R30 1NO+1NC

PC	5 mm	FS	0,6 N
OC	14 mm	FR	0,4 N
CD	0,7 mm		

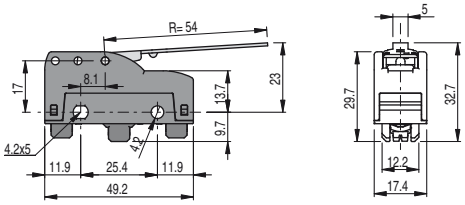
Maximum and minimum speed see page 221 - type 4



MK V11R31 1NO+1NC

PC	1,9 mm	FS	1,47 N
OC	5,1 mm	FR	0,72 N
CD	0,23 mm		

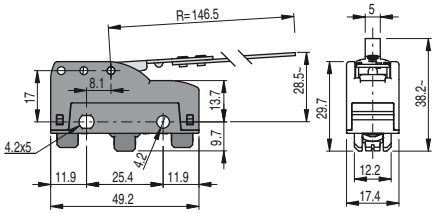
Maximum and minimum speed see page 221 - type 4



MK V11R32 1NO+1NC

PC	4,1 mm	FS	0,7 N
OC	11,2 mm	FR	0,5 N
CD	0,8 mm		

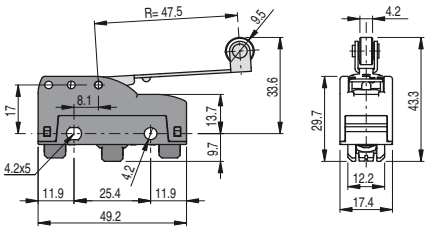
Maximum and minimum speed see page 221 - type 4



MK V11R35 1NO+1NC

PC	13,4 mm	FS	0,3 N
OC	24,3 mm	FR	0,2 N
CD	2,1 mm		

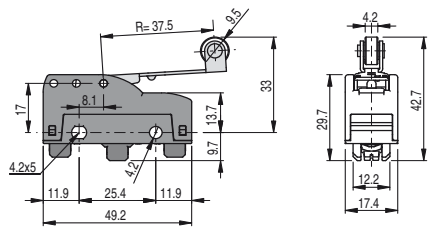
Maximum and minimum speed see page 221 - type 7



MK V11R40 1NO+1NC

PC	2,8 mm	FS	0,8 N
OC	10,9 mm	FR	0,5 N
CD	0,45 mm		

Maximum and minimum speed see page 221 - type 7



MK V11R42 1NO+1NC

PC	2,7 mm	FS	1,2 N
OC	8,4 mm	FR	1,7 N
CD	0,5 mm		

Maximum and minimum speed see page 221 - type 7

All values in the drawings are in mm

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

Accessories See page 197

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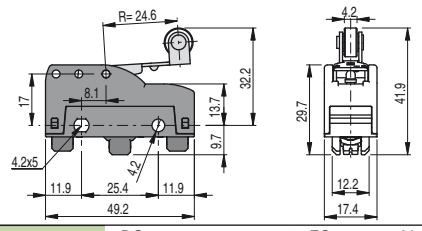
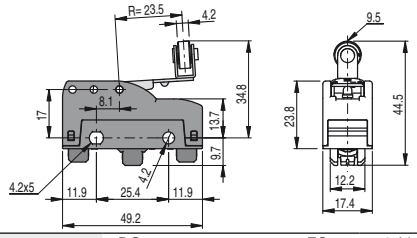


MK V11R45 1NO+1NC

PC	1,5 mm	FS	1,7 N
OC	5,5 mm	FR	1 N
CD	0,3 mm		

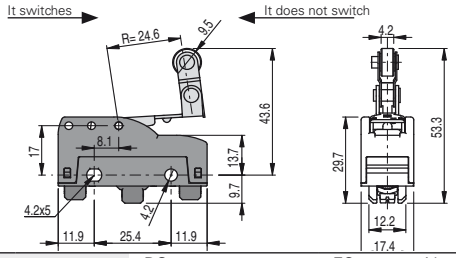
Maximum and minimum speed see page 221 - type 7



MK V11R46 1NO+1NC

PC	1,7 mm	FS	1,8 N
OC	4,8 mm	FR	1,1 N
CD	0,3 mm		

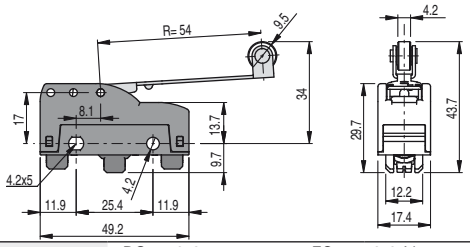
Maximum and minimum speed see page 221 - type 7



MK V11R47 1NO+1NC

PC	1,7 mm	FS	1,7 N
OC	5,3 mm	FR	1 N
CD	0,3 mm		

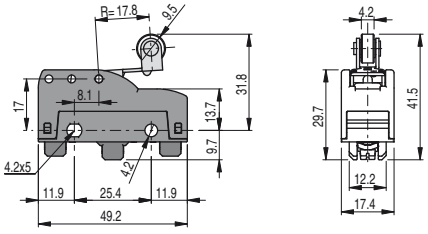
Maximum and minimum speed see page 221 - type 7



MK V11R53 1NO+1NC

PC	3,6 mm	FS	0,8 N
OC	11,2 mm	FR	0,4 N
CD	0,5 mm		

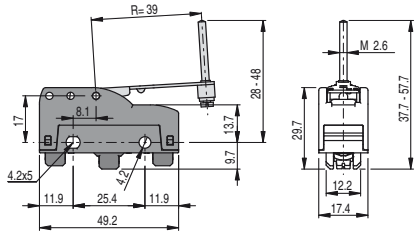
Maximum and minimum speed see page 221 - type 7



MK V11R59 1NO+1NC

PC	1,5 mm	FS	2,4 N
OC	3,9 mm	FR	1,3 N
CD	0,2 mm		

Maximum and minimum speed see page 221 - type 7

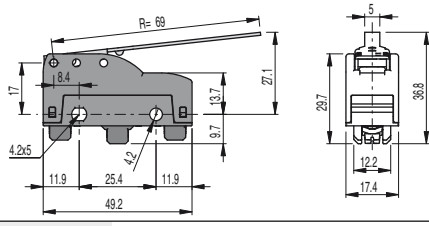


MK V11R60 1NO+1NC

PC	2,7 mm	FS	1,2 N
OC	9,2 mm	FR	0,6 N
CD	0,5 mm		

Maximum and minimum speed see page 221 - type 4

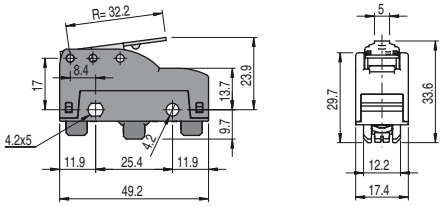
Microswitches with direct actuation at the back



MK V11F30 1NO+1NC

PC	3,2 mm	FS	0,6 N
OC	11,2 mm	FR	0,5 N
CD	0,35 mm		

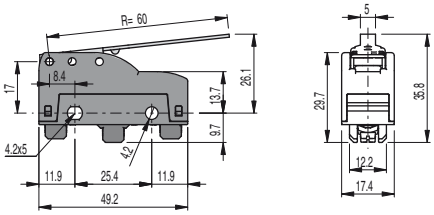
Maximum and minimum speed see page 221 - type 5



MK V11F31 1NO+1NC

PC	1,45 mm	FS	1,5 N
OC	5 mm	FR	0,92 N
CD	0,17 mm	FAP	5,78 N
CAP	5,72 mm		

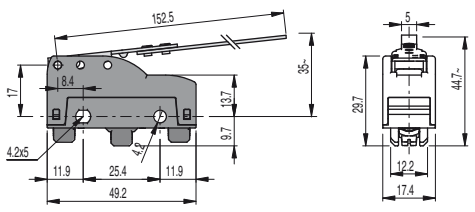
Maximum and minimum speed see page 221 - type 5



MK V11F32 1NO+1NC

PC	2,7 mm	FS	0,7 N
OC	9,3 mm	FR	0,6 N
CD	0,4 mm		

Maximum and minimum speed see page 221 - type 5



MK V11F35 1NO+1NC

PC	7,8 mm	FS	0,25 N
OC	24,1 mm	FR	0,2 N
CD	1,7 mm		

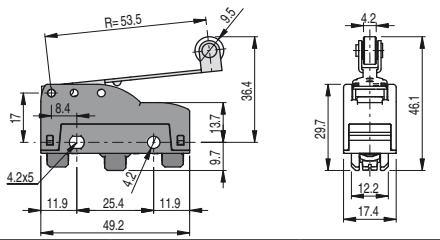
Maximum and minimum speed see page 221 - type 5

All values in the drawings are in mm

Accessories See page 197

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

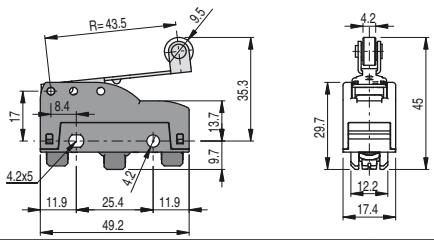
Items with code on **green** background are stock items



MK V11F40 1NO+1NC

PC	2,1 mm	FS	0,85 N
OC	8,3 mm	FR	0,65 N
CD	0,25 mm		

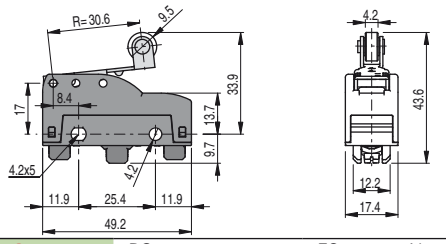
Maximum and minimum speed see page 221 - type 8



MK V11F42 1NO+1NC

PC	1,8 mm	FS	1 N
OC	6,7 mm	FR	0,7 N
CD	0,2 mm	FAP	4,9 N
CAP	9 mm		

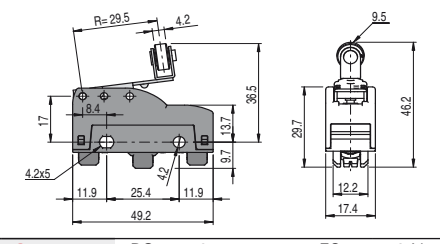
Maximum and minimum speed see page 221 - type 8



MK V11F45 1NO+1NC

PC	1,1 mm	FS	1,5 N
OC	4,9 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

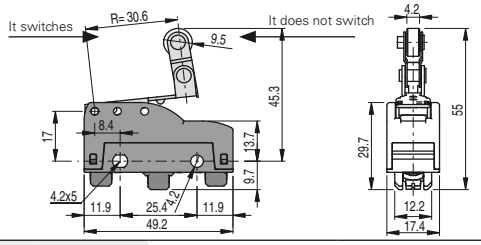
Maximum and minimum speed see page 221 - type 8



MK V11F46 1NO+1NC

PC	1,3 mm	FS	1,6 N
OC	4,7 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

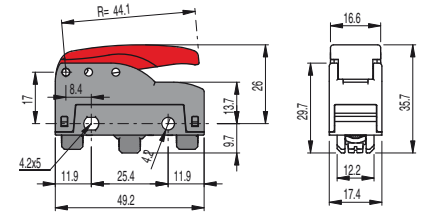
Maximum and minimum speed see page 221 - type 8



MK V11F47 1NO+1NC

PC	1,3 mm	FS	1,6 N
OC	4,7 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

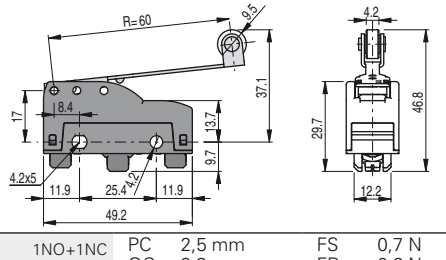
Maximum and minimum speed see page 221 - type 8



MK V11F49 1NO+1NC

PC	1,5 mm	FS	1 N
OC	7,5 mm	FR	0,7 N
CD	0,2 mm	FAP	4,8 N
CAP	9 mm		

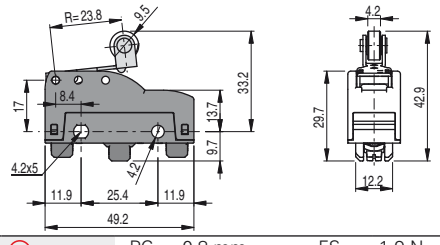
Maximum and minimum speed see page 221 - type 5



MK V11F53 1NO+1NC

PC	2,5 mm	FS	0,7 N
OC	9,3 mm	FR	0,6 N
CD	0,3 mm		

Maximum and minimum speed see page 221 - type 8



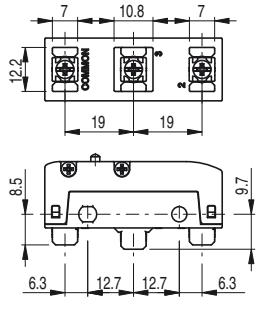
MK V11F59 1NO+1NC

PC	0,8 mm	FS	1,9 N
OC	4,5 mm	FR	1,3 N
CD	0,08 mm	FAP	8,9 N
CAP	4,9 mm		

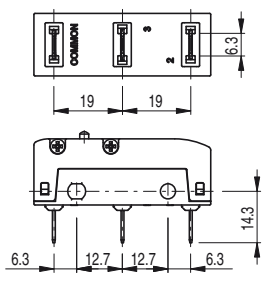
Maximum and minimum speed see page 221 - type 8

Terminal dimensions

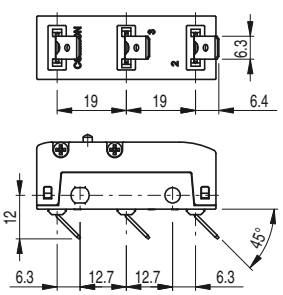
All values in the drawings are in mm



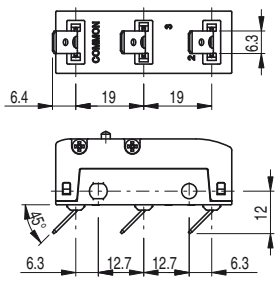
Screw terminals **V** with plate



Faston terminals **H**, vertical



Faston terminals **F**, right angle

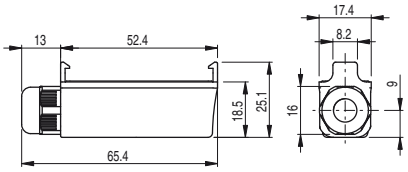


Faston terminals **G**, left angle (upon request)

Note: The vertical faston terminals H can be bent according to specific installation requirements.
We recommend to bend the faston with an angle not higher than 45° and to carry out this operation no more than 5 times.

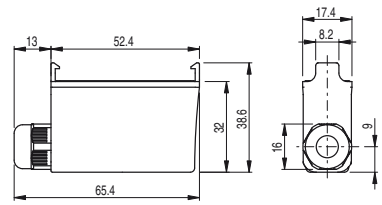
Protective terminal covers

Packs of **10 pcs.**



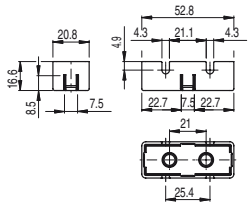
Protective terminal cover for screw terminals with strain relief cable gland and snap-in mounting. It allows to install mutiple switches side-by-side.

Article	Description	Protection degree
VF MKCV11	Protective terminal cover without gasket for multipolar cables Ø 5 … 7.5 mm	IP40
VF MKCV12	Protective terminal cover without gasket for multipolar cables Ø 4 … 7.5 mm	IP40
VF MKCV13	Protective terminal cover without gasket for multipolar cables Ø 2 … 5.5 mm	IP40
VF MKCV22	Protective terminal cover with gasket for multipolar cables Ø 4 … 7.5 mm	IP65
VF MKCV23	Protective terminal cover with gasket for multipolar cables Ø 2 … 5.5 mm	IP65

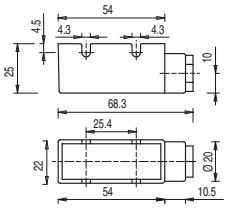


Protective terminal cover for vertical faston terminals with strain relief cable gland and snap-in mounting. It allows to install mutiple switches side-by-side.

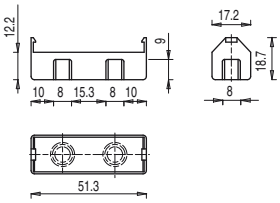
Article	Description	Protection degree
VF MKCH11	Protective terminal cover without gasket for multipolar cables Ø 5 … 7.5 mm	IP40
VF MKCH12	Protective terminal cover without gasket for multipolar cables Ø 4 … 7.5 mm	IP40
VF MKCH13	Protective terminal cover without gasket for multipolar cables Ø 2 … 5.5 mm	IP40
VF MKCH22	Protective terminal cover with gasket for multipolar cables Ø 4 … 7.5 mm	IP65
VF MKCH23	Protective terminal cover with gasket for multipolar cables Ø 2 … 5.5 mm	IP65



Article	Description	Protection degree
VF C01	Protective terminal cover for screw terminals	IP20



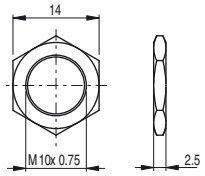
Article	Description	Protection degree
VF C02	Protective terminal cover for screw terminals with PG9 cable gland for multipolar cables Ø 5 … 7 mm	IP40



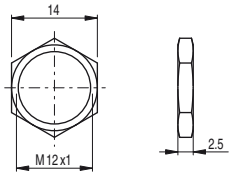
Article	Description	Protection degree
VF C03	Protective terminal cover for screw terminals, snap-in mounting. It allows to install mutiple switches side-by-side	IP20

Accessories

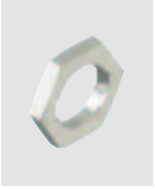
Packs of **10 pcs.**

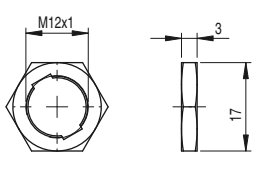


Article	Description
VF AC83	Hex threaded nut for microswitches with actuators D06, D08, D09



Article	Description
VF AC72	Hex threaded nut for micro-switches with actuators D10, D12, D13





Article	Description
AC 35	Hex threaded nut, notched, for microswitches with actuators D15, D16

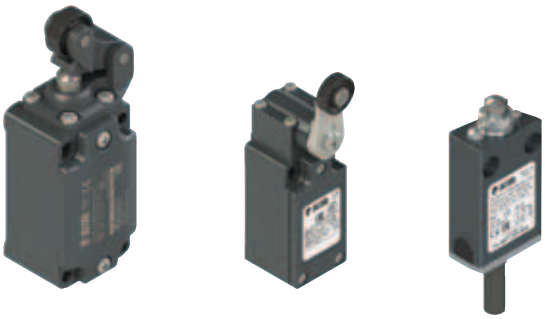
All values in the drawings are in mm

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

Accessories See page 197

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

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 D	-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 D	-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 (**At**mospheres **Ex**plosives) 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 the table below.

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

Environment features				Equipment features			
				acc. to ATEX 2014/34/EU		acc. to IEC 60079-0	
Field of application	Flammable substance	Potentially explosive atmosphere	Classification of potentially explosive atmospheres: ZONE	Required marking of the device: CATEGORY	Required marking of the device: GROUP	EPL	Required protection level
Mining				**M1**	**I**	**Ma**	very high
				M2		**Mb**	high
Surface	**Gases**	It is present continuously, or for long periods or frequently	**0**	**1G**	**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**		**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

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 the following table:

Table 2 - Protective measures and applicable standards

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 o	1.2	/	IEC 60079-6 EN 60079-6
Pressurized enclosure		Ex px Ex py Ex pz	1 1 2	21 21 22	IEC 60079-2 EN 60079-2
Powder filling		Ex q	1.2	/	IEC 60079-5 EN 60079-5
Flameproof enclosure		Ex d	1.2	/	IEC 60079-1 EN 60079-1
Increased safety		Ex e	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	0,1,2	/	IEC 60079-28 EN 60079-28

Marking examples

Devices for places with presence of gas

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

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)

Temperature classes

Table 3

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

Classification of gases

Table 4

excerpt from standard IEC 505

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

Classification of dusts

Table 5

IIIA	IIIB	IIIC
combustible particles	non-conductive powder	conductive powder

Switches compliant with **ATEX** directive Ⓔx / **FD** series

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	CE	EU declaration of conformity Pizzato Elettrica S.r.l.
-EX7	CE 0158	EC type examination certificate DEKRA EXAM Gmbh
-EX8	CE 0158	EC type examination certificate by DEKRA EXAM Gmbh

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20x1.5
Protection degree:	IP66 acc. to EN 60529 with cable gland presenting same 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 211-222

Cable cross section (flexible copper strands)

Contact blocks 2, 20, 21, 22, 28, 29, 30, 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, 8, 9, 10,11,12,13,14,15,16,17,18, 37, 66, 67:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

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 22.2 No.14, IEC 60079-0, EN 60079-0, IEC 60079-11, EN 60079-11.

Compliance with the requirements of:
ATEX Directive 2014/34/EU and EMC Directive 2014/30/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 ⊖ next to 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 214. 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 on pages 211 to 222 and in the certificate.**

⚠ **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 177**

Product code extension -EX4

Category	Zone	EPL	Approvals
3D	22	Dc	Ⓔx II 3D Ex tc IIIC T80°C Dc

Electrical data

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

Utilization category
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)	6	1.1	0.4

Product code extension -EX7

Category	Zone	EPL	Approvals
2G	1	Gb	Ⓔx II 2G Ex ia IIC T6 Gb
M2	M2	Mb	Ⓔx 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**

Electrical data

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

Product code extension -EX8

Category	Zone	EPL	Approvals
2D	21	Db	Ⓔx II 2D Ex tb IIIC T80°C Db

Electrical data

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

Utilization category
Alternating current: AC15 (50÷60 Hz)

Ue (V)	250
Ie (A)	6

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	6	1.1	0.4

Quality marks of the product

UL approval: E131787
EAC approval: RU C-IT.АД35.B.00454

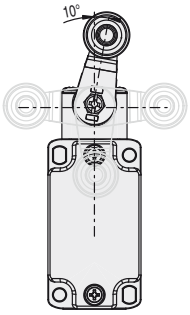
Features approved by UL

Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 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).

In compliance with standard: UL 508, CSA 22.2 No.14
Please contact our technical department for the list of approved products.

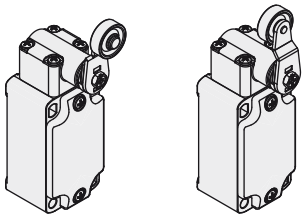
Adjustable levers

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.



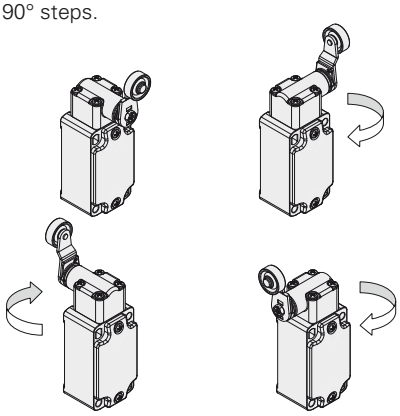
Reversible levers

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.



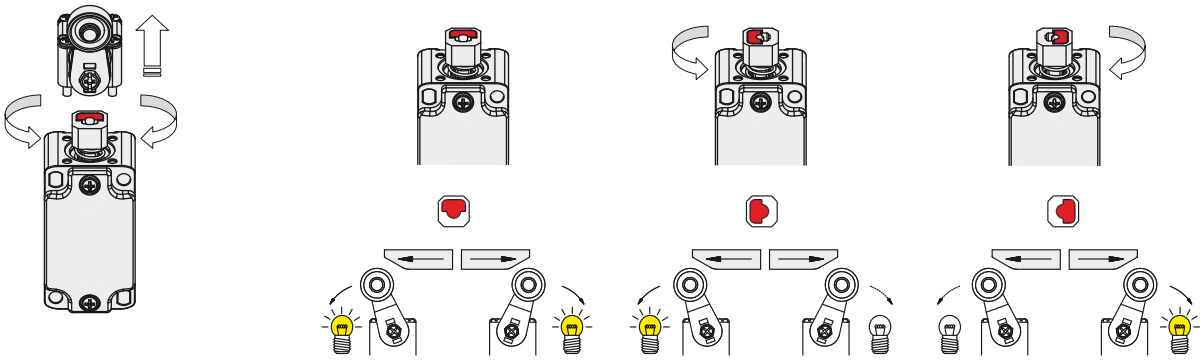
Head with variable orientation

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	2NC, snap action
7	2NO, snap action
...	.....

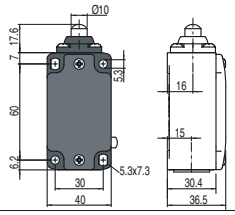
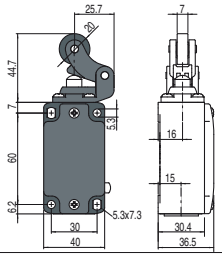
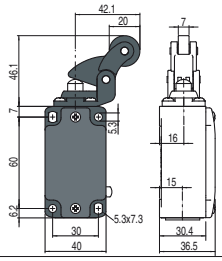
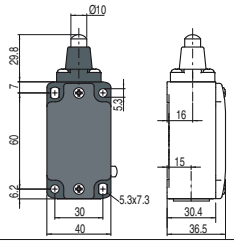
Actuators	
01	short plunger
02	roller lever
...	.....

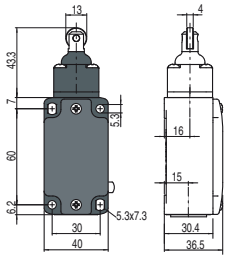
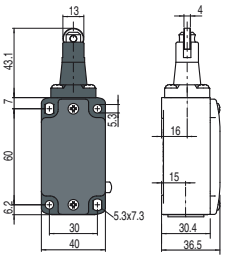
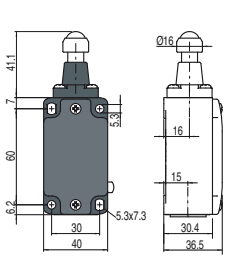
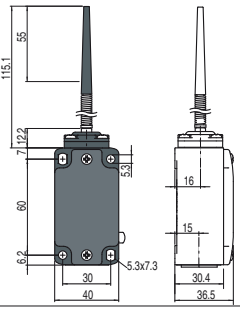
Contact type	
	silver contacts (standard)
G	silver contacts, 1 µm gold coating (not for contact block 2)
G1	silver contacts, 2.5 µm gold coating (not for contact block 20, 21, 22, 28, 29, 30)

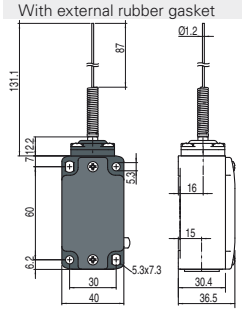
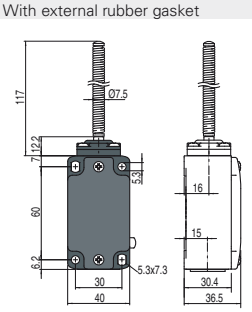
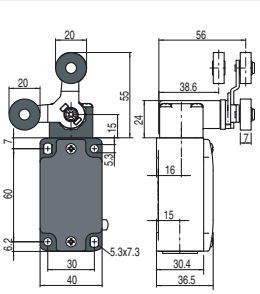
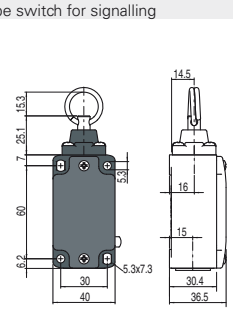
ATEX approval	
-EX4	II 3D Ex tc IIIC T80°C Dc
-EX7	II 2G Ex ia IIC T6 Gb I M2 Ex ia I Mb
-EX8	II 2D Ex tb IIIC T80°C D

Switches compliant with **ATEX** directive ⟨Ex⟩ / **FD** series

Contact type:
R = snap action
L = slow action

Category	Contact block					
				With stainless steel roller on request 	With stainless steel roller on request 	
3D	5	R	FD 501-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 502-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 505-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 511-M2-EX4 ⟨Ex⟩ 1NO+1NC
	6	L	FD 601-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 602-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 605-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 611-M2-EX4 ⟨Ex⟩ 1NO+1NC
	20	L	FD 2001-M2-EX4 ⟨Ex⟩ 1NO+2NC	FD 2002-M2-EX4 ⟨Ex⟩ 1NO+2NC	FD 2005-M2-EX4 ⟨Ex⟩ 1NO+2NC	FD 2011-M2-EX4 ⟨Ex⟩ 1NO+2NC
	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)
2G M2	5	R	FD 501-M2-EX7 ⟨Ex⟩ 1NO+1NC	FD 502-M2-EX7 ⟨Ex⟩ 1NO+1NC	FD 505-M2-EX7 ⟨Ex⟩ 1NO+1NC	FD 511-M2-EX7 ⟨Ex⟩ 1NO+1NC
	20	L	FD 2001-M2-EX7 ⟨Ex⟩ 1NO+2NC	FD 2002-M2-EX7 ⟨Ex⟩ 1NO+2NC	FD 2005-M2-EX7 ⟨Ex⟩ 1NO+2NC	FD 2011-M2-EX7 ⟨Ex⟩ 1NO+2NC
2D	5	R	FD 501-M2-EX8 ⟨Ex⟩ 1NO+1NC	FD 502-M2-EX8 ⟨Ex⟩ 1NO+1NC	FD 505-M2-EX8 ⟨Ex⟩ 1NO+1NC	FD 511-M2-EX8 ⟨Ex⟩ 1NO+1NC
	20	L	FD 2001-M2-EX8 ⟨Ex⟩ 1NO+2NC	FD 2002-M2-EX8 ⟨Ex⟩ 1NO+2NC	FD 2005-M2-EX8 ⟨Ex⟩ 1NO+2NC	FD 2011-M2-EX8 ⟨Ex⟩ 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 ⟨Ex⟩)	6 N (25 N ⟨Ex⟩)	6 N (25 N ⟨Ex⟩)	8 N (25 N ⟨Ex⟩)
Travel diagrams			page 214 - group 1	page 214 - group 2	page 214 - group 2	page 214 - group 1

Category	Contact block					
			With external rubber gasket 		Ball, Ø 12.7 mm, stainless steel 	With external rubber gasket 
3D	5	R	FD 515-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 516-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 519-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 520-M2-EX4 1NO+1NC
	6	L	FD 615-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 616-M2-EX4 ⟨Ex⟩ 1NO+1NC	FD 619-M2-EX4 ⟨Ex⟩ 1NO+1NC	/
	20	L	FD 2015-M2-EX4 ⟨Ex⟩ 1NO+2NC	FD 2016-M2-EX4 ⟨Ex⟩ 1NO+2NC	FD 2019-M2-EX4 ⟨Ex⟩ 1NO+2NC	FD 2020-M2-EX4 1NO+2NC
	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)
2G M2	5	R	FD 515-M2-EX7 ⟨Ex⟩ 1NO+1NC	FD 516-M2-EX7 ⟨Ex⟩ 1NO+1NC	FD 519-M2-EX7 ⟨Ex⟩ 1NO+1NC	FD 520-M2-EX7 1NO+1NC
	20	L	FD 2015-M2-EX7 ⟨Ex⟩ 1NO+2NC	FD 2016-M2-EX7 ⟨Ex⟩ 1NO+2NC	FD 2019-M2-EX7 ⟨Ex⟩ 1NO+2NC	FD 2020-M2-EX7 1NO+2NC
2D	5	R	/	FD 516-M2-EX8 ⟨Ex⟩ 1NO+1NC	FD 519-M2-EX8 ⟨Ex⟩ 1NO+1NC	/
	20	L	/	FD 2016-M2-EX8 ⟨Ex⟩ 1NO+2NC	FD 2019-M2-EX8 ⟨Ex⟩ 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 ⟨Ex⟩)	8 N (25 N ⟨Ex⟩)	8 N (25 N ⟨Ex⟩)	0.09 Nm
Travel diagrams			page 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 3

Category	Contact block					
			With external rubber gasket 	With external rubber gasket 	Bistable 	Rope switch for signalling 
3D	5	R	FD 521-M2-EX4 1NO+1NC	FD 525-M2-EX4 1NO+1NC	FD 541-M2-EX4 ⟨Ex⟩ 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
	2	R	FD 221-M2-EX4 2x(1NO-1NC)	FD 225-M2-EX4 2x(1NO-1NC)	/	FD 276-M2-EX4 2x(1NO-1NC)
2G M2	5	R	FD 521-M2-EX7 1NO+1NC	FD 525-M2-EX7 1NO+1NC	FD 541-M2-EX7 ⟨Ex⟩ 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 ⟨Ex⟩ 1NO+1NC	FD 576-M2-EX8 1NO+1NC
	20	L	/	/	/	FD 2076-M2-EX8 1NO+2NC
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 ⟨Ex⟩)	initial 20 N - final 40 N
Travel diagrams			page 214 - group 3	page 214 - group 3	page 214 - group 4	page 214 - group 6

Accessories See page 197

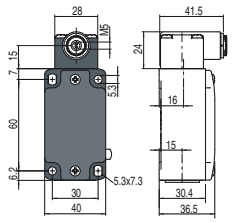
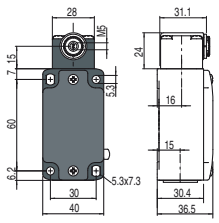
➔ The 2D and 3D files are available at **www.pizzato.com**

All values in the drawings are in mm

Position switches with swivelling lever without actuator

All values in the drawings are in mm

Contact type:
R = snap action
L = slow action

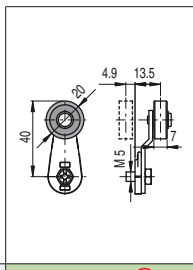
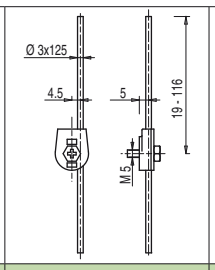
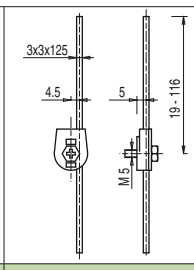
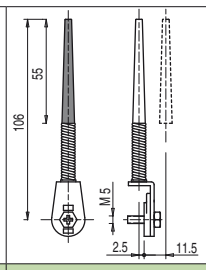
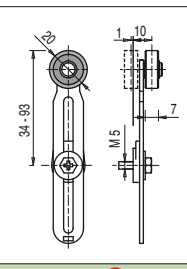
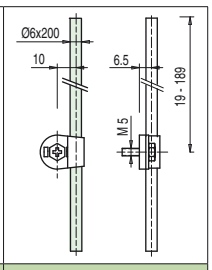
Category	Contact block		Regular head	Compact head
				
3D	5	R	FD 538-M2-EX4 ⊖ 1NO+1NC	FD 558-M2-EX4 ⊖ 1NO+1NC
	6	L	FD 638-M2-EX4 ⊖ 1NO+1NC	FD 658-M2-EX4 ⊖ 1NO+1NC
	20	L	FD 2038-M2-EX4 ⊖ 1NO+2NC	FD 2058-M2-EX4 ⊖ 1NO+2NC
	2	R	FD 238-M2-EX4 2x(1NO-1NC)	FD 258-M2-EX4 2x(1NO-1NC)
2G M2	5	R	FD 538-M2-EX7 ⊖ 1NO+1NC	FD 558-M2-EX7 ⊖ 1NO+1NC
	20	L	FD 2038-M2-EX7 ⊖ 1NO+2NC	FD 2058-M2-EX7 ⊖ 1NO+2NC
2D	5	R	FD 538-M2-EX8 ⊖ 1NO+1NC	FD 558-M2-EX8 ⊖ 1NO+1NC
	20	L	FD 2038-M2-EX8 ⊖ 1NO+2NC	FD 2058-M2-EX8 ⊖ 1NO+2NC
Actuating force			0,1 Nm (0,25 Nm ⊖)	0,06 Nm (0,25 Nm ⊖)
Travel diagrams			page 214 - group 4	page 214 - group 4

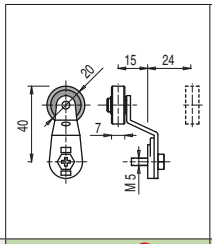
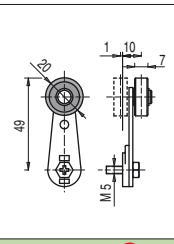
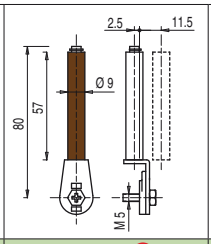
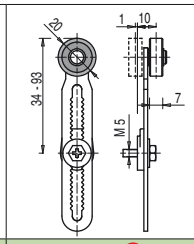
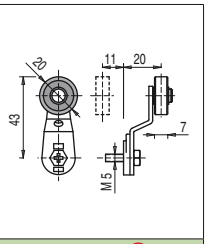
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

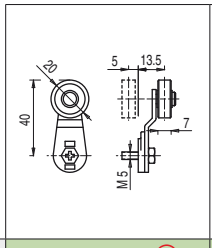
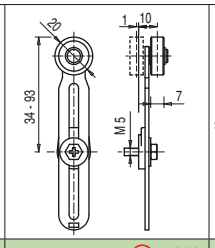
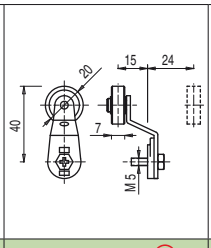
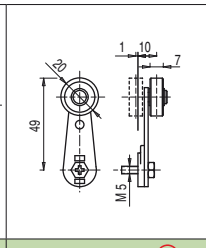
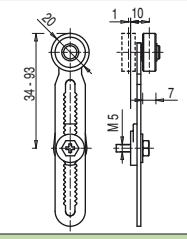
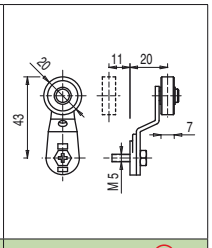
All values in the drawings are in mm

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

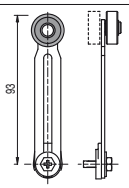
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable glass fibre rod
						
Article	VF L31 ⊖	VF L32 (2)	VF L33 (2)	VF L34	VF L35 ⊖ (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (cam 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°)

Stainless steel rollers, Ø 20 mm

						
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°)

- (1) Actuator 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 FD •58-M2-EX (e.g. FD 558-M2-EX•, FD 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.



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

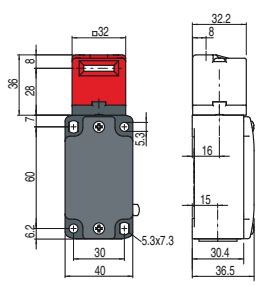
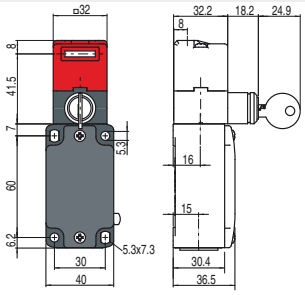
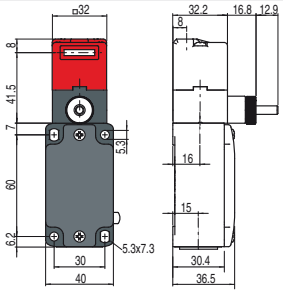
Accessories See page 197

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

Safety switches with separate actuator

All values in the drawings are in mm

Contact type:
L = slow action

Category	Contact block	Switches with separate actuator Switch without actuator	Switches with separate actuator and key release Switch without actuator	Switches with manual mechanical delay Switch without actuator
				
3D	6 L	FD 693-M2-EX4 → 1NO+1NC	/	FD 6R2-M2-EX4 → 1NO+1NC
	18 L	/	FD 1899-M2-EX4 → 1NO+1NC	/
	20 L	FD 2093-M2-EX4 → 1NO+2NC	FD 2099-M2-EX4 → 1NO+2NC	FD 20R2-M2-EX4 → 1NO+2NC
	28 L	/	FD 2899-M2-EX4 → 1NO+2NC	/
2G M2	20 L	FD 2093-M2-EX7 → 1NO+2NC	FD 2099-M2-EX7 → 1NO+2NC	FD 20R2-M2-EX7 → 1NO+2NC
	28 L	/	FD 2899-M2-EX7 → 1NO+2NC	/
2D	20 L	FD 2093-M2-EX8 → 1NO+2NC	FD 2099-M2-EX8 → 1NO+2NC	FD 20R2-M2-EX8 → 1NO+2NC
	28 L	/	FD 2899-M2-EX8 → 1NO+2NC	/
Actuating force		10 N (18 N →)	30 N (40 N →)	10 N (18 N →)
Travel diagrams Gen. Cat. Safety		page 17	page 150	page 142

Actuators





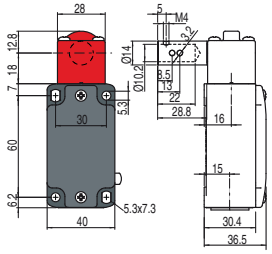

VF KEYF	VF KEYF1	VF KEYF2	VF KEYF3	VF KEYF7	VF KEYF8
Straight actuator	Angled actuator	Swivelling actuator	Actuator adjustable in two directions	Actuator adjustable in one direction	Universal actuator

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

All values in the drawings are in mm

Contact type:
L = slow action

Category	Contact block		
			
3D	18 L	FD 1895-M2-EX4 → 1NO+1NC	
	20 L	FD 2095-M2-EX4 → 1NO+2NC	
2G M2	20 L	FD 2095-M2-EX7 → 1NO+2NC	
2D	20 L	FD 2095-M2-EX8 → 1NO+2NC	
Actuating force		0,15 Nm (0,4 Nm →)	
Travel diagrams Gen. Cat. Safety		page 71	

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

Accessories See page 197

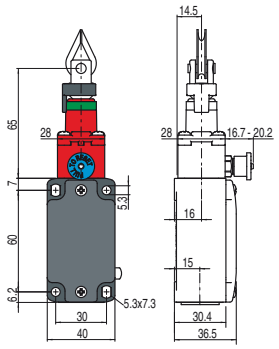
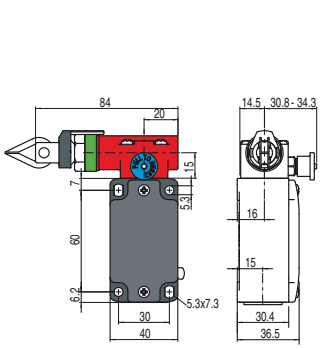
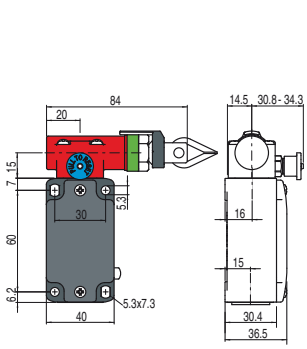
→ The 2D and 3D files are available at **www.pizzato.com**

Safety rope switches with reset for emergency stops

All values in the drawings are in mm

Contact type:

L = slow action

Category	Contact block								
								
3D	18	L	FD 1878-M2-EX4	1NO+1NC	FD 1883-M2-EX4	1NO+1NC	FD 1884-M2-EX4	1NO+1NC
	20	L	FD 2078-M2-EX4	1NO+2NC	FD 2083-M2-EX4	1NO+2NC	FD 2084-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	FD 1884-M2-EX8	1NO+1NC
	20	L	FD 2078-M2-EX8	1NO+2NC	FD 2083-M2-EX8	1NO+2NC	FD 2084-M2-EX8	1NO+2NC
Actuating force			initial 63 N...final 83 N (90 N ⊕)		initial 147 N...final 235 N (250 N ⊕)		initial 147 N...final 235 N (250 N ⊕)	
Travel diagrams Gen. Cat. Safety			page 174 - group 1		page 174 - group 2		page 174 - group 2	

Accessories for rope installation

VF AF-TR5

Adjustable stay bolt

VF AF-TR8

Stay bolt

VF AF-MR5

End clamp

VF AF-ME78

Safety spring for longitudinal heads

VF AF-ME80

Safety spring for transversal heads

VF F05-100

Rope coil Ø 5 mm length 100 m

VF AF-IF1GR11

Rope function indicator.

VF AF-CA5

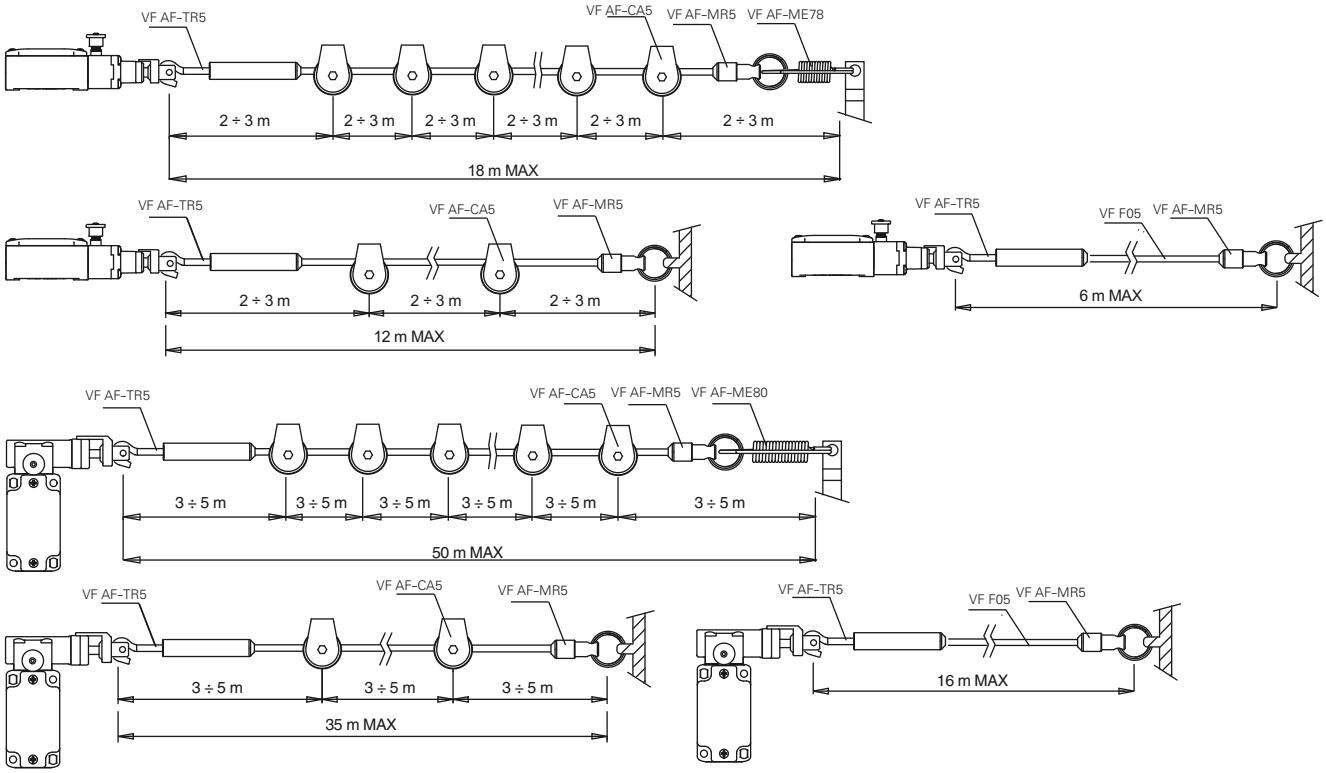
Stainless steel pulley

VF AF-CA10

Angular pulley, stainless steel

Application examples and max. rope length

All values in the drawings are in mm



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

Accessories See page 197

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

Switches compliant with **ATEX** directive Ⓔx / **FL** series

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	CE	EU declaration of conformity Pizzato Elettrica S.r.l.
-EX7	CE 0158	EC type examination certificate DEKRA EXAM Gmbh
-EX8	CE 0158	EC type examination certificate by DEKRA EXAM Gmbh

Technical data

Housing

Metal housing, powder-coated	
Three threaded conduit entries:	M20x1.5
Protection degree:	IP66 acc. to EN 60529 with cable gland presenting same 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•	2,500,00
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222

Cable cross section (flexible copper strands)

Contact blocks 2, 20, 21, 22, 28, 29, 30, 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, 8, 9, 10,11,12,13,14,15,16,17,18 37, 66, 67:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

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 22.2 No.14, IEC 60079-0, EN 60079-0, IEC 60079-11, EN 60079-11.

Compliance with the requirements of:
ATEX Directive 2014/34/EU and EMC Directive 2014/30/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 ⊖ next to 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 214. 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 on pages 211 to 222 and in the certificate.**

⚠ **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 177**

Product code extension -EX4

Category	Zone	EPL	Approvals
3D	22	Dc	Ⓔx II 3D Ex tc IIIC T80°C Dc

Electrical data

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

Utilization category
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)	6	1.1	0.4

Product code extension -EX7

Category	Zone	EPL	Approvals
2G	1	Gb	Ⓔx II 2G Ex ia IIC T6 Gb
M2	M2	Mb	Ⓔx 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**

Electrical data

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

Product code extension -EX8

Category	Zone	EPL	Approvals
2D	21	Db	Ⓔx II 2D Ex tb IIIC T80°C Db

Electrical data

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

Utilization category
Alternating current: AC15 (50÷60 Hz)

Ue (V)	250
Ie (A)	6

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	6	1.1	0.4

Quality marks of the product

UL approval: E131787
EAC approval: RU C-IT.АД35.B.00454

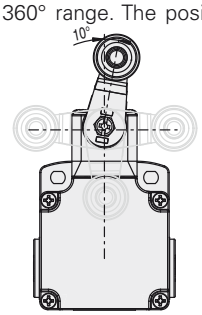
Features approved by UL

Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 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).

In compliance with standard: UL 508, CSA 22.2 No.14
Please contact our technical department for the list of approved products.

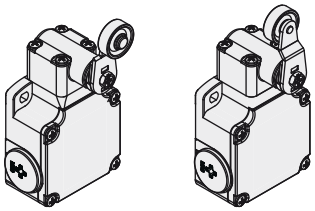
Adjustable levers

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.



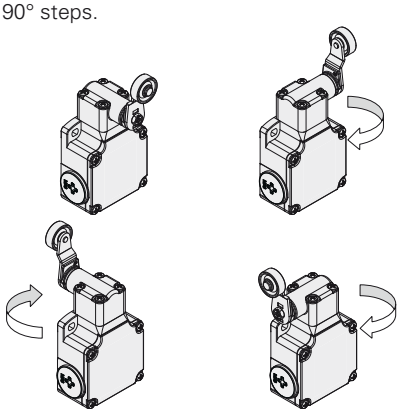
Reversible levers

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.



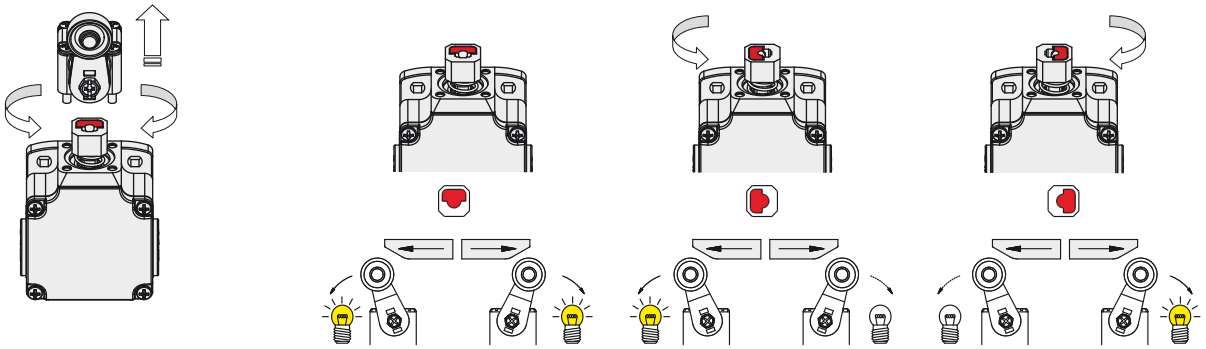
Head with variable orientation

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	2NC, snap action
7	2NO, snap action
...	.....

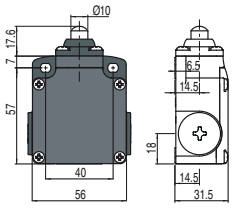
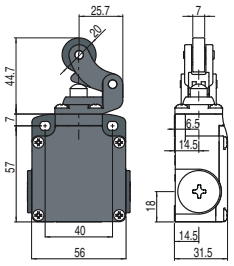
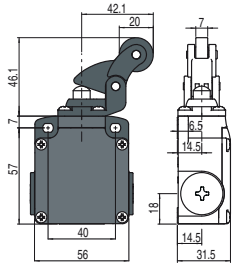
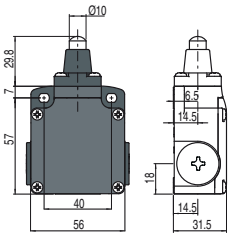
Actuators	
01	short plunger
02	roller lever
...	.....

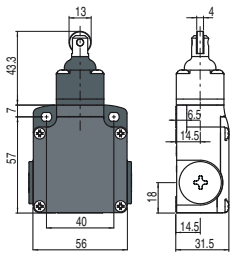
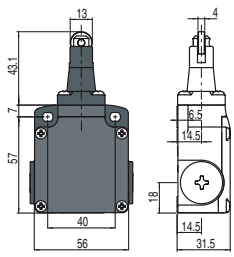
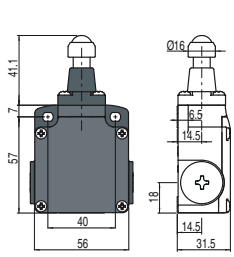
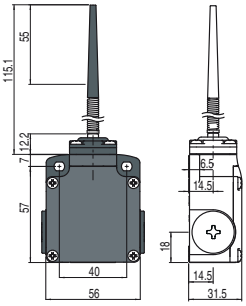
Contact type	
	silver contacts (standard)
G	silver contacts, 1 µm gold coating (not for contact block 2, 3)
G1	silver contacts, 2.5 µm gold coating (not for contact block 20, 21, 22, 28, 29, 30)

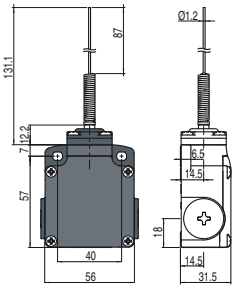
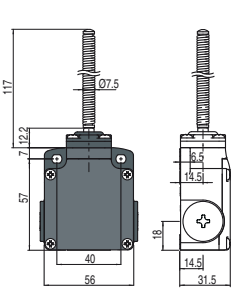
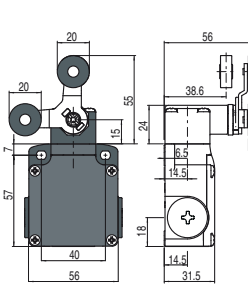
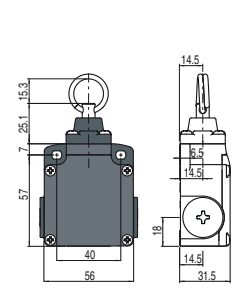
ATEX approval	
-EX4	Ⓔx II 3D Ex tc IIIC T80°C Dc
-EX7	Ⓔx II 2G Ex ia IIC T6 Gb Ⓔx I M2 Ex ia I Mb
-EX8	Ⓔx II 2D Ex tb IIIC T80°C D

Switches compliant with **ATEX** directive ⟨Ex⟩ / **FL** series

Contact type:
R = snap action
L = slow action

Category	Contact block					
				With stainless steel roller on request 	With stainless steel roller on request 	
3D	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
	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)
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 214 - group 1	page 214 - group 2	page 214 - group 2	page 214 - group 1

Category	Contact block					
			With external rubber gasket 		Ball, Ø 12.7 mm, stainless steel 	With external rubber gasket 
3D	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
	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)
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 214 - group 1	page 214 - group 1	page 214 - group 1	page 214 - group 3

Category	Contact block					
			With external rubber gasket 	With external rubber gasket 	Bistable 	Rope switch for signalling 
3D	5 R		FL 521-M2-EX4 1NO+1NC	FL 525-M2-EX4 1NO+1NC	FL 541-M2-EX4 → 1NO+1NC	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
	2 R		FL 221-M2-EX4 2x(1NO-1NC)	FL 225-M2-EX4 2x(1NO-1NC)	/	FL 276-M2-EX4 2x(1NO-1NC)
2G M2	5 R		FL 521-M2-EX7 1NO+1NC	FL 525-M2-EX7 1NO+1NC	FL 541-M2-EX7 → 1NO+1NC	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 → 1NO+1NC	FL 576-M2-EX8 1NO+1NC
	20 L		/	/	/	FL 2076-M2-EX8 1NO+2NC
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 214 - group 3	page 214 - group 3	page 214 - group 4	page 214 - group 6

Accessories See page 197

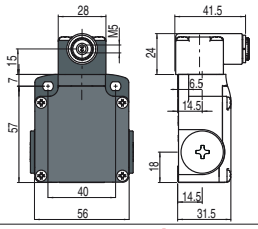
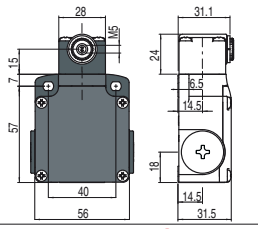
→ The 2D and 3D files are available at **www.pizzato.com**

All values in the drawings are in mm

Position switches with swivelling lever without actuator

All values in the drawings are in mm

Contact type:
R = snap action
L = slow action

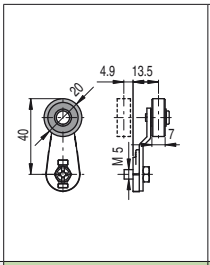
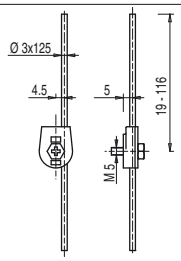
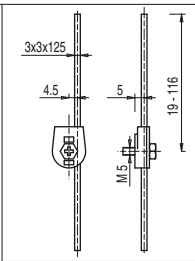
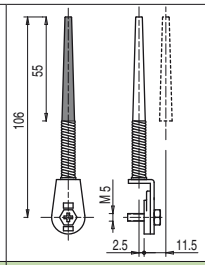
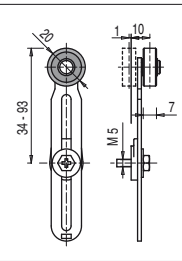
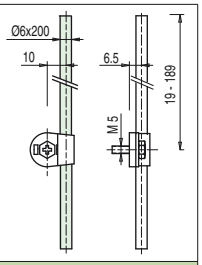
Category	Contact block		Regular head	Compact head
				
3D	5	R	FL 538-M2-EX4 ⊖ 1NO+1NC	FL 558-M2-EX4 ⊖ 1NO+1NC
	6	L	FL 638-M2-EX4 ⊖ 1NO+1NC	FL 658-M2-EX4 ⊖ 1NO+1NC
	20	L	FL 2038-M2-EX4 ⊖ 1NO+2NC	FL 2058-M2-EX4 ⊖ 1NO+2NC
	2	R	FL 238-M2-EX4 2x(1NO-1NC)	FL 258-M2-EX4 2x(1NO-1NC)
2G M2	5	R	FL 538-M2-EX7 ⊖ 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 214 - group 4	page 214 - group 4

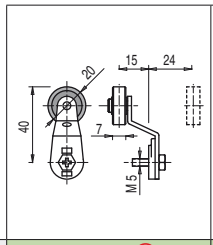
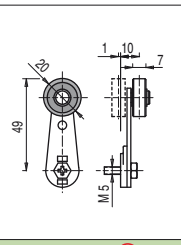
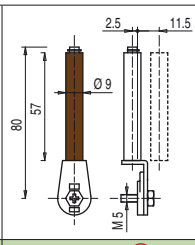
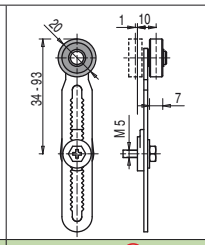
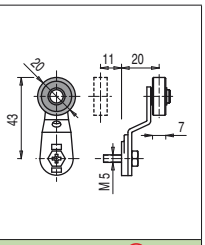
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

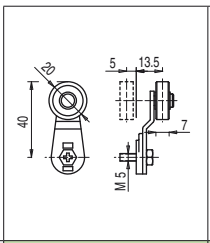
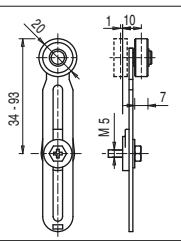
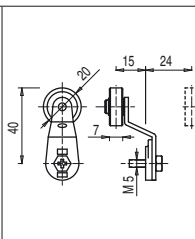
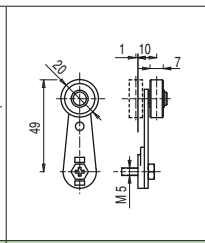
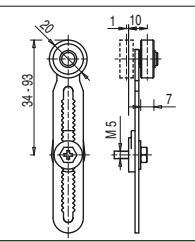
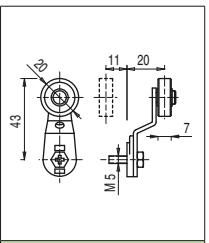
All values in the drawings are in mm

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

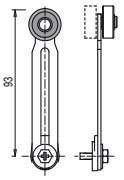
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable glass fibre rod
						
Article	VF L31 ⊖	VF L32 (2)	VF L33 (2)	VF L34	VF L35 ⊖ (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (cam 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°)

Stainless steel rollers, Ø 20 mm

						
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°)

- (1) Actuator 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.



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

Accessories See page 197

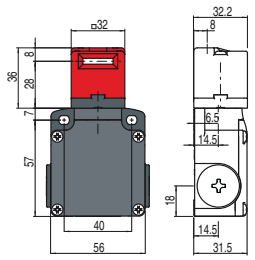
➔ The 2D and 3D files are available at **www.pizzato.com**

Safety switches with separate actuator

All values in the drawings are in mm

Contact type:
L = slow action

Category	Contact block		Switches with separate actuator	
			Switch without actuator	
3D	6	L	FL 693-M2-EX4	1NO+1NC
	20	L	FL 2093-M2-EX4	1NO+2NC
2G M2	20	L	FL 2093-M2-EX7	1NO+2NC
2D	20	L	FL 2093-M2-EX8	1NO+2NC
Actuating force			10 N (18 N →)	
Travel diagrams Gen. Cat. Safety			page 17	



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

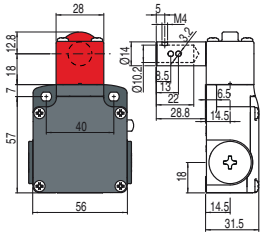
IMPORTANT: These actuators can be used only with items of the FL series (e.g. FL 2093-M2-EX7).
Actuators with low level of coding acc. to EN ISO 14119.

Safety switches for hinges

All values in the drawings are in mm

Contact type:
L = slow action

Category	Contact block			
3D	18	L	FL 1895-M2-EX4	1NO+1NC
	20	L	FL 2095-M2-EX4	1NO+2NC
2G M2	20	L	FL 2095-M2-EX7	1NO+2NC
2D	20	L	FL 2095-M2-EX8	1NO+2NC
Actuating force			0,15 Nm (0,4 Nm →)	
Travel diagrams Gen. Cat. Safety			page 71	



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

Accessories See page 197

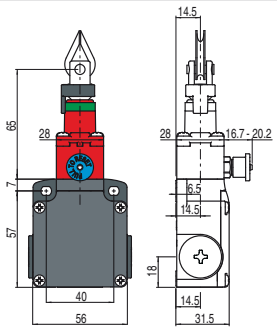
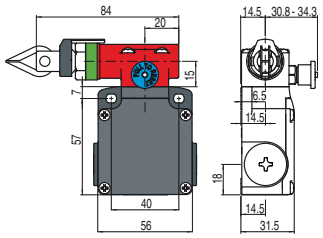
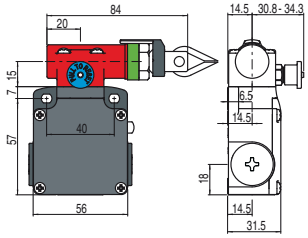
→ The 2D and 3D files are available at **www.pizzato.com**

Safety rope switches with reset for emergency stops

All values in the drawings are in mm

Contact type:

L = slow action

Category	Contact block								
									
3D	18 L	FL 1878-M2-EX4	1NO+1NC	FL 1883-M2-EX4	1NO+1NC	FL 1884-M2-EX4	1NO+1NC		
	20 L	FL 2078-M2-EX4	1NO+2NC	FL 2083-M2-EX4	1NO+2NC	FL 2084-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	FL 1884-M2-EX8	1NO+1NC		
	20 L	FL 2078-M2-EX8	1NO+2NC	FL 2083-M2-EX8	1NO+2NC	FL 2084-M2-EX8	1NO+2NC		
Actuating force		initial 63 N...final 83 N (90 N ⊕)		initial 147 N…final 235 N (250 N ⊕)		initial 147 N…final 235 N (250 N ⊕)			
Travel diagrams Gen. Cat. Safety		page 174 - group 1		page 174 - group 2		page 174 - group 2			

Accessories for rope installation





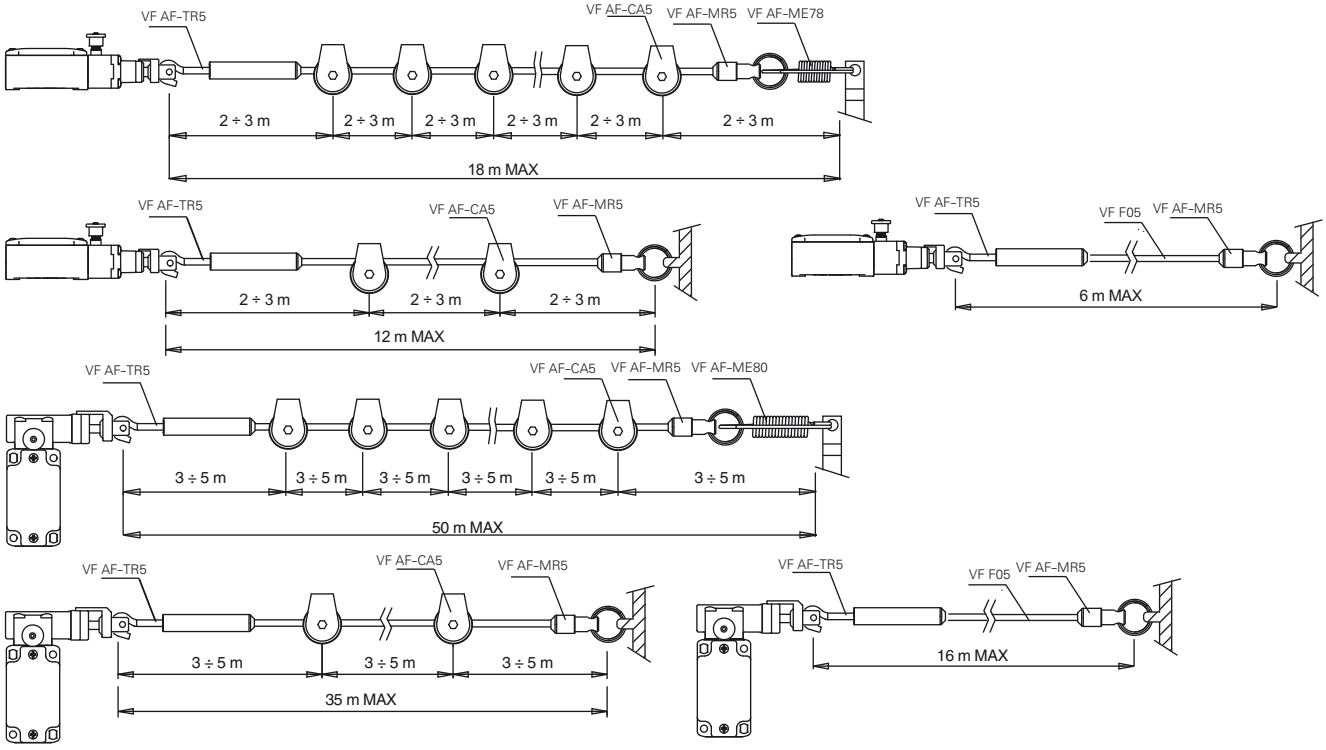




VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR11	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal heads	Safety spring for transversal heads	Rope coil Ø 5 mm length 100 m	Rope function indicator.	Stainless steel pulley	Angular pulley,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

Application examples and max. rope length

All values in the drawings are in mm



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

Accessories See page 197

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

Switches compliant with **ATEX** directive Ⓔx / **FM** series

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
-EX7	CE 0158	EC type examination certificate DEKRA EXAM Gmbh

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20x1.5
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same 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 211-222

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 28, 29, 30, 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, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 37, 66, 67:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

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 22.2 No.14, IEC 60079-0, EN 60079-0, IEC 60079-11, EN 60079-11.

Compliance with the requirements of:
ATEX Directive 2014/34/EU and EMC Directive 2014/30/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 ⊖ next to 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 216. 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 on pages 211 to 222 and in the certificate.**

Product code extension **-EX7**

Category	Zone	EPL	Approvals
2G	1	Gb	Ⓔx II 2G Ex ia IIC T6 Gb
M2	M2	Mb	Ⓔx 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**

Electrical data

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

Quality marks of the product

UL approval: E131787
EAC approval: RU C-IT.АД35.В.00454

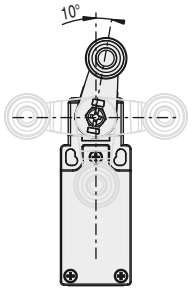
Features approved by UL

Utilization category Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Housing features type 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).

In compliance with standard: UL 508, CSA 22.2 No.14
Please contact our technical department for the list of approved products.

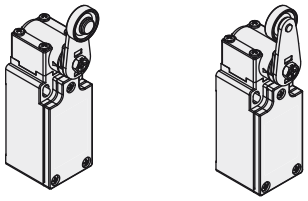
Adjustable levers

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.



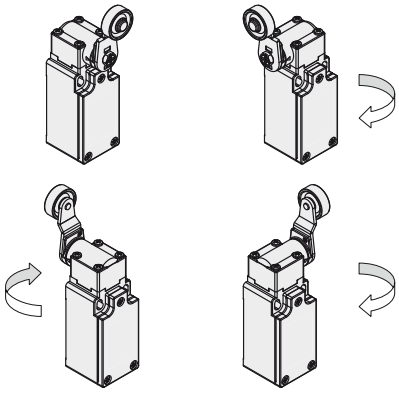
Reversible levers

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)

Switches compliant with **ATEX** directive ⟨Ex⟩ / **FM** series

Contact type:
R = snap action
L = slow action

Category	Contact block					
			With stainless steel roller on request	With stainless steel roller on request	
2G M2	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
	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 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 3

Category	Contact block					
		With external rubber gasket			
2G M2	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
	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 216 - group 1	page 216 - group 1	page 216 - group 1	page 216 - group 1

Category	Contact block					
		With external rubber gasket	With external rubber gasket	With external rubber gasket	Rope switch for signalling
2G M2	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
	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 216 - group 4	page 216 - group 4	page 216 - group 4	page 216 - group 7

All values in the drawings are in mm

Accessories See page 197

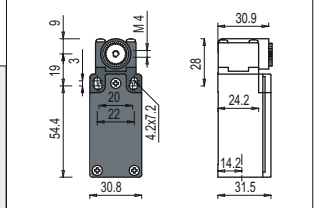
➔ The 2D and 3D files are available at **www.pizzato.com**

Position switches with swivelling lever without actuator

All values in the drawings are in mm

Contact type:

R = snap action
L = slow action



Category	Contact block		
2G M2	5	R	FM 538-M2-EX7 ⊖ 1NO+1NC
	20	L	FM 2038-M2-EX7 ⊖ 1NO+2NC
Actuating force			0,06 Nm (0,25 Nm ⊖)
Travel diagrams			page 216 - group 5

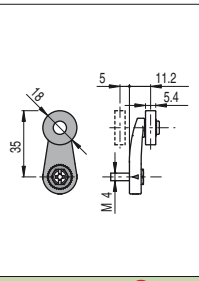
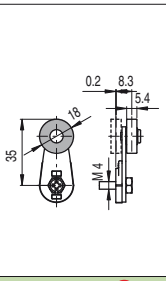
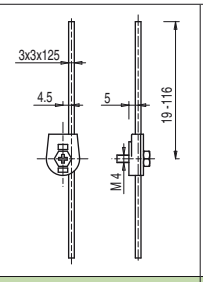
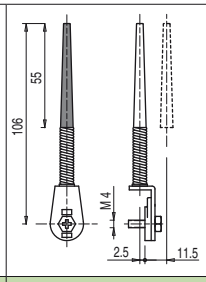
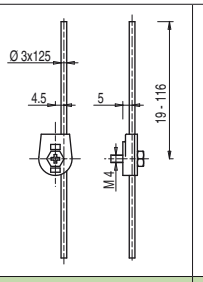
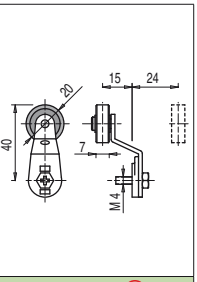
IMPORTANT

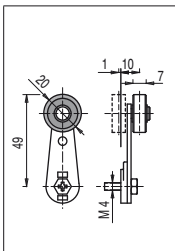
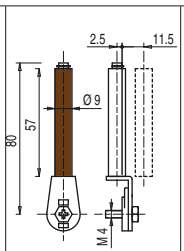
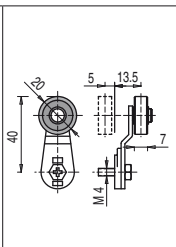
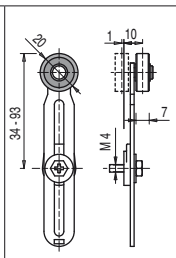
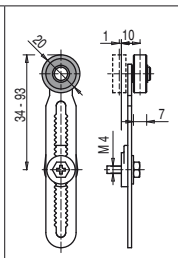
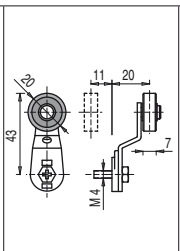
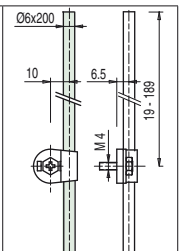
For safety applications: join only switches and actuators marked with symbol ⊖ next to the product code.
For more information about safety applications see details on page 211.

Separate actuators

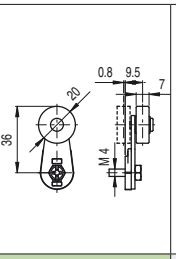
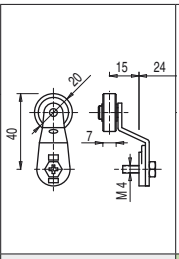
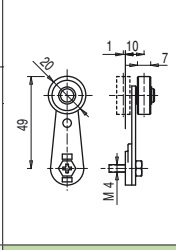
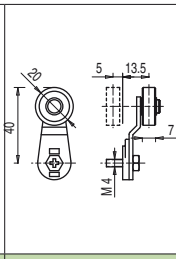
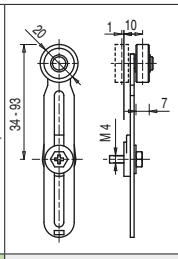
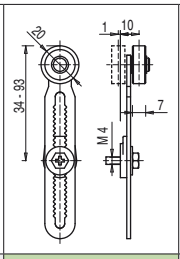
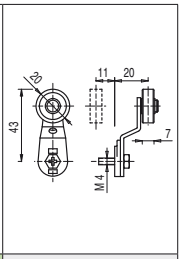
All values in the drawings are in mm

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

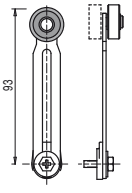
	Roller Ø 18 mm	Roller Ø 18 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable round rod Ø 3x125 mm	Technopolymer roller Ø 20 mm
						
Article	VF LE30 ⊖	VF LE31 ⊖	VF LE33	VF LE34	VF LE50	VF LE51 ⊖
Max. speed	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s (cam at 30°)

	Technopolymer roller Ø 20 mm	Porcelain roller	Technopolymer roller Ø 20 mm	Adjustable actuator with technopolymer roller	Adjustable safety actuator with techno-polymer roller	Technopolymer roller Ø 20 mm	Adjustable glass fibre rod
							
Article	VF LE52 ⊖	VF LE53 ⊖	VF LE54 ⊖	VF LE55 ⊖ (1)	VF LE56 ⊖	VF LE57 ⊖	VF LE69
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 (cam at 30°)	1.5 m/s

Stainless steel rollers, Ø 20 mm

							
Article	VF LE31-R24 ⊖	VF LE51-R24 ⊖	VF LE52-R24 ⊖	VF LE54-R24 ⊖	VF LE55-R24 ⊖ (1)	VF LE56-R24 ⊖	VF LE57-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°)	1.5 m/s (cam at 30°)

- (1) Actuator VF LE55 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 LE56 adjustable safety lever.



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

Accessories See page 197

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

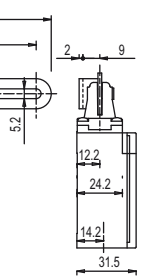
Safety switches with slotted hole lever

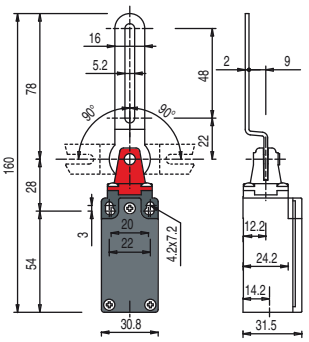
All values in the drawings are in mm

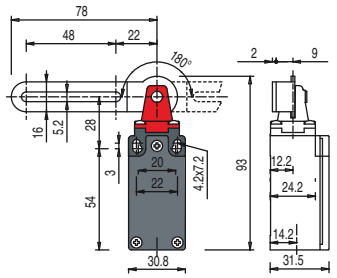
Contact type:

L = slow action

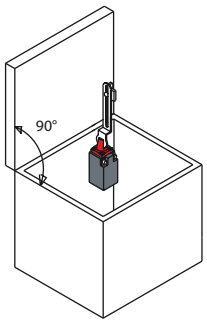
Category	Contact block				
2G M2	20	L	FM 20C1-M2-EX7 → 1NO+2NC	FM 20C2-M2-EX7 → 1NO+2NC	FM 20C3-M2-EX7 → 1NO+2NC
Actuating force			11 N (15 N →)	11 N (15 N →)	11 N (15 N →)
Travel diagrams			page 218 - group 10	page 218 - group 11	page 218 - group 10

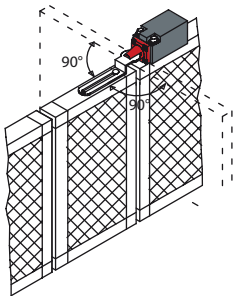






Application examples



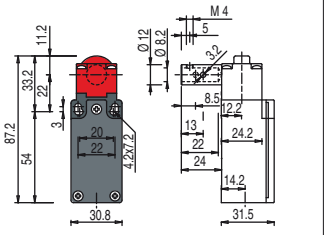


Safety switches for hinges

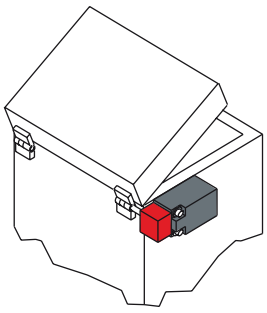
Contact type:

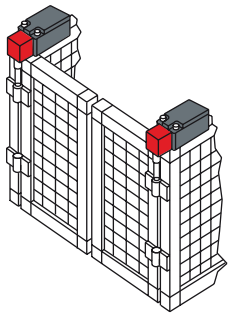
L = slow action

Category	Contact block		
2G M2	20	L	FM 2096-M2-EX7 → 1NO+2NC
Actuating force			0,15 Nm (0,4 Nm →)
Travel diagrams			page 218 - group 9



Application examples





Accessories See page 197

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

Notes

Switches compliant with **ATEX** directive Ⓔx / **FA** series

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

ATEX markings:

Product code extension	Quality mark	Certificate type and notified body
-EX5	CE	EU declaration of conformity Pizzato Elettrica S.r.l.

Technical data

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

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 211-222

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 22.2 No.14, IEC 60079-0, EN 60079-0, IEC 60079-31, EN 60079-31, IEC 60079-15, EN 60079-15.

Compliance with the requirements of:
ATEX Directive 2014/34/EU and EMC Directive 2014/30/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 ⊖ next to 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-tried components) and **D.8** (failure exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 217. 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 on pages 211 to 222 and in the certificate.**

Product code extension	Category	Zone	EPL	Approvals
-EX5	3D	22	Dc	Ⓔx II 3D Ex tc IIIC T80°C Dc
	3G	2	Gc	Ⓔx II 3G Ex nC IIC T6 Gc

Electrical data

Thermal current (I_{th}):	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)

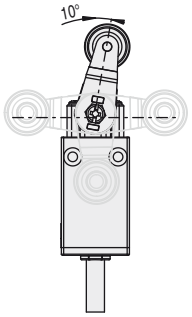
Ue (V)	120	250	400
Ie (A)	6	4	3

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	2.5	0.55	0.27

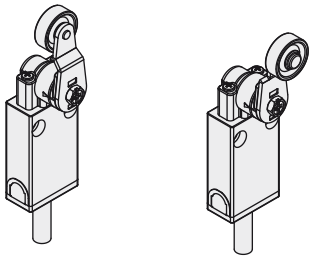
Adjustable levers

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.



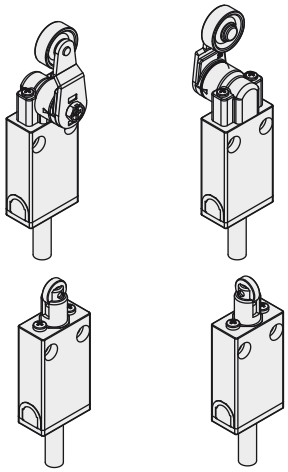
Reversible levers

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.

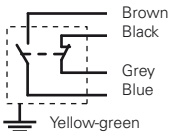


Head with variable orientation

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



Internal wiring



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	
FA	metal

Contact block	
45	1NO+1NC, snap action
46	1NO+1NC, slow action

Actuators	
01	short plunger
02	unidirectional lever
08	plunger
...	.....

Connection type	
1	cable, length: 1 m
2	cable length: 2 m
...	.....
0	cable, length: 10 m

Other lengths on request

Output direction	
S	bottom output

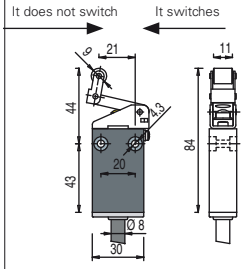
Cable type	
H	PUR cable, halogen free

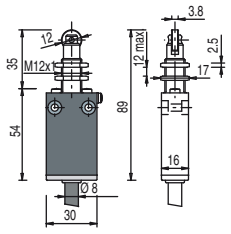
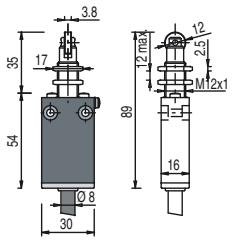
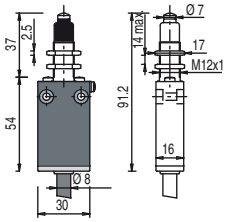
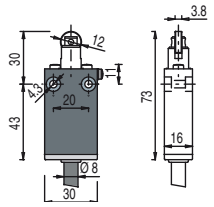
Contact type	
	silver contacts (standard)
G	silver contacts, 1 µm gold coating

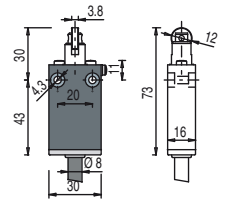
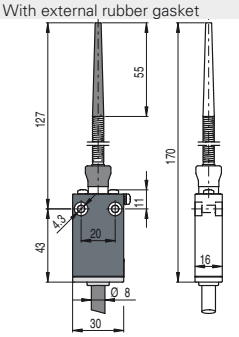
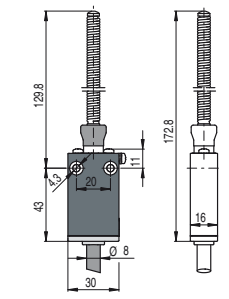
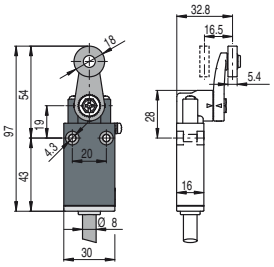
ATEX approval	
-EX5	Ⓔx II 3D Ex tc IIIC T80°C Dc Ⓔx II 3G Ex nC IIC T6 Gc

Switches compliant with **ATEX** directive ⟨Ex⟩ / **FA** series

Contact type:
R = snap action
L = slow action

Category	Contact block					
			Unidirectional operation	With external rubber gasket	Secured only by means of threaded head	
						
3D 3G	45 R	FA 4501-2SH-EX5 → 1NO+1NC	FA 4502-2SH-EX5 → 1NO+1NC	FA 4508-2SH-EX5 → 1NO+1NC	FA 4510-2SH-EX5 → 1NO+1NC	
	46 L	FA 4601-2SH-EX5 → 1NO+1NC	FA 4602-2SH-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	0.5 m/s	
Actuating force		10 N (25 N →)	5 N (25 N →)	10 N (25 N →)	10 N (25 N →)	
Travel diagrams		page 217 - group 1	page 217 - group 2	page 217 - group 1	page 217 - group 1	

Category	Contact block					
			Secured only by means of threaded head	Secured only by means of threaded head	With external rubber gasket	Roller, Ø 12 mm, stainless steel
						
3D 3G	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	
	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 217 - group 1	page 217 - group 1	page 217 - group 1	page 217 - group 1	

Category	Contact block					
			Roller, Ø 12 mm, stainless steel	With external rubber gasket	With external rubber gasket	With Ø 20 mm stainless steel roller on request
						
3D 3G	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	
	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 (0.25 Nm →)	
Travel diagrams		page 217 - group 1	page 217 - group 3	page 217 - group 3	page 217 - group 4	

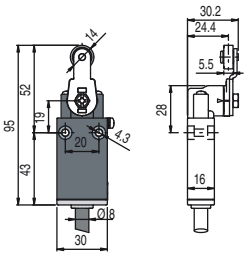
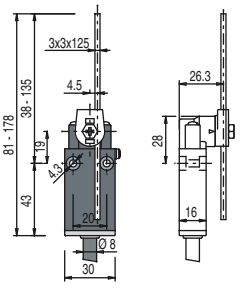
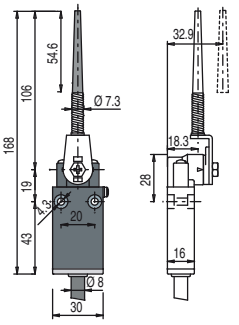
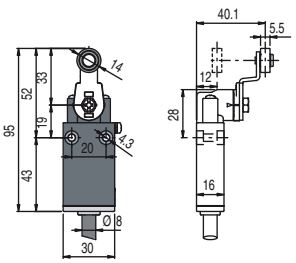
Accessories See page 197

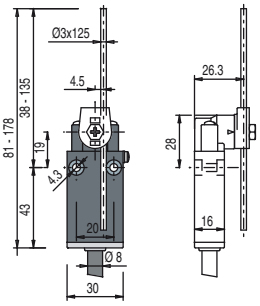
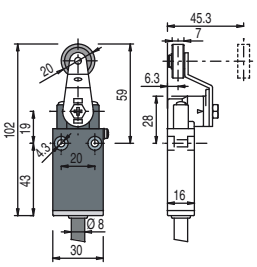
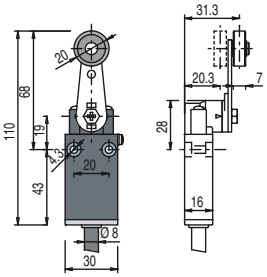
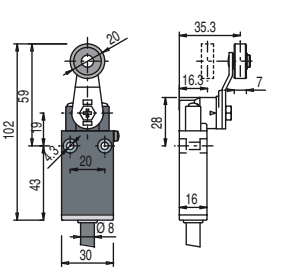
→ The 2D and 3D files are available at **www.pizzato.com**

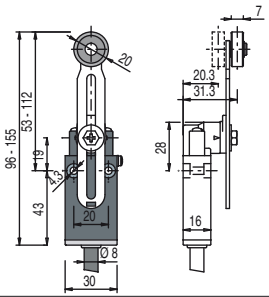
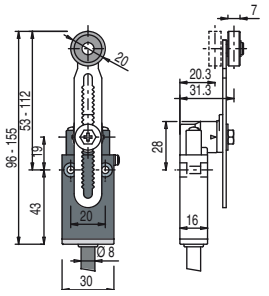
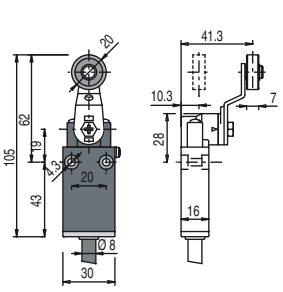
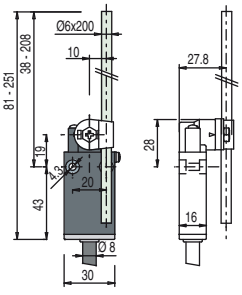
All values in the drawings are in mm

Contact type:

R = snap action
L = slow action

Category	Contact block	With stainless steel roller on request	Square rod, 3x3 mm		With stainless steel roller on request
					
3D 3G	45 R	FA 4531-2SH-EX5 → 1NO+1NC	FA 4533-2SH-EX5 1NO+1NC	FA 4534-2SH-EX5 1NO+1NC	FA 4540-2SH-EX5 → 1NO+1NC
	46 L	FA 4631-2SH-EX5 → 1NO+1NC	FA 4633-2SH-EX5 1NO+1NC	FA 4634-2SH-EX5 1NO+1NC	FA 4640-2SH-EX5 → 1NO+1NC
Max. speed		1.5 m/s with cam at 30°	1.5 m/s	1.5 m/s	1.5 m/s with cam at 30°
Actuating force		0.03 Nm (0.25 Nm →)	0.03 Nm	0.03 Nm	0.03 Nm (0.25 Nm →)
Travel diagrams		page 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

Category	Contact block	Round rod, Ø 3 mm, stainless steel	With stainless steel roller on request	With stainless steel roller on request	With stainless steel roller 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 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

Category	Contact block	With stainless steel roller on request	With stainless steel roller on request	With stainless steel roller on request	Glass fibre rod
					
3D 3G	45 R	FA 4555-2SH-EX5 →(1) 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 →(1) 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 217 - group 4	page 217 - group 4	page 217 - group 4	page 217 - group 4

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

Accessories See page 197

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

All values in the drawings are in mm

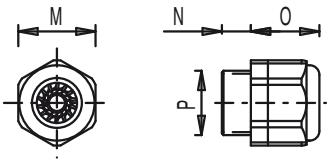
Accessories

All values in the drawings are in mm

ATEX cable gland, technopolymer

Technical data:

ATEX marking:	Ⓔx II 2G 1D Ex e II tD A20 IP68
Body and ring material:	Plastic PA V0 acc. to UL 94
Ambient temperature:	-20 … +95 °C
Protection degree:	IP68 (≤ 10 bar)
Tightening torque:	3 … 4 Nm

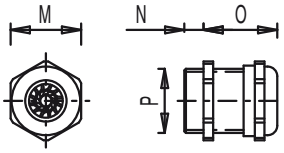


Article	Description	ATEX certificate number	⬡M	N	O	P
VF PBM20C6P-2GD	M20x1.5 technopolymer cable gland for multipolar cables Ø 6.5 … 12 mm	DMT 02 ATEX E 047 X	24	9	24	M20x1.5

ATEX cable gland, metal

Technical data:

ATEX marking:	Ⓔx II 2G Ex e II Ⓔx II 1D Ex tD A20 IP68
Body and ring material:	Nickel-plated brass
Ambient temperature:	-20 … +95 °C
Protection degree:	IP68 (≤ 10 bar)
Tightening torque:	3 … 4 Nm



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

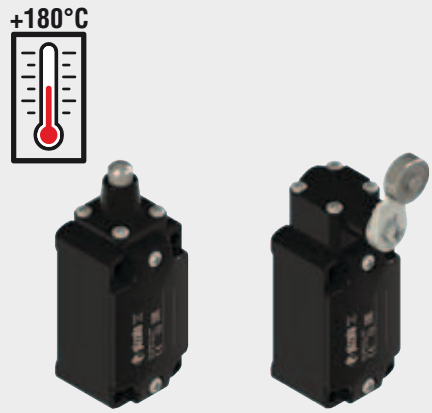
Items with code on **green** background are stock items

Accessories See page 197

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

Notes

FD series position switches for high temperatures



Main features
- Operating temperature up to +180°C
- Metal housing, one conduit entry
- Protection degree IP67

Technical data

Housing

Metal housing, powder-coated	
One threaded conduit entry:	M20 x 1.5
Protection degree:	IP67 acc. to EN 60529 with cable gland presenting same or higher protection degree

General data

Ambient temperature:	-15°C … +180°C for FD 2011-M2T2 and FD 2016-M2T2 articles -25°C … +180°C for all other articles
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	1 million operating cycles
Mounting position:	any
Safety parameter B_{10D}:	2,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 acc. to EN ISO 14119
Tightening torques for installation:	see page 211-222
Fixing screws for the housing:	M5 with spring washer

Cable cross section (flexible copper strands)

Contact block 20:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)

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 22.2 No.14.

Quality marks:

EAC approval: RU C-IT.АД35.Д00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊖ next to 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 214. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

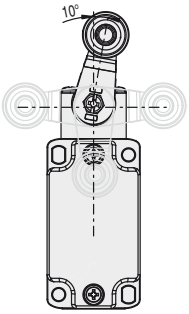
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

Electrical data

			Utilization category
Ambient temperature +20 °C	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Rated impulse withstand voltage (U_{imp}):	4 kV	Ie (A) 4 4 4
	Conditional short circuit current:	1000 A acc. to EN 60947-5-1	Direct current: DC13
	Protection against short circuits:	type gG fuse 4 A 250 V	Ue (V) 24 125 250
	Pollution degree:	3	Ie (A) 4 1.1 0.4
Ambient temperature +180 °C	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	Ue (V) 24 120 250
	Protection against short circuits:	type gG fuse 4 A 250 V	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 1

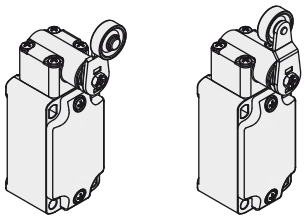
Adjustable levers

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.



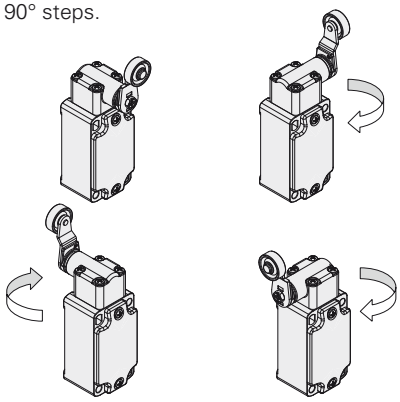
Reversible levers

Negli interruttori a leva girevole è possibile fissare la leva dritta o rovescia mantenendo l'accoppiamento positivo.
In questo modo si possono avere due diversi piani di lavoro della leva.



Head with variable orientation

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



Dimensional drawings

All values in the drawings are in mm

Contact type:
L = slow action

Contact block

20 L	FD 2011-M2T2 1NO+2NC	FD 2016-M2T2 1NO+2NC	FD 2031-M2R24T2 1NO+2NC	FD 2032-M2T2 1NO+2NC
Max. speed	page 213 - type 4	page 213 - type 2	page 213 - type 1	1.5 m/s
Actuating force	8 N (25 N)	8 N (25 N)	0.1 Nm (0.25 Nm)	0.1 Nm
Travel diagrams	page 214 - group 1	page 214 - group 1	page 214 - group 4	page 214 - group 4

Contact type:
L = slow action

Contact block

20 L	FD 2033-M2T2 1NO+2NC	FD 2056-M2R24T2 1NO+2NC	FD 2057-M2R24T2 1NO+2NC	FD 2038-M2T2 1NO+2NC
Max. speed	1.5 m/s	page 213 - type 1	page 213 - type 1	/
Actuating force	0.1 Nm	0.1 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)	0.1 Nm (0.25 Nm)
Travel diagrams	page 214 - group 4	page 214 - group 4	page 214 - group 4	page 214 - group 4

Special separate actuators

All values in the drawings are in mm

Stainless steel roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Stainless steel roller Ø 20 mm	Stainless steel roller Ø 20 mm	Adjustable actuator with Ø 20 mm stainless steel rollers	Stainless steel roller Ø 20 mm
VF L31-R24T2	VF L32-T2	VF L33-T2	VF L51-R24T2	VF L52-R24T2	VF L56-R24T2	VF L57-R24T2

IMPORTANT

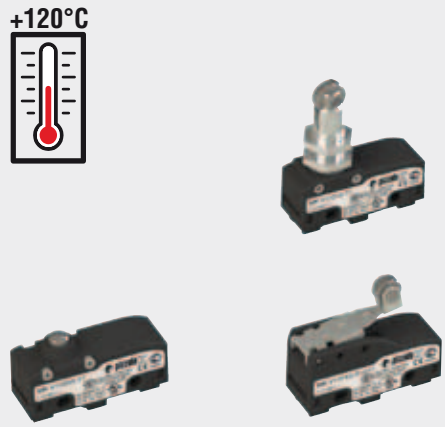
For safety applications: join only switches and actuators marked with symbol next to the product code.

Accessories See page 197

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

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

MK series microswitches for high temperatures



Main features
- Operating temperature up to +120°C
- Technopolymer housing
- High reliability contacts
- 4 terminal types available
- 15 actuators available
- Versions with positive opening ⊖
- Versions with gold-plated silver contacts

Technical data

Housing
Housing made of glass fibre reinforced technopolymer, self-extinguishing and shock-proof.

Protection degree:	IP00 (terminals) IP40 (electrical contacts) acc. to EN 60529

General data

Ambient temperature:	-25°C … +120°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	500,000 operating cycles
Safety parameter B_{10D}:	1,000,000 for NC contacts
Tightening torques for installation:	see page 184

Cable cross section (flexible copper strands)

MK series:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max	2 x 1.5 mm²	(2 x AWG 16)

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529, EN 60947-1, IEC 60947-1

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/EU.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Quality marks:

UL approval:	E131787
EAC approval:	RU C-IT.АД35.B.00454

Installation for safety applications:
Use only microswitches marked with the symbol ⊖ next to the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts) 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** (failure exclusions) for safety applications in general. Actuate the switch **at least up to the positive opening travel (CAP)** reported next to the article code. Actuate the switch **at least with the positive opening force (FAP)** reported next to the article code.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

Electrical data

Ambient temperature +20 °C

Thermal current (I_{th}):	16 A
Rated insulation voltage (U_i):	250 Vac 300 Vdc
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Protection against short circuits:	type gG fuse 16 A 250 V
Pollution degree:	3
Dielectric strength	2000 Vac/min.

Utilization category

Alternating current: AC15 (50 … 60 Hz)

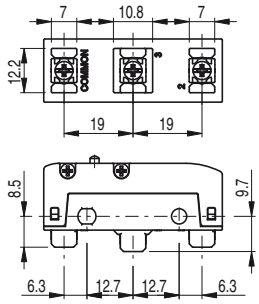
Ue (V)	120	250
Ie (A)	3	2

Direct current: DC13

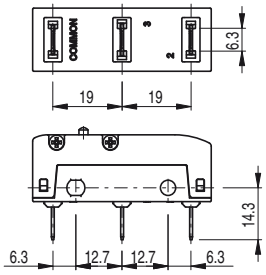
Ue (V)	24	125
Ie (A)	2	0.5

Terminal dimensions

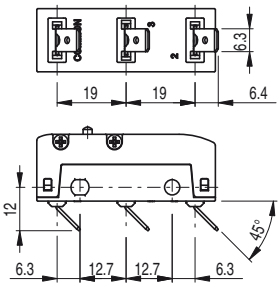
All values in the drawings are in mm



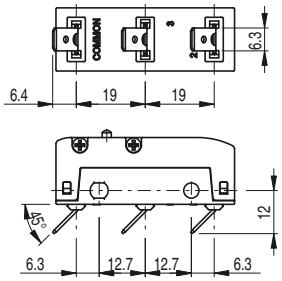
Screw terminals **V** with plate



Faston terminals **H**, vertical



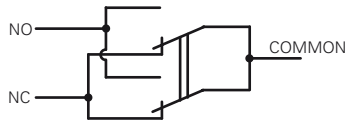
Faston terminals **F**, right angle



Faston terminals **G**, left angle (on request)

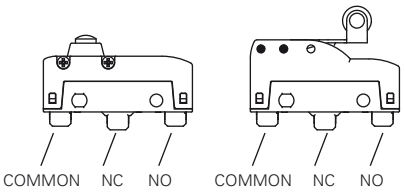
Note: The vertical faston terminals H can be bent according to specific installation requirements.
We recommend to bend the faston with an angle not higher than 45° and to carry out this operation no more than 5 times.

Circuit diagram

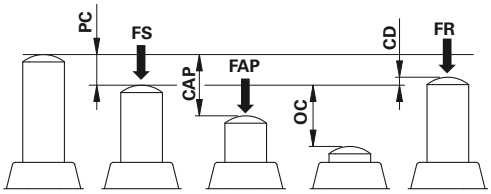


Mobile contact with single interruption and double contacts

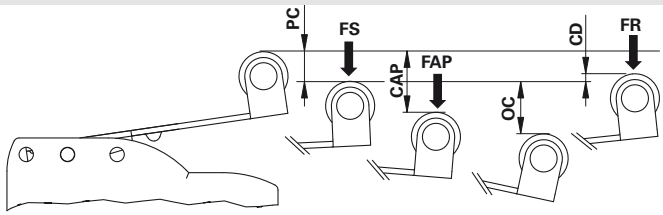
With direct actuation and direct actuation at the back (F, D)



Actuation forces and travels



PC pre-travel
CAP positive opening travel
OC over-travel
CD differential travel



FS Trigger force
FR release force
FAP positive opening force

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

MK V11D40-GR16T7

Terminal type	
V	screw with self-lifting plate
H	vertical faston
F	Faston, 45° bend to the right
G	Faston, 45° bend to the left (on request)

Ambient temperature	
T7	-25°C … +120°C

Rollers	
	standard roller
R16	metal roller Ø 9.5x4 mm (for actuators 40, 42 ,45, 59 only)

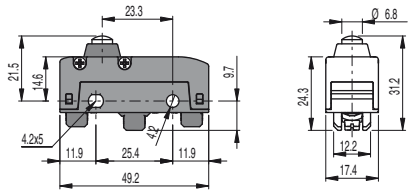
Contact block	
1	1NO+1NC, snap action, change-over

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

Actuator	
05	low plunger
06	threaded plunger
08	threaded plunger
..	.....

Type of actuation	
D	direct actuation
F	direct actuation at the back

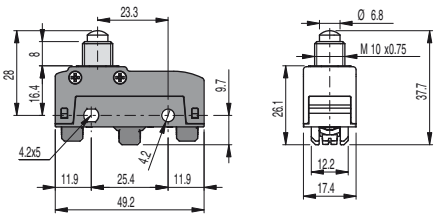
MK series microswitches for high temperatures



MK V11D05-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	2 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

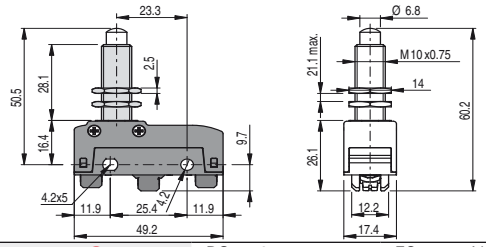
Maximum and minimum speed see page 221 - type 1



MK V11D06-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	3 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

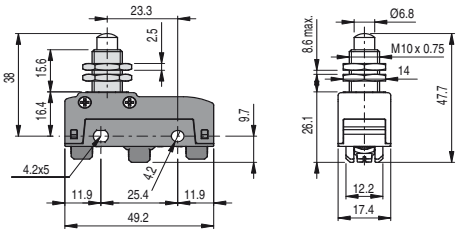
Maximum and minimum speed see page 221 - type 1



MK V11D08-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

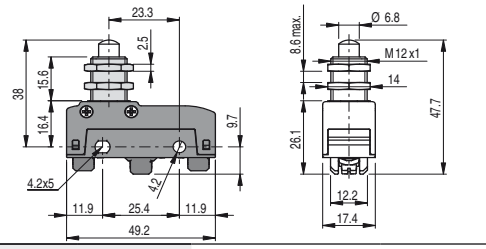
Maximum and minimum speed see page 221 - type 1



MK V11D09-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

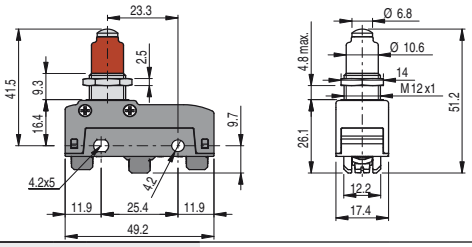
Maximum and minimum speed see page 221 - type 1



MK V11D10-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 1

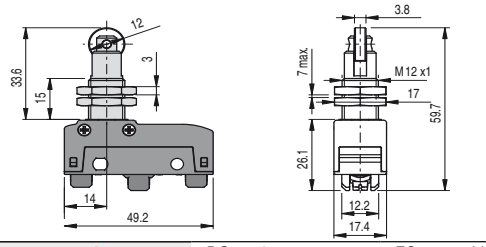


MK V11D12-T7 1NO+1NC

PC	0,5 mm	FS	4,5 N
OC	5,5 mm	FR	3 N .
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 1

Mounting only through threaded fitting

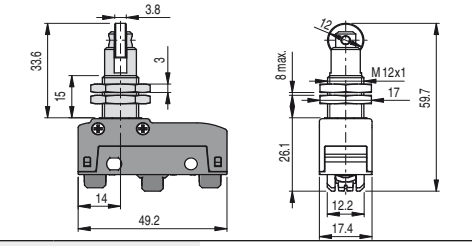


MK V11D15-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N .
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

Maximum and minimum speed see page 221 - type 2

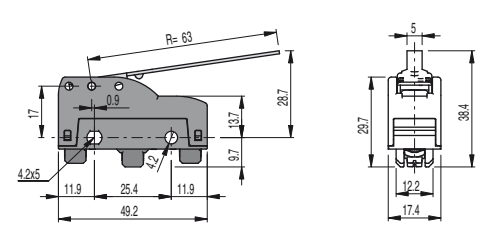
Mounting only through threaded fitting



MK V11D17-T7 1NO+1NC

PC	0,5 mm	FS	4 N
OC	5,5 mm	FR	3 N
CD	0,05 mm	FAP	20 N
CAP	2,2 mm		

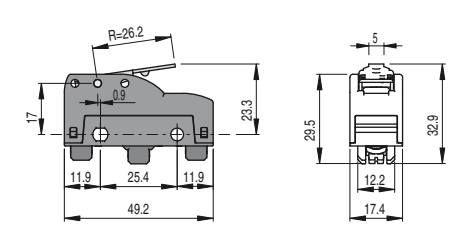
Maximum and minimum speed see page 221 - type 2



MK V11D30-T7 1NO+1NC

PC	11,5 mm	FS	0,65 N
OC	7,6 mm	FR	0,5 N
CD	1,1 mm		

Maximum and minimum speed see page 221 - type 3



MK V11D31-T7 1NO+1NC

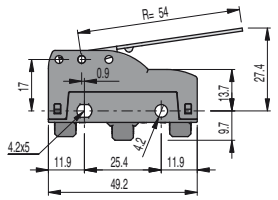
PC	4,6 mm	FS	1,66 N
OC	3,8 mm	FR	1,32 N
CD	0,4 mm		

Maximum and minimum speed see page 221 - type 3

Accessories See page 197

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

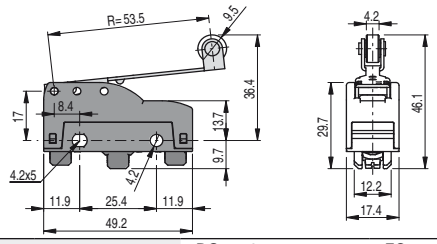
All values in the drawings are in mm



MK V11D32-T7 1NO+1NC

PC	9,1 mm	FS	0,76 N
OC	7,1 mm	FR	0,58 N
CD	0,9 mm		

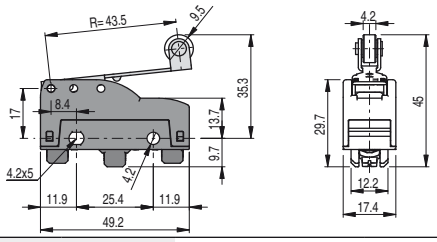
Maximum and minimum speed see page 221 - type 3



MK V11F40-R16T7 1NO+1NC

PC	2,1 mm	FS	0,85 N
OC	8,3 mm	FR	0,65 N
CD	0,25 mm		

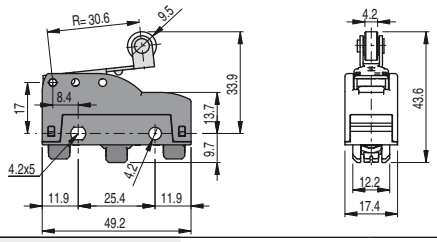
Maximum and minimum speed see page 221 - type 8



MK V11F42-R16T7 1NO+1NC

PC	1,8 mm	FS	1 N
OC	6,7 mm	FR	0,7 N
CD	0,2 mm	FAP	4,9 N
CAP	9 mm		

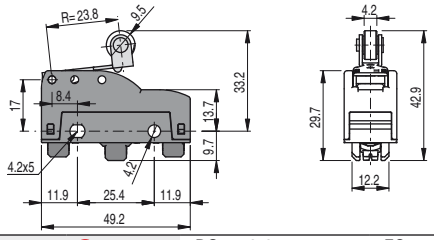
Maximum and minimum speed see page 221 - type 8



MK V11F45-R16T7 1NO+1NC

PC	1,1 mm	FS	1,3 N
OC	4,9 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

Maximum and minimum speed see page 221 - type 8

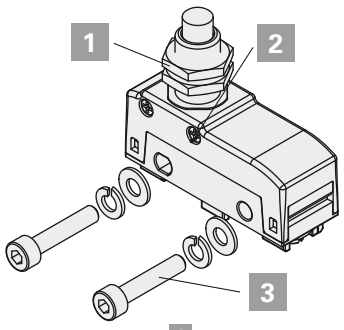


MK V11F59-R16T7 1NO+1NC

PC	0,8 mm	FS	1,7 N
OC	4,5 mm	FR	1,3 N
CD	0,08 mm	FAP	8,9 N
CAP	4,9 mm		

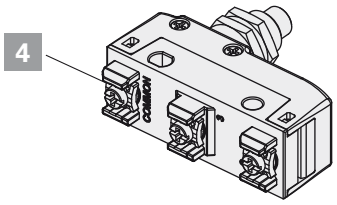
Maximum and minimum speed see page 221 - type 8

Tightening torques



Tighten the nuts 1 with a torque of **2** … **3** Nm.
Tighten the head screws 2 with a torque of **0.4** … **0.5** Nm.
Tighten the screws 3 M4 with a torque of **0,8** … **1,2** Nm, placing a flat washer and a spring washer.

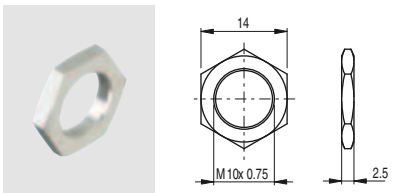
Attention: Using a tightening torque higher than 1.2 Nm could damage the microswitch. Mount on smooth surfaces only.



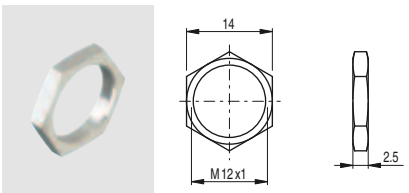
Tighten the terminal screws 4 with a torque of **0,6** … **0,8** Nm.

Accessories

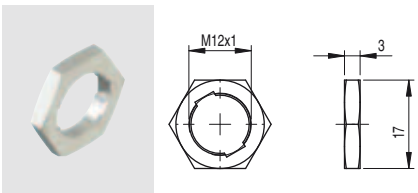
Packs of **10 pcs.**



Article	Description
VF AC83	Hex threaded nut for microswitches with actuators D06, D08, D09



Article	Description
VF AC72	Hex threaded nut for micro-switches with actuators D10, D12, D13



Article	Description
AC 35	Hex threaded nut, notched, for microswitches with actuators D15, D16

Electronic contact blocks for position switches

Main features
- Adjustable operating point
- Bounce-free output signals
- Two static outputs, 1NO and 1NC
- Reduced actuating force
- Signal LEDs for power supply and switching
- Minimum differential travel

Quality marks:

EAC approval: RU C-IT.АД35.B.00454

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU,
EMC Directive 2014/30/EU.

Description

E1 is an electronic contact block, designed to replace the traditional mechanical contact block installed inside Pizzato Elettrica's position switches. The combination provided by the union of the mechanical body and sensor head of the position switches and this electronic contact block forms a mechatronics device that increases the application range of position switches.

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Adjustable operating distance:	0.2 … 2 mm or 2° … 30°
Differential travel:	< 0.1 mm o < 1°
Tightening torques for installation:	see page 211-222

Electrical data

Rated operating voltage (Ue):	10 … 30 Vdc
Rated operating current (Ie):	200 mA
Utilization category:	DC13, 24V 0,2A
Rated insulation voltage (Ui):	30 V
Pollution degree:	3
Conditional short circuit current:	100 A
Voltage drop (Ud):	2 V
Minimum operating current (Im):	0 mA
Current in locked state (Ir):	0.05 mA
Maximum residual ripple:	10%
Current consumption w/o load (Io):	< 10 mA
Short-circuit protection:	yes
Reverse-polarity protection:	yes
Output type:	PNP
LED, power supply:	yes
LED, switching:	yes
Protection fuse:	315 mA, fast

Cable cross section (flexible copper strands)

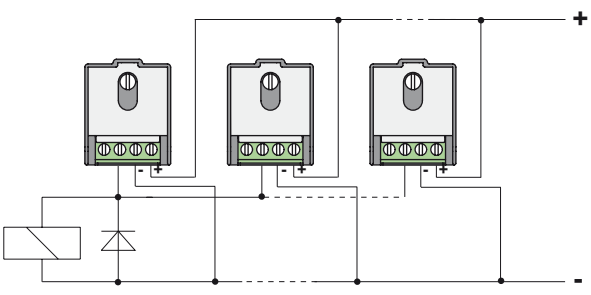
Contact block E1:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	1 x 2.5 mm²	(1 x AWG 14)

In compliance with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

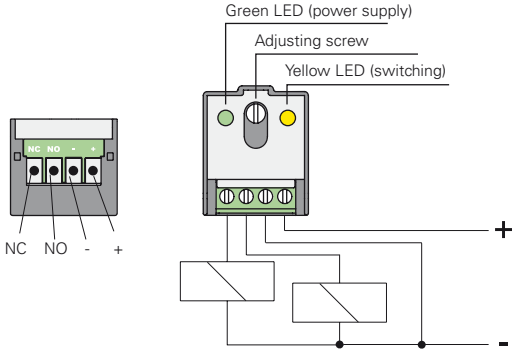
Parallel connection of several units E1 (OR)

For connecting the switches in parallel (OR) no particular protective measures are required. We recommend the installation of a commercially available diode for use with inductive loads (relays).



Wiring diagram

The wires are connected via a terminal strip where the function of the individual poles is marked by silk screen printing. Furthermore there are two signal LEDs, one for power supply and one for switching state.



Main features

The E1 contact block consists of an optical detection system for the position of the mechanical actuator with the following features:

1) Possibility of adjusting the switching point by means of a screw, directly on the contact block. The regulation screw is located on the contact unit cover so that the switching point can be set with the switch installed in its final position with open lid and without having to remove the contact block.
2) Differential travel below 0.1 mm, guaranteed over the entire operating temperature range.
3) Reduced actuating force.
4) Two static outputs, 1NO + 1NC, simultaneous, PNP, short circuit protected.
5) Bounce-free output signal.
6) Wide operating temperature range.
7) Signal LEDs for power supply and switching.

These features allow to resolve e.g. following issues:

1) Problems due to contact bounces or very low voltages when connecting position switches to PLCs.
2) Detection of light objects that require a contact block with high sensibility and reduced actuating forces.
3) When it is necessary to detect very small objects that require low differential travels.
4) When it is required to adjust the operating point. The internal LED precisely shows the switching point directly at the switch when you turn the adjusting screw.
5) In cases where the perfectly simultaneous switching of the two outputs is required.
6) Detection of transparent objects or in any case where there are difficulties with normal sensors, taking into account that specialised sensors typically cost much more than this mechatronics device.

Series connection of several E1 units (AND)

When connecting the switches in series (AND), following conditions must be fulfilled:
The output current of the first switch is the sum of the load current and the maximum currents absorbed by the other switches. Considering then the connection of the *n* switches, the nominal operating current "*Ie*" becomes:

$Ie = (200\text{-}20 \times n)$ mA

Provided that *Ie*: rated operating current
n: number of switches connected in series

Example: with 3 switches it is possible to switch up to 140 mA.

Each switch causes a voltage drop in the connected-through state. The load must be suitable to operate at a voltage of:

$Uc = Ua - 2 \times n$

Provided that *Uc:* rated operating voltage of the load
Ua: used supply voltage
n: number of switches connected in series

Example: with 3 switches powered at 24 Vdc, the load must be able to work at 18 Vdc.

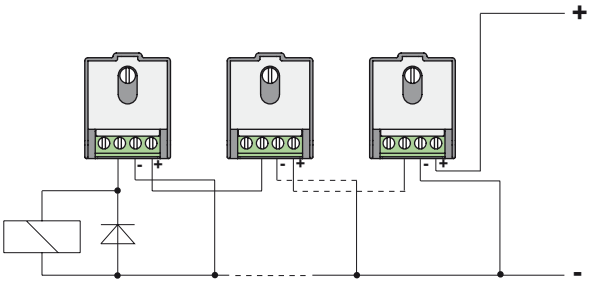
The maximum number of switches that can be connected in series depends on the supply voltage used. In any case, the number should be lower than:

$$no._{max.} \leq \frac{Va - 10}{2} + 1$$

Provided that $no._{max.}$: max. number of switches for series connection
Va: supply voltage used

Example: at 24 Vdc it is possible to connect up to 7 switches. At 30 Vdc it is possible to connect up to 11 switches

We recommend the installation of a commercially available diode for use with inductive loads (relays).



Recommended installation

These switches are protected against electric interference of industrial environment. When used under extreme conditions, as for example installed close to high surge voltages (electric motors, welding machines, etc.), it is advisable to adopt the following precautions:

- Eliminate disturbances at the source;
- Filter the DC power supply with adequate capacitor;
- Separate the power cables from the switch cables;
- Limit the cable length to max. 200 m.

It is equally important to take into account the voltage drops along the supply lines;
Reconnect and shield outgoing signal cables or use a shielded twisted-pair cable with suitable cross sections.

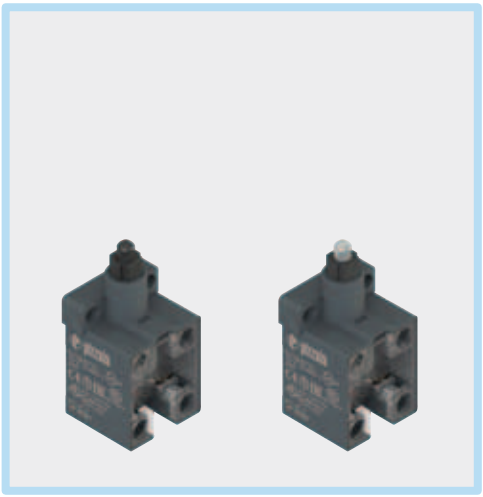
Special loads

The switch is protected against overload and short-circuit, hence, it is required to limit possible load inrush currents. Typical examples are capacitors that require high current pulses during their charging and incandescent lamps whose resistance in cold state can be the tenth of the resistance in hot state. For capacitive loads, whenever necessary, connect a limiting resistance in series, while for lamps, whenever necessary, use a special preheating resistance.

Limits of use

- **Not suitable for installations for safety applications.**
- Suitable for FD, FP, FL, FR, FM, FX and FZ series position switches only.

Position switches for **indoor use**



Main features

- Technopolymer housing
- Protection degree IP20 (terminals), IP40 (contacts)
- 14 contact blocks available
- Actuators with plastic or metal button
- Contact block with positive opening ⊕
- For internal use in PA, PX, PC series foot switches

Quality marks:

UL approval:	E131787
CCC approval:	2013010305600704
EAC approval:	RU C-IT.АД35.В.00454

Technical data

Housing

Housing made of glass fibre reinforced technopolymer, self-extinguishing and shock-proof

Protection degree:	IP20 (terminals), IP40 (contacts) acc. to EN 60529

General data

Ambient temperature:	-40°C … +80°C
Safety parameter B_{10D}:	40,000,000 for NC contacts
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	20 million operating cycles
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s (slow action) 0.01 mm/s (snap action)
Tightening torques for contact block screws:	0.6 … 0.8 Nm

Cable cross section (flexible copper strands)

Contact blocks
5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 18, 37, 66, 67.

min.1 x 0.5 mm^2 (1 x AWG 20)
max. 2 x 2.5 mm^2 (2 x AWG 14)

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 22.2 No. 14 .
Approvals:
UL 508, CSA 22.2 No. 14, EN 60947-1, EN 60947-5-1

Compliance with the requirements of:
Low Voltage Directive 2014/35/EU, EMC Directive 2014/30/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 ⊕ next to 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 table 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** reported in the travel diagrams. Actuate the switch **at least up to the positive opening force**, reported in brackets below each article, aside the minimum force value.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

Electrical data

Thermal current (I_{th}):	10 A
Rated insulation voltage (U_i):	500 Vac 600 Vdc
Rated impulse withstand voltage (U_{imp}):	6 kV
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)

Ue (V)	250	400	500
Ie (A)	6	4	1

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	6	1.1	0.4

Features approved by UL

Utilization categories	Q300 (69 VA, 125-250 Vdc) A600 (720 VA, 120-600 Vac)
Housing data:	opEN type

For all contact blocks use 60 or 75 °C copper (Cu) conductors, rigid or flexible, wire size AWG 12-14. Terminal tightening torque of 7.1 lb in (0.8 Nm).

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

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

Description

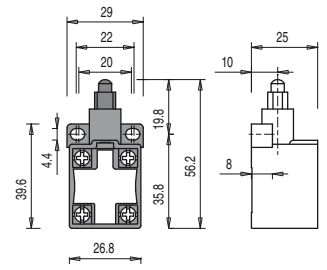
Contact block with captive screws, finger protection and self-lifting clamping screw plates. Provided with positive opening NC contacts for safety applications. Provided with twin bridge contacts, they are particularly suitable for high-reliability applications. Suitable for installation inside PA, PX and PC series foot switches.

Dimensional drawings

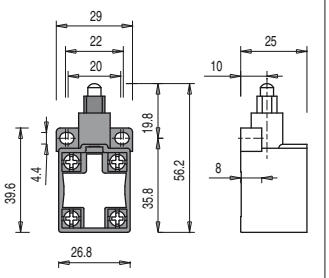
All measures in the drawings are in mm

Contact type:

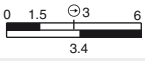
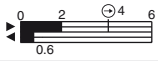
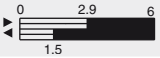
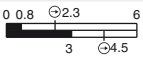
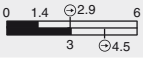
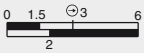
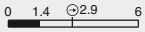
- R = snap action
- L = slow action
- LO = slow action make before break
- LS = slow action shifted
- LV = slow action shifted and spaced
- LA = slow action **closer**



Technopolymer button



Metal button

Contact block		Technopolymer button		Metal button		Travel diagrams
5	R	VF B501	1NO+1NC	VF B502	1NO+1NC	
6	L	VF B601	1NO+1NC	VF B602	1NO+1NC	
7	LO	VF B701	1NO+1NC	VF B702	1NO+1NC	
9	L	VF B901	2NC	VF B902	2NC	
10	L	VF B1001	2NO	VF B1002	2NO	
11	R	VF B1101	2NC	VF B1102	2NC	
12	R	VF B1201	2NO	VF B1202	2NO	
13	LV	VF B1301	2NC	VF B1302	2NC	
14	LS	VF B1401	2NC	VF B1402	2NC	
15	LS	VF B1501	2NO	VF B1502	2NO	
18	LA	VF B1801	1NO+1NC	VF B1802	1NO+1NC	
37	L	VF B3701	1NO+1NC	VF B3702	1NO+1NC	
66	L	VF B6601	1NC	VF B6602	1NC	
67	L	VF B6701	1NO	VF B6702	1NO	
Max. speed		0,5 m/s		0,5 m/s		
Actuating force		8 N (20 N ⊕)		8 N (20 N ⊕)		

Legend

Closed contact | Open contact | ⊕ Positive opening travel acc. to IEC 60947-5-1 | ► Pushing the switch / ◄ Releasing the switch

Code structure

article + options

VF B501-G

Contact block	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, make before break
9	2NC, slow action
10	2NO, slow action
11	2NC, snap action
12	2NO, snap action
...	.....

Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating
G1	silver contacts with 2.5 µm gold coating

Actuators	
01	with technopolymer button
02	with metal button

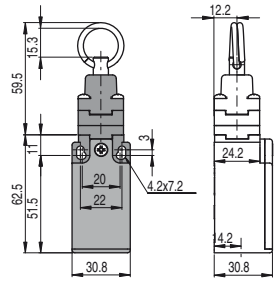
Items with code on **green** background are stock items

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

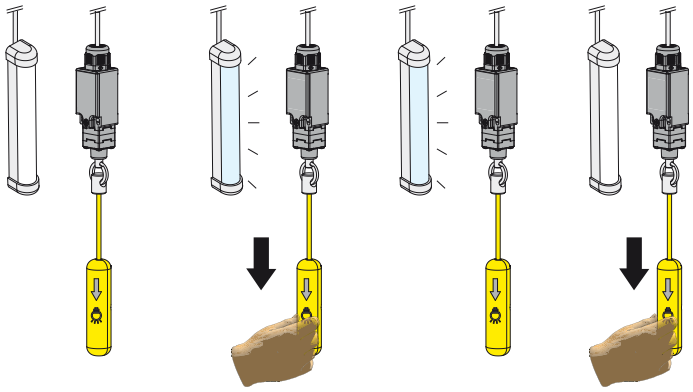
FR 573-M2 signal switches with persistent contact

Contact type:

R = snap action



Contact block			
5	R	FR 573-M2	1NO+1NC
11	R	FR 1173-M2	2NO
12	R	FR 1273-M2	2NC
Max. speed		0.5 m/s	
Actuating force		initial 20 N - final 40 N	



The switch is operated by traction of a rope connected to it and retains its state after actuation.

This means that the first actuation closes the contacts, the next actuation opens them and so on.

This solution has been specifically designed to be applicable in all those situations where a floating switch is usually used to control a stepping relay, such as, for example, a device for switching on and off lights in rooms or for the opening / closing of gates.

Thanks to the retained actuation state, the first traction on the rope will enable, for example, the switching on of an illumination system, which can then be switched off by a subsequent traction.

The use of the switch alone makes the combinations of stepping relays and associated wiring unnecessary, greatly simplifying installation.

For more information see the General Catalogue Lifts by Pizzato Elettrica.

FT series switches with electrical reset

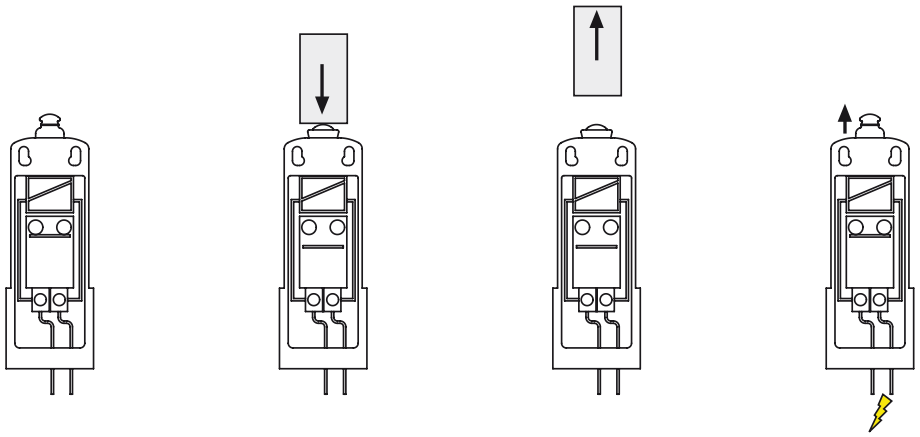
The FT series safety switches with reset retain their switching state when operated: their reset occurs electrically through the integrated solenoid. Thanks to this special feature, the switch can be remotely reset without having to go physically near it.

Available with 3 supply voltages of the solenoid (24 Vdc, 48 Vdc, 230 Vac) and with multiple actuators, the FT series switches are able to adapt to a wide variety of applications, particularly in the area of lifts, speed limiters and, more generally, in the world of security. Some models may also be manually reset.

Pizzato Elettrica has also introduced a new adjustment system integrated into the switch. It is designed specifically for speed limiter applications and allows a very fine and sensitive setting of the switch position along its vertical axis.

For more information see the General Catalogue Lifts 2017-2018 by Pizzato Elettrica.

Operating principle



Switch in rest position

Actuation of the switch. Opening of the contacts

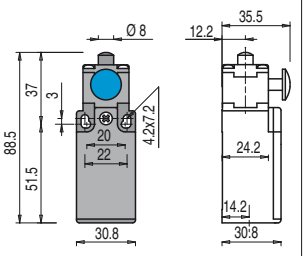
Release of the switch. The contacts remain open

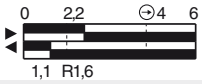
Reset of the switch via electric impulse

Switches for switching cabinets - FR 5F1-M2, FR 10F1-M2

Contact type:

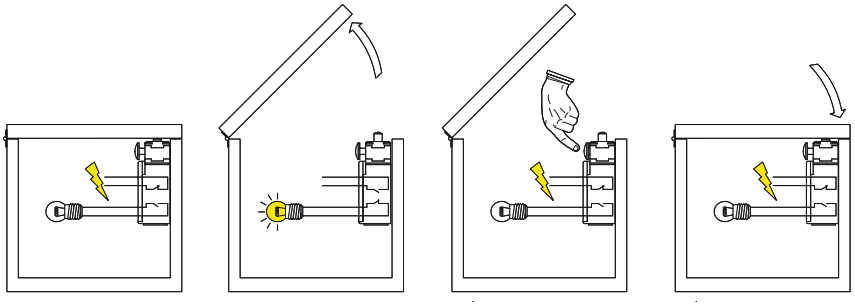
R = snap action
L = slow action



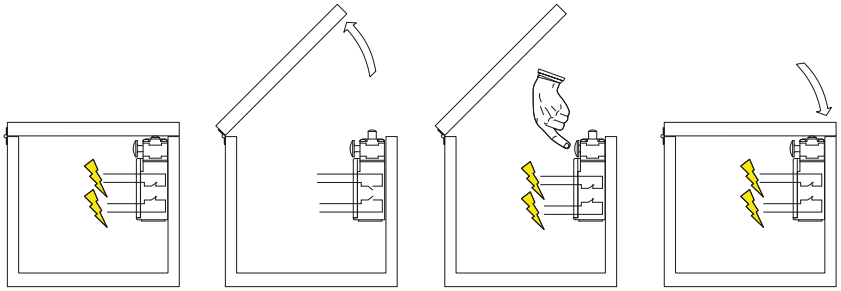
Contact block			
5	R	FR 5F1-M2	1NO+1NC
			
10	L	FR 10F1-M2	2NO
			
Max. speed		page 215 - type 4	
Actuating force		8 N (25 N ⊕)	

The FR 5F1-M2, FR 10F1-M2 switches are applied on electrical panel doors and are used when opening the door to turn on any signalling devices (e.g. three-phase flashing, etc.). Maintenance personnel of the panel can simulate the closing of the door by pressing the blue button. When maintenance is performed by simply closing the switching cabinet door, the switch functionality will be automatically reset.

FR 5F1-M2 operating principle



FR 10F1-M2 operating principle

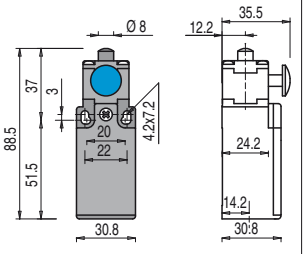


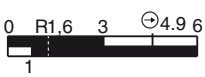
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

Switches for switching cabinets - FR 37F1-M2

Contact type:

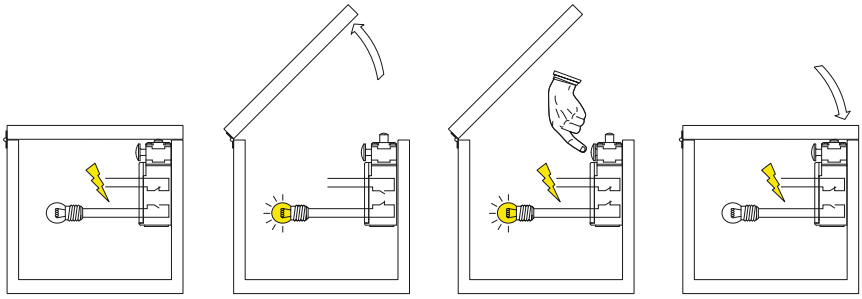
L = slow action



Contact block			
37	L	FR 37F1-M2	1NO+1NC
			
Max. speed		page 215 - type 4	
Actuating force		8 N (25 N ⊕)	

The present switch and the one described above have a similar operation principle.
Pressing the switch button simulates the closing of the door powering the auxiliary circuit again while still leaving the light on that will only be turned off when the door is closed.

FR 37F1-M2 operating principle



⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

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

Switches with external parts in **stainless steel**

Description

Pizzato Elettrica offers a wide range of products suitable for places where chemical and corrosive agents are used and for aseptic places where particular attention must be paid to cleanliness and hygiene.
The technopolymer housings and external metal parts in stainless steel allow these devices to be used for a variety of applications, ranging from the food and pharmaceutical sectors to the chemical and marine sectors.

Main features:

- Technopolymer housings
- External metallic parts exclusively in stainless steel
- Protection degree IP67 (FR, FX, FK, FW, FP series switches)
- Protection degree IP67 and IP69K (SR, ST, HX series sensors)

Resistance against corrosion

Substance	Stainless steel	Technopolymer
Acetylene	■	■
Vinegar	■	■
Acetone	■	■
Acetic acid	■	□
Boric acid	■	■
Citric acid	■	■
Hydrochloric acid 100%	□	□
Chromic acid 5%	■	□
Hydrofluoric acid 100%	■	□
Formic acid	■	□
Phosphoric acid (<40%)	◘	■
Lactic acid	■	■
Nitric acid (concentrated)	■	□
Oleic acid	■	■
Sulphuric acid (<10%)	■	◘
Sulphuric acid (10-75%)	□	□
Sulphuric acid (75-100%)	□	□
Stearic acid	■	■
Tartaric acid	◘	■
White water	■	■
Sea water	◘	■
Distilled water	■	■
White spirit	■	■
Ethyl alcohol	■	■
Methyl alcohol	■	■
Liquid ammonia	■	■
Ammonium acetate	■	■
Ammonium carbonate	■	■
Ammonium sulfate	■	■
Leaded petrol	■	■
Unleaded petrol	■	■
Benzol	■	□
Beer	■	■
Butane	■	■
Butanol	■	■
Quicklime	■	■
Calcium chloride	■	■
Calcium hydroxide	■	■
Chloroform	■	■
Aluminium chloride	■	■
Ferrous chloride	□	□
Chrome plating	◘	◘
Diesel	■	■
Ether	■	■
Formaldehyde 100%	■	□
Furfural	■	■
Gelatine	■	■
Glycerine	■	■
Glucose	■	■
Shellac (orange)	■	■
Hydrogen (gas)	■	■
Iodine	□	■
Milk	■	■
Magnesium chloride	□	■
Magnesium hydroxide	■	■
Magnesium sulphate (Epsom salt)	■	■
Mayonnaise	■	■

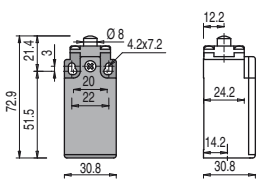
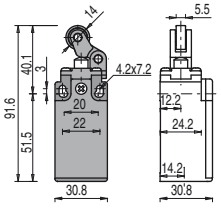
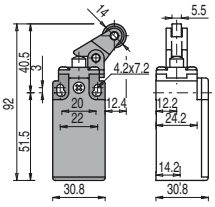
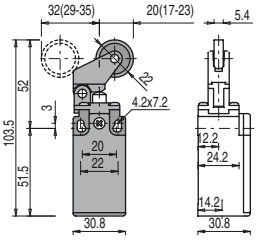
Substance	Stainless steel	Technopolymer
Whisky malt	■	■
Molasses	■	■
Nickel chloride	◘	◘
Aluminium nitrate	■	■
Combustible oils	■	■
Tanning oil	■	-
Linseed oil	■	■
Hydraulic oil (synthetic)	■	■
Mineral Oil	■	■
Motor Oil	■	■
Transformer oil	■	■
Paraffin	■	■
Potassium chloride	■	■
Potassium hydroxide (caustic potash)	■	◘
Potassium sulphate	■	■
Propane (liquid)	■	■
Copper sulphate >5%	■	□
Liquid soaps	■	■
Chocolate syrup	■	■
Milk whey	■	-
Sodium bicarbonate	■	■
Sodium bisulphate	◘	■
Sodium carbonate	■	■
Sodium chloride	■	■
Sodium hydroxide (80%)	■	◘
Sodium hypochlorite (100%)	□	□
Sodium nitrate	■	■
Sodium sulphate	■	■
Sodium sulphide	□	■
Aluminium sulphate	■	■
Ferrous sulphate	■	■
Calcium hydroxide	□	■
Potassium hydroxide	■	■
Sodium hydroxide	-	■
Tanning solutions	■	■
Photographic solutions	-	■
Fruit juice	■	■
Vegetable juice	■	■
Toluene	■	◘
Transparent (paint)	■	-
Trichloroethylene	■	■
Whisky and wine	■	■
Zinc plate	◘	□
Zinc chloride	■	■
Zinc sulphate	-	■
Sulphur chloride	■	■
Sugar (liquid)	■	■
Sugar beet	■	■

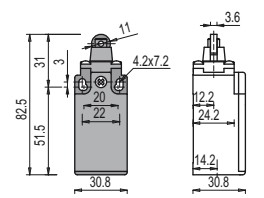
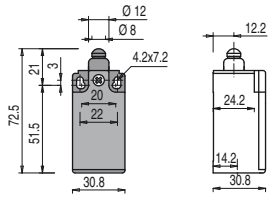
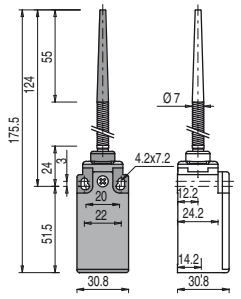
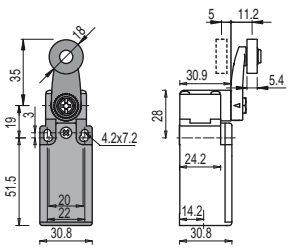
Resistance against corrosion

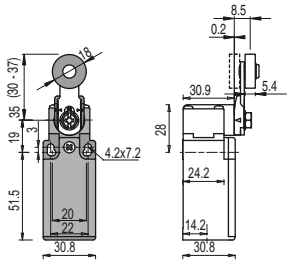
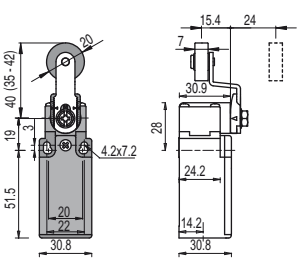
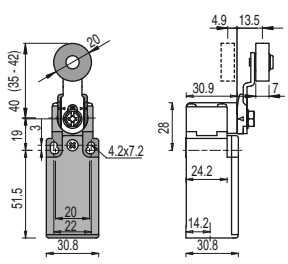
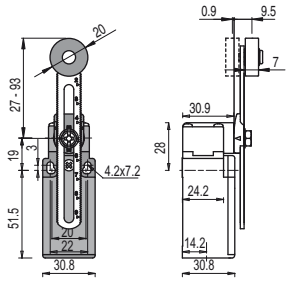
■ No corrosion
◘ Possible corrosion
□ Corrosion
- Data not available

Contact type:

R = snap action
L = slow action

Contact block					
					
5	R	FR 501-XM2 1NO+1NC	FR 502-XM2 1NO+1NC	FR 505-XM2 1NO+1NC	FR 507-XM2 1NO+1NC
6	L	FR 601-XM2 1NO+1NC	FR 602-XM2 1NO+1NC	FR 605-XM2 1NO+1NC	FR 607-XM2 1NO+1NC
9	L	FR 901-XM2 2NC	FR 902-XM2 2NC	FR 905-XM2 2NC	FR 907-XM2 2NC
20	L	FR 2001-XM2 1NO+2NC	FR 2002-XM2 1NO+2NC	FR 2005-XM2 1NO+2NC	FR 2007-XM2 1NO+2NC
2	R	FR 201-XM2 2x(1NO-1NC)	FR 202-XM2 2x(1NO-1NC)	FR 205-XM2 2x(1NO-1NC)	FR 207-XM2 2x(1NO-1NC)
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	4 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 3

Contact block			With external rubber gasket	With external rubber gasket	
					
5	R	FR 515-XM2 1NO+1NC	FR 5A1-XM2 1NO+1NC	FR 520-XM2 1NO+1NC	FR 530-XM2V38 1NO+1NC
6	L	FR 615-XM2 1NO+1NC	FR 6A1-XM2 1NO+1NC		FR 630-XM2V38 1NO+1NC
9	L	FR 915-XM2 2NC	FR 9A1-XM2 2NC		FR 930-XM2V38 2NC
20	L	FR 2015-XM2 1NO+2NC	FR 20A1-XM2 1NO+2NC	FR 2020-XM2 1NO+2NC	FR 2030-XM2V38 1NO+2NC
2	R	FR 215-XM2 2x(1NO-1NC)		FR 220-XM2 2x(1NO-1NC)	FR 230-XM2V38 2x(1NO-1NC)
Max. speed		page 215 - type 2	page 215 - type 4	1 m/s	page 215 - type 1
Actuating force		8 N (25 N →)	6 N (25 N →)	0.07 Nm	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 1	page 216 - group 1	page 216 - group 4	page 216 - group 5

Contact block					
					
5	R	FR 531-XM2V38 1NO+1NC	FR 551-XM2V38 1NO+1NC	FR 554-XM2V38 1NO+1NC	FR 556-XM2V38 1NO+1NC
6	L	FR 631-XM2V38 1NO+1NC	FR 651-XM2V38 1NO+1NC	FR 654-XM2V38 1NO+1NC	FR 656-XM2V38 1NO+1NC
9	L	FR 931-XM2V38 2NC	FR 951-XM2V38 2NC	FR 954-XM2V38 2NC	FR 956-XM2V38 2NC
20	L	FR 2031-XM2V38 1NO+2NC	FR 2051-XM2V38 1NO+2NC	FR 2054-XM2V38 1NO+2NC	FR 2056-XM2V38 1NO+2NC
2	R	FR 231-XM2V38 2x(1NO-1NC)	FR 251-XM2V38 2x(1NO-1NC)	FR 254-XM2V38 2x(1NO-1NC)	FR 256-XM2V38 2x(1NO-1NC)
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 5

All values in the drawings are in mm

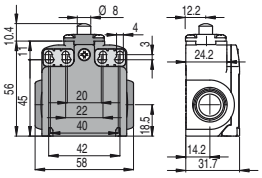
Accessories See page 197

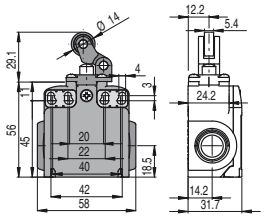
→ The 2D and 3D files are available at **www.pizzato.com**

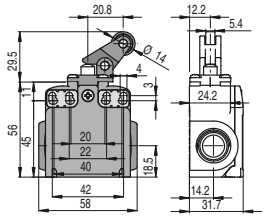
Switches with external parts in **stainless steel**

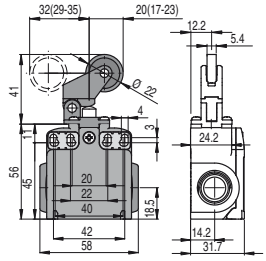
Contact type:

R = snap action
L = slow action

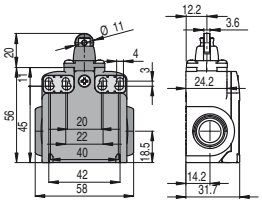




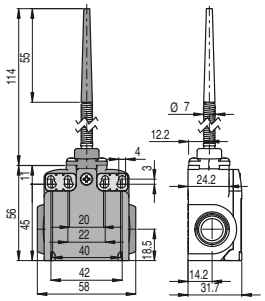




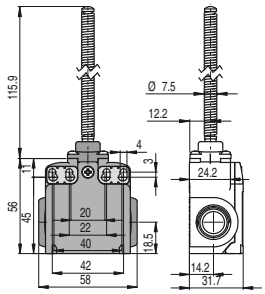
Contact block					
5	R	FX 501-XM2 → 1NO+1NC	FX 502-XM2 → 1NO+1NC	FX 505-XM2 → 1NO+1NC	FX 507-XM2 → 1NO+1NC
6	L	FX 601-XM2 → 1NO+1NC	FX 602-XM2 → 1NO+1NC	FX 605-XM2 → 1NO+1NC	FX 607-XM2 → 1NO+1NC
9	L	FX 901-XM2 → 2NC	FX 902-XM2 → 2NC	FX 905-XM2 → 2NC	FX 907-XM2 → 2NC
20	L	FX 2001-XM2 → 1NO+2NC	FX 2002-XM2 → 1NO+2NC	FX 2005-XM2 → 1NO+2NC	FX 2007-XM2 → 1NO+2NC
2	R	FX 201-XM2 2x(1NO-1NC)	FX 202-XM2 2x(1NO-1NC)	FX 205-XM2 2x(1NO-1NC)	FX 207-XM2 2x(1NO-1NC)
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	4 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 3

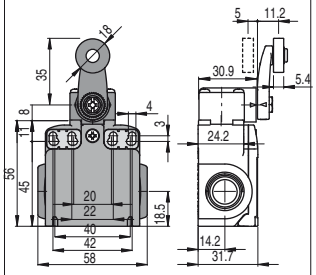


With external rubber gasket

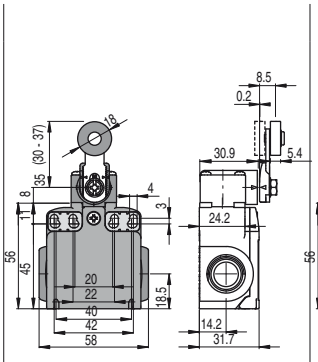


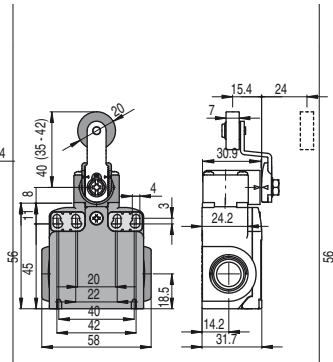
With external rubber gasket

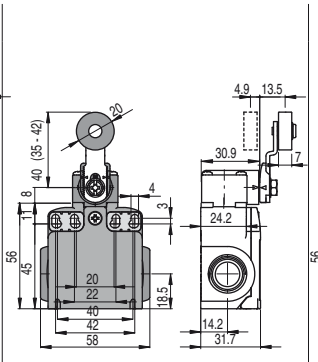


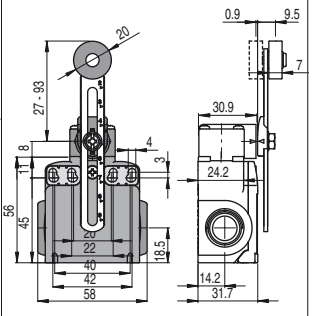


Contact block					
5	R	FX 515-XM2 → 1NO+1NC	FX 520-XM2 1NO+1NC	FX 525-XM2 1NO+1NC	FX 530-XM2V38 → 1NO+1NC
6	L	FX 615-XM2 → 1NO+1NC			FX 630-XM2V38 → 1NO+1NC
9	L	FX 915-XM2 → 2NC			FX 930-XM2V38 → 2NC
20	L	FX 2015-XM2 → 1NO+2NC	FX 2020-XM2 1NO+2NC	FX 2025-XM2 1NO+2NC	FX 2030-XM2V38 → 1NO+2NC
2	R	FX 215-XM2 2x(1NO-1NC)	FX 220-XM2 2x(1NO-1NC)	FX 225-XM2 2x(1NO-1NC)	FX 230-XM2V38 2x(1NO-1NC)
Max. speed		page 215 - type 2	1 m/s	1 m/s	page 215 - type 1
Actuating force		8 N (25 N →)	0.07 Nm	0.12 Nm	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 1	page 216 - group 4	page 216 - group 4	page 216 - group 5









Contact block					
5	R	FX 531-XM2V38 → 1NO+1NC	FX 551-XM2V38 → 1NO+1NC	FX 554-XM2V38 → 1NO+1NC	FX 556-XM2V38 → 1NO+1NC
6	L	FX 631-XM2V38 → 1NO+1NC	FX 651-XM2V38 → 1NO+1NC	FX 654-XM2V38 → 1NO+1NC	FX 656-XM2V38 → 1NO+1NC
9	L	FX 931-XM2V38 → 2NC	FX 951-XM2V38 → 2NC	FX 954-XM2V38 → 2NC	FX 956-XM2V38 → 2NC
20	L	FX 2031-XM2V38 → 1NO+2NC	FX 2051-XM2V38 → 1NO+2NC	FX 2054-XM2V38 → 1NO+2NC	FX 2056-XM2V38 → 1NO+2NC
2	R	FX 231-XM2V38 2x(1NO-1NC)	FX 251-XM2V38 2x(1NO-1NC)	FX 254-XM2V38 2x(1NO-1NC)	FX 256-XM2V38 2x(1NO-1NC)
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 5

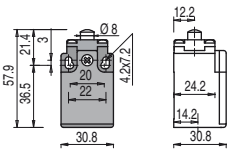
All values in the drawings are in mm

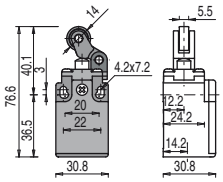
Accessories See page 197

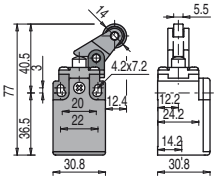
→ The 2D and 3D files are available at **www.pizzato.com**

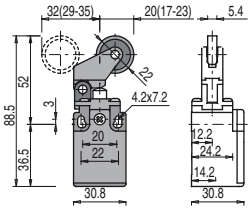
Contact type:

R = snap action
L = slow action



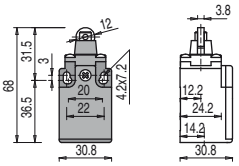




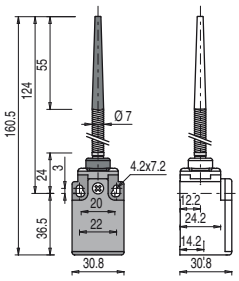


Contact block

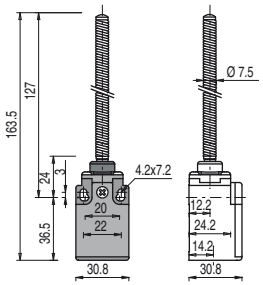
3	R	FK 301-XM1 1NO+1NC	FK 302-XM1 1NO+1NC	FK 305-XM1 1NO+1NC	FK 307-XM1 1NO+1NC
33	L	FK 3301-XM1 → 1NO+1NC	FK 3302-XM1 → 1NO+1NC	FK 3305-XM1 → 1NO+1NC	FK 3307-XM1 → 1NO+1NC
34	L	FK 3401-XM1 → 2NC	FK 3402-XM1 → 2NC	FK 3405-XM1 → 2NC	FK 3407-XM1 → 2NC
Max. speed		page 215 - type 4	page 215 - type 3	page 215 - type 3	page 215 - type 3
Actuating force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	4 N (25 N →)
Travel diagrams		page 216 - group 1	page 216 - group 2	page 216 - group 2	page 216 - group 3

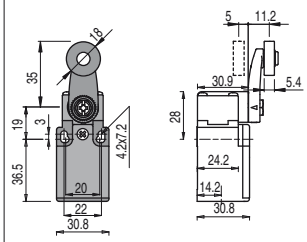


With external rubber gasket



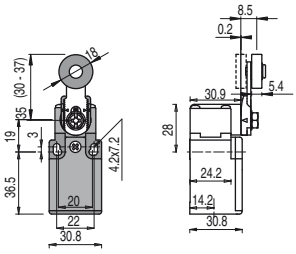
With external rubber gasket

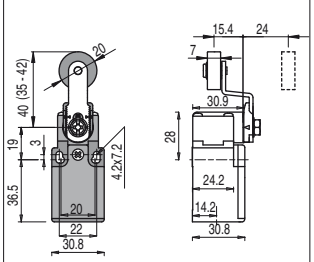


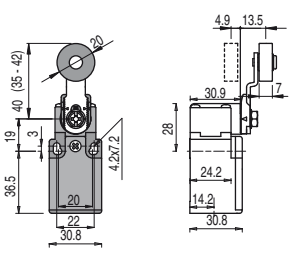


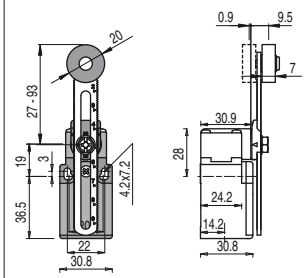
Contact block

3	R	FK 315-XM1 1NO+1NC	FK 320-XM1 1NO-1NC	FK 325-XM1 1NO-1NC	FK 330-XM1V38 1NO+1NC
33	L	FK 3315-XM1 → 1NO+1NC	FK 3320-XM1 1NO+1NC	FK 3325-XM1 1NO+1NC	FK 3330-XM1V38 → 1NO+1NC
34	L	FK 3415-XM1 → 2NC	FK 3420-XM1 2NC	FK 3425-XM1 2NC	FK 3430-XM1V38 → 2NC
Max. speed		page 215 - type 2	1 m/s	1 m/s	page 215 - type 1
Actuating force		8 N (25 N →)	0.05 Nm	0.1 Nm	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 1	page 216 - group 4	page 216 - group 4	page 216 - group 5









Contact block

3	R	FK 331-XM1V38 1NO+1NC	FK 351-XM1V38 1NO+1NC	FK 354-XM1V38 1NO+1NC	FK 356-XM1V38 1NO+1NC
33	L	FK 3331-XM1V38 → 1NO+1NC	FK 3351-XM1V38 → 1NO+1NC	FK 3354-XM1V38 → 1NO+1NC	FK 3356-XM1V38 → 1NO+1NC
34	L	FK 3431-XM1V38 → 2NC	FK 3451-XM1V38 → 2NC	FK 3454-XM1V38 → 2NC	FK 3456-XM1V38 → 2NC
Max. speed		page 215 - type 1	page 215 - type 1	page 215 - type 1	page 215 - type 1
Actuating force		0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)	0.06 Nm (0.25 Nm →)
Travel diagrams		page 216 - group 5	page 216 - group 5	page 216 - group 5	page 216 - group 5

All values in the drawings are in mm

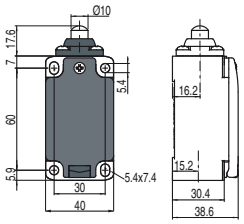
Accessories See page 197

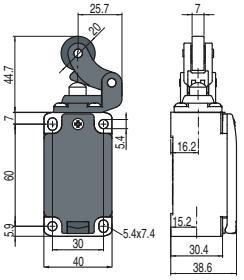
→ The 2D and 3D files are available at **www.pizzato.com**

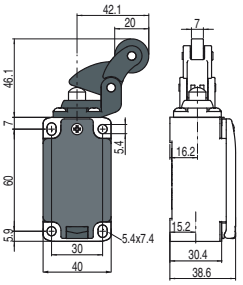
Switches with external parts in **stainless steel**

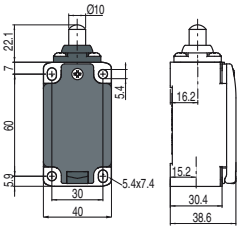
Contact type:

R = snap action
L = slow action

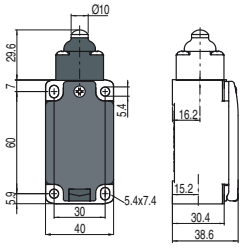


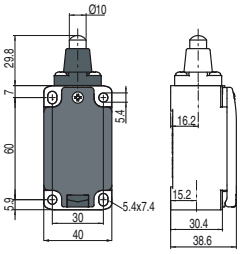


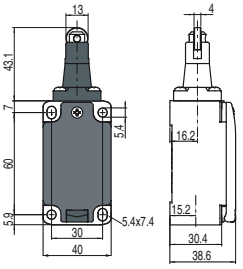




Contact block					
5	R	FP 501-XM2 → 1NO+1NC	FP 502-XM2 → 1NO+1NC	FP 505-XM2 → 1NO+1NC	FP 508-XM2 → 1NO+1NC
6	L	FP 601-XM2 → 1NO+1NC	FP 602-XM2 → 1NO+1NC	FP 605-XM2 → 1NO+1NC	FP 608-XM2 → 1NO+1NC
9	L	FP 901-XM2 → 2NC	FP 902-XM2 → 2NC	FP 905-XM2 → 2NC	FP 908-XM2 → 2NC
20	L	FP 2001-XM2 → 1NO+2NC	FP 2002-XM2 → 1NO+2NC	FP 2005-XM2 → 1NO+2NC	FP 2008-XM2 → 1NO+2NC
2	R	FP 201-XM2 2x(1NO-1NC)	FP 202-XM2 2x(1NO-1NC)	FP 205-XM2 2x(1NO-1NC)	FP 208-XM2 2x(1NO-1NC)
Max. speed		page 213 - type 4	page 213 - type 3	page 213 - type 3	page 213 - type 4
Actuating force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	8 N (25 N →)
Travel diagrams		page 214 - group 1	page 214 - group 2	page 214 - group 2	page 214 - group 1







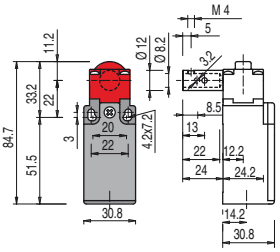
Contact block					
5	R	FP 510-XM2 → 1NO+1NC	FP 511-XM2 → 1NO+1NC	FP 516-XM2 → 1NO+1NC	
6	L	FP 610-XM2 → 1NO+1NC	FP 611-XM2 → 1NO+1NC	FP 616-XM2 → 1NO+1NC	
9	L	FP 910-XM2 → 2NC	FP 911-XM2 → 2NC	FP 916-XM2 → 2NC	
20	L	FP 2010-XM2 → 1NO+2NC	FP 2011-XM2 → 1NO+2NC	FP 2016-XM2 → 1NO+2NC	
2	R	FP 210-XM2 2x(1NO-1NC)	FP 211-XM2 2x(1NO-1NC)	FP 216-XM2 2x(1NO-1NC)	
Max. speed		page 213 - type 4	page 213 - type 4	page 213 - type 2	
Actuating force		11 N (25 N →)	8 N (25 N →)	8 N (25 N →)	
Travel diagrams		page 214 - group 1	page 214 - group 1	page 214 - group 1	

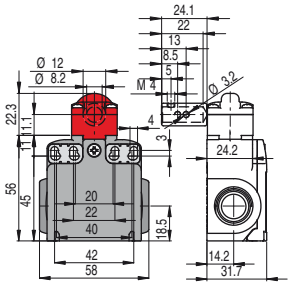
Safety switches for hinges

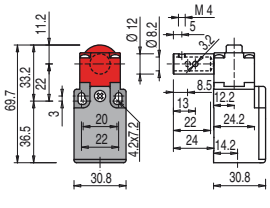
All values in the drawings are in mm

Contact type:

L = slow action







Contact block				
18	L	FR 1896-XM2 → 1NO+1NC	FX 1896-XM2 → 1NO+1NC	/
9	L	FR 996-XM2 → 2NC	FX 996-XM2 → 2NC	/
20	L	FR 2096-XM2 → 1NO+2NC	FX 2096-XM2 → 1NO+2NC	/
33	L	/	/	FK 3396-XM1 → 1NO+1NC
34	L	/	/	FK 3496-XM1 → 2NC
Actuating force		0,15 Nm (0,4 Nm →)	0,15 Nm (0,4 Nm →)	0,15 Nm (0,4 Nm →)
Travel diagrams		page 218 - group 9	page 218 - group 9	page 218 - group 9

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 211 to 222.**

Accessories See page 197

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

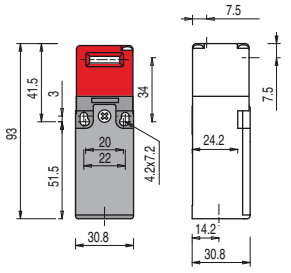
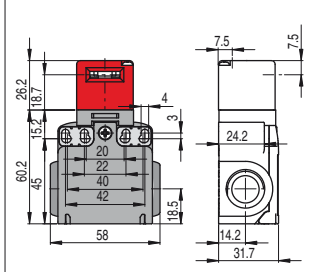
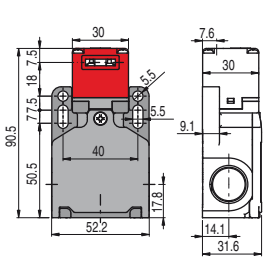
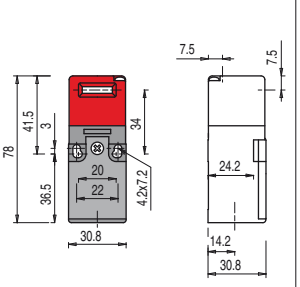
Safety switches with separate actuator

All values in the drawings are in mm

Contact type:

R = snap action
L = slow action

Contact block

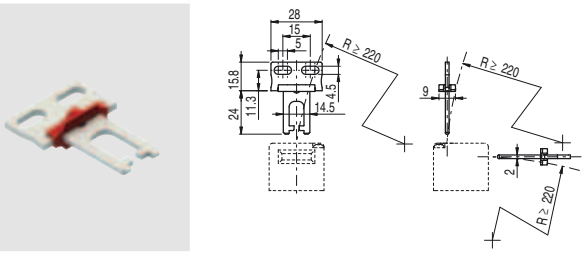
		without actuator	without actuator	without actuator	without actuator
					
6	L	FR 693-XM2 → 1NO+1NC	FX 693-XM2 → 1NO+1NC	FW 692-XM2 → 1NO+1NC	/
9	L	FR 993-XM2 → 2NC	FX 993-XM2 → 2NC	FW 992-XM2 → 2NC	/
20	L	FR 2093-XM2 → 1NO+2NC	FX 2093-XM2 → 1NO+2NC	FW 2092-XM2 → 1NO+2NC	/
33	L	/	/	/	FK 3393-XM1 → 1NO+1NC
34	L	/	/	/	FK 3493-XM1 → 2NC
Actuating force		10 N (18 N →)	10 N (18 N →)	10 N (18 N →)	10 N (18 N →)
Travel diagrams		page 218 - group 8	page 218 - group 8	page 218 - group 8	page 218 - group 8

Stainless steel actuators

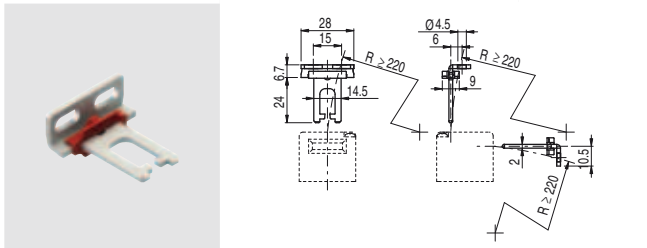
All values in the drawings are in mm

IMPORTANT: These actuators can be used only with items of the FR, FX, FK and FW series (e.g. FR 693-XM2).
Low level of coding acc. to EN ISO 14119.

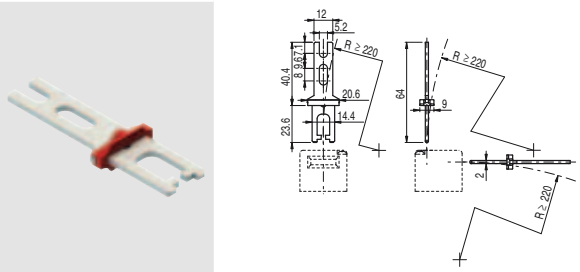
Article	Description
VF KEYD	Straight actuator



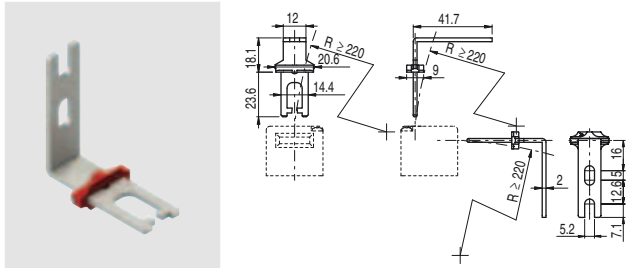
Article	Description
VF KEYD1	Angled actuator



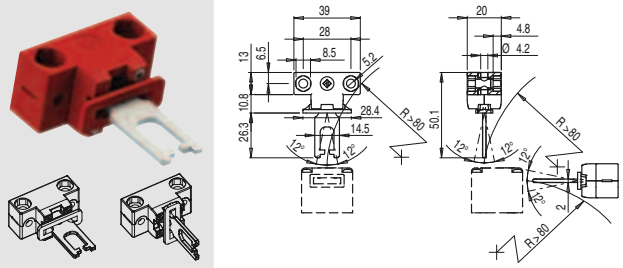
Article	Description
VF KEYD5	Extended actuator



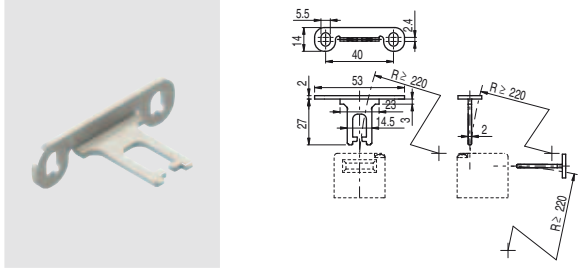
Article	Description
VF KEYD6	Extended actuator, angled



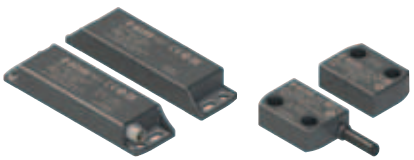
Article	Description
VF KEYD8	Universal actuator



Article	Description
VF KEYD10	Profiled actuator



3 FR series magnetic safety sensors



See General Catalogue Safety
Pizzato Elettrica 2017-2018, pages 25 / 31

4 ST series safety sensors with RFID technology

See General Catalogue Safety
Pizzato Elettrica 2017-2018, page 37

5 HX series stainless steel safety switches

See General Catalogue Safety
Pizzato Elettrica 2017-2018, page 57

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

Accessories See page 197

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

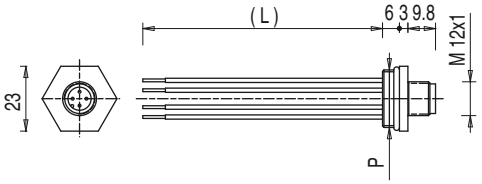
M12 male connectors

All values in the drawings are in mm

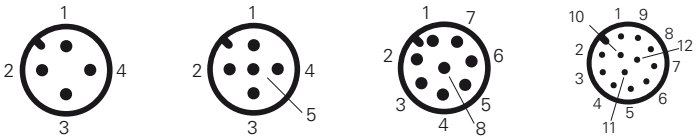
These standard M12 male connectors are ready for the installation on the switches.
Their wires have the right length for the connection to the contact blocks and are provided with wire-end sleeves. On request they can be delivered already wired to the switch. The connectors are used where a very short machine down time is required (e.g. in big plants). The connector-provided switch can be replaced very quickly with an identical one with no chance of incorrect wiring.

Technical data:

Max. operating voltage:	250 Vac / 300 Vdc (4/5-pole) 30 Vac / 36 Vdc (8/12-pole)
Max. operating current:	4 A (4/5-pole) 2 A (8-pole) 1.5 A (12-pole)
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653
Ambient temperature:	-25°C … +80°C
Tightening torque:	1 … 1.5 Nm
Wire cross-section:	0.5 mm² (20 AWG) for 4/5-pole 0.25 mm² (23 AWG) for 8-pole 0.14 mm² (26 AWG) for 12-pole
Contact type:	gold-plated



Pin assignment



4 poles		5 poles		8 poles		12 poles	
Pin	Colour	Pin	Colour	Pin	Colour	Pin	Colour
1	Brown	1	Brown	1	White	1	Brown
2	White	2	White	2	Brown	2	Blue
3	Blue	3	Blue	3	Green	3	White
4	Black	4	Black	4	Yellow	4	Green
		5	Grey	5	Grey	5	Pink
				6	Pink	6	Yellow
				7	Blue	7	Black
				8	Red	8	Grey
						9	Red
						10	Purple
						11	Grey-Pink
						12	Red-Blue

Code structure

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

article: **VF CNM5MM** — options: **-L100**

Body material	
M	metal
P	plastic

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Connection type	
M	M12x1

Connector thread (P)	
M	M20 x 1.5 (standard)
P	PG 13.5

Cable length (L)	
	8.5 cm (standard)
L16	16 cm
L100	100 cm
L200	200 cm

Stock items

- VF CNP4MM
- VF CNP4PM
- VF CNM5MM
- VF CNM5PM
- VF CNP8MM
- VF CNP5PM
- VF CNP5MM
- VF CNM4PM
- VF CNM8MM
- VF CNM8PM
- VF CNM12MM-L16
- VF CNM4MM

ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.
Note: the 12-pole connector is only available in metal with M20x1.5 thread and 16 cm cables.

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

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

M12 female connectors with cable

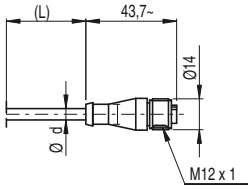
All values in the drawings are in mm

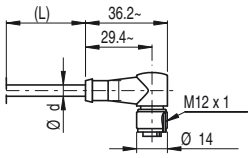
Technical data:

- Polyurethane connector body
- Class 6 copper conductors acc. to IEC 60228 - mobile installation
- Gold-plated contacts (resistance < 5 mΩ)
- Self-locking ring nut
- High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II. With polyurethane sheath on request

Technical data:

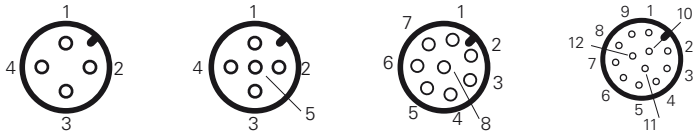
Max. operating voltage:	250 Vac / 300 Vdc (4/5-pole) 30 Vac / 36 Vdc (8/12-pole)
Max. operating current:	4 A (4-5-pole), 2 A (8-pole), 1.5 A (12-pole)
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-25°C … +80°C for fixed installation -15°C … +80°C for mobile installation
Wire cross-section:	0.34 mm² (22 AWG) for 4-pole 0.25 mm² (23 AWG) for 5/8-pole 0.14 mm² (26 AWG) for 12-pole
Minimum bending radius:	> cable diameter x 15





ø d: 5 mm for 4 and 5-pole
6 mm for 8 and 12 poles

Pin assignment



4 poles		5 poles		8 poles		12 poles	
Pin	Colour	Pin	Colour	Pin	Colour	Pin	Colour
1	Brown	1	Brown	1	White	1	Brown
2	White	2	White	2	Brown	2	Blue
3	Blue	3	Blue	3	Green	3	White
4	Black	4	Black	4	Yellow	4	Green
		5	Grey	5	Grey	5	Pink
				6	Pink	6	Yellow
				7	Blue	7	Black
				8	Red	8	Grey
						9	Red
						10	Purple
						11	Grey-Pink
						12	Red-Blue

Code structure

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

VF CA4PD3M

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Cable sheath	
P	PVC (standard)
U	PUR

Connector type	
D	straight (standard)
G	angled

Connection type	
M	M12x1

Cable length (L)		No. of poles 4	5	8	12
1	1 metre				
2	2 metres				
3	3 metres (standard)	•	•		
4	4 metres				
5	5 metres (standard)	•	•	•	•
...					
0	10 metres (standard)	•	•	•	•

Other lengths on request

Stock items

VF CA4PD3M
VF CA4PD5M
VF CA4PD0M
VF CA5PD3M
VF CA5PD5M
VF CA5PD0M
VF CA8PD5M
VF CA8PD0M
VF CA12PD5M
VF CA12PD0M

Attention! No stock items, minimum order quantity 100 pcs.

ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.

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

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

M12 male connectors with cable

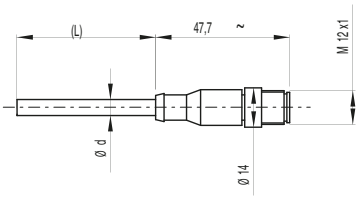
All values in the drawings are in mm

Technical data:

- Polyurethane connector body
- Class 6 copper conductors acc. to IEC 60228 - mobile installation
- Gold-plated contacts (resistance < 5 mΩ)
- Self-locking ring nut
- High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II. With polyurethane sheath on request

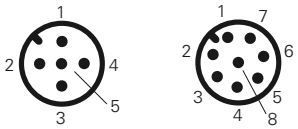
Technical data:

Max. operating voltage:	250 Vac / 300 Vdc (5-pole) 30 Vac / 36 Vdc (8-pole)
Max. operating current:	4 A (5-pole), 2 A (8-pole)
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-25°C … +80°C for fixed installation -15°C … +80°C for mobile installation
Wire cross-section:	0.25 mm2 (23 AWG)
Minimum bending radius:	> cable diameter x 15



ø d: 5 mm for 5-pole
6 mm for 8-pole

Pin assignment



5 poles		8 poles	
Pin	Colour	Pin	Colour
1	Brown	1	White
2	White	2	Brown
3	Blue	3	Green
4	Black	4	Yellow
5	Grey	5	Grey
		6	Pink
		7	Blue
		8	Red

Code structure

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

VF CF5PD3M

No. of poles	
5	5 poles
8	8 poles

Connection type	
M	M12x1

Cable length (L)	
3	3 metres (standard)
5	5 metres
0	10 metres

Other lengths on request

Cable sheath	
P	PVC (standard)
U	PUR

Connector type	
D	straight

Articles

VF CF5PD3M
VF CF8PD3M

Attention! No stock items, minimum order quantity 100 pcs.

ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.

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

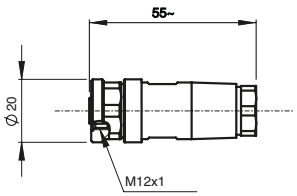
Field wireable M12 female connectors

All values in the drawings are in mm

General data

Technopolymer connector body
Gold-plated contacts
Screw terminals for cable screw fittings

Max. operating voltages	250 Vac/dc (4 and 5-pole)
	30 Vac/dc (8-pole)
Maximum current	4 A (4 and 5-pole)
	2 A (8-pole)
Protection degree	IP67 acc. to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	0.25 mm² (23 AWG) … 0.5 mm² (20 AWG)



Article	Description	no. of poles
VF CBMP4DM04	Field wireable M12 female connector, straight, for Ø 4 … Ø 6.5 mm multipolar cables	4
VF CBMP5DM04	Field wireable M12 female connector, straight, for Ø 4 … Ø 6.5 mm multipolar cables	5
VF CBMP8DM04	Field wireable M12 female connector, straight, for Ø 4 … Ø 7 mm multipolar cables	8

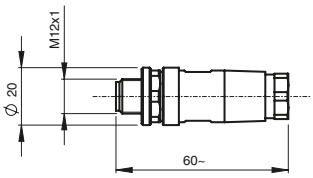
Field wireable M12 male connectors

All values in the drawings are in mm

General data

Technopolymer connector body
Gold-plated contacts
Screw terminals for cable screw fittings

Max. operating voltages	250 Vac/dc (5-pole)
	30 Vac/dc (8-pole)
Maximum current	4 A (5-pole)
	2 A (8-pole)
Protection degree	IP67 acc. to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	0.25 mm² (23 AWG) … 0.5 mm² (20 AWG)



Article	Description	no. of poles
VF CCMP5DM04	Field wireable M12 male connector, straight, for Ø 4 ... Ø 6.5 mm multipolar cables	5
VF CCMP8DM04	Field wireable M12 male connector, straight, for Ø 4 ... Ø 7 mm multipolar cables	8

ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.

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

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

Series connection with Y-shaped M12 connectors

To facilitate and simplify the series wiring of the safety devices, a variety of accessories designed specifically for this purpose are available. With the help of the proven M12 round connector and the connection of standard elements, safety equipment of Category 4, SIL3 and PL e with up to 32 elements connected in series is possible. All of which is possible without the risk of connection errors and with a high IP67 protection degree.
The safety circuits consist of a 24Vdc power supply unit, a number of extensions to the installed devices, Y connectors for branching out from the chain to each individual device and a terminating plug.
In addition to the power supply unit, a suitable safety module is used to assess the state of the safety outputs within the safety chain.

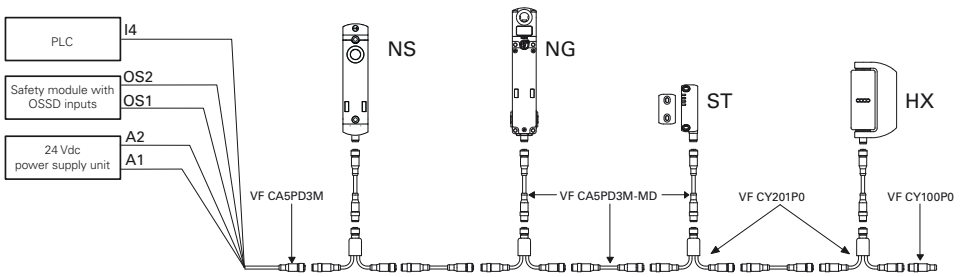
Devices suitable for series connection

The series may consist both of devices that are identical to one another (homogeneous series) or that belong to different series (mixed series).
Only the following Pizzato Elettrica devices may be connected in series using the Y connectors:
ST series safety sensors with RFID technology: ST D•31•M•, ST D•71•M•
NG series safety switches with solenoid and RFID technology: Any item with an M12 connector for series connection with a "Y" connector or with option: K950, K951, K952.
NS: Any item with an M12 connector for series connection with a "Y" connector or with the option "integrated cable or connector", letter "Q".
HX series safety hinge switches: HX BEE1-••M.

Electrical connection of the chain

Pin	Colour	Connection	
1	Brown	A1	Supply input +24 Vdc
2	White	OS1	Safety output
3	Blue	A2	Supply input 0 V
4	Black	OS2	Safety output
5	Grey	I4	Solenoid activation input

Note: By activating/deactivating input I4, all switches of the NG and NS series in the chain simultaneously block/open all guards. Activation and deactivation of input I4 has no effect on the ST sensors and HX hinges in the chain.



Attention! For proper operation of the devices connected in series via cables, Y connectors or junction boxes, it is necessary to pay particular attention to the voltage drop that occurs in the circuit. Pay particular attention to the flowing currents and cross-section/length of the used cables to ensure that the supply voltage of the components at the end of the series connection remains within the specified limit values during effective operation.

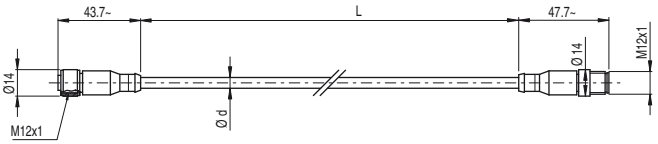
M12 extension cable

All values in the drawings are in mm

Technical data:
Polyurethane connector body
Class 6 copper conductors acc. to IEC 60228
Gold-plated contacts (resistance < 5 mΩ)
Self-locking ring nut
High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II.

Technical data:

Max. operating voltage:	250 Vac / 300 Vdc (5-pole) 30 Vac / 36 Vdc (8-pole)
Max. operating current:	4 A (5-pole), 2 A (8-pole)
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 2653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-25°C … +80°C for fixed installation -15°C … +80°C for mobile installation
Wire cross-section:	0.5 mm² (20 AWG) (5-pole) 0.25 mm² (23 AWG) (8-pole)
Minimum bending radius:	> cable diameter x 15



ø d: 6.4 mm for 5-pole
6 mm for 8-pole

Code structure

VF CA5PD3M-MD

No. of poles	
5	5 poles
8	8 poles

Cable sheath	
P	PVC

Connector type	
D	straight

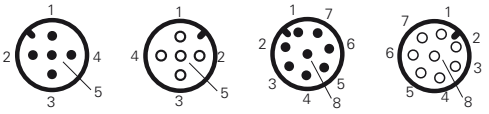
Connection type	
M	M12x1

Cable length (L)	No. of poles 5	8
3	3 metres (standard)	•	•
5	5 metres (standard)	•	•
0	10 metres (standard)	•	

Other lengths on request

Pin assignment

5 poles male	5 poles female	8 poles male	8 poles female



Stock items

VF CA5PD3M-MD
VF CA5PD5M-MD
VF CA5PD0M-MD
VF CA8PD3M-MD
VF CA8PD5M-MD

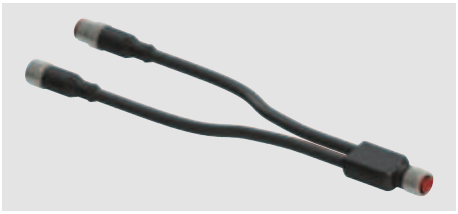
ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.

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

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

M12 connectors, Y-shaped, for series connections

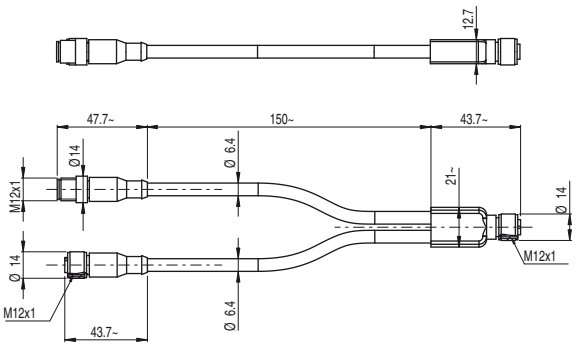
All values in the drawings are in mm



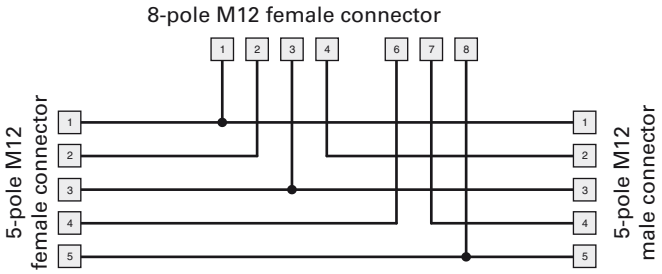
Technical data:
Polyurethane connector body
Class 6 copper conductors acc. to IEC 60228
Gold-plated contacts (resistance < 5 mΩ)
Self-locking ring nut
High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II.

Technical data:

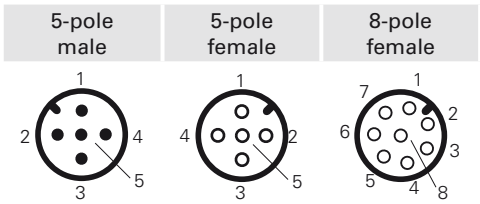
Max. operating voltage:	30 Vac / 36 Vdc
Max. operating current:	4 A (5-pole), 2 A (8-pole)
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 2653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-25°C … +80°C for fixed installation -15°C … +80°C for mobile installation
Wire cross-section:	0.5 mm² (20 AWG)
Minimum bending radius:	> cable diameter x 15



Internal block diagram, Y-shaped connector



Pin assignment



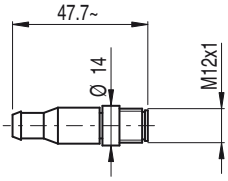
Article	Description
VF CY201P0	M12 connectors, Y-shaped, for series connections

M12 terminating plugs for series connections

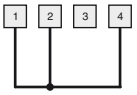
All values in the drawings are in mm

Technical data:
Polyurethane connector body
Gold-plated contacts (resistance < 5 mΩ)
Self-locking ring nut

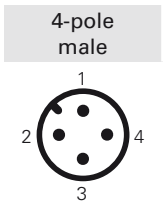
Protection degree:	IP67 acc. to EN 60529
Max. operating voltage:	250 Vac / 300 Vdc
Max. operating current:	4 A



Internal block diagram of the terminating plug



Pin assignment



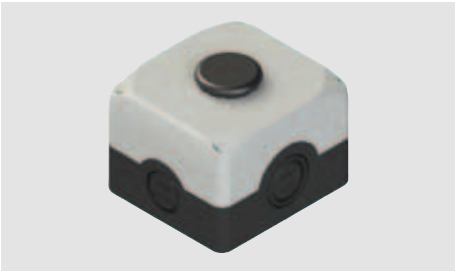
Article	Description
VF CY100P0	M12 terminating plugs for series connections, 4-pole

ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.

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

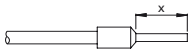
➔ The 2D and 3D files are available at **www.pizzato.com**

Junction box for series connection of up to 4 devices



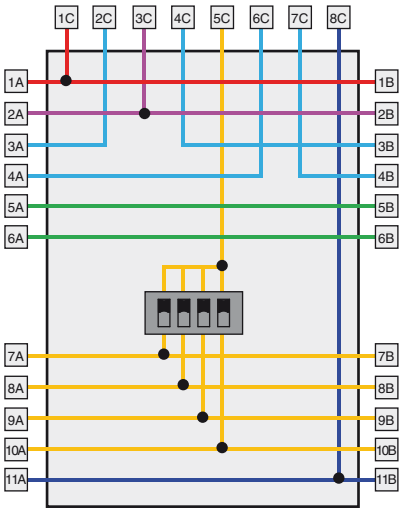
Technical data:

Material:	Self-extinguishing shock-proof polycarbonate with double insulation, UV-resistant and glass fibre reinforced, high shock resistance.
Material of the screws:	stainless steel
Protection degree:	IP67 acc. to EN 60529, IP69K acc. to ISO 20653, with cable gland of equal or higher protection degree
Conduit entries:	• 2x M20 - 1/2 NPT knock-out upper and lower entries • 2x M20 - 1/2 NPT - M25 knock-out side entries • 2x M16 knock-out base entries
Ambient temperature:	-40°C … +80°C
Tightening torque of the cover screws:	1 … 1.4 Nm
Connection system:	PUSH-IN spring type
Cross-section of rigid/flexible wires w. wire-end sleeve:	min. 1 x 0.34 mm² (1 x AWG 24) max. 1 x 1.5 mm² (1 x AWG 16)
Wire cross-section with pre-insulated wire-end sleeve:	min. 1 x 0.34 mm² (1 x AWG 24) max. 1 x 0.75 mm² (1 x AWG 18)
Cable stripping length (x):	min.: 8 mm max.: 12 mm



Article	Description
VF CY302P0	Junction box for series connection of up to 4 devices

Pin assignment



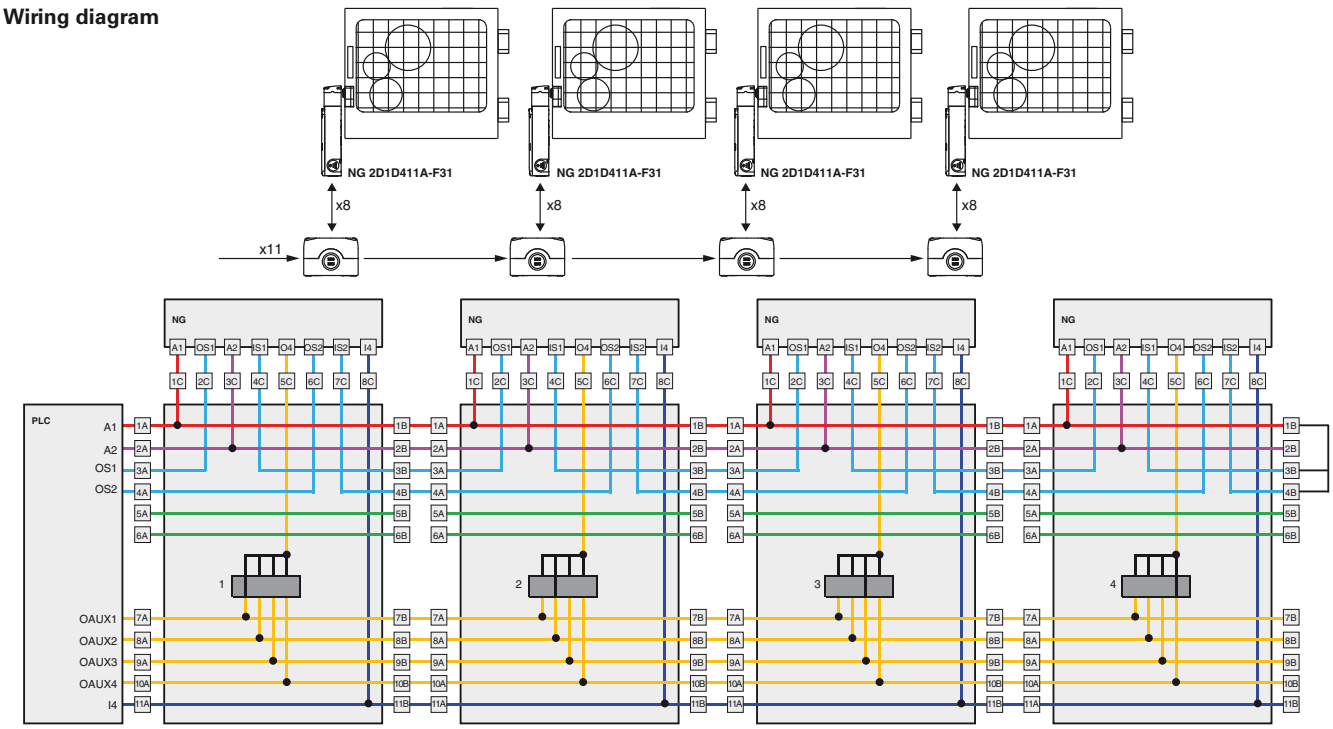
Example of series connection of 4 NG series switches

Terminal box	Connection	
1A	A1	Supply input +24 Vdc
2A	A2	Supply input 0 V
3A	OS1	Safety output
4A	OS2	Safety output
5A		Auxiliary connection
6A		Auxiliary connection
7A	OAUX1	Auxiliary output Oaux1
8A	OAUX2	Auxiliary output Oaux2
9A	OAUX3	Auxiliary output Oaux3
10A	OAUX4	Auxiliary output Oaux4
11A	I4	Solenoid activation input

Terminal box	Connection	
1B	A1	Supply input +24 Vdc
2B	A2	Supply input 0 V
3B	IS1	Safety input
4B	IS2	Safety input
5B		Auxiliary connection
6B		Auxiliary connection
7B	OAUX1	Auxiliary output Oaux1
8B	OAUX2	Auxiliary output Oaux2
9B	OAUX3	Auxiliary output Oaux3
10B	OAUX4	Auxiliary output Oaux4
11B	I4	Solenoid activation input

Terminal box	Connection	
1C	A1	Supply input +24 Vdc
2C	OS1	Safety output
3C	A2	Supply input 0 V
4C	IS1	Safety input
5C	O3	Signalling output, actuator inserted
	O4	Signalling output, actuator inserted and locked
6C	OS2	Safety output
7C	IS2	Safety input
8C	I4	Solenoid activation input

Wiring diagram

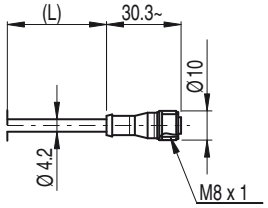


M8 female connectors with cable

All values in the drawings are in mm

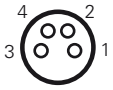
Technical data:
Polyurethane connector body
Class 6 copper conductors acc. to IEC 60228
Gold-plated contacts (resistance < 5 mΩ)
Self-locking ring nut
High flexibility cable with PVC sheath suitable to be used in drag chains, acc. to IEC 60332-3 and CEI 20-22II. With polyurethane sheath on request.

Max. operating voltage:	60 Vac / 75 Vdc
Max. operating current:	4 A
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-25°C … +80°C for fixed installation -15°C … +80°C for mobile installation
Wire cross-section:	0.25 mm2 (23 AWG)
Minimum bending radius:	> cable diameter x 15



Pin assignment

4 poles



Pin	Colour
1	Brown
2	White
3	Blue
4	Black

Code structure

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

VF CA4PD3K

No. of poles	
4	4 poles

Cable sheath	
P	PVC (standard)
U	PUR

Connector type	
D	straight

Connection type	
K	M8x1

Cable length (L)	
1	1 metre
2	2 metres
3	3 metres (standard)
4	4 metres
5	5 metres (standard)
...	
0	10 metres

Other lengths on request

Stock items

VF CA4PD3K
VF CA4PD5K

Attention! No stock items, minimum order quantity 100 pcs.

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

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

Field wireable M23 female connectors

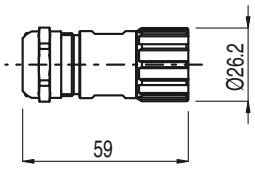
All values in the drawings are in mm

General data:

- Nickel-plated metal connector body
- Gold-plated contacts
- 12-pole or 19-pole versions

Technical data:

Max. operating voltage:	250 Vac (12-pole)
Max. operating voltage:	100 Vac (19-pole)
Max. operating current:	8 A
Protection degree:	IP67 / IP69K
Ambient temperature:	-40°C … +125°C
Tightening torque:	1 … 1.5 Nm
Contact type:	gold-plated (resistance < 3 mΩ)
Pollution degree:	3
Switching cycles:	> 1000



Pin configuration

12 poles

clockwise numbering

counterclockwise numbering

19-pole

clockwise numbering

Article	Description
VF AC2205 	Mounting key. Necessary for opening and wiring the connector.

Code structure

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

VF CBSM12TC07

Connection type	
S	M23x1

Body material	
M	metal

No. of poles	
12	12 poles
19	19-pole

Cable diameter	
07	Ø 7 … Ø 12 mm

Pin connection type	
C	crimp connection (standard) 0.34 … 1 mm²
S	solder connection 0.34 … 1 mm²

Connector type	
T	clockwise numbering (standard)
D	counterclockwise numbering

Stock items

VF CBSM12TC07
VF CBSM19TC07
VF CBSM12TS07

Note: For crimp connections, use, e.g., Knipex pliers, article number 97 52 63.

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

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

M23 female connectors with cable

All values in the drawings are in mm

General data:

- Polyurethane connector body
- Class 5 copper conductors acc. to VDE 0295 (12-pole)
- Class 2 copper conductors acc. to VDE 0295 (19-pole)
- Gold-plated contacts (resistance < 5 mΩ)
- Self-locking ring nut
- Cable with PVC sheath acc. to IEC 60332-3, CEI 20-22 II e CEI 20-35/1-2 (flame retarding)

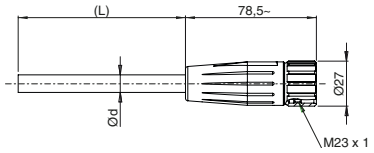
Technical data:

Max. operating voltage:	250 Vac (12-pole) 100 Vac (19-pole)
Max. operating current:	4 A
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-5°C … +70°C
Wire cross-section:	0.5 mm² (20 AWG) (12-pole) 0.34 mm² (22 AWG) (19-pole)
Minimum bending radius:	> cable diameter x 15

Pin assignment

12-pole	19-pole

Pin	Colour	Pin	Colour
1	White	1	White
2	Brown	2	Brown
3	Green	3	Green
4	Yellow	4	Yellow
5	Grey	5	Grey
6	Pink	6	Pink
7	Blue	7	Blue
8	Red	8	Red
9	Black	9	Black
10	Purple	10	Purple
11	Grey-Pink	11	Grey-Pink
12	Red-Blue	12	Red-Blue
		13	White-Green
		14	Brown-Green
		15	White-Yellow
		16	Yellow-Brown
		17	White-Grey
		18	Grey-Brown
		19	White-Pink



ø d: 8.2 mm for 12-pole
8.6 mm for 19 poles

Code structure

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

VF CA12PD20S

No. of poles	
12	12-pole
19	19-pole

Connection type	
S	M23x1

Cable sheath	
P	PVC (standard)

Cable length (L)	
0	10 metres
20	20 metres

Other lengths on request

Connector type	
D	straight (standard)

Articles

VF CA12PD0S
VF CA12PD20S
VF CA19PD0S
VF CA19PD20S

Attention! No stock items, minimum order quantity 50 pcs.

ATTENTION: always disconnect the power supply before removing the connector. The connector is not suitable for separation of electrical loads.

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

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

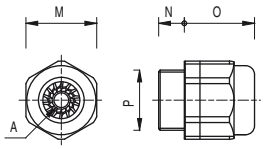
Strain relief cable glands

Packs of **10 pcs.**

This particular design ensures high resistance to traction of the cable glands. All cable glands are also suitable for a wide range of cable diameters.
Suitable for circular cross-section cables only.

Technical data:

Body and ring material:	technopolymer without halogen
Protection degree:	IP67 acc. to EN 60529
Tightening torque:	3 … 4 Nm (PG 13.5/M20) 2 … 2.5 Nm (PG 11/M16)



	Article	Description	A	⬡M	N	O	P
Metric threads	VF PAM25C7N	Cable gland M25x1.5 for a cable from Ø 10 to Ø 17 mm	○	30	10	28	M25x1.5
	VF PAM20C6N	M20x1.5 cable gland for one cable Ø 6 … 12 mm	○	24	9	24	M20x1.5
	VF PAM20C5N	M20x1.5 cable gland for one cable Ø 5 … 10 mm	○	24	9	24	M20x1.5
	VF PAM20C3N	M20x1.5 cable gland for one cable Ø 3 … 7 mm	○	24	9	24	M20x1.5
	VF PAM16C5N	M16x1.5 cable gland for one cable Ø 5 … 10 mm	○	22	7.5	23	M16x1.5
	VF PAM16C4N	M16x1.5 cable gland for one cable Ø 4 … 8 mm	○	22	7.5	23	M16x1.5
	VF PAM16C3N	M16x1.5 cable gland for one cable Ø 3 … 7 mm	○	22	7.5	23	M16x1.5
	VF PAM20CBN	M20x1.5 multi-hole cable gland for 2 cables Ø 3 … 5 mm	○	24	9	23	M20x1.5
	VF PAM20CDN	M20x1.5 multi-hole cable gland for 3 cables Ø 1 … 4 mm	○	24	9	23	M20x1.5
	VF PAM20CEN	M20x1.5 multi-hole cable gland for 3 cables Ø 3 … 5 mm	○	24	9	23	M20x1.5
	VF PAM20CFN	M20x1.5 multi-hole cable gland for 4 cables Ø 1 … 4 mm	○	22	9	23	M20x1.5
Threads PG	VF PAP13C6N	PG 13.5 cable gland for one cable from Ø 6 … 12 mm	○	24	9	24	PG 13.5
	VF PAP13C5N	PG 13.5 cable gland for one cable from Ø 5 … 10 mm	○	24	9	24	PG 13.5
	VF PAP13C3N	PG 13.5 cable gland for one cable from Ø 3 … 7 mm	○	24	9	24	PG 13.5
	VF PAP11C5N	PG 11 cable gland for one cable from Ø 5 … 10 mm	○	22	7.5	23	PG 11
	VF PAP11C4N	PG 11 cable gland for one cable from Ø 4 … 8 mm	○	22	7.5	23	PG 11
	VF PAP11C3N	PG 11 cable gland for one cable from Ø 3 … 7 mm	○	22	7.5	23	PG 11

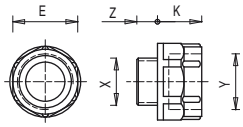
Thread adapters

Packs of **100 pcs.**

Thread adapters make it possible to fulfil requests for switches with a different thread to those generally found in stock. This means it is possible to offer customers a single product type with various threaded connections, while only having to stock the product itself and many kinds of adapters.

Technical data:

Body material:	glass fibre reinforced technopolymer
Tightening torque:	3 … 4 Nm



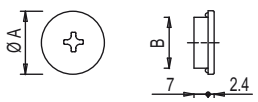
Article	Description	X	Y	Z	K	⬡E
VF ADPG13-PG11	Adapter from PG 13.5 to PG 11	PG 13.5	PG 11	9	12	22
VF ADPG13-M20	Adapter from PG 13.5 to M20x1.5	PG 13.5	M20x1.5	9	14	24
VF ADPG13-1/2NPT	Adapter from PG 13.5 to 1/2 NPT	PG 13.5	1/2 NPT	9	14	24
VF ADPG11-1/2NPT	Adapter from PG 11 to 1/2 NPT	PG 11	1/2 NPT	7	14	24
VF ADPG11-PG13	Adapter from PG 11 to PG 13.5	PG 11	PG 13.5	7	14	24
VF ADM20-1/2NPT	Adapter from M20 x 1.5 to 1/2 NPT	M20 x 1.5	1/2 NPT	9	14	24

Protection caps

Packs of **10 pcs.**

Technical data:

Body material:	technopolymer, self-extinguishing
Protection degree:	IP67 acc. to EN 60529 and IP69K acc. to ISO 20653
Tightening torque:	1.2 … 1.6 Nm
Cross-recessed screw:	PH3



Article	Description	A	B
VF PTM20	Protection cap M20x1.5	24	M20x1.5
VF PTG13.5	Protection cap PG13.5	24	PG 13.5

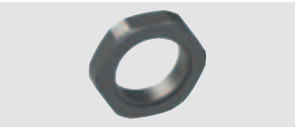
All values in the drawings are in mm

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

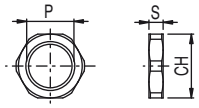
→ The 2D and 3D files are available at **www.pizzato.com**

Threaded nuts

Packs of **10 pcs.**



Technical data:
Body material: technopolymer
Tightening torque: 1.2 … 2 Nm



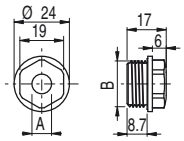
	Article	Description	S	CH	P
Plastic	VF DFPM25	Plastic nut, threaded, M25x1.5	6	32	M25x1.5
	VF DFPM20	Plastic nut, threaded, M20x1.5	6	27	M20x1.5
	VF DFPM16	Plastic nut, threaded, M16x1.5	5	22	M16x1.5
	VF DFPP13	Plastic nut, threaded, PG13.5	6	27	PG 13.5
Metal	VF DFMM20	M20x1.5 threaded nut in nickel-plated brass	3	23	M20x1.5

Chock plugs

Packs of **100 pcs.**

Technical data:
Body material: technopolymer
Protection degree: IP54 acc. to EN 60529
Tightening torque: 0.8 … 1 Nm

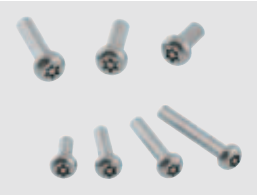
Notes: Use a socket wrench for tightening.



Article	Description	A	B
VF PFM20C8N	M20x1.5 chock plug for cables from Ø 8…Ø 12 mm	7.5	M20x1.5
VF PFM20C4N	M20x1.5 chock plug for cables from Ø 4…Ø 8 mm	3.5	M20x1.5

Torx safety screws

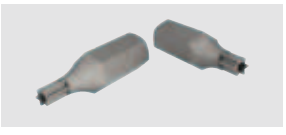
Packs of **10 pcs.**



Pan head screws with Torx fitting and pin, stainless steel.
Use a thread locker where required for applications acc. to. EN ISO 14119.

Article	Description
VF VAM4X10BX-X	M4x10 screw, with Torx T20 fitting, AISI 304
VF VAM4X15BX-X	M4x15 screw, with Torx T20 fitting, AISI 304
VF VAM4X20BX-X	M4x20 screw, with Torx T20 fitting, AISI 304
VF VAM4X25BX-X	M4x25 screw, with Torx T20 fitting, AISI 304
VF VAM4X30BX-X	M4x30 screw, with Torx T20 fitting, AISI 304
VF VAM5X10BX-X	M5x10 screw, with Torx T25 fitting, AISI 304
VF VAM5X15BX-X	M5x15 screw, with Torx T25 fitting, AISI 304
VF VAM5X20BX-X	M5x20 screw, with Torx T25 fitting, AISI 304
VF VAM5X25BX-X	M5x25 screw, with Torx T25 fitting, AISI 304
VF VAM5X35BX-X	M5x35 screw, with Torx T25 fitting, AISI 304
VF VAM5X45BX-X	M5x45 screw, with Torx T25 fitting, AISI 304

Bits for Torx safety screws



Bits for Torx safety screws with pin, with ¼" hexagonal connection.

Article	Description
VF VAIT1T20	Bits for M4 screws with Torx T20 fitting
VF VAIT1T25	Bits for M5 screws with Torx T25 fitting
VF VAIT1T30	Bits for M6 screws with Torx T30 fitting

One-Way safety screws

Packs of **10 pcs.**

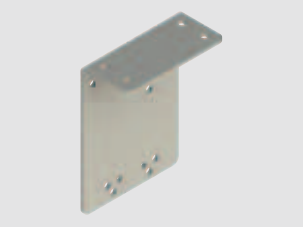
Pan head screws with OneWay fitting in stainless steel.
This screw type cannot be removed or tampered with using common tools. Ideal for fixing safety device actuators in accordance with EN ISO 14119.

Article	Description
VF VAM4X10BW-X	M4x10 screw, with OneWay fitting, AISI 304
VF VAM4X15BW-X	M4x15 screw, with OneWay fitting, AISI 304
VF VAM4X20BW-X	M4x20 screw, with OneWay fitting, AISI 304
VF VAM4X25BW-X	M4x25 screw, with OneWay fitting, AISI 304
VF VAM5X10BW-X	M5x10 screw, with OneWay fitting, AISI 304
VF VAM5X15BW-X	M5x15 screw, with OneWay fitting, AISI 304
VF VAM5X20BW-X	M5x20 screw, with OneWay fitting, AISI 304
VF VAM5X25BW-X	M5x25 screw, with OneWay fitting, AISI 304

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

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

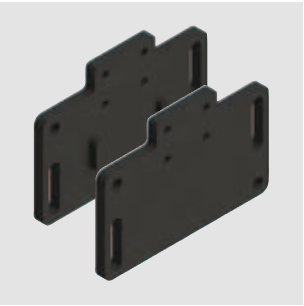
Fixing plates



Metal fixing plate, for fixing rope switches on the ceiling.
The plate is provided with bore holes for fasting switches of the FD, FL, FC, FP, FR, FM, FZ, FX, FK series. It is supplied without screws.

Article	Description
VF SFP2	Ceiling fixing plate

Fixing plates



Fixing plate (complete with fastening screws) provided with long slots for adjusting the operating point.
Each plate is provided with two pairs of fixing holes, one for standard switches and one for switches with reset device. The actuator thus always has the same actuating point.

Article	Description
VF SFP1	Fixing plate (FR series)
VF SFP3	Fixing plate (FX series)

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

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

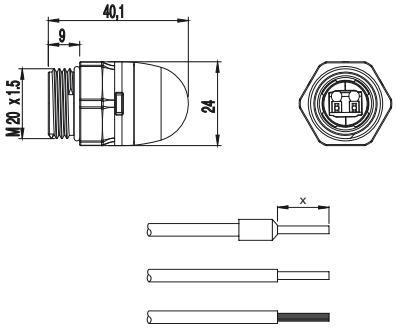
LED signalling lights

Packs of **5 pcs.**

These signalling lights with high luminosity LEDs are used for signalling that an electric contact has changed its state inside the switch. They can be installed only on switches of the FL, FX, FZ, FW, FG, NG or FS series by screwing them on one of the conduit entries not used for electric cables. They can be used for many different purposes: for example, in combination with a rope switch (e.g. FL 1878-M2) they can be used to signal (even from a distance) if the switch has been actuated.
In combination with safety switches with separate actuator (e.g. FL 693-M2), they can instead be used to signal whether or not the protection is closed correctly. In combination with solenoid safety switches (FS, FG or NG series), they can signal if the protection is locked or unlocked. If they are combined with any switch of the FL, FX, FW or FZ series they can be used to calibrate the actuator. The inner part can rotate in such a way that it can be wired and screwed on the switch without any risk of twisting the wires.

Technical data:

Protection degree:	IP67 acc. to EN 60529 and IP69K acc. to ISO 20653
Ambient temperature:	-25°C … +70°C
Operating voltage U_n:	24 Vac/dc 120 Vac 230 Vac
Tolerance on the supply voltages:	±15% of U_n
Operating current:	10 mA
Connection system:	PUSH-IN spring type
Cross-section of rigid/flexible wires w. wire-end sleeve:	min. 1 x 0.34 mm² (1 x AWG 24) max. 1 x 1.5 mm² (1 x AWG 16)
Wire cross-section with pre-insulated wire-end sleeve:	min. 1 x 0.34 mm² (1 x AWG 24) max. 1 x 0.75 mm² (1 x AWG 18)
Cable stripping length (x):	min.: 8 mm max.: 12 mm
Tightening torque.	1.2 … 2 Nm



Code structure

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

VF SL1A3PA1

Operating voltage	
1	24 Vac/dc
3	120 Vac
4	230 Vac

Type of light source	
A	standard LED with continuous light

Body design	
A	Total height 40 mm, spherical lens, threading M20x1.5mm

Connection type	
P	PUSH-IN terminal strip

Lens colour	
2	White
3	Red
4	Green
5	Yellow

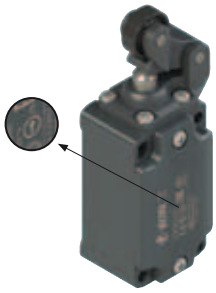
Stock items

VF SL1A3PA1
VF SL1A5PA1

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

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

Installation of single switches with safety functions



- Use **only** switches with the symbol ⊖ (see figure on the side).
- Connect the safety circuit to **the NC normally closed contacts (11-12, 21-22 or 31-32).**
- **The NO normally open contacts (13-14, 23-24, 33-34)** should be used **only for signalling**; these contacts are not to be connected with the safety circuit. However, if two or more switches are used on the same guard, a connection can be established between the NO contacts and the safety circuit.
  In this case at least one of the two switches must have positive opening and a normally closed contact NC (11-12, 21-22 or 31-32) must be connected to the safety circuit.
- Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams with symbol ⊖.
- The actuation system must be able to exert a force that is greater than the **positive opening force**, as specified in brackets below each article, next to the minimum force value.
- The device must be affixed in compliance with EN ISO 14119.

Whenever the machine guard is opened and during the whole opening travel, **the switch must be pressed directly** (fig. 1) **or through a rigid connection** (fig. 2)**.**
Only in this way the positive opening of the normally closed NC contacts (11-12, 21-22, 31-32) is guaranteed.

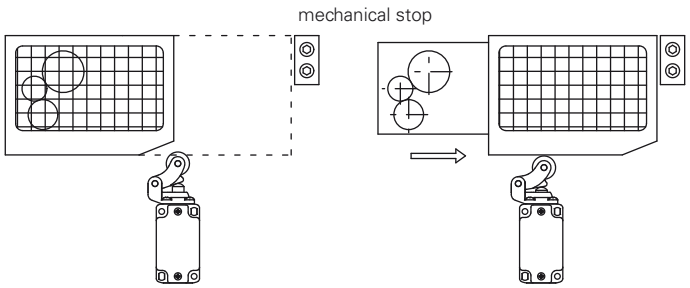


Fig.1

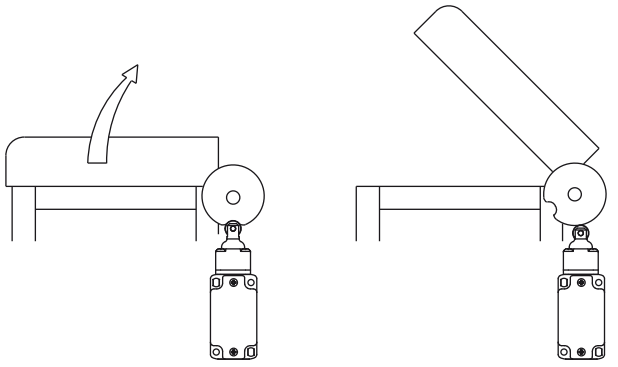


Fig.2

In safety applications with only one switch for each guard, the switches **must never be activated by a release** (fig. 3 and 4) **or through a non rigid connection** (i.e. by a spring).

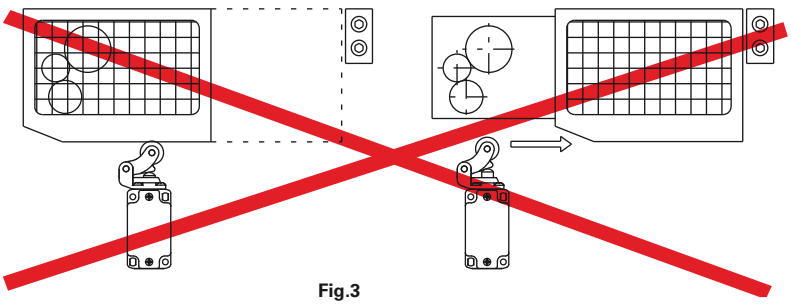


Fig.3

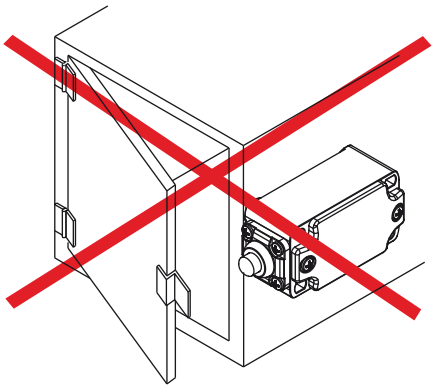
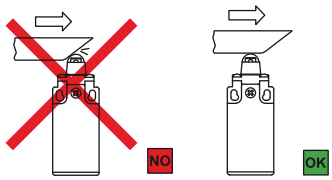


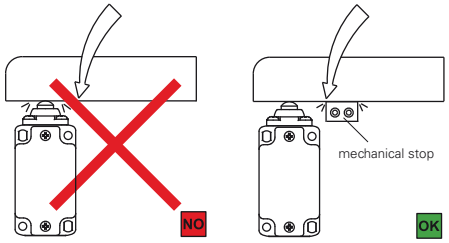
Fig.4

Mechanical stop

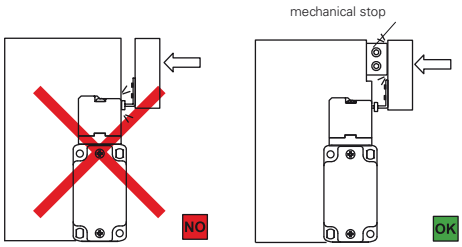
Acc. to EN ISO 14119 paragraph 5.2 letter h) "the position sensors must not be used as mechanical stop".



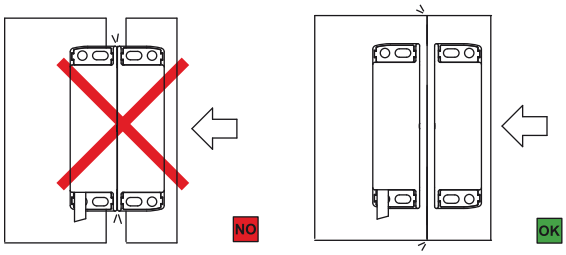
The actuator must not exceed the max. travel as indicated in the travel diagrams.



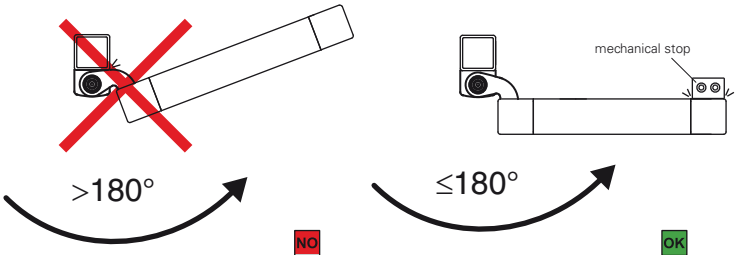
The guard must not use the switch head as a mechanical stop.



The actuator must not strike directly against the switch head.

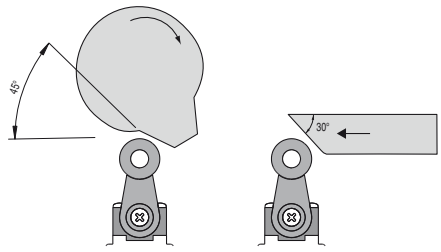
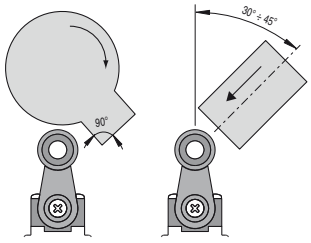
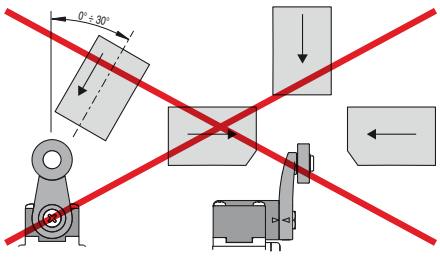
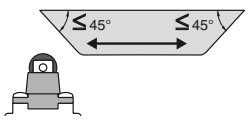
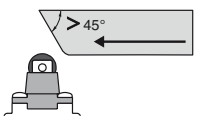
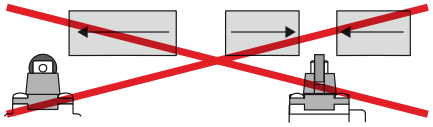
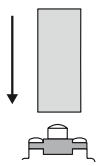
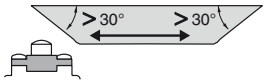
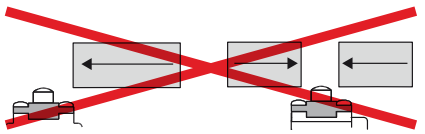


The actuator must not strike directly against the magnetic sensor.



The opening angle of safety hinge switch HP and HC series must not exceed 180°.

Actuation modes

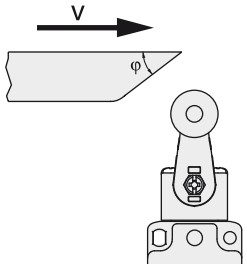
Recommended application	Application to avoid This application is possible, but increased mechanical stress may shorten the operating life of the switch	Forbidden application
		
		
		

Switches for heavy duty applications

Maximum and minimum actuation speed - FD-FL-FP-FC series

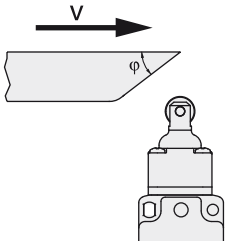
Roller lever - Type 1

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	2,5	9	0,07
30°	1,5	8	
45°	1	7	
60°	0,75	7	



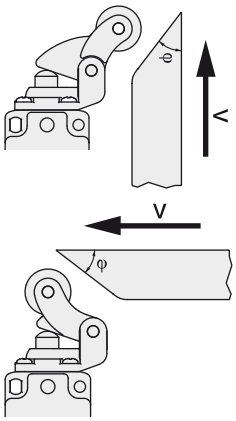
Roller plunger - Type 2

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	1	4	0,04
30°	0,5	2	0,02
45°	0,3	1	0,01



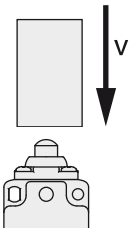
Roller lever - Type 3

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	1	5	0,05
30°	0,5	2,5	0,025
45°	0,3	1,5	0,015



Plunger - Type 4

Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
0,5	1	0,01

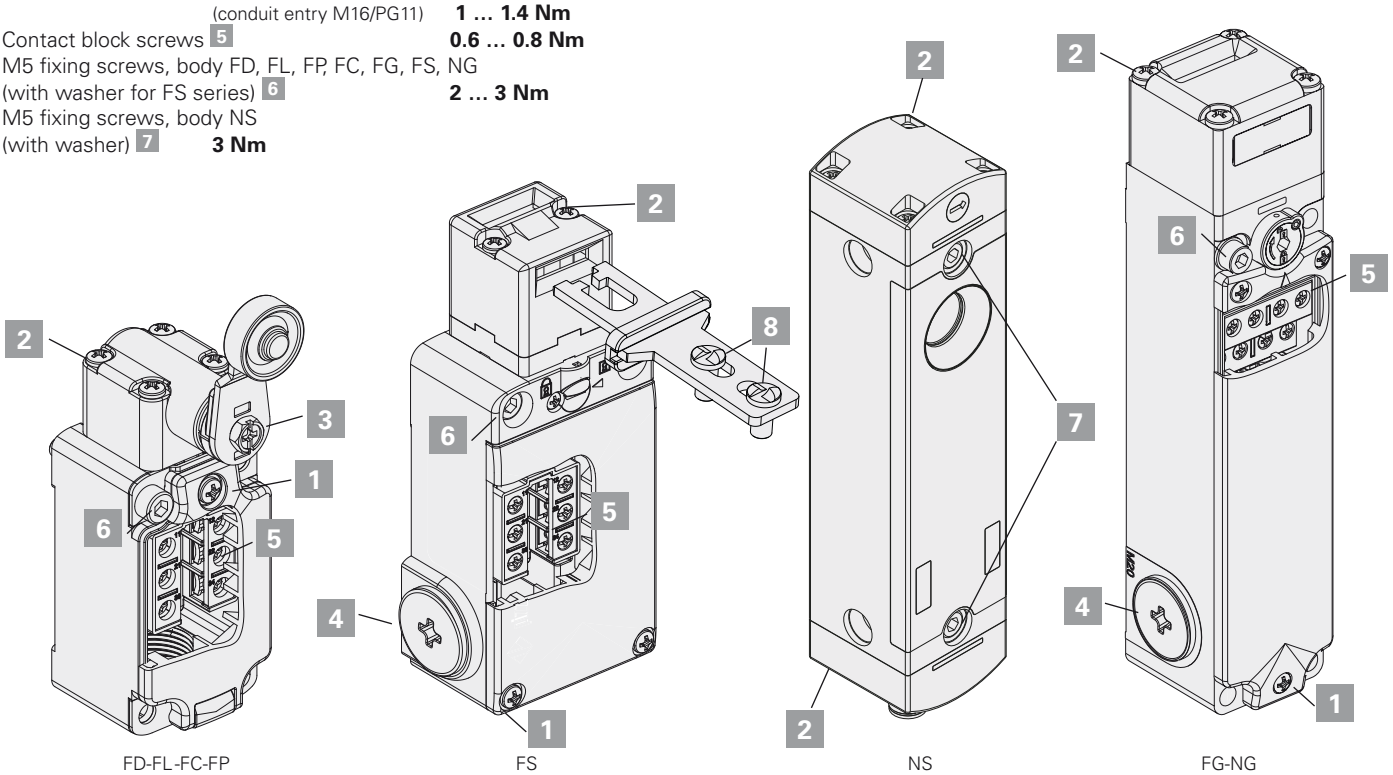


Contact type:

R = snap action
L = slow action

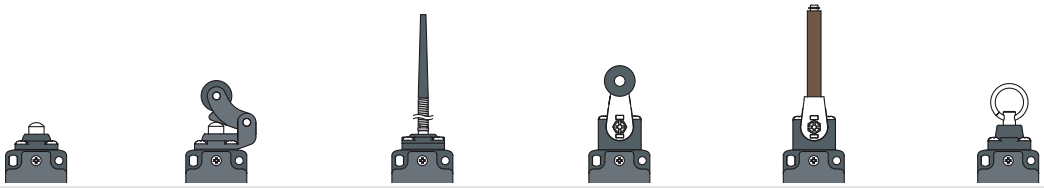
Tightening torques FD-FL-FP-FC-FG-FS-NG series

Cover screws 1	**0.8 ... 1.2 Nm**
Head screws 2	**0.8 ... 1.2 Nm**
Lever screw 3	**0.8 ... 1.2 Nm**
Protection caps 4 (conduit entry M20/PG13.5)	**1.2 ... 1.6 Nm**
(conduit entry M16/PG11)	**1 ... 1.4 Nm**
Contact block screws 5	**0.6 ... 0.8 Nm**
M5 fixing screws, body FD, FL, FP, FC, FG, FS, NG (with washer for FS series) 6	**2 ... 3 Nm**
M5 fixing screws, body NS (with washer) 7	**3 Nm**
Actuator screws VF KEY••• 8	**1.2 ... 1.6 Nm**



FD-FL-FP-FC series switches for heavy duty applications

Travel diagrams



Contact block	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6 inverted contacts
2 2x(1NO-1NC)	0 1.3 6 / 0.7	0 1.6 8 / 0.9	0 8° / 4°	0 20° 75° / 13°	0 20° 75° / 13°	0 3.3 8 / 2.5
3 1NO-1NC	0 1.3 6 / 0.8	0 1.7 8 / 1.1	0 10° / 5°	0 20° 75° / 13°	0 20° 75° / 13°	0 5.3 8 / 4.5
5 1NO+1NC	0 2.2 ⊖4 6 / 1.1	0 2.7 ⊖4.9 8 / 1.4	0 15° / 5°	0 30° ⊖60° 75° / 17°	0 22° ⊖52° 75° / 9°	0 2.9 8 / 1.7
6 1NO+1NC	0 1.5 ⊖3 6 / 3.4	0 1.8 ⊖3.7 8 / 4.2	/	0 22° ⊖42° 75° / 42°	0 14° ⊖34° 75° / 34°	0 2.3 8 / 0.8
7 1NO+1NC	0 3.1 ⊖4.6 6 / 1.6	0 3.8 ⊖5.7 8 / 2	/	0 40° 60° ⊖75° / 23°	0 32° ⊖52° 75° / 15°	0 1 8 / 2.2
9 2NC	0 2.9 ⊖4.4 6	0 3.6 ⊖5.4 8	/	0 40° 60° ⊖75°	0 32° ⊖52° 75°	0 1 8
10 2NO	0 1.4 6	0 1.7 8	0 9°	0 22° 75°	0 14° 75°	0 2.5 8
11 2NC	0 2 ⊖4 6 / 0.6	0 2.5 ⊖4.9 8 / 0.7	/	0° 27° ⊖57° 75° / 11°	/	0 3.5 8 / 2.1
12 2NO	0 2.9 6 / 1.5	0 3.6 8 / 1.8	/	0 38° 75° / 22°	0 30° 75° / 14°	0 2.6 8 / 1.1
13 2NC	0 0.8 ⊖2.3 6 / 3 ⊖4.5	0 1 ⊖2.8 8 / 3.7 ⊖5.5	/	0 14° ⊖34° 75° / 41° ⊖61°	0 6° ⊖26° 75° / 33° ⊖53°	0 1 8 / 3.2
14 2NC	0 1.4 ⊖2.9 6 / 3 ⊖4.5	0 1.7 ⊖3.6 8 / 3.7 ⊖5.5	/	0 22° ⊖42° 75° / 40° ⊖60°	0 14° ⊖34° 75° / 32° ⊖52°	0 0.9 8 / 2.5
15 2NO	0 1.4 6 / 3	0 1.7 8 / 3.7	/	0 22° 75° / 40°	0 14° 75° / 32°	0 1 8 / 2.6
16 2NC	/	/	/	66° 0 26° ⊖30° / ⊖37° 26° 66°	/	/
18 1NO+1NC	0 1.5 ⊖3 6 / 2	0 1.8 ⊖3.7 8 / 2.5	0 10° / 13°	0 23° ⊖43° 75° / 29°	0 15° ⊖35° 75° / 21°	0 2.4 8 / 1.9
20 1NO+2NC	0 1.5 ⊖3 6 / 2	0 1.8 ⊖3.7 8 / 2.5	0 10° / 13°	0 23° ⊖43° 75° / 29°	0 15° ⊖35° 75° / 21°	0 2.4 8 / 1.9
21 3NC	0 1.5 ⊖3 6	0 1.8 ⊖3.7 8	0 10°	0 23° ⊖43° 75°	0 15° ⊖35° 75°	0 2.4 8
22 2NO+1NC	0 1.5 ⊖3 6 / 2	0 1.8 ⊖3.7 8 / 2.5	0 10° / 13°	0 23° ⊖43° 75° / 29°	0 15° ⊖35° 75° / 21°	0 2.4 8 / 1.9
28 1NO+2NC	0 1.5 ⊖3 4.5 6 / 2 ⊖5.5	0 1.8 ⊖3.7 5.6 8 / 2.5 ⊖6.9	/	0 23° ⊖43° 60° 75° / 29° ⊖70°	0 15° ⊖35° 52° 75° / 21° ⊖62°	/
29 3NC	0 1.5 ⊖3 6 / 4.5 ⊖5.5	0 1.8 ⊖3.7 8 / 5.6 ⊖6.9	/	0 23° ⊖43° 75° / 60° ⊖70°	0 15° ⊖35° 75° / 52° ⊖62°	/
30 3NC	0 1.5 ⊖3 6 / 4.5 ⊖5.5	0 1.8 ⊖3.7 8 / 5.6 ⊖6.9	/	0 23° ⊖43° 75° / 60° ⊖70°	0 15° ⊖35° 75° / 52° ⊖62°	/
33 1NO+1NC	0 1.5 ⊖3 6 / 2	0 1.8 ⊖3.7 8 / 2.5	0 10° / 12°	0 23° ⊖43° 75° / 27°	0 15° ⊖35° 75° / 19°	0 2.4 8 / 2.1
34 2NC	0 1.5 ⊖3 6	0 1.8 ⊖3.7 8	0 10°	0 23° ⊖43° 75°	0 15° ⊖35° 75°	0 2.4 8
37 1NO+1NC	0 3.4 ⊖4.9 6 / 1.5	0 4.3 ⊖6.2 8 / 1.9	/	0 45° 65° ⊖75° / 18°	0 37° ⊖57° 75° / 10°	0 3 8 / 1.1
66 1NC	0 1.4 ⊖2.9 6	0 1.7 ⊖3.6 8	/	0 22° ⊖42° 75°	0 14° ⊖34° 75°	0 0.9 8
67 1NO	0 1.4 6	0 1.7 8	0 9°	0 22° 75°	0 14° 75°	0 2.5 8

Legend

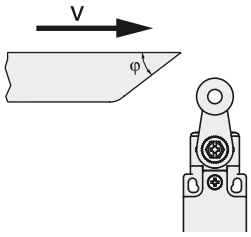
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Switch pressed / ◄ Switch released

Switches for normal duty applications

Maximum and minimum actuation speed - FR-FM-FX-FZ-FK series

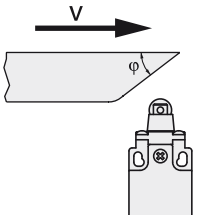
Roller lever - Type 1

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	2,5	9	0,07
30°	1,5	8	
45°	1	7	
60°	0,75	7	



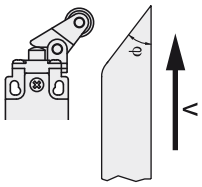
Roller plunger - Type 2

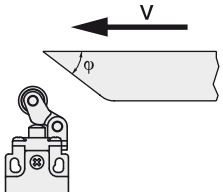
φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	1	4	0,04
30°	0,5	2	0,02
45°	0,3	1	0,01



Roller lever - Type 3

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	1	5	0,05
30°	0,5	2,5	0,025
45°	0,3	1,5	0,015



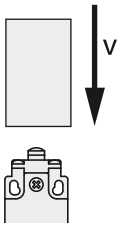


Contact type:

R = snap action
L = slow action

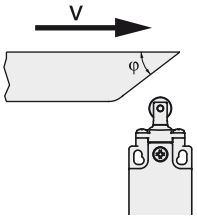
Plunger - Type 4

Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
0,5	1	0,01



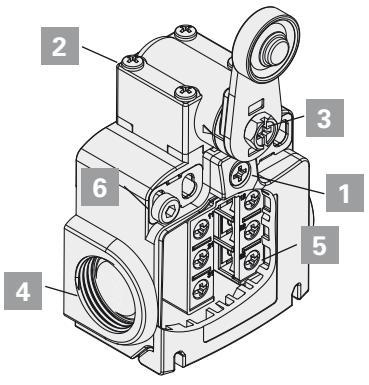
Roller plunger - Type 5

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	0,3	4	0,04
30°	0,2	2	0,02



Tightening torques - FR, FX, FK and FW series

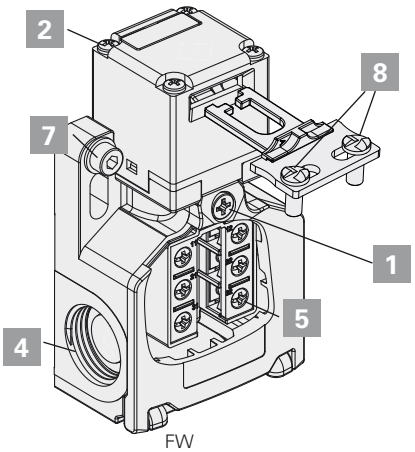
Cover screws 1	**0.7 ... 0.9 Nm**
Head screws 2	**0.5 ... 0.7 Nm**
Lever screw 3	**0.7 ... 0.9 Nm**
Protection caps 4	**1.2 ... 1.6 Nm**
Contact block screws 5	**0.6 ... 0.8 Nm**
M4 fixing screws, body (with washer for FR-FK series) 6	**2 ... 2.5 Nm**
M5 fixing screws, body (with washer for FW series) 7	**2 ... 2.5 Nm**
Actuator screws VF KEY••• 8	**1.2 ... 1.6 Nm**



FR-FX-FK-FM-FZ

Tightening torques - FM and FZ series

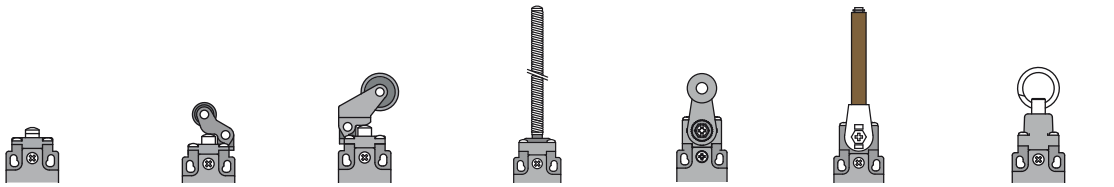
Cover screws 1	**0.5 ... 0.7 Nm**
Head screws 2	**0.5 ... 0.7 Nm**
Lever screw 3	**0.8 ... 1.2 Nm**
Protection caps 4	**1.2 ... 1.6 Nm**
Contact block screws 5	**0.6 ... 0.8 Nm**
M4 fixing screws, body 6	**2 ... 3 Nm**



FW

FR-FM-FX-FZ-FK series switches for normal duty applications

Travel diagrams



Contact block	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7 inverted contacts
2 2x(1NO-1NC)	0 1.3 6 / 0.7	0 2 8 / 1.1	0 3 13 / 1.6	0 9° / 4°	0 17° 75° / 10°	0 17° 75° / 10°	0 5.4 8 / 4.8
3 1NO-1NC	0 1.3 6 / 0.8	0 2 8 / 1.2	0 3 13 / 1.8	0 9° / 4°	0 17° 75° / 10°	0 17° 75° / 10°	0 3.4 8 / 2.9
5 1NO+1NC	0 2.2 ⊖4 6 / 1.1	0 3.3 ⊖6 8 / 1.7	0 5.1 ⊖9.2 13 / 2.5	0 17° / 6°	0 30° 60° ⊖ 75° / 15°	0 25° ⊖55° 75° / 10°	0 5 8 / 3.8
6 1NO+1NC	0 1.5 ⊖3 6 / 3.1	0 2.3 ⊖4.5 8 / 4.7	0 3.5 ⊖6.9 13 / 7.1	/	0 20° ⊖40° 75° / 42°	0 15° ⊖35° 75° / 35°	0 4.6 8 / 3
7 1NO+1NC	0 3.1 ⊖4.6 6 / 1.6	0 4.7 ⊖6.9 / 2.4 8	0 7.1 ⊖10.6 / 3.7 13	/	0 41° 61° ⊖ 75° / 22°	0 36° ⊖56° 75° / 17°	0 3 8 / 4.5
9 2NC	0 2.9 ⊖4.4 6	0 4.4 ⊖6.6	0 6.7 ⊖10.1	/	0 39° 75°	0 34° ⊖54° 75°	0 3.1 8
10 2NO	0 1.4 6	0 2.1 8	0 3.2 13	0 10°	0 20° 75°	0 15° 75°	0 4.6 8
11 2NC	0 2 ⊖4 6 / 0.6	0 3 ⊖6 8 / 0.9	0 4.6 ⊖9.2 13 / 1.4	/	0° 26° 56° ⊖ 75° / 7°	/	0 5.6 8 / 4
12 2NO	0 2.9 6 / 1.5	0 4.4 8 / 2.3	0 6.7 13 / 3.5	0 21° / 8°	0 37° 75° / 19°	0 32° 75° / 14°	0 4.7 8 / 3.3
13 2NC	0 0.8 ⊖2.3 6 / 3 ⊖4.5	0 1.2 ⊖3.5 8 / 4.5 ⊖6.8	0 1.8 ⊖5.3 13 / 6.9 ⊖10.4	/	0 11° ⊖31° 75° / 40° ⊖60°	6° ⊖26° 75° / 0 35° ⊖55°	0 3.1 8 / 5.3
14 2NC	0 1.4 ⊖2.9 6 / 3 ⊖4.5	0 2.1 ⊖4.4 8 / 4.5 ⊖6.8	0 3.2 ⊖6.7 13 / 6.9 ⊖10.4	/	0 19° ⊖39° 75° / 40° ⊖60°	0 14° ⊖34° 75° / 35° ⊖55°	0 3 8 / 4.7
15 2NO	0 1.4 6 / 3	0 2.1 8 / 4.5	0 3.2 13 / 6.9	/	0 19° 75° / 40°	0 14° 75° / 35°	0 4.7 8 / 3.1
16 2NC	/	/	/	/	75° 0 28° ⊖48° / 48° ⊖ 28° 75°	/	/
18 1NO+1NC	0 1.5 ⊖3 6 / 2	0 2.3 ⊖4.5 8 / 3	0 3.5 ⊖6.9 13 / 4.6	0 10° / 14°	0 20° ⊖40° 75° / 27°	0 15° ⊖35° 75° / 22°	0 4.6 8 / 4.1
20 1NO+2NC	0 1.5 ⊖3 6 / 2	0 2.3 ⊖4.5 8 / 3	0 3.5 ⊖6.9 13 / 4.6	0 10° / 14°	0 20° ⊖40° 75° / 27°	0 15° ⊖35° 75° / 22°	0 4.6 8 / 4
21 3NC	0 1.5 ⊖3 6	0 2.3 ⊖4.5 8	0 3.5 ⊖6.9 13	0 10°	0 20° ⊖40° 75°	0 15° ⊖35° 75°	0 4.6 8
22 2NO+1NC	0 1.5 ⊖3 6 / 2	0 2.3 ⊖4.5 8 / 3	0 3.5 ⊖6.9 13 / 4.6	0 10° / 14°	0 20° ⊖40° 75° / 27°	0 15° ⊖35° 75° / 22°	0 4.6 8 / 4.1
28 1NO+2NC	0 1.5 ⊖3 4.5 6 / 2 ⊖5.5	0 2.3 ⊖4.5 6.5 8 / 3 ⊖7.5	0 3.5 ⊖6.9 13 / 4.6 10.2 ⊖12.5	/	0 20° 40° ⊖ 58° 75° / 27° ⊖70°	0 15° ⊖35° 53° 75° / 22° ⊖65°	0 1.8 4.6 8 / 4
29 3NC	0 1.5 ⊖3 6 / 4.5 ⊖5.5	0 2.3 ⊖4.5 8 / 6.5 ⊖7.5	0 3.5 ⊖6.9 13 / 10.2 ⊖12.5	/	0 20° ⊖40° 75° / 58° ⊖70°	0 15° ⊖35° 75° / 53° ⊖65°	0 4.6 8 / 1.8
30 3NC	0 1.5 ⊖3 6 / 4.5 ⊖5.5	0 2.3 ⊖4.5 8 / 6.5 ⊖7.5	0 3.5 ⊖6.9 13 / 10.2 ⊖12.5	/	0 20° ⊖40° 75° / 58° ⊖70°	0 15° ⊖35° 75° / 53° ⊖65°	0 4.6 8 / 1.8
33 1NO+1NC	0 1.5 ⊖3 6 / 2	0 2.3 ⊖4.5 8 / 3	0 3.5 ⊖6.9 13 / 4.6	0 10° / 14°	0 20° ⊖40° 75° / 25°	0 15° ⊖35° 75° / 20°	0 4.6 8 / 4.3
34 2NC	0 1.5 ⊖3 6	0 2.3 ⊖4.5 8	0 3.5 ⊖6.9 13	0 10°	0 20° ⊖40° 75°	0 15° ⊖35° 75°	0 4.6 8
37 1NO+1NC	0 3.4 ⊖4.9 / 1.5 6	0 5.2 ⊖7.4 / 2.3 8	0 7.8 13 / 3.4 ⊖11.2	/	0 45° ⊖65° / 18° 75°	0 40° ⊖60° 75° / 13°	0 2.8 8 / 4.9
66 1NC	0 1.4 ⊖2.9 6	0 2.1 ⊖4.4 8	0 3.2 ⊖6.7 13	0 10°	0 19° ⊖39° 75°	0 14° ⊖34° 75°	0 3 8
67 1NO	0 1.4 6	0 2.1 8	0 3.2 13	0 10°	0 20° 75°	0 15° 75°	0 4.6 8

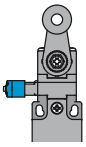
Legend

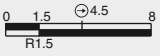
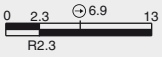
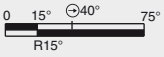
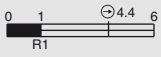
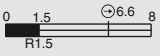
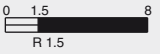
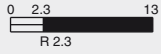
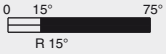
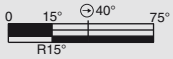
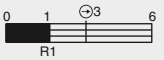
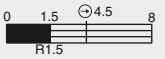
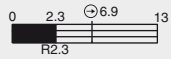
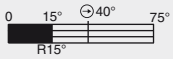
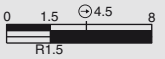
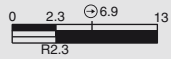
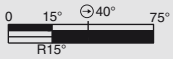
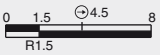
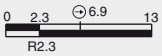
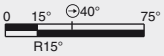
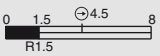
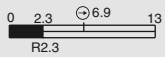
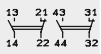
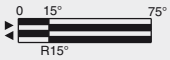
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Switch pressed / ◄ Switch released

FR-FM-FX-FZ-FK series switches with W3 reset for normal duty applications

Travel diagrams



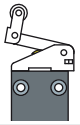
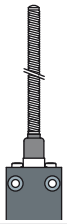



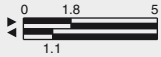
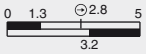
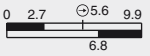
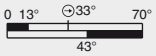
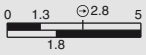
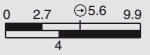
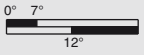
Contact block		Group 1	Group 2	Group 3	Group 4
6 1NO+1NC					
9 2NC					
10 2NO					
20 1NO+2NC					
21 3NC					
22 2NO+1NC					
33 1NO+1NC					
34 2NC					
2 2x(1NO-1NC)					

Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Switch pressed / ◄ Switch released | R reset engagement travel

FA series pre-wired switches

Travel diagrams

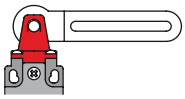

Contact block		Group 1	Group 2	Group 3	Group 4
41 1NO+1NC					
45 1NO+1NC					
46 1NO+1NC					
48 1NO+1NC					

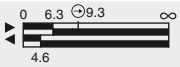
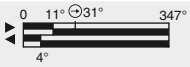
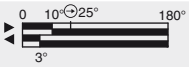
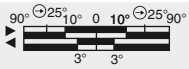
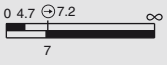
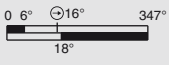
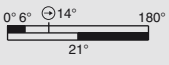
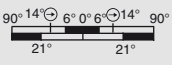
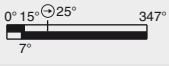
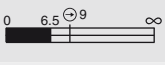
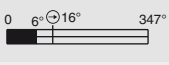
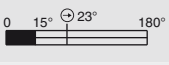
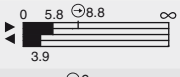
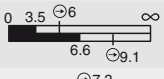
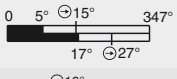
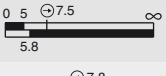
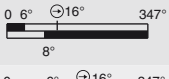
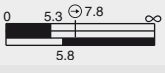
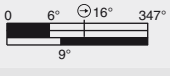
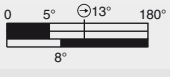
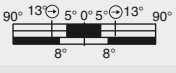
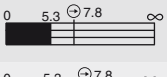
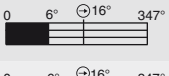
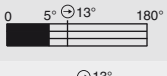
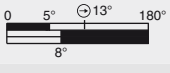
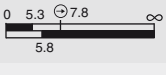
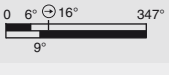
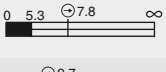
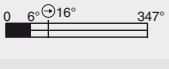
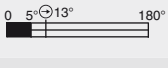
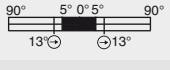
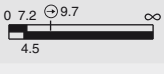
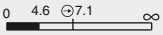
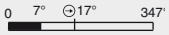
Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Switch pressed / ◄ Switch released

FR-FM-FX-FZ-FK-FW series switches for safety applications

Travel diagrams






Contact block		Group 8	Group 9	Group 10	Group 11
5 1NO+1NC					
6 1NO+1NC					
7 1NO+1NC				/	/
9 2NC					
11 2NC			/	/	/
13 2NC			/	/	/
14 2NC				/	/
18 1NO+1NC					
20 1NO+2NC					
21 3NC					
22 2NO+1NC					
33 1NO+1NC					
34 2NC					
37 1NO+1NC			/	/	/
66 1NC					

Legend

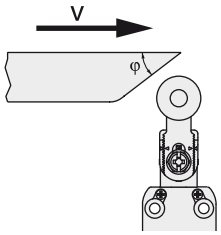
Closed contact | Open contact | Positive opening travel acc. to EN 60947-5-1 | ► Switch pressed / ◄ Switch released

NA-NB-NF series modular pre-wired switches

Maximum and minimum actuation speed

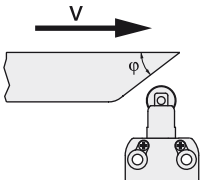
Roller lever - Type 1

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	2,5	9	0,07
30°	1,5	8	
45°	1	7	
60°	0,75	7	



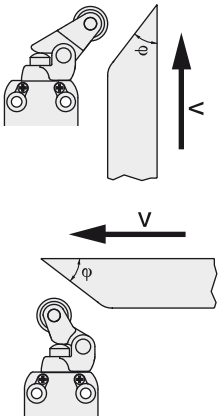
Roller plunger - Type 2

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	1	4	0,04
30°	0,5	2	0,02
45°	0,3	1	0,01



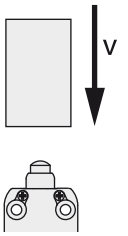
Roller lever - Type 3

φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	1	5	0,05
30°	0,5	2,5	0,025
45°	0,3	1,5	0,015



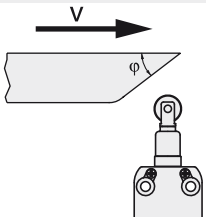
Plunger - Type 4

Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
0,5	1	0,01



Roller plunger - Type 5

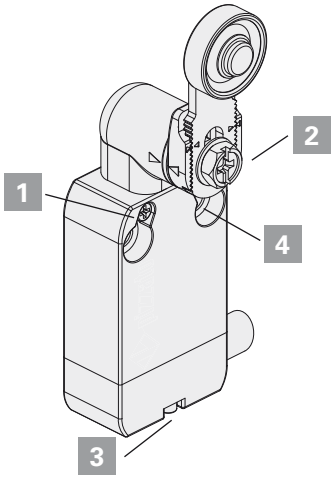
φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	0,3	4	0,04



Contact type:

R = snap action
L = slow action

Screw tightening torques



For NA and NB series:

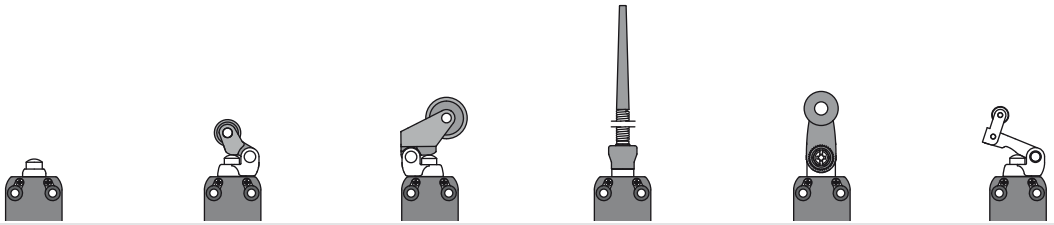
Head screws 1	**0.5 ... 0.7 Nm**
Lever screws 2	**0.8 ... 1.2 Nm**
Connector screw 3	**0.3 ... 0.6 Nm**
M4 fixing screws, body 4	**2 ... 3 Nm**

For NF series:

Head screws 1	**0.3 ... 0.4 Nm**
Lever screws 2	**0.8 ... 1.2 Nm**
Connector screw 3	**0.2 ... 0.3 Nm**
M4 fixing screws, body 4	**2 ... 3 Nm**

NA-NB-NF series modular pre-wired switches

Travel diagrams



Contact block	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
B11 1NO+1NC	0 1.5 4⊖ 5 0.9	0 2.1 5.6⊖ 7 1.5	0 3.5 9.6⊖ 11 2.5	0 13° 8°	0 20° ⊖50° 75° 11°	0 4.6 11.2⊖ 14 3.1
B02 2NC	0 1.5 ⊖4 5 0.9	0 2.1 5.6⊖ 7 1.5	0 3.5 9.6⊖ 11 2.5	0 13° 8°	0 20° ⊖50° 75° 11°	0 4.6 11.2⊖ 14 3.1
B12 1NO+2NC	0 1.5 4⊖ 5 0.9	0 2.1 5.6⊖ 7 1.5	0 3.5 9.6⊖ 11 2.5	0 13° 8°	0 20° ⊖50° 75° 11°	0 4.6 11.2⊖ 14 3.1
B22 2NO+2NC	0 1.5 ⊖4 5 0.9	0 2.1 5.6⊖ 7 1.5	0 3.5 9.6⊖ 11 2.5	0 13° 8°	0 20° ⊖50° 75° 11°	0 4.6 11.2⊖ 14 3.1
G11 1NO+1NC	0 1.4 ⊖2.9 5 3.1	0 2 ⊖4.1 7 4.5	0 3.3 ⊖7 11 7.3	/	0 18° ⊖38° 75° 41°	0 4.1 ⊖8.1 14 9.5
G02 2NC	0 1.4 ⊖2.9 5	0 2 ⊖4.1 7	0 3.3 ⊖7 11	0 12°	0 18° ⊖38° 75°	0 4.1 ⊖8.1 14
G12 1NO+2NC	0 1.4 ⊖2.9 5 3.1	0 2 ⊖4.1 7 4.5	0 3.3 ⊖7 11 7.3	/	0 18° ⊖38° 75° 41°	0 4.1 ⊖8.1 14 9.5
G22 2NO+2NC	0 1.4 ⊖2.9 5 3.1	0 2 ⊖4.1 7 4.5	0 3.3 ⊖7 11 7.3	/	0 18° ⊖38° 75° 41°	0 4.1 ⊖8.1 14 9.5
H11 1NO+1NC	0 1.4 ⊖2.9 5 1	0 2 ⊖4.1 7 1.4	0 3.3 ⊖7 11 2.3	0 12° 7°	0 18° ⊖38° 75° 10°	0 4.4 ⊖8.1 14 2.8
H12 1NO+2NC	0 1.4 ⊖2.9 5 1	0 2 ⊖4.1 7 1.4	0 3.3 ⊖7 11 2.3	0 12° 7°	0 18° ⊖38° 75° 10°	0 4.4 ⊖8.1 14 2.8
H22 2NO+2NC	0 1.4 ⊖2.9 5 1	0 2 ⊖4.1 7 1.4	0 3.3 ⊖7 11 2.3	0 12° 7°	0 18° ⊖38° 75° 10°	0 4.4 ⊖8.1 14 2.8
L11 1NO+1NC	0 1.4 ⊖2.9 5 1.8	0 2 ⊖4.1 7 2.6	0 3.3 ⊖7 11 4.2	0 12° 15°	0 18° ⊖38° 75° 23°	0 3.8 ⊖8.1 14 5.2
L12 1NO+2NC	0 1.4 ⊖2.9 5 1.8	0 2 ⊖4.1 7 2.6	0 3.3 ⊖7 11 4.2	0 12° 15°	0 18° ⊖38° 75° 23°	0 3.8 ⊖8.1 14 5.2
L22 2NO+2NC	0 1.4 ⊖2.9 5 1.8	0 2 ⊖4.1 7 2.6	0 3.3 ⊖7 11 4.2	0 12° 15°	0 18° ⊖38° 75° 23°	0 3.8 ⊖8.1 14 5.2
BA1 1NO+1NC change-over	0 1.5 4⊖ 5 0.9	0 2.1 5.6⊖ 7 1.5	0 3.5 9.6⊖ 11 2.5	0 13° 8°	0 20° ⊖50° 75° 11°	0 4.6 11.2⊖ 14 3.1

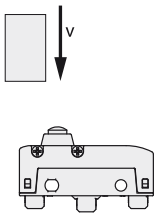
Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Switch pressed / ◄ Switch released

MK series microswitches

Maximum and minimum actuation speed

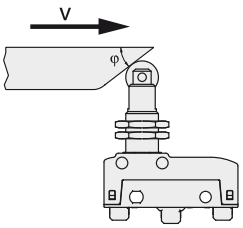
Plunger - Type 1

Vmax (m/s)	Vmin (mm/s)
0,5	0,05



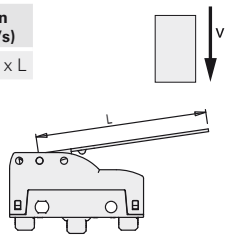
Roller plunger - Type 2

φ	Vmax (m/s)	Vmin (mm/s)
15°	0,6	0,2
30°	0,3	0,1
45°	0,1	0,05



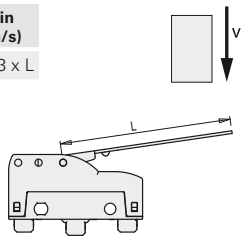
Lever with direct action (D) - Type 3

Vmax (m/s)	Vmin (mm/s)
0,03 x L	0,0166 x L



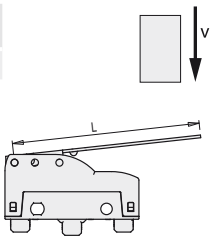
Lever with inverted action (R) - Type 4

Vmax (m/s)	Vmin (mm/s)
0,015 x L	0,0083 x L



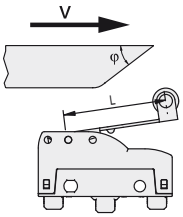
Lever with direct action, rear (F) - Type 5

Vmax (m/s)	Vmin (mm/s)
0,01 x L	0,0047 x L



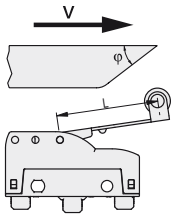
Roller lever with direct action (D) - Type 6

φ	Vmax (m/s)	Vmin (mm/s)
15°	0,1 x L	0,0664 x L
30°	0,05 x L	0,0332 x L
45°	0,03 x L	0,0166 x L



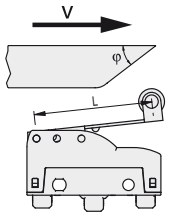
Roller lever with inverted action (R) - Type 7

φ	Vmax (m/s)	Vmin (mm/s)
15°	0,048 x L	0,0332 x L
30°	0,024 x L	0,0166 x L
45°	0,015 x L	0,0083 x L

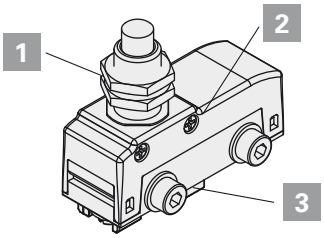


Roller lever with direct action, rear (F) - Type 8

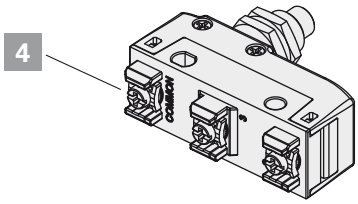
φ	Vmax (m/s)	Vmin (mm/s)
15°	0,032 x L	0,0188 x L
30°	0,016 x L	0,0094 x L
45°	0,01 x L	0,0047 x L



Tightening torques



Tighten the nuts 1 with a torque of **2** ... **3** Nm.
Tighten the head screws 2 with a torque of **0.3** ... **0.4** Nm.
Tighten the M4 screws 3 with a torque of **0.8** ... **1.2** Nm, insert washer.
Attention: A tightening torque higher than 1.2 Nm can cause the breaking of the microswitch.



Tighten the terminal screws 4 with a torque of **0.6** ... **0.8** Nm.

General requirements

The device is designed to be installed on industrial machineries.

The installation must be performed only by qualified staff aware of the regulations in force in the country of installation.

The device must be used exactly as supplied, properly fixed to the machine and wired.

It is not allowed to disassemble the product and use only parts of the same, the device is designed to be used in its assembly as supplied. It is prohibited to modify the device, even slightly e.g.: replace parts of it, drill it, lubricate it, clean it with gasoline or gas oil or any aggressive chemical agents.

The protection degree of the device refers to the electrical contacts only. Carefully evaluate all the polluting agents present in the application before installing the device, since the IP protection degree refers exclusively to agents such as dust and water according to EN 60529. Thus the device may not be suitable for installation in environments with dust in high quantity, condensation, humidity, steam, corrosive and chemical agents, flammable or explosive gas, flammable or explosive dust or other polluting agents.

Some devices are provided with a housing with openings for connecting the electrical cables. To guarantee an adequate protection degree of the device, the opening that the wiring passes through must be protected against the penetration of harmful materials by means of an appropriate seal. Proper wiring therefore requires the use of cable glands, connectors or other devices with IP protection degree that is equal to or greater than that of the device.

Store the products in their original packaging, in a dry place with temperature between -40° C and +70°C

Failure to comply with these requirements or incorrect use during operation can lead to the damage of the device and the loss of the function performed by the device itself. This will result in termination of the warranty on the item and will release the manufacturer from any liability.

Using the devices

- Before use, check if the national rules provide for further requirements in addition to those given here.
- Before installation, make sure the device is not damaged in any part.
- All devices are designed for actuation by moving parts of industrial machines.
- Do not use the device as mechanical stop of the actuator.
- Do not apply excessive force to the device once it has reached the end of its actuation travel.
- Do not exceed the maximum actuation travel.
- Avoid contact of the device with corrosive fluids.
- Do not stress the device with bending and torsion.
- Do not disassemble or try to repair the device, in case of defect or fault replace the entire device.
- In case the device is deformed or damaged it must be entirely replaced. Correct operation cannot be guaranteed when the device is deformed or damaged.
- Always attach the following instructions to the manual of the machine in which the device is installed.
- If specific operating instructions exist for a device (supplied or downloadable from www.pizzato.com), they must always be included with the machine manual and be available for the entire service life of the machine.
- These operating instructions must be kept available for consultation at any time and for the whole period of use of the device.

Wiring and installation

- Installation must be carried out by qualified staff only.
- Use of the device is limited to function as a control switch.
- Observe minimum distances between devices (if provided).
- Comply with the tightening torques indicated in this catalogue.
- Keep the electrical load below the value specified by the respective utilization category.
- Disconnect the power before to work on the contacts, also during the wiring.
- Do not paint or varnish the devices.
- Install the product on flat and clean surfaces only.
- Do not bend or deform the device during installation.
- Never use the device as support for other machine components (cable ducts, tubes, etc.)
- For installation on the machine, use the intended bore holes in the housing. The device must be fixed with screws of adequate length and resistance to the expected stress. At least two screws must be used to fix the housing to the machine.
- After and during installation, do not pull the electrical cables connected to the device. If excessive tension is applied to the cables (that is not supported by an appropriate cable gland), the contact block may be damaged.
- During wiring comply with the following requirements:
- For terminals (if present), comply with the minimum and maximum cross-sections of the conductors.
- Tighten the electrical terminals with the torque indicated in this catalogue (if present).
- Do not introduce polluting agents into the device as: talc, lubricants for cable sliding, powder separating agents for multipolar cables, small strands of copper and other pollutants that could affect the proper functioning of the device.
- Before closing the device cover (if present) verify the correct positioning of the gaskets.
- Verify that the electrical cables, wire-end sleeves, cable numbering systems and any other parts do not obstruct the cover from closing correctly or if pressed between them do not damage or compress the internal contact block.
- For devices with integrated cable, the free end of the cable must be properly connected inside a protected housing. The electrical cable must be properly protected from cuts, impacts, abrasion, etc.
- After installation and before commissioning of the machine, verify:
  - the correct operation of the device and all its parts;
  - the correct wiring and tightening of all screws;
  - the actuating travel of the actuator must be shorter than the maximum travel allowed by the device.
- After installation, periodically check for correct device operation.

Do not use in following environments:

- Environments where dust and dirt can cover the device and by sedimentation stop its correct working.
- Environment where sudden temperature changes cause condensation.
- Environments where coatings of ice may form on the device.
- Environments where the application causes knocks or vibrations that could damage the device.
- Environment with presence of explosive or flammable gas or dust.

Limits of use

- Use the devices following the instructions, complying with their operation limits and the standards in force.
- The devices have specific application limits (min. and max. ambient temperature, mechanical endurance, protection degree, utilisation category, etc.) These limits are met by the different devices only if considered individually and not if combined with each other. For further information contact our technical department.
- The utilization implies knowledge of and compliance with following standards: EN 60204-1, EN 60947-5-1, ISO 12100, EN ISO 14119.
- Please contact our technical department for information and assistance (phone +39.0424.470.930 / fax +39.0424.470.955 / e-mail tech@pizzato.com) in the following cases:
  - Cases not mentioned in the present utilization requirements.
  - In nuclear power stations, trains, airplanes, cars, incinerators, medical devices or any application where the safety of two or more persons depend on the correct operation of the device.

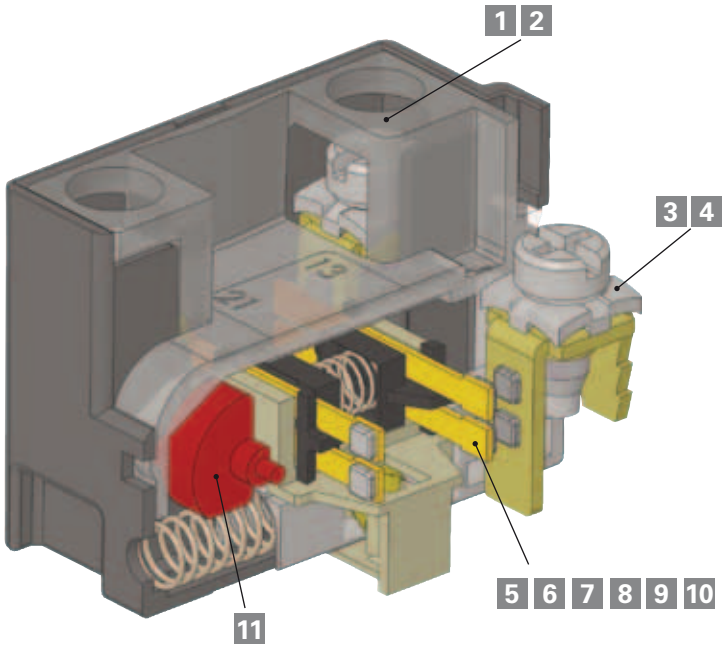
Additional requirements for safety applications

Provided that all previous requirements for the devices are fulfilled, for installations with operator protection function additional requirements must be observed:

- The utilization implies knowledge of and compliance with following standards: IEC 60204-1, IEC 60947-5-1, ISO 12100, EN ISO 14119, EN 62061, EN ISO 13849-1, EN ISO 13850.
- The protection fuse (or equivalent device) must be always connected in series with the NC contacts of the safety circuit.
- Periodically verify the correct working of the safety devices; the periodicity of this verification is settled by the machine manufacturer based on the machine danger degree and it does not have to be less than one a year.
- After installation and before commissioning of the machine, verify:
  - the correct operation of the device and all its parts;
  - the correct wiring and tightening of all screws;
  - the actuating travel of the actuator must be shorter than the maximum travel allowed by the device;
  - the actuating travel of the actuator must be greater than the positive opening travel;
  - the actuation system must be able to exert a force that is greater than the positive opening force.
- Devices with a safety function have a limited service life. Although still functioning, after 20 years from the date of manufacture the device must be replaced completely. The production date can be derived from the production batch on the item. Example: A10 FD7-411. The batch's first letter refers to the month of manufacture (A=January, B=February, etc.). The second and third letters refer to the year (10=2010, 11=2011, etc.).

Features

The contact blocks developed by Pizzato Elettrica are the result of 30 years of development experience and millions of sold switches. The range of contact blocks presented in this chapter is one of the most extensive in the world in the sector of position switches.
This chapter introduces to some features of Pizzato Elettrica contact blocks, in order to give the final user a better understanding of the technologies behind that element simply named "contact".
We underline that contact blocks are not available for sale (to the public) separately from switches, both because some of them are mechanically connected to the switch and because some technical features may change in accordance with the switch and its function. The following data is only intended to serve as an aid for the initial selection of the contact block. It is not to be used for determining the characteristics of the switch that uses this contact block. For example, the use of a contact block with positive opening with a switch with flexible actuator results in the combination of the two devices not having positive opening.
In this chapter, the properties of the E1 electronic contact block are explained in detail. It is used with position switches with multiple monitoring tasks that would require extensive effort to realize with electronic sensors. There is no other electronic sensor on the market that can match this contact unit with respect to precision and repeatability, adjustment of the switching point, operating temperature and price.



	Description
1	Captive screws
2	Finger protection
3	Clamping screw plates for cables with various diameters
4	Self-lifting clamping screw plates
5	Material of the contacts: Silver alloy or gold-plated silver alloy
6	Contact technology and reliability: Single bridge, double bridge
7	Operating voltages and currents for reliable switching

	Description
8	Classification of the contact design acc. to EN 60947-5-1: X, Y, C, Za, Zb
9	Contact type: Slow action / snap action / snap action with constant pressure
10	Force on contacts
11	Positive opening of contacts

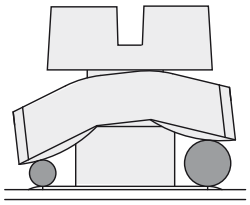
1 Captive screws

Switches with this characteristic have clamping screws that remain in place even if completely unscrewed. This feature reduces wiring time, since the operator does not have to be careful not to unscrew the screws completely and does not risk to lose them by mistake, which is very useful in case of wirings in uncomfortable position

2 Finger protection

All terminals in the contact blocks have protection degree IP20 in accordance with EN 60529, they are therefore protected against access to dangerous parts with a diameter greater than 12 mm.

3 Clamping screw plates for cables with various diameters



The clamping screw plates are provided with a particular "roofing tile" structure and are loosely coupled to the clamping screw. The design causes connection wires of different diameter to be pulled towards the screw when tightening the screw (see figure), preventing the wires from escaping towards the outside.

4 Self-lifting clamping screw plates

Switches with this feature are equipped with clamping screw plates that move up or down by turning the clamping screw; wiring is easier and faster as a result.

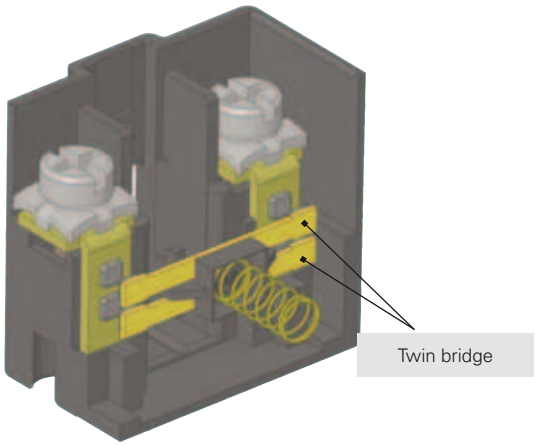
5 Contact material: gold-plated silver alloy

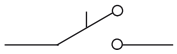
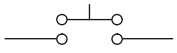
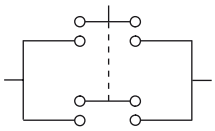
The contact blocks can be supplied with silver electric contacts with a special gold-plated surface, with total gold thickness of one micron. This type of treatment can be useful in environments which are aggressive against silver (very humid or sulphurous atmospheres) and in case of very small electric loads, usually with low voltages and supply currents. This thickness of the gold coating permits several million switching cycles.

6 Contact technology and reliability

Very rarely, an electric contact does not function. A failed switching operation is a typical consequence of an exceptionally high contact resistance caused by dust, a thin layer of oxidation or other impurities that could penetrate the switch during wiring. Thus, the repeated occurrence of faulty switching depends not only on the sensor type, but also on its environmental conditions and the load that the switch drives. These effects are more evident with low electrical loads if the electric voltage cannot penetrate the thin layers of oxide or small grains of dust.
This type of malfunction can normally be tolerated with hand-operated devices, because repeating the operation is enough to restore the function. This is not the case with position switches, as severe machine damage could result if the end position is not ascertained.
In the following table we refer to two typical contact structures (type A and B) normally used in the industry and the ones which have been used by Pizzato Elettrica for several years in most switches: movable contacts with double interruption and twin bridge (type C).
As you can see from the table below, the last structure (type C) has the same contact resistance **(R)** as the simple mobile contact (type A), but with a much lower probability of failure **(fe).**
With a failure probability of **x** for a single switching operation, the failure probability for type A is **fe=x**, for type B **fe** ≅ **2·x,** whereas for type C it is **fe** **4·x²**
This means that if the probability of a switching failure is x in a given situation, e.g., 1x10-4, (1 switching failure in 10,000), the result is as follows:

- for type A one failed commutation every 10,000.
- for type B one failed commutation every 5,000.
- for type C one failed commutation every 25,000,000.



Type	Diagram	Description	Contact resistance R	Probability of errors fe
A		simple mobile contact	R=Rc	fe=x
B		mobile contact with double interruption	R=2·Rc	$fe=2x-x^2$
C		mobile contact with double interruption and twin bridge	$R=\frac{2\cdot Rc}{2}=Rc$	$fe=4x^2-4x^3+x^4$

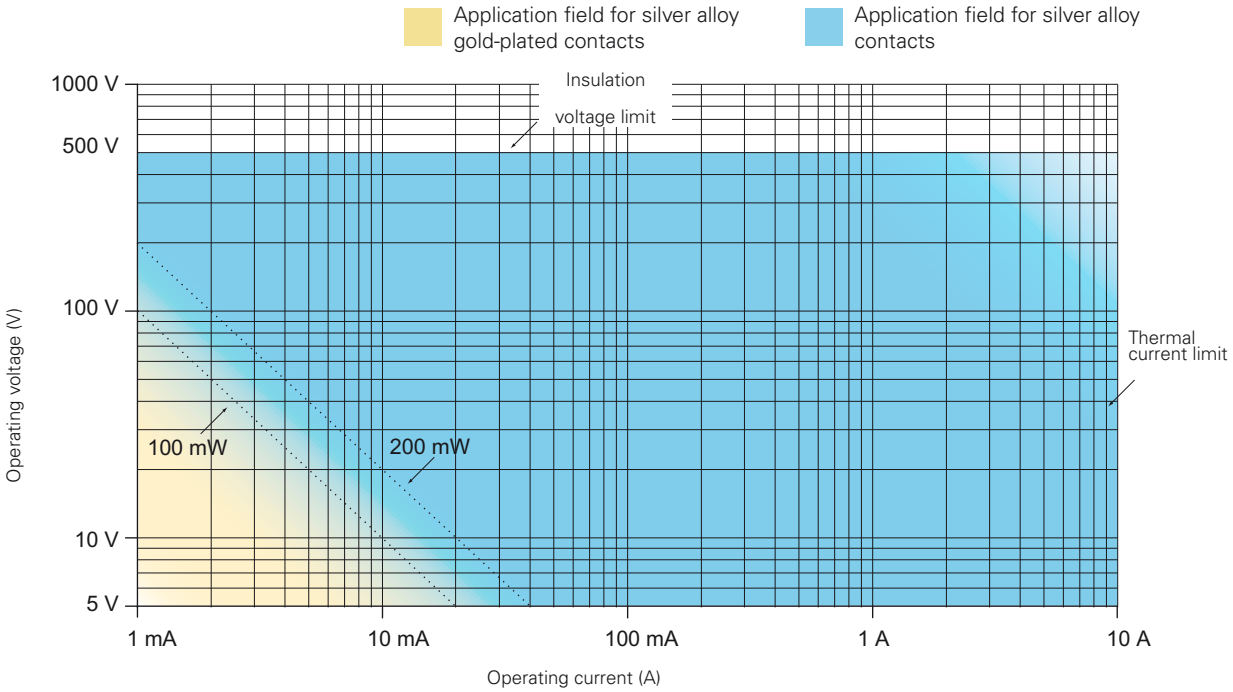
7 Minimum operating voltages and currents for reliable switching

The reliability of an electric contact depends on several factors, whose influence varies depending on the type of load. For high power loads is necessary for the contact to be able to dissipate the heat generated during switching. For low power loads, instead, it is important that it oxides and other impurities do not obstruct the passing of the electric signal. As a result, the material chosen for the electric contacts is a compromise among different and sometimes contrasting needs. In position switches contacts are usually made of a silver that has proved to be suitable for the switching of loads in the range of approximately 1 kW to 0.1 W. However, at lower loads, the effects of the oxide, which silver naturally develops upon contact with air, may occur; additionally to be taken into account are possible contaminations or impurities in the contact switching chamber (for example the talc powder in the cable sheaths that an installer could accidentally insert in the switch may have a similar effect).

It is impossible to define a fix threshold above which the "missing switching phenomenon" does not appear, because there are a lot of mechanical end electric parameters that influence this value. For example, in laboratory environment a good twin bridge electric contact is able to switch loads in the µW range for dozens of millions of handling operations, without losing signals. However, this does not mean that the same contact will have the same performance when the switch operates in environments with sudden changes of temperature (condensation) or where few switching occur (oxidation).

In order to avoid this kind of problem, gold plated contacts are used for very low loads profiting from the non-oxidability of this material. The gold-plating layer should be thick enough to be mechanically resistant to switching as well as electrically resistant to possible sparks that may vaporize it. For this reason Pizzato Elettrica uses micron thickness gold plating suitable for millions of working cycles. Thinner gold plating layers have often a purely aesthetic function and are only suitable to protect the product against oxidation during long time storage.

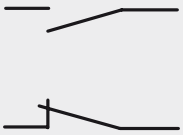
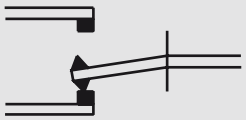
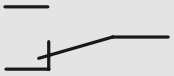
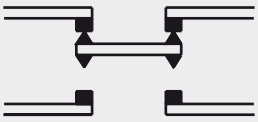
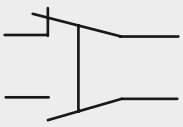
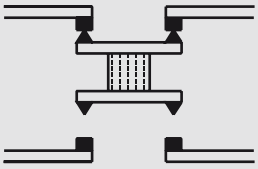
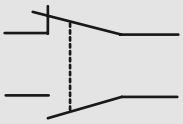
The minimum current and voltage values recommended by Pizzato Elettrica are shown in the diagram below, that is divided into two areas defined by a steady power limit. These values identify voltage and current combinations with high commutation reliability in most industrial fields. The lower voltage and current limits shown in the diagram are typical minimum values for industrial applications. They may also be reduced in non typical conditions. It is recommended, however, to always evaluate that the signal power to be switched is at least one magnitude order higher than the noise produced in the electric circuit, in particular when circuit cables are long and pass through areas with high electromagnetic fields and especially for powers lower than 10 mW.



100 mW Suggested limit for general applications with snap action contact blocks with silver alloy contacts.

200 mW Recommended limit for general applications with slow action contact blocks with silver alloy contacts.

8 Classification of the contact block acc. to the EN 60947-5-1

Design	Figure	Symbol	Description
X **Y**			Double interruption contact element with two terminals
C			Change-over contact element with single interruption and three terminals
Za			Change-over contact element with double interruption and four terminals. **The contacts have identical polarity**
Zb			Change-over contact element with double interruption and four terminals. **Mobile contacts are electrically separated**

Electrically separated contacts

The "**+**" symbol between two designs (e.g., X+X, Za+Za, X+X+Y, etc.) represents the combination of simple, **electrically separated** contact blocks.

The electrically separated contacts **allow** different voltages to be applied between the contacts and loads to be connected to different polarities (figure 1).

Requirements and restrictions for Za contacts

Electrical loads must be connected to the same phase or polarity. The contacts are not electrically separated. As a result, different voltages may not be applied to the NC and NO contacts (figures 2 and 3).

According to EN 60947-5-1 section K.7.1.4.6.1., the following restrictions apply for positive opening contacts of design Za when used for safety applications:

"If the control switch has changeover contact element of design C or Za, **only one contact element may be used** (closure or interruption). For changeover contact elements of design Zb, both contacts may be used..."

Contact design Zb

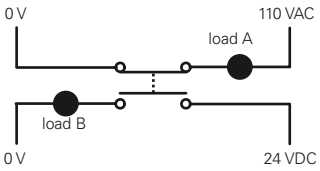


figure 1: **correct**

Contact design Za

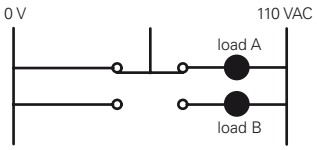


figure 2: **correct**

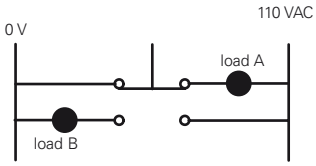
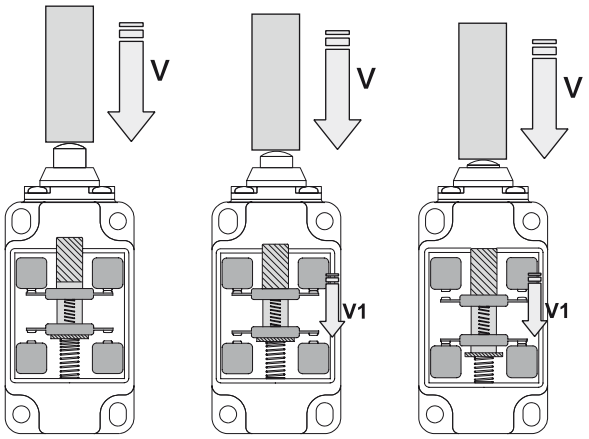


figure 3: **incorrect**

9 Contact blocks with different operating principle: slow action and snap action

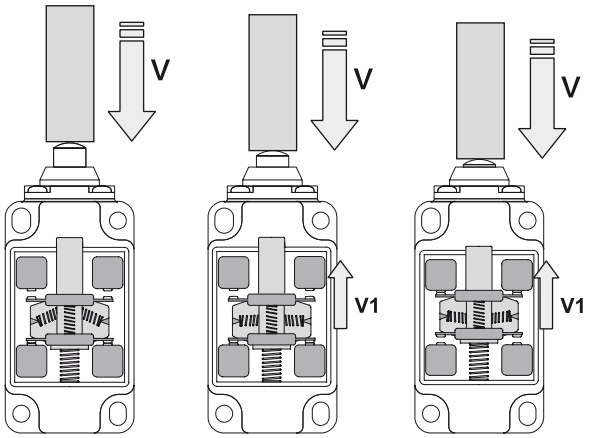
Contact blocks with slow action: component where the speed of the contact movement (V1) depends on the speed of the switch actuation (**V**). The contact carrier moves at a rate proportional to the actuation speed.
The slow action contact block is suitable for applications having low to medium currents and quick actuation movements. It has no differential travel.

V = V1



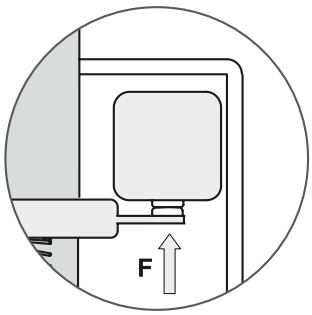
Contact block with snap action: component where the speed of the contact movement (**V1**) doesn't depend on the speed of the switch actuation (**V**). Upon reaching a predetermined point in the actuation travel, the contact carrier triggers and switches the contacts.
The snap action contact block is suitable for applications having high currents and/or slow actuation movements. This kind of contact block has a differential travel.

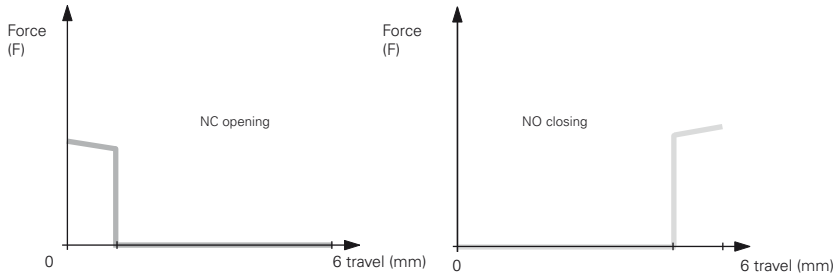
V ≠ V1



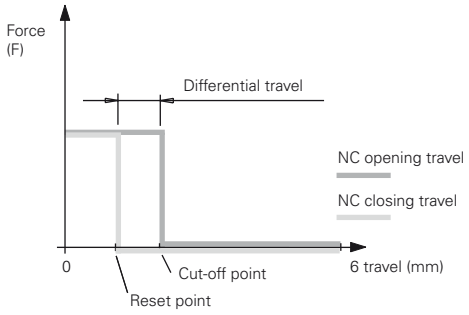
10 Contact blocks: diagrams of the force on the contacts

The following diagrams show the relationship between of the force exerted on the contacts (F) and the actuation travel to the end position.

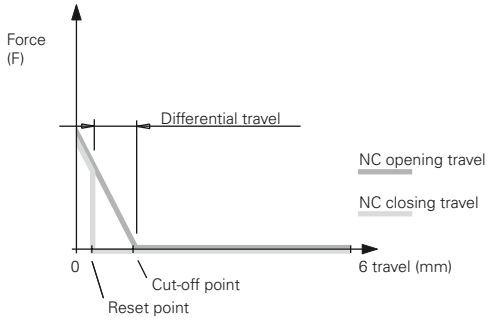




Contact block with slow action

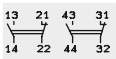
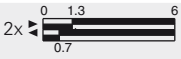
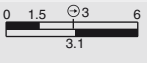
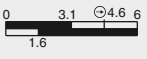
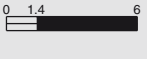
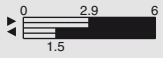
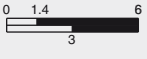
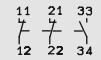
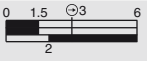
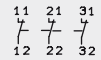
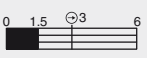
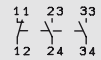
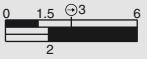
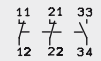
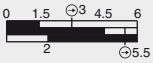
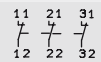
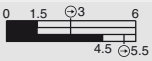
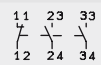
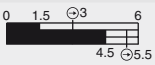
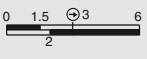
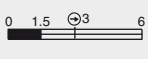
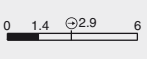


Contact block with snap action and constant pressure: 5, 11, 12.
The pressure on the contacts remains constant as the switching point is approached



Contact block with snap action: 2, 3, 17
The pressure on the contacts decreases as the switching point is approached

Contact blocks of the FD-FP-FL-FC-FR-FM-FX-FZ-FK-FW-FS series

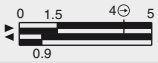
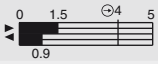
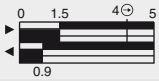
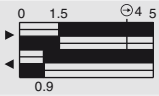
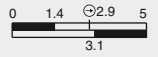
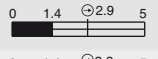
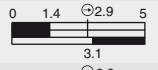
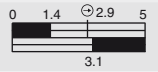
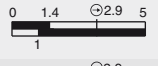
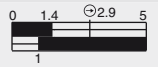
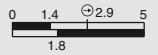
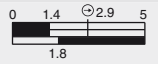
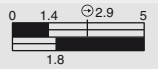
Contact block		Contact diagram	Linear travel diagram	Contact design	Operation type	Positive opening ⊕	Contact type	Captive screws	Terminals with finger protection	Gold-plated contacts
2	2x(1NO-1NC)			Za+Za	snap action	no	Double interruption	no	no	Not available
3	1NO-1NC			Za	snap action	no	Double interruption	no	no	Not available
5	1NO+1NC			Zb	snap action	yes	Double interruption, twin bridge	yes	yes	G / G1
6	1NO+1NC			Zb	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
7	1NO+1NC			Zb	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
8	1NC			Y	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
9	2NC			Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
10	2NO			X+X	slow action	no	Double interruption, twin bridge	yes	yes	G / G1
11	2NC			Y+Y	snap action	yes	Double interruption, twin bridge	yes	yes	G / G1
12	2NO			X+X	snap action	no	Double interruption, twin bridge	yes	yes	G / G1
13	2NC			Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
14	2NC			Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
15	2NO			X+X	slow action	no	Double interruption, twin bridge	yes	yes	G / G1
16	2NC			Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
18	1NO+1NC			Zb	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
20	1NO+2NC			Y+Y+X	slow action	yes	Double interruption, twin bridge	yes	yes	G
21	3NC			Y+Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G
22	2NO+1NC			Y+X+X	slow action	yes	Double interruption, twin bridge	yes	yes	G
28	1NO+2NC			Y+Y+X	slow action	yes	Double interruption, twin bridge	yes	yes	G
29	3NC			Y+Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G
30	3NC			Y+Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G
33	1NO+1NC			Zb	slow action	yes	Double interruption, twin bridge	yes	yes	G
34	2NC			Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	G
37	1NO+1NC			Zb	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
66	1NC			Y	slow action	yes	Double interruption, twin bridge	yes	yes	G / G1
67	1NO			X	slow action	no	Double interruption, twin bridge	yes	yes	G / G1
E1	1NO-1NC			PNP	electronic	no	electronic	no	no	/

Legend: G= gold plated 1µm / G1= gold-plated 2.5µm

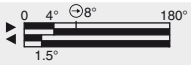
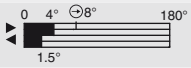
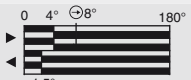
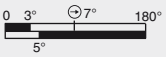
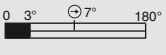
Contact blocks - FG series

Contact block		Contact diagram	Linear travel diagram	Contact design	Operation type	Positive opening ⊕	Contact type	Captive screws	Terminals with finger protection	Gold-plated contacts
60•	Contact block with 4 poles and multiple contact designs. See page 93, General Catalogue Safety 2017-2018.				slow action	yes	Double interruption, twin bridge and double contact point	yes	yes	G

Contact blocks - NA-NB-NF series

Contact block		Contact diagram	Linear travel diagram	Contact design	Operation type	Positive opening ⊖	Contact type	Captive screws	Terminals with finger protection	Gold-plated contacts
B11	1NO+1NC			Zb	snap action	yes	Double interruption	/	/	G
B02	2NC			Y+Y	snap action	yes	Double interruption	/	/	G
B12	1NO+2NC			X+Y+Y	snap action	yes	Double interruption	/	/	G
B22	2NO+2NC			X+X+Y+Y	snap action	yes	Double interruption	/	/	G
G11	1NO+1NC			Zb	slow action	yes	Double interruption	/	/	G
G02	2NC			Y+Y	slow action	yes	Double interruption	/	/	G
G12	1NO+2NC			X+Y+Y	slow action	yes	Double interruption	/	/	G
G22	2NO+2NC			X+X+Y+Y	slow action	yes	Double interruption	/	/	G
H11	1NO+1NC			Zb	slow action	yes	Double interruption	/	/	G
H12	1NO+2NC			X+Y+Y	slow action	yes	Double interruption	/	/	G
H22	2NO+2NC			X+X+Y+Y	slow action	yes	Double interruption	/	/	G
L11	1NO+1NC			Zb	slow action	yes	Double interruption	/	/	G
L12	1NO+2NC			X+Y+Y	slow action	yes	Double interruption	/	/	G
L22	2NO+2NC			X+X+Y+Y	slow action	yes	Double interruption	/	/	G
BA1	1NO+1NC change-over			C	snap action	yes	Double interruption	/	/	G

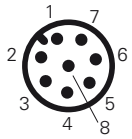
Contact blocks - HP series

Contact block		Contact diagram	Linear travel diagram	Contact design	Operation type	Positive opening ⊖	Contact type	Captive screws	Terminals with finger protection	Gold-plated contacts
50C	1NO+1NC			Zb	snap action	yes	Double interruption	/	/	G
50D	2NC			Y+Y	snap action	yes	Double interruption	/	/	G
50F	1NO+2NC			X+Y+Y	snap action	yes	Double interruption	/	/	G
50M	2NO+2NC			X+X+Y+Y	snap action	yes	Double interruption	/	/	G
52C	1NO+1NC			Zb	slow action	yes	Double interruption	/	/	G
52D	2NC			Y+Y	slow action	yes	Double interruption	/	/	G
52F	1NO+2NC			X+Y+Y	slow action	yes	Double interruption	/	/	G
52M	2NO+2NC			X+X+Y+Y	slow action	yes	Double interruption	/	/	G
53C	1NO+1NC			Zb	slow action	yes	Double interruption	/	/	G
53F	1NO+2NC			X+Y+Y	slow action	yes	Double interruption	/	/	G
53M	2NO+2NC			X+X+Y+Y	slow action	yes	Double interruption	/	/	G

Wiring diagram for assembled connectors

For FD - FL - FM - FZ - FC series with metal housing

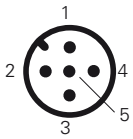
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

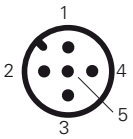
Contact block 5
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

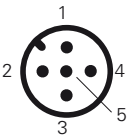
Contact block 6
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

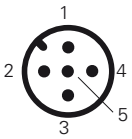
Contact block 7
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

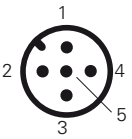
Contact block 9
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

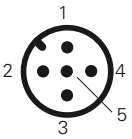
Contact block 10
2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

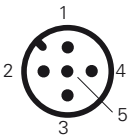
Contact block 11
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

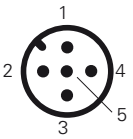
Contact block 12
2NO



M12 connector, 5-pole

Contacts	Pin no.
NO	1-2
NO	3-4
ground	5

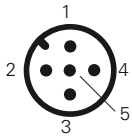
Contact block 13
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

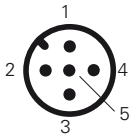
Contact block 14
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4
ground	5

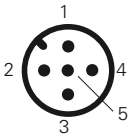
Contact block 15
2NO



M12 connector, 5-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4
ground	5

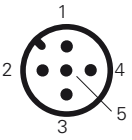
Contact block 16
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4
ground	5

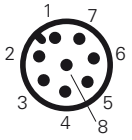
Contact block 18
1NO+1NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

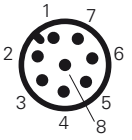
Contact block 20
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8
ground	1

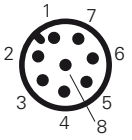
Contact block 21
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

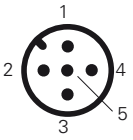
Contact block 22
1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8
ground	1

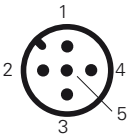
Contact block 33
1NC+1NO



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NO	3-4
ground	5

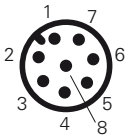
Contact block 34
2NC



M12 connector, 5-pole

Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

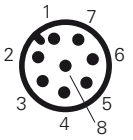
Contact block 28
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8
ground	1

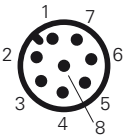
Contact block 29
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

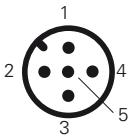
Contact block 30
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8
ground	1

Contact block E1
PNP

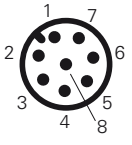


M12 connector, 5-pole

Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

For FS series with technopolymer housing

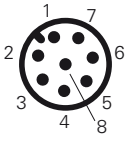
Contact block 18
1NO+1NC



M12 connector, 8-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NO	5-6

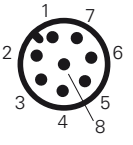
Contact block 20
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8

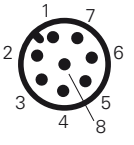
Contact block 21
3NC



M12 connector, 8-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8

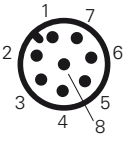
Contact block 28
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8

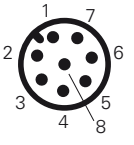
Contact block 29
3NC



M12 connector, 8-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8

Contact block 30
3NC



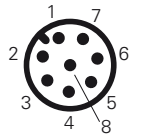
M12 connector, 8-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8

Wiring diagram for assembled connectors

For FP - FR - FX - FW series with technopolymer housing

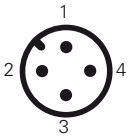
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8-pole

Contacts	Pin no.
NO	3-4
NC	5-6
NC	7-8
NO	1-2

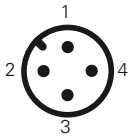
Contact block 5
1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

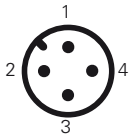
Contact block 6
1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

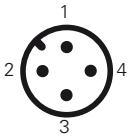
Contact block 7
1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

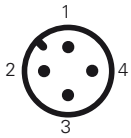
Contact block 9
2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

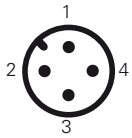
Contact block 10
2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

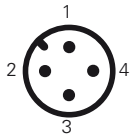
Contact block 11
2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

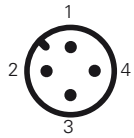
Contact block 12
2NO



M12 connector, 4-pole

Contacts	Pin no.
NO	1-2
NO	3-4

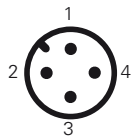
Contact block 13
2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

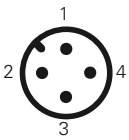
Contact block 14
2NC



M12 connector, 4-pole

Contacts	Pin no.
NC (1°)	1-2
NC (2°)	3-4

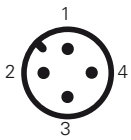
Contact block 15
2NO



M12 connector, 4-pole

Contacts	Pin no.
NO (1°)	1-2
NO (2°)	3-4

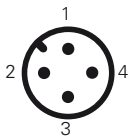
Contact block 16
2NC



M12 connector, 4-pole

Contacts	Pin no.
NC, lever to the right	1-2
NC, lever to the left	3-4

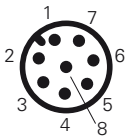
Contact block 18
1NO+1NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

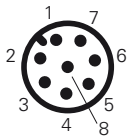
Contact block 20
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8

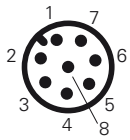
Contact block 21
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8

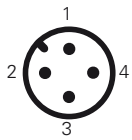
Contact block 22
1NC+2NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NO	5-6
NO	7-8

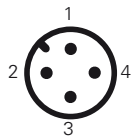
Contact block 33
1NC+1NO



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NO	3-4

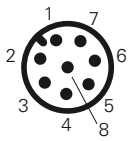
Contact block 34
2NC



M12 connector, 4-pole

Contacts	Pin no.
NC	1-2
NC	3-4

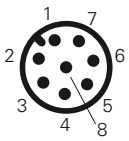
Contact block 28
2NC+1NO



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NO	7-8

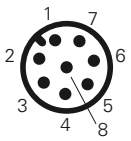
Contact block 29
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8

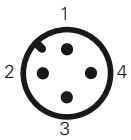
Contact block 30
3NC



M12 connector, 8-pole

Contacts	Pin no.
NC	3-4
NC	5-6
NC	7-8

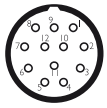
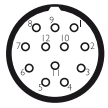
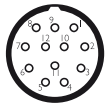
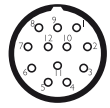
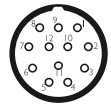
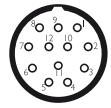
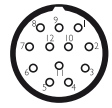
Contact block E1
PNP

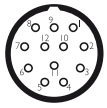
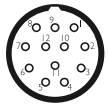
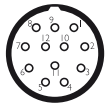
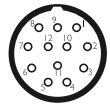
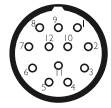
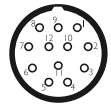
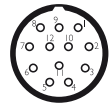


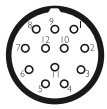
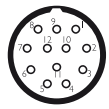
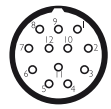
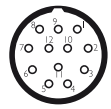
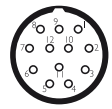
M12 connector, 4-pole

Contacts	Pin no.
+	1
-	3
NC	2
NO	4

For FG series with metal housing and M23 connector

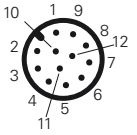
Contact block 60A 2NO+2NC	Contact block 60B 1NO+3NC	Contact block 60C 4NC	Contact block 60D 1NO+3NC	Contact block 60E 1NO+3NC	Contact block 60F 2NO+2NC	Contact block 60G 4NC	Contact block 60H 4NC	Contact block 60I 1NO+3NC	Contact block 60L 2NO+2NC
									
M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole
Contacts **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**
A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2
NC 3-4	NC 3-4	NC 3-4	NO 3-4	NC 3-4	NC 3-4	NC 3-4	NC 3-4	NC 3-4	NC 3-4
NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6
NO 7-8	NC 7-8	NC 7-8	NC 7-8	NC 7-8	NO 7-8	NC 7-8	NC 7-8	NC 7-8	NO 7-8
NO 9-10	NO 9-10	NC 9-10	NC 9-10	NO 9-10	NO 9-10	NC 9-10	NC 9-10	NO 9-10	NO 9-10
ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11

Contact block 60M 3NO+1NC	Contact block 60N 3NO+1NC	Contact block 60P 4NC	Contact block 60R 2NO+2NC	Contact block 60S 2NO+2NC	Contact block 60T 1NO+3NC	Contact block 60U 4NC	Contact block 60V 2NO+2NC	Contact block 60X 1NO+3NC	Contact block 60Y 2NO+2NC
									
M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole
Contacts **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**
A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2
NO 3-4	NO 3-4	NC 3-4	NC 3-4	NC 3-4	NC 3-4	NC 3-4	NC 3-4	NO 3-4	NC 3-4
NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6
NO 7-8	NO 7-8	NC 7-8	NO 7-8	NO 7-8	NC 7-8	NC 7-8	NO 7-8	NC 7-8	NO 7-8
NO 9-10	NO 9-10	NC 9-10	NO 9-10	NO 9-10	NO 9-10	NC 9-10	NO 9-10	NC 9-10	NO 9-10
ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11

Contact block 61A 1NO+3NC	Contact block 61B 2NO+2NC	Contact block 61C 3NO+1NC	Contact block 61D 3NO+1NC	Contact block 61E 3NO+1NC	Contact block 61G 3NO+1NC	Contact block 61H 2NO+2NC	Contact block 61M 3NO+1NC	Contact block 61R 1NO+3NC	Contact block 61S 3NO+1NC
									
M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole	M23 connector, 12-pole
Contacts **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**	**Contacts** **Pin no.**
A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2	A1-A2 1-2
NC 3-4	NC 3-4	NO 3-4	NO 3-4	NO 3-4	NO 3-4	NC 3-4	NO 3-4	NC 3-4	NO 3-4
NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6	NC 5-6
NC 7-8	NO 7-8	NO 7-8	NO 7-8	NO 7-8	NO 7-8	NO 7-8	NO 7-8	NC 7-8	NO 7-8
NO 9-10	NO 9-10	NO 9-10	NO 9-10	NO 9-10	NO 9-10	NO 9-10	NO 9-10	NO 9-10	NO 9-10
ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11	ground 11

For FG series with metal housing and M12 connector

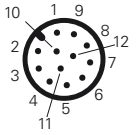
Contact block 60A
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

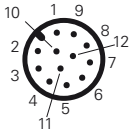
Contact block 60B
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10

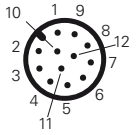
Contact block 60C
4NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10

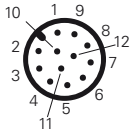
Contact block 60D
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NC	7-8
NC	9-10

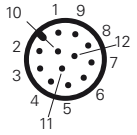
Contact block 60E
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

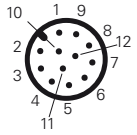
Contact block 60F
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

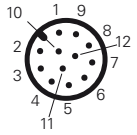
Contact block 60G
4NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10

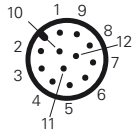
Contact block 60H
4NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10

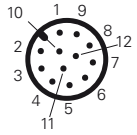
Contact block 60I
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10

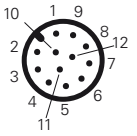
Contact block 60L
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

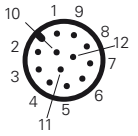
Contact block 60M
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

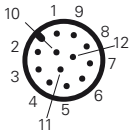
Contact block 60N
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

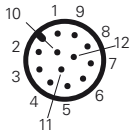
Contact block 60P
4NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10

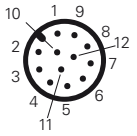
Contact block 60R
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

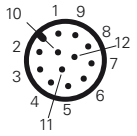
Contact block 60S
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

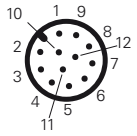
Contact block 60T
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10

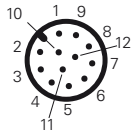
Contact block 60U
4NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10

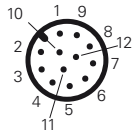
Contact block 60V
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

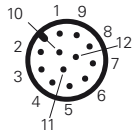
Contact block 60X
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NC	9-10

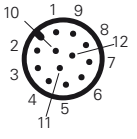
Contact block 60Y
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

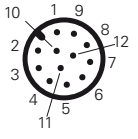
Contact block 61A
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10

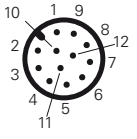
Contact block 61B
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

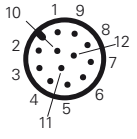
Contact block 61C
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

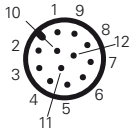
Contact block 61D
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

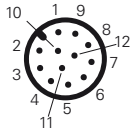
Contact block 61E
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

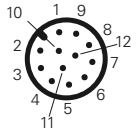
Contact block 61G
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

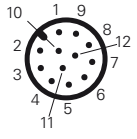
Contact block 61H
2NO+2NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10

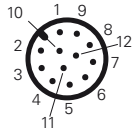
Contact block 61M
3NO+1NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

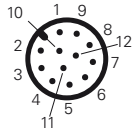
Contact block 61R
1NO+3NC



M12 connector, 12-pole

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10

Contact block 61S
3NO+1NC



M12 connector, 12-pole

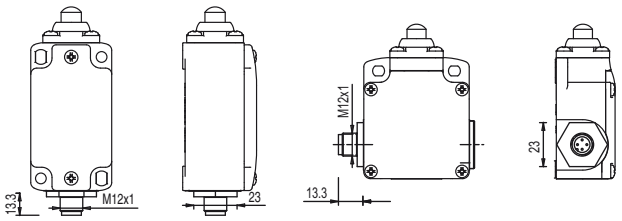
Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10

Note: the wires connected to pins 11 and 12 of the M12 connector can be used to activate the LEDs in FG series configurations with freely connectable LEDs.

Dimensions with assembled connectors

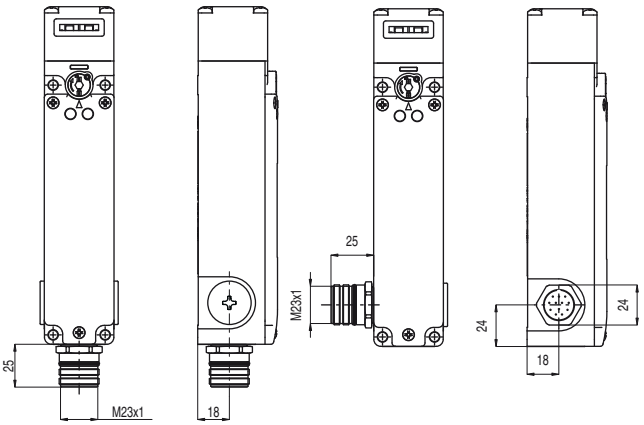
All values in the drawings are in mm

Switch with M12 connector, at bottom	Switch with M12 connector, at the right, at the left, or at bottom



FD - FP - FL - FC - FR - FM - FX - FZ - FW - FS - FG - NG series

Switch with M23 connector, at bottom	Switch with M23 connector, at the right or left

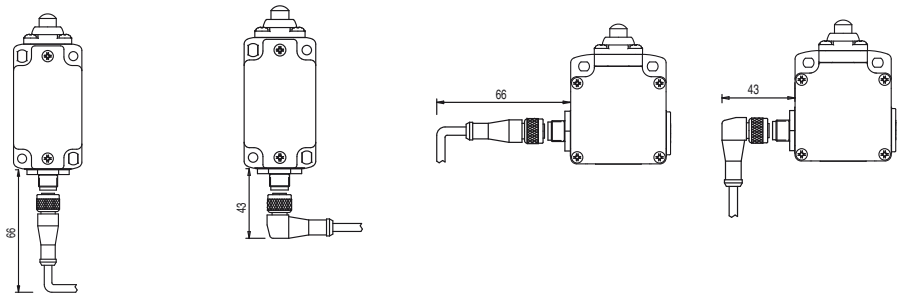


FG - NG series

Minimum distances required for insertion of the connectors

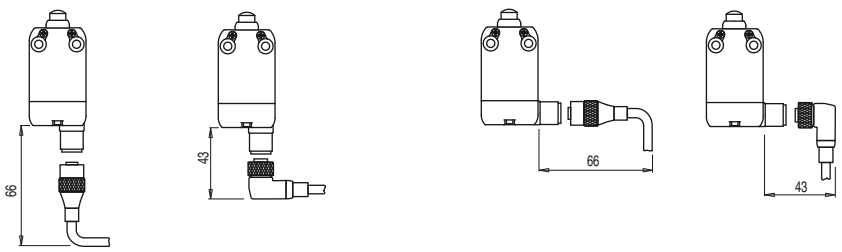
All values in the drawings are in mm

Switch with M12 connector, at bottom	Switch with M12 connector, at the right or left



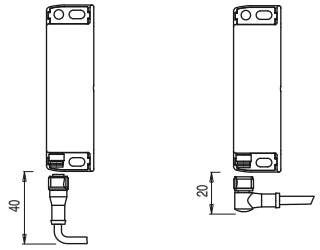
FD - FP - FL - FC - FR - FM - FX - FZ - FW - FS - FG - NG series

Switch with M12 connector, at bottom	Switch with M12 connector, at the right



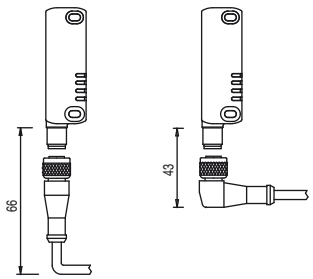
NA - NB - NF series

Sensor with M8 connector



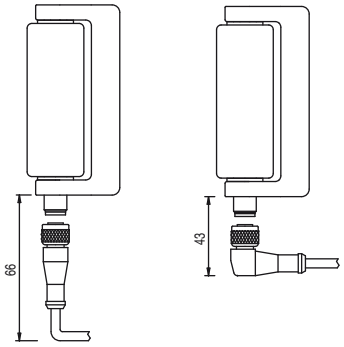
SR series

Sensor with M12 connector



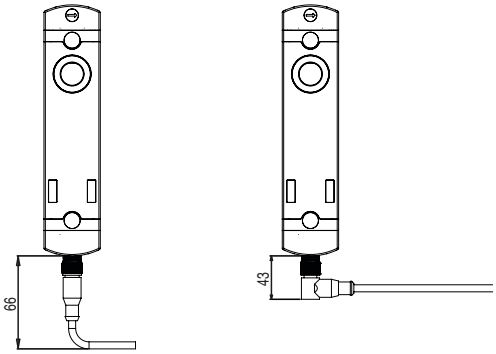
ST series

Hinge with M12 connector



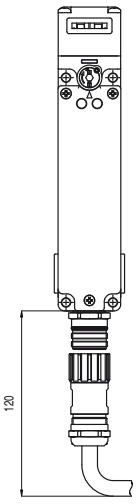
HP - HX series

Switch with M12 connector on bottom or swivel-mounted

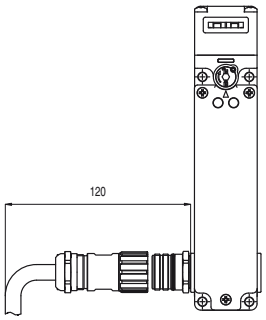


NS series

Switch with M23 connector
at bottom



Switch with M23 connector
at the right or left



FG - NG series

1- Introduction

The purpose of this section is to provide the machine manufacturer with a quick overview of a number of standards related to machine safety, to clarify some basic terms and to provide some application examples. This brief guide only covers aspects related to the functional safety of the machine, i.e., all measures that must be taken to protect the operating personnel from the hazards arising from the operation of the machine, as well as the project planning and selection of the appropriate interlocking devices for the given guard.
The machine designer himself must identify risks that are posed by other hazards, such as live parts, pressurised containers, explosive atmospheres, etc. These risks are not dealt with in this guideline.
Pizzato Elettrica prepared this document to the best of its knowledge, taking into consideration the standards, interpretations and existing technologies. The examples provided here must always be considered by the end customer with respect to the latest state of technology and standardisation. Pizzato Elettrica accepts no responsibility for the examples provided here and does not exclude the possibility of unintentional errors or inaccuracies.

2 -Design in safety. Structure of the European standards.

To freely market any type of device or machine in the countries of the European Community, they must comply with the provisions of the EU directives. They establish the general principles for ensuring that manufacturers place products on the market that are not hazardous to the operating personnel. The vast range of products pose many different hazards and, over time, has led to the release of various directives. As an example, consider the Low Voltage Directive 2014/35/EU, the Equipment for Explosive Atmospheres (ATEX) Directive 2014/34/EU, the Electromagnetic Compatibility Directive 2014/30/EU, etc. The hazards that arise from the operation of machinery are described in the Machinery Directive 2006/42/EC.
Conformity with the directives is certified by the Declaration of Conformity issued by the manufacturer and by the application of the CE marking on the machine.

For the assessment of risks posed by a machine and for the realisation of the safety systems for protecting the operating personnel from those risks, the European standardisation organisations CEN and CENELEC have issued a series of standards which translate the contents of the directives into technical requirements. The standards published in the Official Journal of the European Union are harmonised. The manufacturer is to verify conformity with the applied and listed standards.

The machine safety standards are divided into three types: A, B and C.
Type A standards: Standards that cover basic concepts and general principles for design in order to achieve safety in the design of machinery.
Type B standards: Standards that deal with one or more safety aspects and are divided into the following standards:
B1: Standards on particular safety aspects (e.g. safety distances, temperature, noise, etc.)
B2: Standards on safeguards (e.g. two-hand controls, interlocking devices, guards, etc.)
Type C standards: Standards that deal with detailed safety requirements for a particular group of machines (e.g. hydraulic presses, injection moulding machines, etc.)

The system or machine manufacturer must therefore determine whether the product is covered by a type C standard. If this is the case, this standard specifies the safety requirements; otherwise, the type B standards shall apply for any specific aspect or device of the product. In the absence of specifications, the manufacturer shall follow the general guidelines stated in the type A standards.

TYPE A STANDARDS
For example:

EN ISO 12100. Safety of machinery - General principles for design - Risk assessment and risk reduction.

TYPE B1 STANDARDS
For example:

EN 62061. Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems
EN ISO 13849-1 e -2. Safety-related parts of control systems

TYPE B2 STANDARDS
For example:

EN 574. Two-hand control devices
EN ISO 13850. Emergency stop
EN ISO 14119. Interlocking devices associated with guards
EN 60204-1. Electrical equipment of machines
EN 60947-5-1. Electromechanical control circuit devices

TYPE C STANDARDS
For example:

EN 201. Plastics and rubber machines - Injection moulding machines
EN 415-1. Safety of packaging machines
EN 692. Mechanical presses
EN 693. Hydraulic presses
EN 848-1. Safety of wood-working machines – One side moulding machines with rotating tool – Part 1: Single spindle vertical moulding machines

3 - Designing safe machines. Risk analysis.

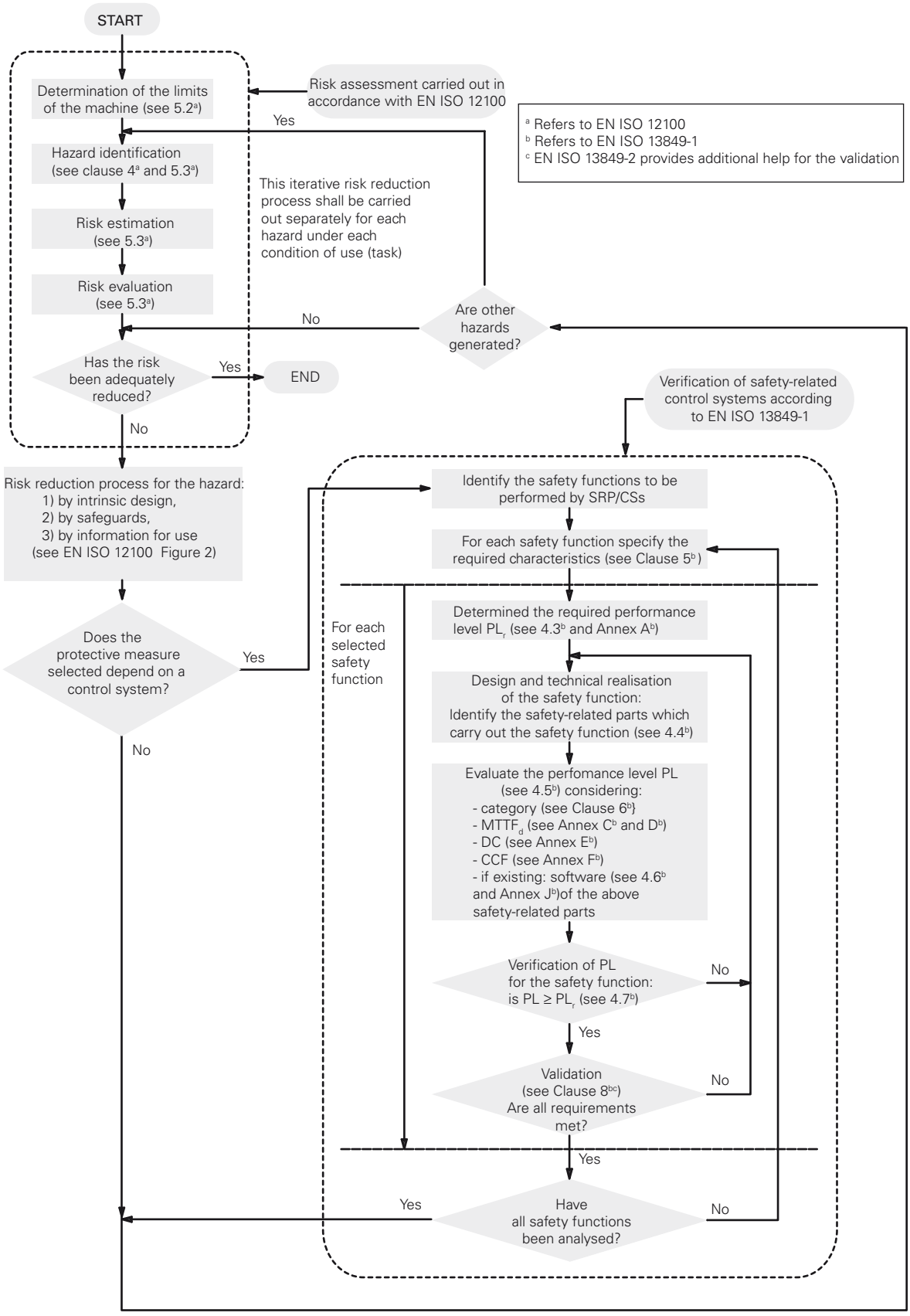
The first step in producing a safe machine is to identify the possible hazards to which the operators of a machine are exposed. The identification and classification of the hazards allows the risk for the operator or the combination of the probability of a hazard and the possible injury to be determined.

The methodology for risk analysis and evaluation and the procedure for the elimination/reduction of risks is defined by standard EN ISO 12100. This standard introduces a cyclic analysis model: starting with the initial objectives, the risk analysis and the various possibilities for reducing these risks are repeatedly evaluated until the initial objective is met.

The model introduced in this standard specifies that one proceed as follows after performing a risk analysis to reduce or eliminate risks:
1) Elimination of risks at their source through the use of intrinsically safe design principles and the structural set-up of the systems
2) Risk reduction through safeguarding and monitoring systems
3) Identification of residual risks though signalling and by informing the operating personnel.

Since every machine has hazards and because it is not possible to eliminate all possible risks, the objective is to reduce the residual risks to an acceptable level.

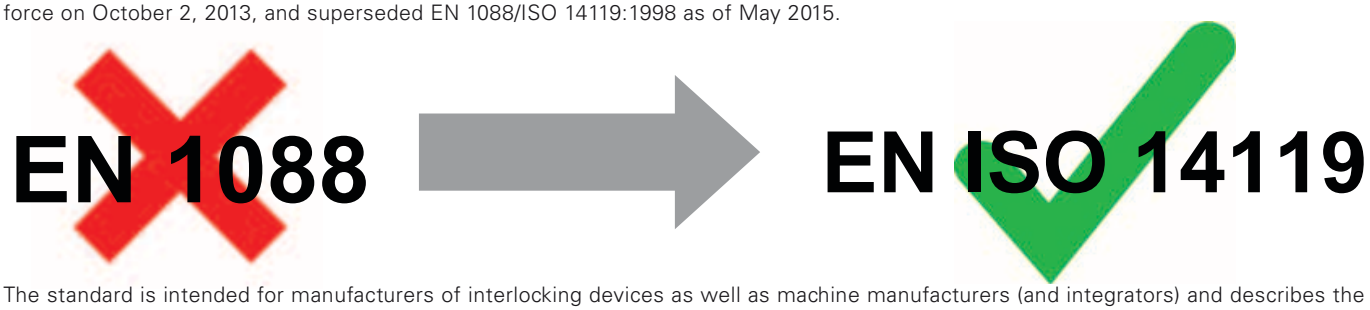
If a risk is reduced by means of a monitoring system, standard EN ISO 13849-1, which provides an evaluation model for the quality of this system, comes into play. If a given level is specified for a risk, it is possible to use a safety function of equal or higher level.



Note: This diagram was created by combining figures 1 and 3 of standard EN 13849-1. The texts in the diagram are not identical to those in the standard.

4- Design and selection of interlocking devices associated with guards (standard EN ISO 14119)

The new European standard EN ISO 14119 "Interlocking devices associated with guards – Principles for design and selection" came into force on October 2, 2013, and superseded EN 1088/ISO 14119:1998 as of May 2015.



The standard is intended for manufacturers of interlocking devices as well as machine manufacturers (and integrators) and describes the requirements on the devices and their correct installation.
The new standard provides clarification to a number of questions that are not always clear cut and considers the latest technologies used in the design of interlocking devices, defines a number of parameters (**actuator type and level of coding**) and describes the procedure for correct installation with the goal of minimizing the defeat possibilities of the interlocking devices.
The standard also considers other aspects related to interlocking devices (e.g. guard locking principles, electromagnetic guard locking, auxiliary release, escape and emergency release, etc.) which are not described here.

Coding level of the actuators

An important new addition to the standard is the definition of a coded actuator and the classification of the coding levels:

- **coded actuator** – actuator which was specially designed for use with a specific interlocking device;
- **low level coded actuator** – coded actuator for which 1 to 9 variations in code are available (e.g. the SR magnetic switch series or the safety switches with separate actuator and mechanical detection FS, FG, FR, FD…);
- **medium level coded actuator** – coded actuator for which 10 to 1000 variations in code are available;
- **high level coded actuator** – coded actuator for which more than 1000 variations are available. (e.g. the ST series sensors with RFID technology or the interlocking devices of the NG series with RFID technology and guard locking).

Types of interlocking devices

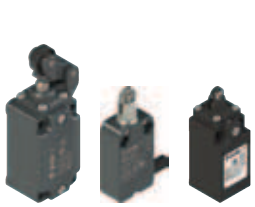
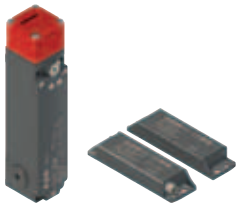
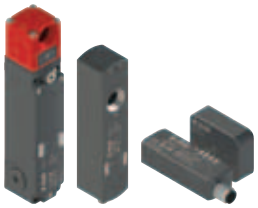
Standard EN ISO 14119 defines different types of interlocking devices:

- **Type 1 interlocking device** – interlocking device that is mechanically actuated by an uncoded actuator (e.g. HP series hinged interlocking devices)
- **Type 2 interlocking device** – interlocking device that is mechanically actuated by a coded actuator (e.g. safety switches with separate actuator of the FR, FS, FG, … series)
- **Type 3 interlocking device** – interlocking device that is contactlessly actuated by an uncoded actuator
- **Type 4 interlocking device** – interlocking device that is contactlessly actuated by a coded actuator (e.g. ST series safety sensors with RFID technology and NG and NS series safety switches with RFID technology)

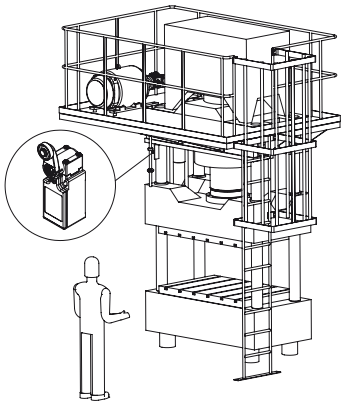
Examples of actuation principles		Actuator examples		Type
Mechanical	Direct contact/force	Uncoded	Rotary cam	Type 1
			Linear cam	
			Hinge	
		Coded	Key-actuated	Type 2
			Trapped key	
Non-contact	Inductive	Uncoded	Ferromagnetic material	Type 3
	Magnetic		Magnet, solenoid	
	Capacitive		Any suitable object	
	Ultrasonic		Any suitable object	
	Optic		Any suitable object	
	Magnetic	Coded	Coded magnet	Type 4
	RFID		Coded RFID tag	
	Optic		Optically coded tag	

Excerpt from EN ISO 14119 - Table 1

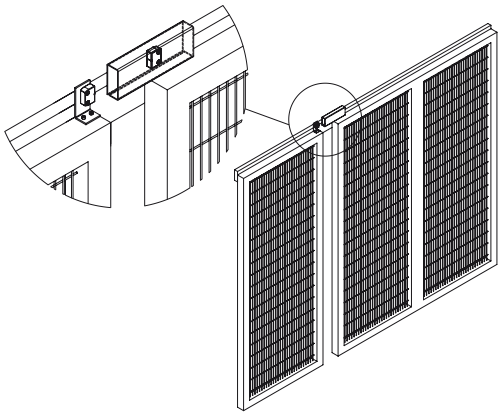
Requirements for the design and the installation of interlocking devices according to EN ISO 14119 to reduce defeating of guards.

Principles and measures against defeating	Type 1 devices		Type 2 and type 4 devices (low level coded actuators)	Type 2 and type 4 devices (high level coded actuators)
	Cam safety switches rotary or linear cam	Hinged safety switches		
				
Installation out of reach (1)	X		X	
Barriers or shielding (2)				
Installation in hidden position (3)				
Testing by means of control circuit (4)				
Non-detachable fixing of position switch and cam				
Non-detachable fixing of position switch		M		
Non-detachable fixing of the actuation element or cam		M	M	M
Additional position sensing and plausibility check	R		R	

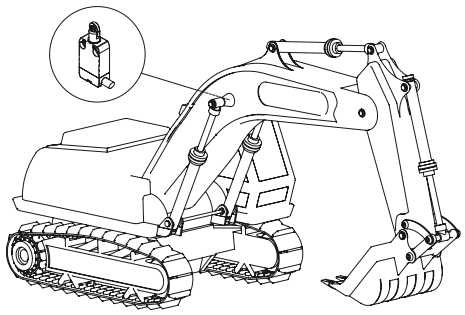
X: mandatory to apply at least one of the measures listed in the "Principles and measures" column Excerpt from EN ISO 14119 - Table 3
M: mandatory measure
R: recommended measure
It is clear that the use of devices with RFID technology, high coding level and hinged switches is the easiest way to meet the requirements of EN ISO 14119, as it is only necessary to fulfil a few requirements in order to prevent defeating of guards.
Devices with low or medium coding level require additional measures to ensure a tamperproof application.



(1) - Installation out of reach



(2) - Barriers or shielding



(3) - Installation in hidden position

(4) – Status monitoring or periodic testing can, for example, be performed on a machine with a simple operating cycle so as to verify that the guards are actually open at the end of or during specific operating phases (e.g. to remove the processed material or to perform quality controls). If status monitoring does not detect opening of the guard, an alarm is generated and the machine is stopped.

Guard locking devices and holding force

The manufacturer of the interlocking device with guard locking must ensure that the device can withstand at least the measured holding force FZh while the interlock is engaged. This holding force must not exceed the maximum holding force divided by a safety coefficient equal to 1.3.

$$F_{Zh} = \frac{F_{1max}}{1{,}3}$$

Example: A device with maximum holding force of FZh =2000 N must pass a test with a maximum holding force equal to F1max =2600 N.
An interlocking device with guard locking can both monitor the position of the guard (open/closed) as well as lock the guard (locked/unlocked). Each of the two functions may require a different PL safety level (acc. to EN ISO 13849-1). The guard locking function generally requires a lower PL than the position monitoring function. (See paragraph 8.4, note 2 of EN ISO 14119).
To identify whether an interlocking device also performs status monitoring, the standard specifies that the product label includes the symbol shown to the side here.

5 - Current status of the standards. Reason for changes, new standards and some overlapping

The "traditional" standards for functional safety, such as EN 954-1, played a large part in formalising some of the basic principles for the analysis of safety circuits on the basis of deterministic principles. On the other hand, they make no mention of the topic of programmable electronic control systems and are not generally in line with the current state of technology. To take programmable electronic control systems into account in the analysis of safety circuits, the approach taken by current standards is fundamentally probabilistic and introduces new statistical variables.

This approach is based on IEC 61508, which deals with the safety of complex programmable electronic systems and is very extensive (divided into 8 sections with nearly 500 pages). It is also used in a diverse range of application fields (chemical industry, machine construction, nuclear plants) and is therefore classified as a type A standard (not harmonised). This standard introduces the SIL concept (Safety Integrity Level), a probabilistic indication of a system's residual risk.

From IEC 61508 comes EN 62061, which covers the functional safety of the complex electronic or programmable control systems in industrial applications. The concepts introduced here permit general use for any safety-related electrical, electronic and programmable electronic control systems (systems with non-electrical technologies are not covered).

EN ISO 13849-1, developed by CEN under the aegis of ISO, is also based on this probabilistic approach. This standard, however, attempts to structure the transition to the concepts in a less problematic way for the manufacturer, who is accustomed to the concepts of EN 954-1. The standard covers electromechanical, hydraulic, "non-complex" electronic systems and some programmable electronic systems with predefined structures. EN ISO 13849-1 is a type B1 standard and introduces the PL concept (Performance Level); as with SIL, the concept provides a probabilistic indication of a machine's residual risk. This standard points out a correlation between SIL and PL; concepts borrowed by EN 61508 – such as DC and CCF – are used and a connection to the safety categories of EN 954-1 is established.

Important note
EN 13849-1 is a type B1 standard; if a type C standard is already applied for a machine, the type C standard is to be used. All type C standards previously developed are based on the concepts of EN 954-1. For manufacturers of machines that are covered by a type C standard, the introduction time of the new standards depends on how quickly the various technical committees update the C standards.

In the area of functional safety for the safety of control circuits, there are thus two standards presently in force:
EN ISO 13849-1. Standard type B1, which uses the PL concept.
EN 62061. Standard type B1, which uses the SIL concept.

There is clear overlapping of the two standards EN 62061 and EN ISO 13849-1 concerning their application field and many aspects are similar; there is also a link between the two symbol names (SIL and PL), which indicate the result of the analyses according to the two standards.

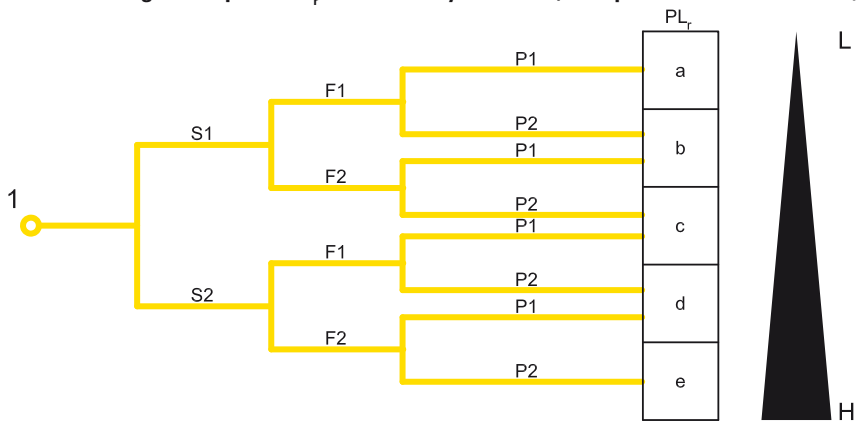
PL EN ISO 13849-1	**a**	**b**	**c**	**d**	**e**
SIL EN 62061 - IEC 61508	**-**	**1**	**1**	**2**	**3**
PFH_D	from 10^{-4} to 10^{-5}	from 10^{-5} to $3x10^{-6}$	from $3x10^{-6}$ to 10^{-6}	from 10^{-6} to 10^{-7}	from 10^{-7} to 10^{-8}
A hazardous failure every n years	from ~1 to ~10	from ~10 to ~40	from ~40 to ~100	from ~100 to ~1000	from ~1000 to ~10000

The choice of the standard to be applied is left to the manufacturer according to the technology that is used. We believe that standard EN ISO 13849-1 is easier to use thanks to its mediatory approach and the re-utilisation of the concepts already introduced on the market.

6- Standard EN ISO 13849-1 and the new parameters: PL, $MTTF_D$, DC, CCF

Standard EN ISO 13849-1 offers the manufacturer an iterative method for assessing whether the hazards posed by a machine can be reduced to an acceptable residual level through the use of appropriate safety functions. The applied method specifies a hypothesis-analysis-validation cycle for each risk. Once completed, it must be possible to demonstrate that every selected safety function is appropriate for the respective risk.
The first step involves the determination of the required performance level, which is required of each safety function. Like EN 954-1, EN ISO 13849-1 also uses a risk graph for the risk analysis of a machine function (figure A.1). Instead of a safety category, however, this graph is used to determine – as a function of the risk – a Required Performance Level or PLr for the safety function which protects the respective part of the machine.
Starting with point 1 of the graph, the machine manufacturer answers questions S, F and P and can then determine the PLr for the safety function being examined. He must then develop a system with a performance level PL that is equal to or greater than that which is required to protect the operating personnel.

Risk graph for determining the required PL_r for the safety function (excerpt from EN ISO 13849-1, figure A.1)



Key

1 Starting point for the evaluation of the safety function's contribution to risk reduction
L Low contribution to risk reduction
H High contribution to risk reduction
PL_r Required performance level

* F1 should be selected if the total duration of the exposure to the hazard does not exceed 1/20 of the total work time and the frequency of exposure to the hazard does not exceed once every 15 minutes
****** If there are no other reasons, F2 should be selected if the frequency of exposure to the hazard is greater than once every 15 minutes.

Risk parameters

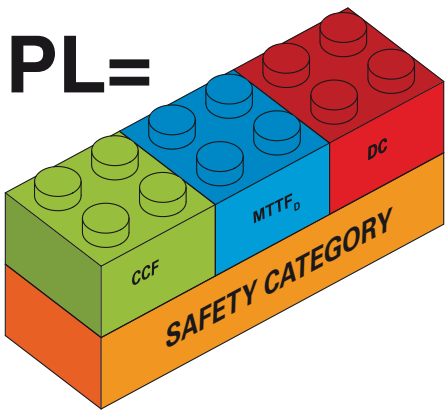
S Severity of injury
S1 Slight (normally reversible injury)
S2 Serious (normally irreversible injury or death)
F Frequency and/or exposure to hazard
***F1** Seldom-to-less-often and/or exposure time is short
****F2** Frequent-to-continuous and/or exposure time is long
P Possibility of avoiding hazard or limiting harm
P1 Possible under certain conditions
P2 Scarcely possible

Note: For a machine manufacturer, it may be of interest forego repeating the risk analysis of the machine and to instead to try and reuse the data already derived from the EN 954-1 risk analysis.
This is not generally possible, since the risk graph changed with the new standard (see previous figure) and, as a result, the required performance level of the safety function may have changed with identical risks. The German Institute for Occupational Safety and Health (BGIA), in its report 2008/2 on EN ISO 13849-1, recommends the following: assuming the "worst case", implementation can occur according to the following table. For further information, refer to the mentioned report.

Category required by EN 954-1		Required performance level (PLr) and category acc. to EN ISO 13849-1
B	→	b
1	→	c
2	→	d, Category 2
3	→	d, Category 3
4	→	e, Category 4

There are five performance levels, from PL a to PL e, with increasing risk; each represents a numerical range for the average probability of a dangerous failure per hour. For example, PL d specifies that the average probability of dangerous failures per hour is between 1x10-6 and 1x10-7, i.e., about 1 dangerous failure every 100-1000 years.

PL	Average probability of dangerous failures per hour PFHd (1/h)		
a	$\geq 10^{-5}$	e	$< 10^{-4}$
b	$\geq 3 \times 10^{-6}$	e	$<10^{-5}$
c	$\geq 10^{-6}$	e	$< 3 \times 10^{-6}$
d	$\geq 10^{-7}$	e	$< 10^{-6}$
e	$\geq 10^{-8}$	e	$<10^{-7}$

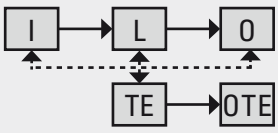
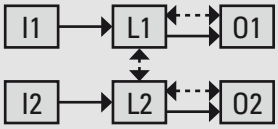
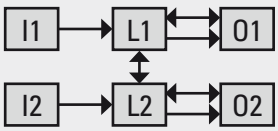


Several parameters are needed to determine the PL of a control system:
1. The safety category of the system, which is dependent on the architecture (structure) of the control system and its behaviour in the event of damage
2. $MTTF_d$ of the components
3. DC or Diagnostic Coverage of the system.
4. CCF or Common Cause Failures.

Safety category.
Most control circuits normally used can be represented with the following logic components:
- Input or signal input
- Logic or signal processing logic
- Output or output of the monitoring signal

These are connected to one another differently depending on the structure of the control circuit.

EN ISO 13849-1 allows for five different basic circuit structures, referred to as the designated architectures of the system. As shown in the following table, the architectures – combined with the requirements on the system behaviour in the event of failure and the minimum values of MTTFd, DC and CCF – give the safety category of the system control. Thus, the safety categories of EN ISO 13849-1 are not the equivalent, but rather extend the concept of the safety category introduced by the previous standard EN 954-1.

Category	Summary of the requirements	System behaviour	Safety principles	$MTTF_d$ of each channel	DC_{avg}	CCF
B	Safety-related parts of monitoring systems and/or their protective equipment, as well as their accessories, must be designed, constructed, selected, assembled and combined in accordance with the relevant standards so that they can withstand the expected influences. Fundamental safety principles must be used. Architecture: 	The occurrence of a fault can lead to the loss of the safety function.	Mainly determined by the selection of components	Low to medium	None	Not relevant
1	In addition to the requirements of Category B, proven components and safety principles must be used. Architecture: 	The occurrence of a fault can lead to the loss of the safety function; the probability of fault occurrence is, however, lower than for Category B.	Mainly determined by the selection of components	High	None	Not relevant
2	Requirements of Category B and proven safety principles must be used. The safety function must be checked at appropriate intervals by the control system. Architecture: 	The occurrence of a fault between two checks can lead to the loss of the safety function. The loss of the safety function is detected through the check.	Determined mainly by the structure	Low to high	Low to medium	See Annex F
3	Requirements of Category B and proven safety principles must be used. Important safety-related parts must be designed so that: - A single fault in any of these parts does not lead to the loss of the safety function. - Where reasonably practicable, the single fault is detected. Architecture: 	If a single fault occurs, the safety function is always performed. Some, but not all faults are detected. Accumulation of undetected faults can lead to the loss of the safety function.	Determined mainly by the structure	Low to high	Low to medium	See Annex F
4	Requirements of Category B and proven safety principles must be used. Important safety-related parts must be designed, so that: - a single fault in any of these parts does not lead to the loss of the safety function, and - a single fault during or before the next request for the safety function is detected. If this is not possible, the accumulation of undetected faults must not lead to the loss of the safety function. Architecture: 	If a single fault occurs, the safety function is always performed. The detection of accumulated faults reduces the probability of the loss of the safety function (high DC). The faults are detected in time to prevent the loss of the safety function.	Determined mainly by the structure	High	High (including accumulation of faults)	See Annex F

$MTTF_D$ ("Mean Time To Dangerous Failure").

This parameter is used to determine the functional system quality over the mean lifetime in years before a dangerous failure occurs (other failures are not considered). The calculation of the $MTTF_d$ is based on numerical values supplied by the manufacturers of the individual components of the system. In the absence of this data, the values can be taken from the tables with guide values included in the standard (EN ISO 13849-1 Annex C). The evaluation results in a numerical value, divided into three categories: High, Medium or Low.

Classification	Values
Not acceptable	$MTTF_D$< 3 years
Low	3 years ≤ $MTTF_D$< 10 years
Medium	10 years ≤ $MTTF_D$< 30 years
High	(30 years ≤ $MTTF_D$ ≤ 100 years

For components that are susceptible to high wear (typical for mechanical and hydraulic devices), the manufacturer supplies the value B_{10D} for the component, i.e., the number of component operations within which 10% of the samples failed dangerously, instead of the $MTTF_d$ of the component.

The B_{10D} value of the component must be converted to $MTTF_d$ by the machine manufacturer using the following formula:

$$MTTF_D = \frac{B_{10_D}}{0{,}1 \cdot n_{op}}$$

Where n_{op}= means number of annual operations for the component.
By assuming the daily operating frequency and the daily operating hours for the machine, n_{op} can be calculated as follows:

$$n_{op} = \frac{d_{op} \cdot h_{op} \cdot 3600s/h}{t_{ciclo}}$$

where
d_{op}= work days per year
h_{op}= operating hours per day
t_{cycle}= cycle time (s)

For components that are susceptible to wear, note that parameter $MTTF_d$ is dependent not only on the component itself but also on the application. An electromechanical device with low frequency of use, e.g. a remote switch that is only used for emergency stops, has a high $MTTF_d$; if the same device is used for normal processes in the operating cycle, the $MTTF_d$ of the same remote switch could drop dramatically.

All elements of the circuit contribute to the calculation of the $MTTF_d$ depending on their structure. In control systems with single-channel architecture (as is the case in categories B, 1 and 2), the contribution of each components is linear and the $MTTF_d$ of the channel is calculated as follows:

$$\frac{1}{MTTF_D} = \sum_{i=1}^{N} \frac{1}{MTTF_{D\,i}}$$

To avoid overly optimistic designs, the maximum value of the $MTTF_d$ of each channel is limited to 100 years (for categories B, 1, 2 and 3) or 2500 years (category 4). Channels with an $MTTF_d$ of less than 3 years are not allowed.

For two-channel systems (categories 3 and 4), the $MTTF_d$ of the circuit is calculated by averaging the $MTTF_d$ of the two channels using the following formula:

$$MTTF_D = \frac{2}{3}\left[MTTF_{DC1} + MTTF_{DC2} - \frac{1}{\frac{1}{MTTF_{DC1}} + \frac{1}{MTTF_{DC2}}}\right]$$

DC ("Diagnostic Coverage").

This parameter provides information on the effectiveness of a system's ability to self-detect any possible failures within the system. Using the percentage of the detectable dangerous failures, one obtains a diagnostic coverage of better or worse quality. The numerical DC parameter is a percentage value which is calculated using values taken from a table (EN ISO 13849-1 Annex E). Depending on the measures for failure detection taken by the manufacturer, example values are provided there. Because multiple measures are normally taken to rectify different anomalies in the same circuit, an average value or a DC_{avg} is calculated and can be assigned four levels:
High DC_{avg} ≥ 99%
Medium 90% ≤ DC_{avg}<99%
Low 60% ≤ DC_{avg}<90%
None DC_{avg} < 60%
A diagnostic coverage of none is only permissible for systems of category B or 1.

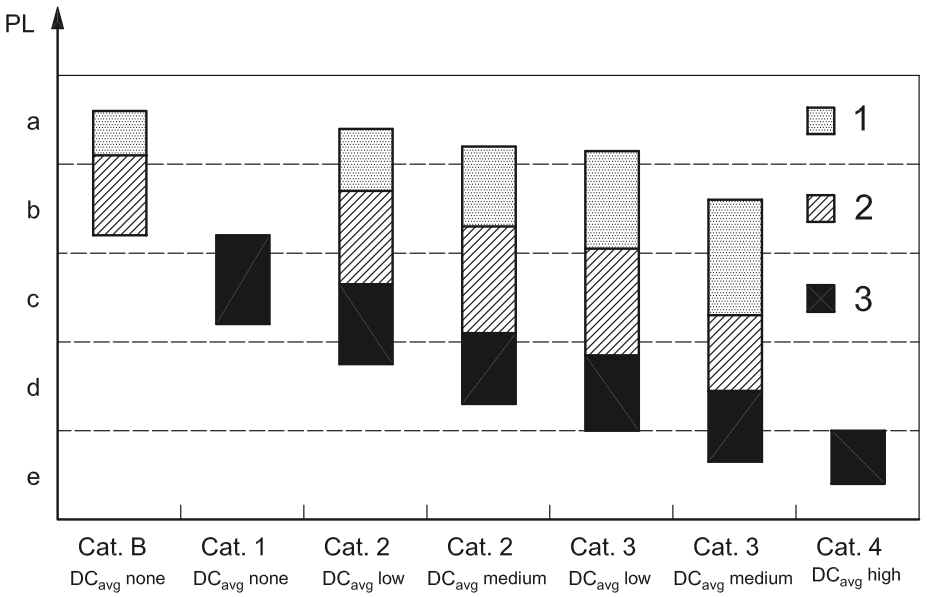
CCF ("Common Cause Failures")

For the calculation of the PL for systems of category 2, 3 or 4, it is also necessary to evaluate possible common cause failures or CCF, which may compromise the redundancy of the system. The evaluation is performed using a checklist (Annex F of EN ISO 13849-1); on the basis of the measures taken against common cause failures, points from 0 to 100 are assigned. The minimum permissible value for categories 2, 3 and 4 is 65 points.

PL ("Performance Level")

After determining this data, EN ISO 13849-1 gives the PL of the system using an assignment table (EN ISO 13849-1) or, alternatively, using a simplified graphic (EN ISO 13849-1, paragraph 4.5) as shown in the following.

Relationships between the categories, DC_{avg}, $MTTF_d$ of each channel and PL (acc. to EN ISO 13849-1, figure 5)



1 = $MTTF_{D\ of\ each\ channel\ =\ Low}$ (3 years ≤ $MTTF_D$ < 10 years)

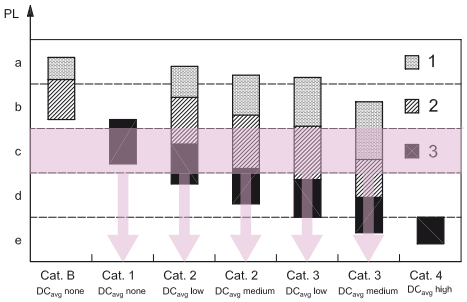
2 = $MTTF_D$ of each channel = Medium (10 years ≤ $MTTF_D$ < 30 years)

3 = $MTTF_D$ of each channel = High (30 years ≤ $MTTF_D$ ≤ 100 years)

This figure is very useful, as it can be read from multiple points of view. For a given PLr, it shows all possible solutions with which this PL can be achieved, i.e., the possible circuit structures that provide the same PL.

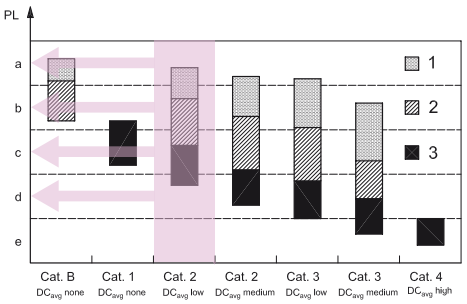
Considering the figure more closely, it is seen that the following possibilities exist for a system with PL equal to "c":

1. Category 3 system with less reliable components ($MTTF_D$=low) and medium DC.
2. Category 3 system with reliable components ($MTTF_D$=medium) and low DC.
3. Category 2 system with reliable components ($MTTF_D$=medium) and medium DC.
4. Category 2 system with reliable components ($MTTF_D$=medium) and low DC.
5. Category 1 system with very reliable components ($MTTF_D$=high).



Considering a given circuit structure, in this figure one can also identify the maximum PL that can be reached depending on the average diagnostic coverage and the $MTTF_D$ of the components.
Thus, the manufacturer can exclude a number of circuit structures in advance, as they do not meet the required PL_r.

However, the figure is not usually used to determine the PL of the system since the graphic areas overlap the boundaries of the different PL levels in many cases. Instead, the table in Annex K of standard EN ISO 13849-1 is used to precisely determine the PL of the circuit.



Notes

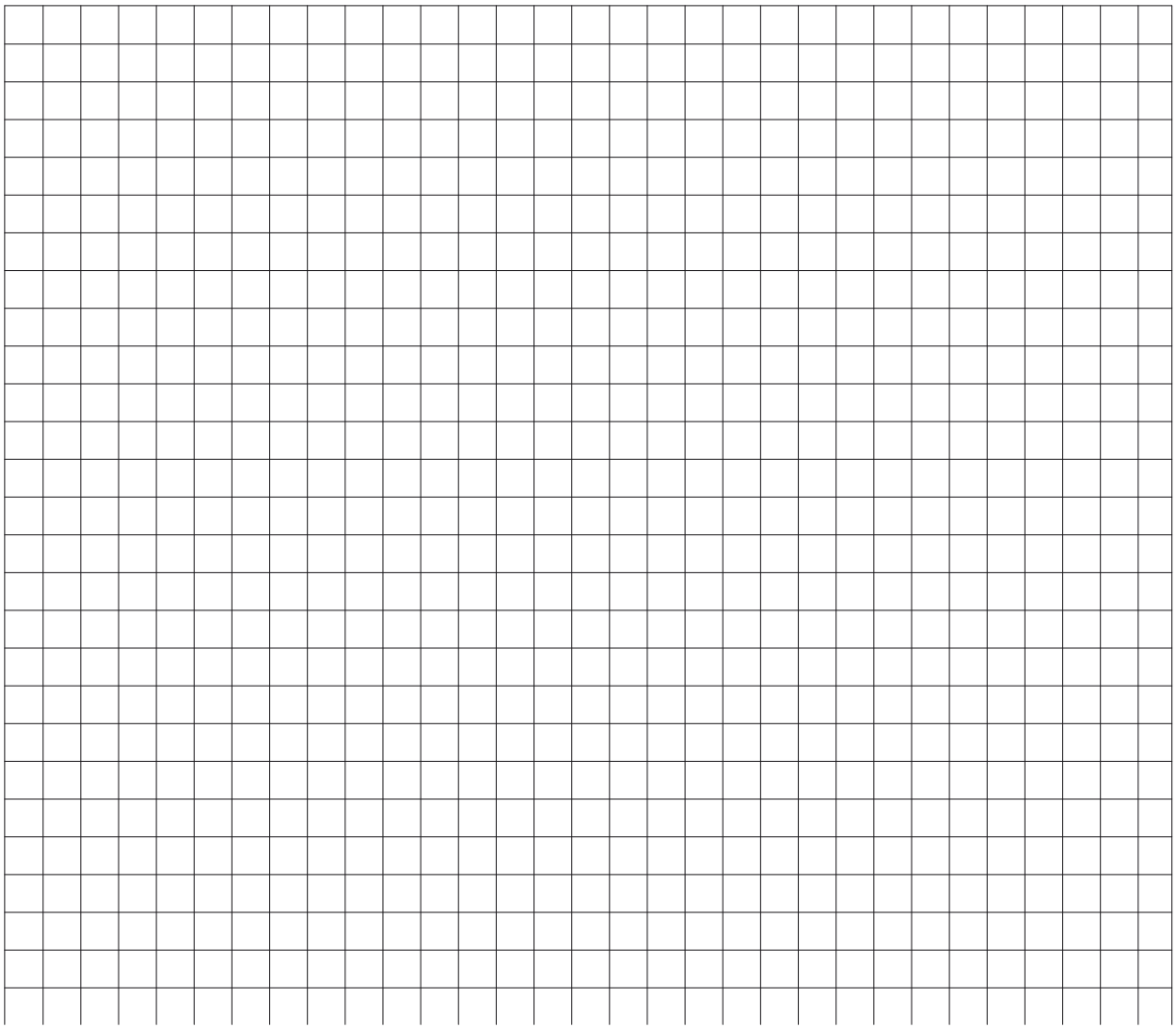


Table of safety parameters

The B_{10D} data in the table refers to the mechanical life of the device contacts under normal ambient conditions. The NO contacts may only be used in the safety circuits in combination with an NC contact and must be monitored (e.g. using a module or a safety PLC). The value of B_{10D} for NC and NO contacts refers to a maximum electrical load of 10% of the current value specified in the utilisation category. Mission time (for all articles listed below): 20 years.

Electromechanical control devices

Series	Article description	B_{10D} (NO)	B_{10D} (NC)	B_{10}/B_{10D}
F• ••••	Position switches	1,000,000	40,000,000	50%
F• ••93 F• ••92	Safety switches with separate actuator	1,000,000	2,000,000	50%
F• ••99 F• ••R2	Safety switches with separate actuator with lock	1,000,000	1,000,000	50%
FG	Safety switches with separate actuator with solenoid interlock	1,000,000	5,000,000	20%
FS	Safety switches with separate actuator with solenoid interlock	1,000,000	4,000,000	20%
F• ••96 F• ••95	Safety switch with hinge pin	1,000,000	5,000,000	20%
F• ••C•	Switches with slotted hole lever for hinged guards	1,000,000	2,000,000	50%
F• ••••	Rope switches for emergency stop	1,000,000	2,000,000	50%
HP - HX B•22-•••	Safety hinges	1,000,000	5,000,000	20%
SR	Magnetic safety sensors (with compatible Pizzato Elettrica safety modules)	20,000,000	20,000,000	50%
SR	Magnetic safety sensors (with max load: DC12 24V 250mA)	400,000	400,000	100%
PX, PA	Foot switches	1,000,000	20,000,000	50%
MK	Micro position switches	1,000,000	20,000,000	50%
NA, NB, NF	Modular pre-wired position switches	1,000,000	40,000,000	50%
E2 C•••••••	Contact blocks	1,000,000	40,000,000	50%

Series	Article description	B_{10D} (NC)	B_{10}/B_{10D}
E2 •PU1••••••, E2 •PL1••••••	Single buttons, maintained	2,000,000	50%
E2 •PU2••••••, E2 •PL2••••••	Single buttons, spring-return	30,000,000	50%
E2 •PD••••••, E2 •PT••••••	Double and triple buttons	2,000,000	50%
E2 •PE••••••	Emergency buttons	600,000	50%
E2 •SE••••••, E2 •SL••••••	Selector switches with and without illumination	2,000,000	50%
E2 •SC••••••	Key selector switches	600,000	50%
E2 •PQ••••••	Quadruple buttons	2,000,000	50%
E2 •MA••••••	Joystick	2,000,000	50%

ATEX series	Article description	B_{10D} (NO)	B_{10D} (NC)	B_{10}/B_{10D}
F• ••••-EX•	Position switches	500,000	20,000,000	50%
F• ••93-EX• F• ••92-EX•	Safety switches with separate actuator	500,000	1,000,000	50%
F• ••99-EX• F• ••R2-EX•	Safety switches with separate actuator with lock	500,000	500,000	50%
F• ••96-EX• F• ••95-EX•	Safety switch with hinge pin	500,000	2,500,000	20%
F• ••C•-EX•	Switches with slotted hole lever for hinged guards	500,000	1,000,000	50%
F• ••••-EX•	Rope switches for emergency stop	500,000	1,000,000	50%

Electronic devices

Code	Article description	$MTTF_D$	DC	PFH_D	SIL CL	PL	Cat
HX BEE1-•••	Safety hinge with electronic unit	2413	H	1.24E-09	3	e	4
ST	Safety sensors with RFID technology	4077	H	1.20E-11	3	e	4
NG	RFID safety switches with lock	1883	H	8.07E-10	3	e	4
NS	RFID safety switch with lock	1671	H	1.24E-09	3	e	4
CS AM-01	Safety module for standstill monitoring	218	M	8.70E-09	2	d	3
CS AR-01, CS AR-02	Safety module for monitoring guards and emergency stops	227	H	1.18E-10	3	e	4
CS AR-04	Safety module for monitoring guards and emergency stops	152	H	1.84E-10	3	e	4
CS AR-05, CS AR-06	Safety module for monitoring guards, emergency stops and light barriers	152	H	1.84E-10	3	e	4
CS AR-07	Safety module for monitoring guards and emergency stops	111	H	7.56E-10	3	e	4
CS AR-08	Safety module for monitoring guards, emergency stops and light barriers	1547	H	9.73E-11	3	e	4
CS AR-20, CS AR-21	Safety module for monitoring guards and emergency stops	225	H	4.18E-10	3	e	3
CS AR-22, CS AR-23	Safety module for monitoring guards and emergency stops	151	H	5.28E-10	3	e	3
CS AR-24, CS AR-25	Safety module for monitoring guards and emergency stops	113	H	6.62E-10	3	e	3
CS AR-40, CS AR-41	Safety module for monitoring guards and emergency stops	225	H	4.18E-10	2	d	2
CS AR-46	Safety module for monitoring guards and emergency stops	435	-	3.32E-08	1	c	1
CS AR-51	Safety module for monitoring safety mats and safety bumpers	212	H	3.65E-09	3	e	4

B_{10D}: Number of operations after which 10% of the components have failed dangerously
B_{10}: Number of operations after which 10% of the components have failed
B_{10}/B_{10D}: ratio of total failures to dangerous failures.
$MTTF_D$: Mean Time To Dangerous Failure
DC: Diagnostic Coverage
PFH_D: Probability of Dangerous Failure per hour

SIL CL: Safety Integrity Level Claim Limit. Maximum achievable SIL according to EN 62061
PL : Performance Level. PL acc. to EN ISO 13849-1

Electronic devices

Code	Article description	$MTTF_D$	DC	PFH_D	SIL CL	PL	Cat
CS AR-90	Safety module for monitoring floor leveling in lifts	382	H	5.03E-10	3	e	4
CS AR-91	Safety module for monitoring floor leveling in lifts	227	H	1.18E-10	3	e	4
CS AR-93	Safety module for monitoring floor leveling in lifts	227	H	1.34E-10	3	e	4
CS AR-94	Safety module for monitoring floor leveling in lifts	213	H	5.62E-09	3	e	4
CS AR-94•U12	Safety module for monitoring floor leveling in lifts	227	H	1.13E-10	3	e	4
CS AR-95	Safety module for monitoring floor leveling in lifts	213	H	5.42E-09	3	e	4
CS AT-0•, CS AT-1•	Safety module with timer for monitoring guards and emergency stops	88	H	1.23E-08	3	e	4
CS AT-3•	Safety module with timer for monitoring guards and emergency stops	135	H	1.95E-09	3	e	4
CS DM-01	Safety module for monitoring two-hand controls	142	H	2.99E-08	3	e	4
CS DM-02	Safety module for monitoring two-hand controls	206	H	2.98E-08	3	e	4
CS DM-20	Safety module for monitoring two-hand controls	42	-	1.32E-06	1	c	1
CS FS-1•	Safety timer module	404	H	5.06E-10	3	e	4
CS FS-2•, CS FS-3•	Safety timer module	205	H	1.10E-08	2	d	3
CS FS-5•	Safety timer module	379	M	1.31E-09	2	d	3
CS ME-01	Contact expansion module	91	H	5.26E-10	①	①	①
CS ME-02	Contact expansion module	114	H	4.17E-10	①	①	①
CS ME-03	Contact expansion module	152	H	3.09E-10	①	①	①
CS ME-20	Contact expansion module	114	H	6.14E-10	①	①	①
CS ME-3•	Contact expansion module	110	H	4.07E-09	①	①	①
CS M•201	Multifunction safety modules	135	H	1.44E-09	3	e	4
CS M•202	Multifunction safety modules	614	H	1.32E-09	3	e	4
CS M•203	Multifunction safety modules	103	H	1.61E-09	3	e	4
CS M•204	Multifunction safety modules	134	H	1.52E-09	3	e	4
CS M•205	Multifunction safety modules	373	H	2.19E-09	3	e	4
CS M•206	Multifunction safety modules	3314	H	1.09E-09	3	e	4
CS M•207	Multifunction safety modules	431	H	7.08E-09	3	e	4
CS M•208	Multifunction safety modules	633	H	7.02E-09	3	e	4
CS M•301	Multifunction safety modules	128	H	1.88E-09	3	e	4
CS M•302	Multifunction safety modules	535	H	1.57E-09	3	e	4
CS M•303	Multifunction safety modules	485	H	1.76E-09	3	e	4
CS M•304	Multifunction safety modules	98	H	2.05E-09	3	e	4
CS M•305	Multifunction safety modules	535	H	1.57E-09	3	e	4
CS M•306	Multifunction safety modules	100	H	1.86E-09	3	e	4
CS M•307	Multifunction safety modules	289	H	8.38E-09	3	e	4
CS M•308	Multifunction safety modules	548	H	7.27E-09	3	e	4
CS M•309	Multifunction safety modules	496	H	7.46E-09	3	e	4
CS M•401	Multifunction safety modules	434	H	1.73E-09	3	e	4
CS M•402	Multifunction safety modules	478	H	7.24E-09	3	e	4
CS M•403	Multifunction safety modules	438	H	7.42E-09	3	e	4

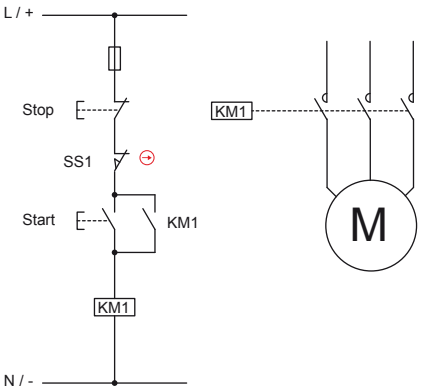
B_{10D}: Number of operations after which 10% of the components have failed dangerously
B_{10}: Number of operations after which 10% of the components have failed
B_{10}/B_{10D}: ratio of total failures to dangerous failures.
$MTTF_D$: Mean Time To Dangerous Failure
DC: Diagnostic Coverage
PFH_D: Probability of Dangerous Failure per hour

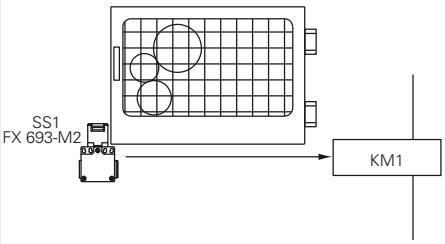
SIL CL: Safety Integrity Level Claim Limit. Maximum achievable SIL according to EN 62061
PL : Performance Level. PL acc. to EN ISO 13849-1

① Dependent on the base module

EXAMPLE 1
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**1**
Performance Level	**PL c**





Description of the safety function
The control circuit illustrated above has a guard monitoring function. If the guard is open the engine must not be able to start. The hazard analysis showed that the system has no inertia or rather that the engine, once the power has been switched off, stops at a much faster rate than the opening of the guard. The risk analysis has shown that the required PL_r target is PL c. This is necessary to verify if the intended control circuit with single channel structure is provided with a PL higher or equal to PL_r.
The guard position is detected by the switch with separate actuator SS1, which operates directly on the contactor KM1. The contactor KM1 monitoring the moving parts is usually activated by the Start and Stop buttons. Though, the analysis of the working cycle has shown that the guard is opening at every switching operation too. Therefore, the number of switch operations by the contactor and by the safety switch can be considered equal.
A circuit structure is defined as single-channel without supervision (category B or 1) if there are only an Input component (switch) and an Output (contactor) component.
In case a failure on one of the two devices the safety function is not guaranteed anymore.
No measures for fault detection have been applied.

Device data:
- SS1 (FX 693-M2) is a switch with positive opening (in accordance with EN 60947-5-1, Annex K). The switch is a well-tried component according to EN ISO 13849-2 table D.4. The B_{10D} value of the device supplied by the manufacturer is equal to 2,000,000 switching operations.
- KM1 is a contactor operated at nominal load and is a well-tried component in compliance with EN ISO 13849-2, table D.4. The B_{10D} value of this component is equal to 1,300,000 switching operations. This value results from the tables of the applicable standard (see EN ISO 13849-1, table C.1).

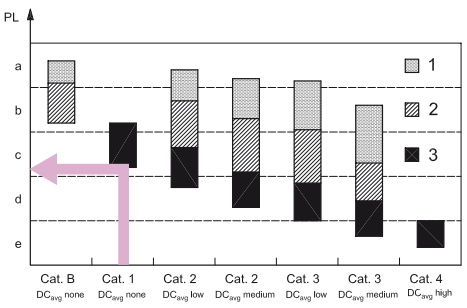
Assumption of the frequency of use
- It is assumed that the equipment is used for a maximum of 365 days per year, for three shifts of 8 hours and 600 s cycle time. For the switch, the number of switching operations per year is equal to maximum N_{op}=(365x24x3,600)/600=52,560.
- It is assumed that the start button is operated every 300 seconds. Therefore, the maximum number of switching operations per year is equal to n_{op}/year=105,120
- The contactor KM1 is actuated both for the normal start-stop of the machine as well as for the restart after a guard opening. n_{op}/year=52,560+105,120 = 157,680

$MTTF_D$ calculation
The$MTTF_D$ of the SS1 switch is equal to: $MTTF_D = B_{10D}/(0,1 \times n_{op})$ = 2,000,000/(0,1 x 52560) = 381 years
The$MTTF_D$ of the KM1 contactor is equal to: $MTTF_D = B_{10D}/(0.1 \times n_{op})$ = 1,300,000/(0.1 x 157680) = 82 years
Therefore, the $MTTF_D$ of the single-channel circuit is equal to: 1/(1/381+1/82) = 67 years

Diagnostic Coverage DC_{avg}
No measures for fault detection have been applied and there is therefore no diagnostic coverage, a permissible condition for the circuit in question that is in category 1.

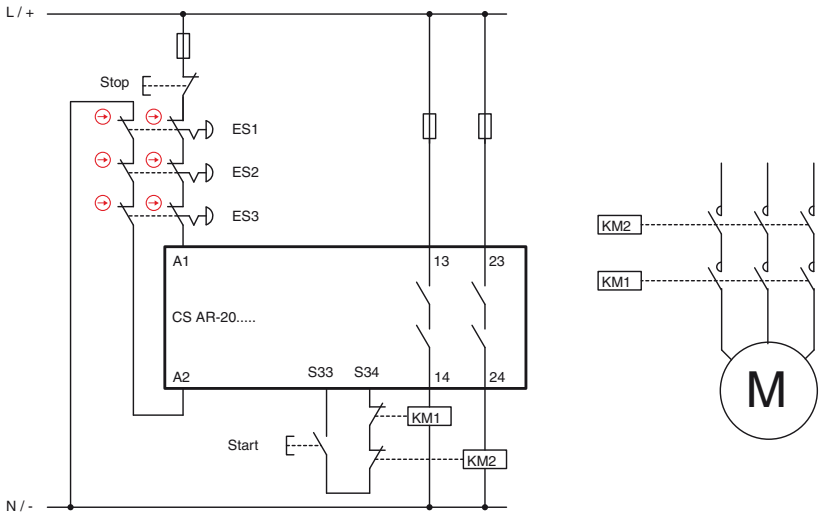
CCF Common Cause Failures
The CCF calculation is not required for category 1 circuits.

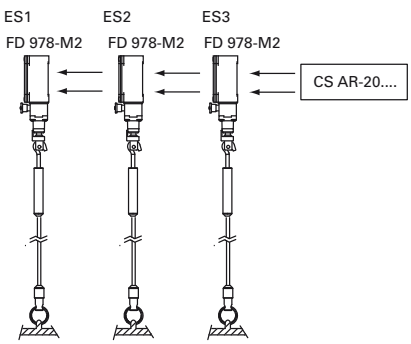
PL determination
Using the graph or the figure no. 5 it can be verified that for a Category 1 circuit with $MTTF_D$=95 years the resulting PL of the control circuit is PL c. The PL_r target is therefore achieved.



EXAMPLE 2
Application: Emergency stop control

Reference standard EN ISO 13849-1	
Safety category	**3**
Performance Level	**PL e**





Description of the safety function
The operation of one of the emergency devices causes the intervention of the safety module and the two contactors KM1 and KM2. The signal of the devices ES1, ES2, ES3 is redundantly read by the CS safety module. The contactors KM1 and KM2 (with forcibly guided contacts) are monitored by the CS via the feedback circuit too.

Device data:
- The devices ES1, ES2, ES3 (FD 978-M2) are rope switches for emergency stop with positive opening. The B_{10D} value is equal to 2,000,000 (see page 271)
- KM1 and KM2 are contactors operated at nominal load. The B_{10D} value is 1,300,000 (see EN ISO 13849-1 - Table C.1)
- CS is a safety module (CS AR-20) with $MTTF_D$=225 years and DC= High
- The circuit structure is two-channel in category 3

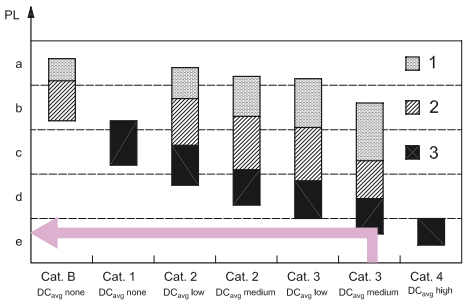
Assumption of the frequency of use
- Twice a month, n_{op}/year = 24
- Start button actuation: 4 times a day
- Assuming 365 working days, the contactors will take action 4 x 365 + 24 = 1484 times / year
- The switches will be operated with the same frequency.
- It is not expected that multiple buttons will be pressed simultaneously.

$MTTF_D$ calculation
- $MTTF_{D\ ES1,ES2,ES3}$ = 833,333 years
- $MTTF_{D\ KM1,KM2}$ = 8760 years
- $MTTF_{D\ CS}$ = 225 years
- $MTTF_{D\ CH1}$ =219 years. The value must be limited to 100 years. The channels are symmetric, therefore $MTTF_d$=100 years (High)

Diagnostic Coverage DC_{avg}
- The contacts of KM1 and KM2 are monitored by the CS module via the feedback circuit. DC=99% (High)
- The safety module CS AR-20 is provided with a "High" diagnostic coverage.
- Not all failures in the series of emergency devices can be detected. The diagnostic coverage is 90% (Medium)

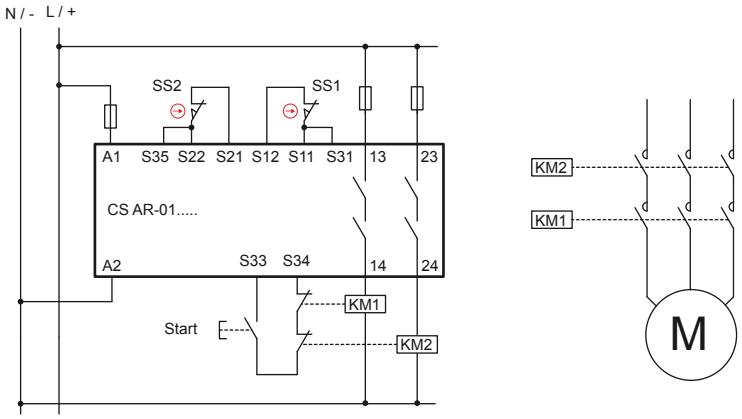
CCF Common Cause Failures
We assume a score > 65 (acc. to EN ISO 13849-1 - Annex F).

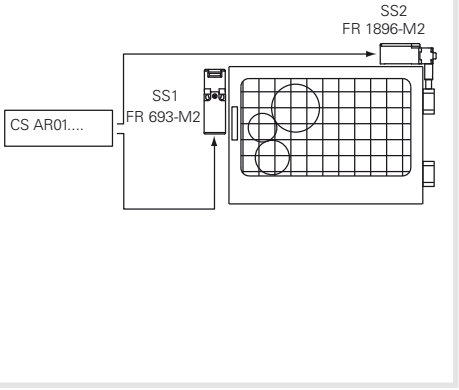
PL determination
A circuit in category 3 with $MTTF_D$=High and DC_{avg}= High can reach a PL e.



EXAMPLE 3
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**4**
Performance Level	**PL e**





Description of the safety function
The guard opening causes the intervention of the switches SS1 and SS2 and, by consequence, of the safety module and the KM1 and KM2 contactors too
The signal of the devices SS1, SS2 is redundantly monitored by the CS safety module.
The switches have different operating principles.
The contactors KM1 and KM2 (with forcibly guided contacts) are monitored by the CS via the feedback circuit too.

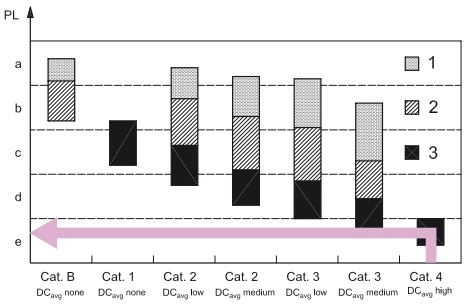
Device data:
- The switch SS1 (FR 693-M2) is a switch with positive opening. The B_{10D} value is 2,000,000
- The switch SS2 (FR 1896-M2) is a hinge switch with positive opening. B_{10D}= 5,000,000
- KM1 and KM2 are contactors operated at nominal load. B_{10D} = 1,300,000 (see EN ISO 13849-1 - Table C.1)
- The CS modules are safety modules (CS AR-01) with $MTTF_d$=227 years and DC= High

Assumption of the frequency of use
365 days/year, 16 h/day, 1 action every 4 minutes (240 s). n_{op}/year = 87,600.

$MTTF_D$ calculation
- $MTTF_{D\ SS1}$ = 228 years
- $MTTF_{D\ SS2}$ = 571 years
- $MTTF_{D\ KM1,KM2}$ = 148 years
- $MTTF_{D\ CS}$= 227 years
- $MTTF_{D\ CH1}$ = 64 years (SS1,CS,KM1)
- $MTTF_{D\ CH2}$ = 77 years (SS2,CS,KM2)
- $MTTF_D$: by calculating the average of the two channels $MTTF_D$ = 70.7 years (High) is achieved

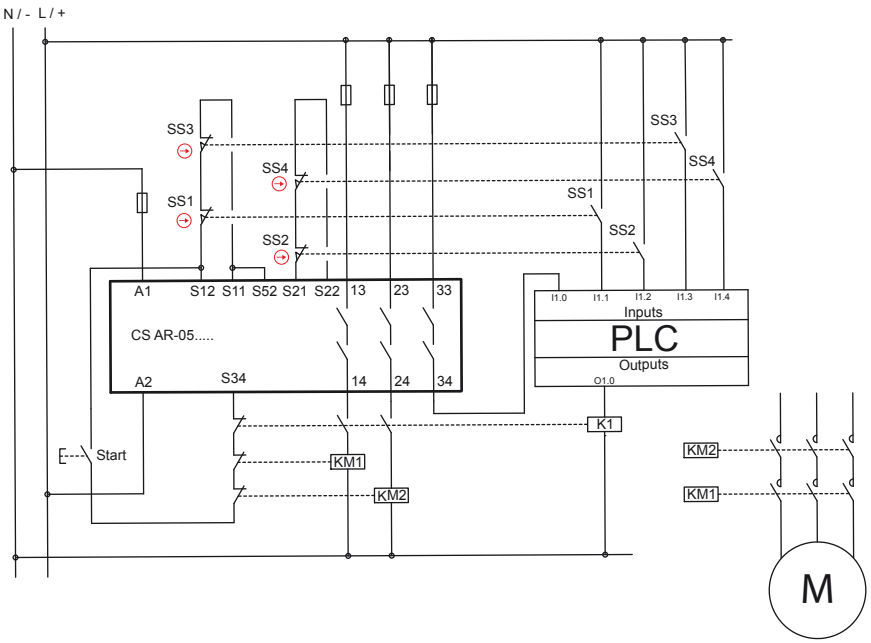
Diagnostic Coverage DC_{avg}
- SS1, SS2 have DC = 99% since the SS1 and SS2 contacts are monitored by CS and have different operation principles.
- The contacts of KM1 and KM2 are monitored by the CS module via the feedback circuit. DC=99% (High)
- CS AR-01 is provided with an internal redundant and self-monitoring circuit. DC = High
- DC_{avg}= High

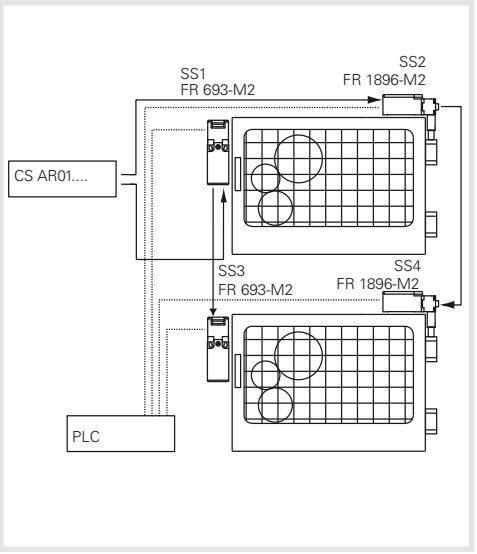
PL determination
A circuit in category 4 with $MTTF_D$=72.1 years and DC_{avg}=High corresponds to PL e.



EXAMPLE 4
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**4**
Performance Level	**PL e**





Description of the safety function
The opening of a guard triggers the switches SS1 and SS2 on the first guard as well as SS3 and SS4 on the second. The switches trigger the safety module and the contactors KM1 and KM2 too.
The signal of the devices SS1, SS2 and SS3, SS4 is redundantly monitored by the CS safety module. Furthermore, an auxiliary contact of the switch is monitored by the PLC.
The switches have different operating principles.
The contactors KM1 and KM2 (with forcibly guided contacts) are monitored by the CS via the feedback circuit too.

Device data:
- The switches SS1, SS3 (FR 693-M2) are switches with positive opening. The B_{10D} value is 2,000,000
- The switches SS2, SS4 (FR 1896-M2) are hinge switches with positive opening. B_{10D}= 5,000,000
- KM1 and KM2 are contactors operated at nominal load. The B_{10D} value is 1,300,000 (see EN ISO 13849-1 - Table C.1)
- CS is a safety module (CS AR-05) with $MTTF_D$=152 years and DC= High

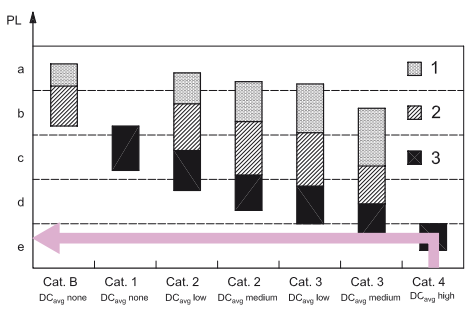
Assumption of the frequency of use
- 4 times per hour for 24 h/day for 365 days/year equal to n_{op}/year = 35,040
- The contactors will operate for twice the number of operations = 70,080

$MTTF_D$ calculation
- $MTTF_{D\ SS1,SS3}$ = 571 years; $MTTF_{D\ SS2,SS4}$ = 1,427 years
- $MTTF_{D\ KM1,KM2}$ = 185 years
- $MTTF_{D\ CS}$ = 152 years
- $MTTF_{D\ Ch1}$ = 73 years (SS1,CS,KM1) / (SS3,CS,KM1)
- $MTTF_{D\ Ch2}$ = 79 years (SS2,CS,KM2) / (SS4,CS,KM2)
- $MTTF_D$: by calculating the average of the two channels $MTTF_D$ = 76 years (High) is achieved

Diagnostic Coverage DC_{avg}
- The contacts of KM1, KM2 are monitored by the CS module via the feedback circuit. DC=99%
- All auxiliary contacts of the switches are monitored by the PLC. DC=99%
- The CS AR-05 module has a DC= High (see page 271)
- The diagnostic coverage for both channels is 99% (High)

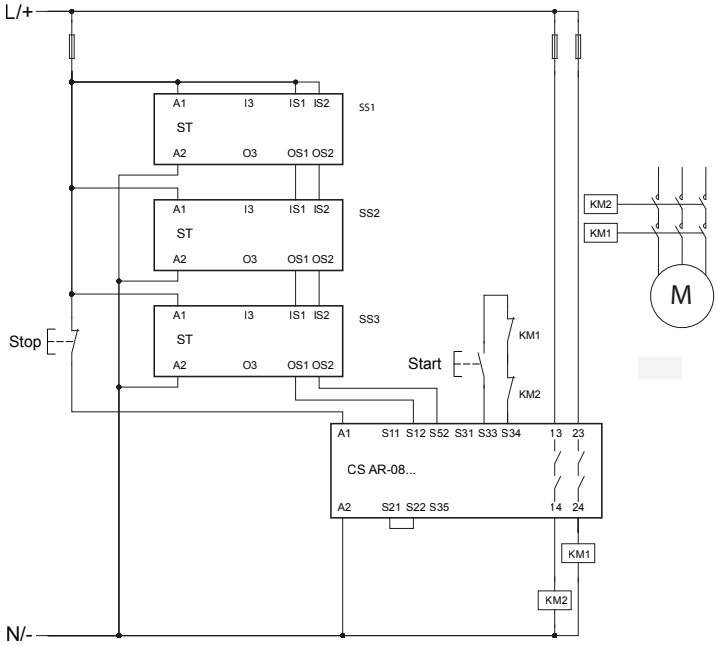
CCF Common Cause Failures
- We assume a score > 65 (acc. to EN ISO 13849-1 - Annex F).

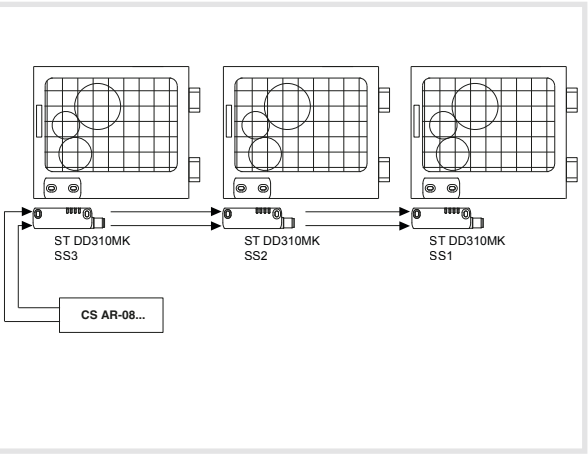
PL determination
- A circuit in category 4 with $MTTF_D$=88.6 years and DC_{avg}=High corresponds to PL e.



EXAMPLE 5
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**4**
Performance Level	**PL e**

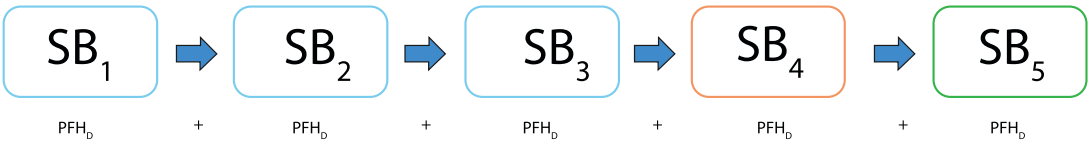




Description of the safety function
The opening of guards triggers the sensors SS1 on the first guard, SS2 on the second and SS3 on the third. The sensors trigger the safety module CS AR-08 and the contactors KM1 and KM2 too. The contactors KM1 and KM2 (with forcibly guided contacts) are monitored by the CS AR-08 via the feedback circuit.

Device data
SS1, SS2, SS3 are ST series coded sensors with RFID technology. PFH_D = 1.20E-11, PL ="e"
CS AR-08 is a safety module. PFH_D = 9.73E-11, PL = "e"
KM1 and KM2 are contactors operated at nominal load. B_{10D} = 1,300,000 (see EN ISO 13849-1 - Table C.1)

Assumption of the frequency of use
Each door is opened every 2 minutes, 16 hours a day, for 365 days a year, equal to nop = 175,200
Definition of the SRP/CS and subsystems
The SRP/CS consists of 5 subsystems (SB):
SB1,2,3 represent the three ST series RFID sensors
SB4 represents the safety module CS AR-08...
SB5 represents the two contactors KM1 and KM2 in redundant architecture (cat. 4)



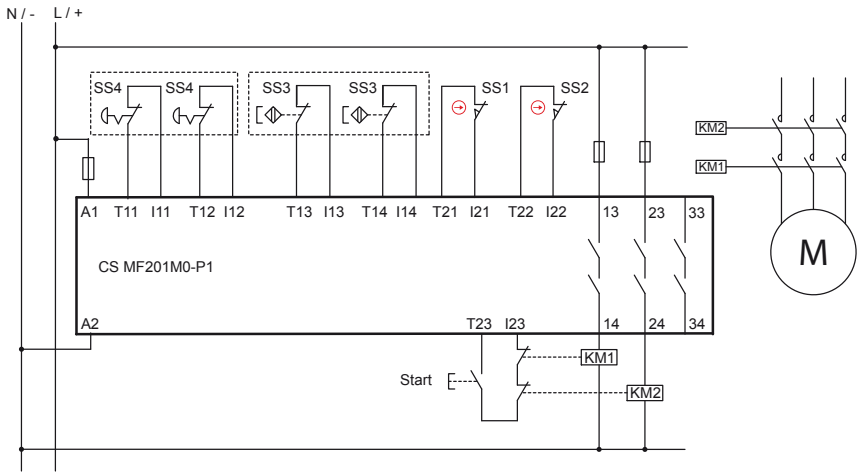
PFH_D calculation for SB5
$MTTF_D$ KM1,KM2 = 74.2 years.
DC = 99%, the contacts of KM1 and KM2 are monitored by the CS safety module via the feedback circuit.
For the CCF parameter we assume a score higher than 65 (acc. to EN ISO 13849-1 - Annex F).
A category 4 circuit with $MTTF_D$ = 74.2 years (high) and high diagnostic coverage (DC = 99%) corresponds to a failure probability of PFH_D = 3.4E-08 and a PL "e".

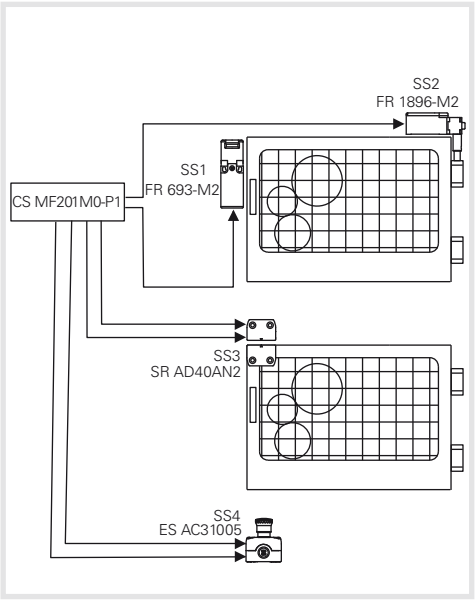
Calculation of the total PFH_D of the SRP/CS
$PFH_{DTOT} = PFH_{DSB1} + PFH_{DSB2} + PFH_{DSB3} + PFH_{DSB4} + PFH_{DSB5}$ = 3.5E-08
It corresponds to PL "e".

Calculation example performed with SISTEMA software, downloadable free of charge at www.pizzato.com

EXAMPLE 6
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	4
Performance Level	PL e





Description of the safety function
The opening of a guard triggers switches SS1 and SS2 on the first guard and triggers sensor SS3 on the second; the switches trigger the safety module and both contactors KM1 and KM2.
The signals from the SS1, SS2 and SS3 devices are redundantly monitored by the CS MF safety module.
There is also an emergency button which has a two-channel connection with the safety module too.
The contactors KM1 and KM2 (with forcibly guided contacts) are monitored by the CS MF via the feedback circuit too.

Device data:
- The switch SS1 (FR 693-M2) is a switch with positive opening. B_{10D} = 2,000,000
- The switch SS3 (FR 1896-M2) is a hinge switch with positive opening. B_{10D}= 5,000,000
- SS3 (SR AD40AN2) is a magnetic safety sensor. B_{10D} = 20,000,000
- SS4 (ES AC31005) is a housing with emergency button (E2 1PERZ4531) provided with 2 NC contacts. B_{10D}= 600,000
- KM1 and KM2 are contactors operated at nominal load. B_{10D} = 1,300,000 (see EN ISO 13849-1 - Table C.1)
- CS MF201M0-P1 is a safety module with $MTTF_D$=842 years and DC=99%

Assumption of the frequency of use
- Each door is opened 2 times per hour for 16 h/day for 365 days/year equal to n_{op}/year = 11,680
- It is assumed that the emergency button is actuated at a maximum of once a day, n_{op}/year = 365
- The contactors will operate for twice the number of operations = 23,725

$MTTF_D$ calculation

Guard SS1/SS2
- $MTTF_{D\ SS1,SS3}$ = 1,712 years
- $MTTF_{D\ SS2,SS4}$ = 4,281 years
- $MTTF_{D\ KM1,KM2}$ = 548 years
- $MTTF_{D\ CS}$ = 842 years
- $MTTF_{D\ CH1}$ = 278 years (SS1,CS,KM1)
- $MTTF_{D\ CH2}$ = 308 years (SS2,CS,KM2)
- $MTTF_D$ = by calculating the average of the two channels $MTTF_D$ = 293 years is achieved

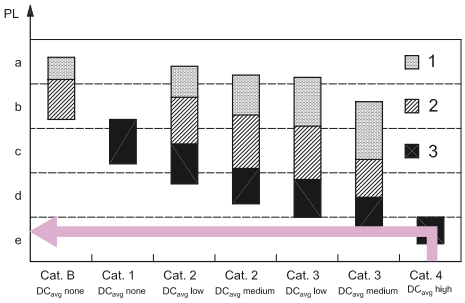
Guard SS3
- $MTTF_{D\ SS3}$ = 17,123 years
- $MTTF_{D\ KM1,KM2}$ = 548 years
- $MTTF_{D\ CS}$ = 842 years
- $MTTF_D$ = 325 years

Emergency button SS4
- $MTTF_{D\ SS4}$ = 16,438 years
- $MTTF_{D\ KM1,KM2}$ = 548 years
- $MTTF_{D\ CS}$ = 842 years
- $MTTF_D$ = 325 years

Diagnostic Coverage DC_{avg}
- The contacts of KM1, KM2 are monitored by the CS MF module via the feedback circuit. DC=99%
- For the devices SS1, SS2 and SS3 it is possible to detect all faults. DC=99%
- The CS MF201M0-P1 module has a DC=99%
- We assume a diagnostic coverage of 99% (High)

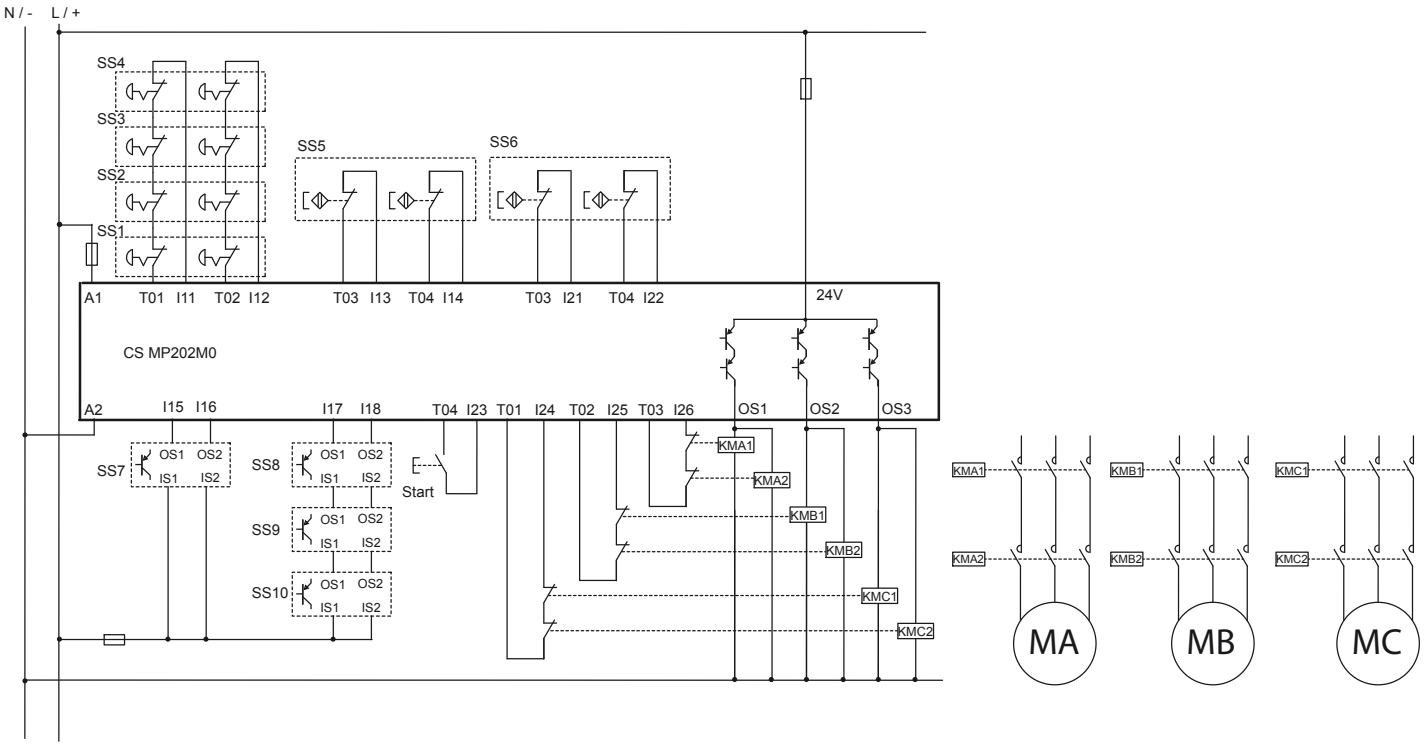
CCF Common Cause Failures
- We assume a score > 65 (acc. to EN ISO 13849-1 - Annex F).

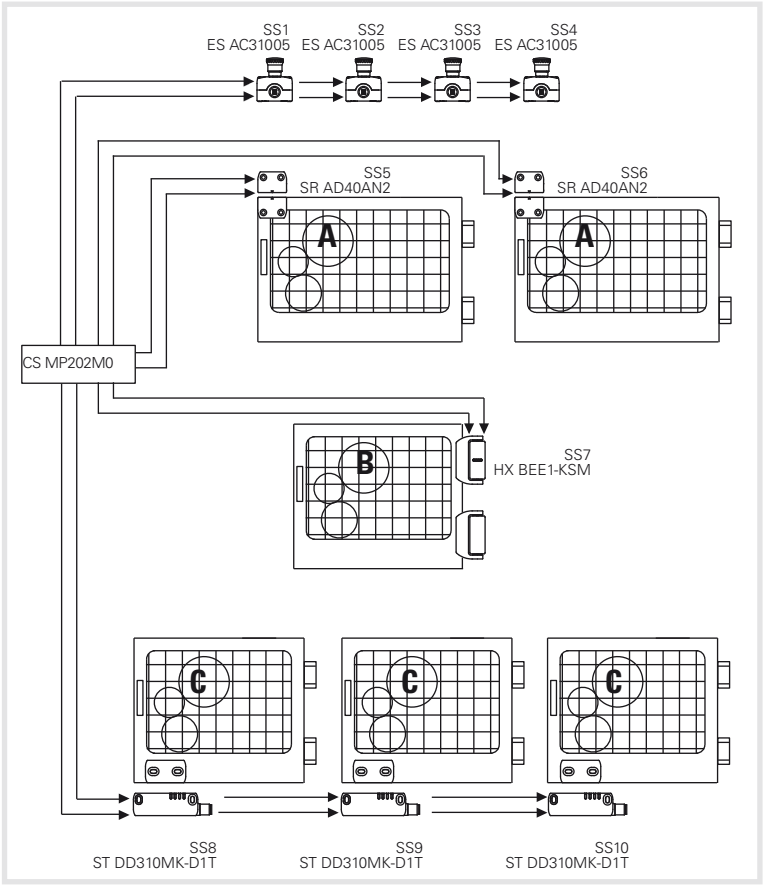
PL determination
- A circuit in category 4 with $MTTF_D$=High and DC_{avg}= High corresponds to PL e.
- The safety functions associated to the guards SS1/SS2, SS3 and the emergency button present the level PL e.

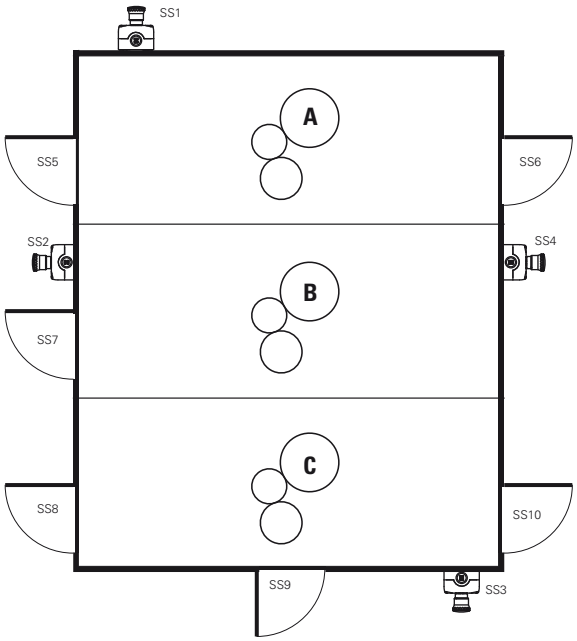


EXAMPLE 7
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**4**
Performance Level	**PL e**







Description of the safety function

Every machine is divided into 3 different zones. The access to each zone is monitored by the guards and 4 emergency buttons are present too.
The operation of an emergency button will trigger the CS MP safety module as well as the forcibly guided contactors KMA1/2, KMB1/2 and KMC1/2, and will therefore stop all motors.
The opening of a guard in zone A triggers the devices SS5 or SS6 and, as a consequence, the CS MP safety module as well as the contactors KMA1 and KMA2, and therefore also the stop of the MA motor. The devices SS5 and SS6 are connected to the CS MP safety module separately, with a two-channel connection.
The opening of the guard in zone B triggers the device SS7 and, as a consequence, the CS MP safety module as well as the contactors KMB1 and KMB2, and therefore also the stop of the MB motor. The SS7 hinge is provided with two OSSD outputs and is redundantly controlled by the CS MP safety module.
The opening of a guard in zone C triggers the devices SS8, SS9 or SS10 and, as a consequence, the safety module as well as the contactors KMC1 and KMC2, and therefore also the stop of the MC motor. The sensors SS8, SS9 and SS10 are interconnected via the OSSD outputs and are redundantly monitored by the CS MP safety module.

Device data

- SS1, SS2, SS3 and SS4 (ES AC31005) are emergency buttons (E2 1PERZ4531) provided with 2 NC contacts. B_{10D} = 600,000 (see page 333)
- SS5 and SS6 (SR AD40AN2) are magnetic safety sensors. B_{10D} = 20,000,000
- SS7 (HX BEE1-KSM) is a safety hinge with OSSD outputs. $MTTF_D$= 4,077 years / DC=99%
- SS8, SS9 and SS10 (ST DD310MK-D1T) are safety sensors with RFID technology and OSSD outputs. $MTTF_D$= 4,077 years / DC=99% (see page 333)
- KMA, KMB and KMC are contactors operated at nominal load. B_{10D} = 1,300,000 (see EN ISO 13849-1 - Table C.1)
- CS MP202M0 is a safety module with $MTTF_D$=2035 years / DC=99%

Assumption of the frequency of use

- Each door of zone A is opened 2 times per hour for 16 h/day for 365 days/year equal to n_{op}/year = 11,680. The contactors will operate for twice the number of operations = 23,360
- The door of zone B is opened 4 times per hour for 16 h/day for 365 days/year equal to n_{op}/year = 23,360. The contactors will operate for a given number of operations = 23,360
- Each door of zone C is opened 1 times per hour for 16 h/day for 365 days/year equal to n_{op}/year = 5,840. The contactors will operate for a given number of operations = 17,520
- It is assumed that the emergency button is actuated at a maximum of once a week, n_{op}/year = 52
- Fault Exclusion: since it is assumed that the pairs of contactors, connected in parallel to the respective safety outputs, are wired permanently within the switching cabinet, the possibility of short-circuit between +24V and the contactors is excluded (see Table D.4, item D.5.2 of EN ISO 13849-2).

$MTTF_D$ calculation

Emergency buttons

- $MTTF_D$ SS1/SS2/SS3/SS4 = 115,384 years
- $MTTF_D$ CS = 2035 years
- $MTTF_D$ KMC1,KMC2 = 742 years
- $MTTF_D$ e-stop = 541 years

Guards, zone A

- $MTTF_D$ SS5/SS6 = 17,123 years
- $MTTF_D$ CS = 2035 years
- $MTTF_D$ KMA1,KMA2 = 556 years
- $MTTF_D$ A = 425 years (SS5/SS6,CS,KMA)

Guards, zone B

- $MTTF_D$ SS7 = 4,077 years
- $MTTF_D$ CS = 2035 years
- $MTTF_D$ KMB1,KMB2 = 556 years
- $MTTF_D$ B = 394 years (SS7,CS,KMB)

Guards, zone C

- $MTTF_D$ SS8/SS9/SS10 = 4,077 years
- $MTTF_D$ CS = 2035 years
- $MTTF_D$ KMC1,KMC2 = 742 years
- $MTTF_D$ C = 479 years (SS8/SS9/SS10,CS,KMC)

Diagnostic Coverage DC_{avg}

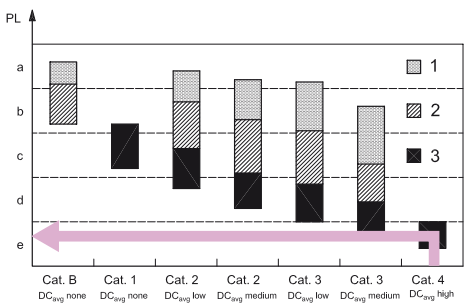
- The contacts of KMA, KMB and KMC are monitored by the CS MP module via the feedback circuit. DC=99%
- All faults in the various devices can be detected. DC=99%
- The CS MP202M0 module has a DC=99%
- The result is a diagnostic coverage of 99% for each function

CCF Common Cause Failures

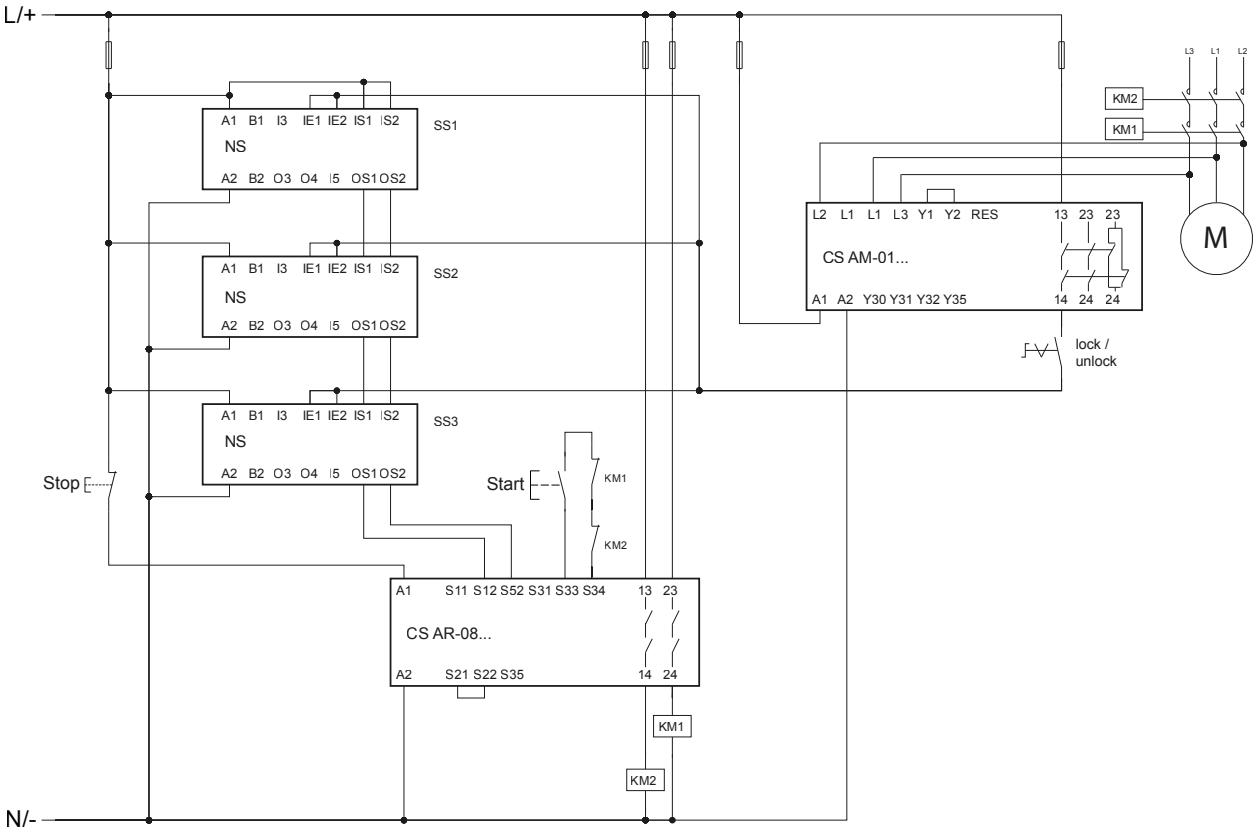
- We assume a score > 65 for all safety functions (acc. to EN ISO 13849-1 - Annex F).

PL determination

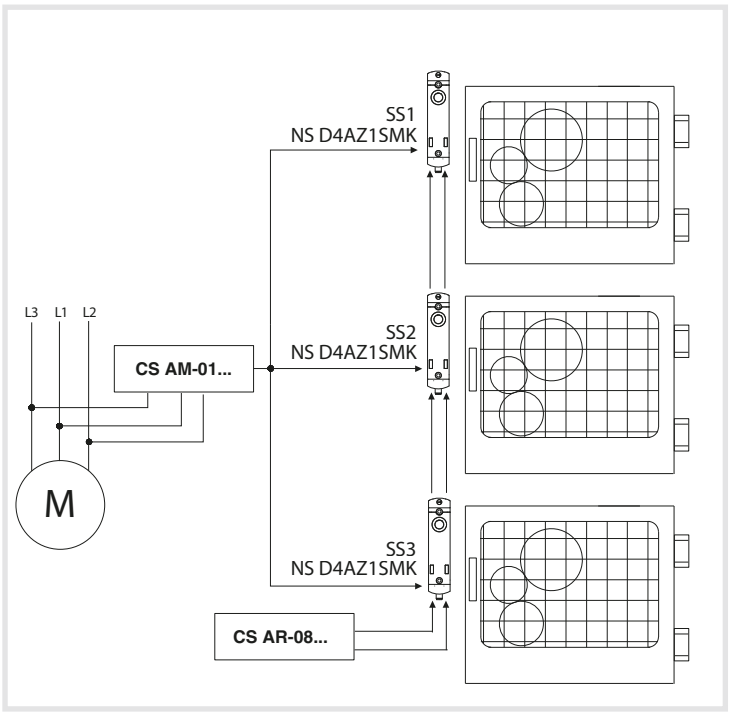
- A circuit in category 4 with $MTTF_D$=High and DC_{avg}= High corresponds to PL e.
- All safety functions associated to the guards and the emergency buttons have PL e.



EXAMPLE 8
Application: Guard monitoring



Reference standard EN ISO 13849-1	
Performance Level - Safety function 1	**PL e**
Performance Level - Safety function 2	**PL d**



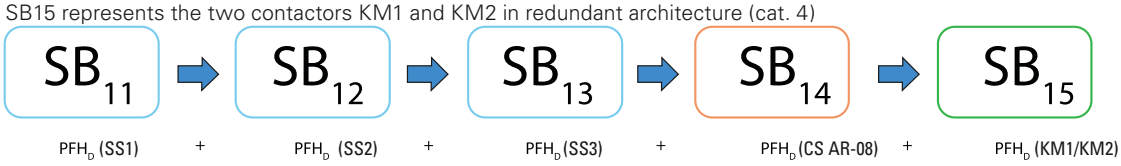
Description of the safety function
Interlocking devices SS1, SS2 and SS3 perform two safety functions: monitoring the locked state and locking the guard.
Once the guards have been released, the three sensors trigger the safety module and the contactors KM1 and KM2 too. The contactors KM1 and KM2 (with forcibly guided contacts) are monitored by the CS AR-08 via the feedback circuit.
The interlock command on the three devices SS1, SS2 and SS3 is maintained until the motor standstill monitoring module

CS AM-01 detects the actual stopping of movement.

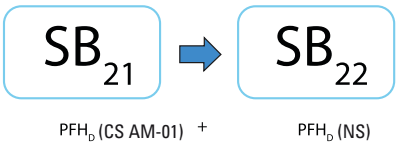
Device data
SS1, SS2, SS3 are NS series coded interlock devices with RFID technology, with guard locking device. Locked protection detection function PFH_D = 1.22E-09 PL ="e", operating of locking control PFH_D = 2.29E-10 PL ="e".
CS AR-08 is a safety module, PFH_D = 9.73 E-11, PL = "e".
CS AM-01 is a safety module for motor standstill monitoring, PFH_D = 8,70E-09, PL "d".
KM1 and KM2 are contactors operated at nominal load. $B10_D$ = 1,300,000 (see EN ISO 13849-1 - Table C.1)

Assumption of the frequency of use
Each door is opened every 10 minutes, 16 hours a day, for 365 days a year, equal to n_{op}/year = 35,040

Definition of the SRP/CS and subsystems
This application example presents two safety functions:
1. Safety-related stop function initiated by a protective measure
2. Maintaining the protection guard interlock with M motor in motion
The safety function 1 is performed by an SRP/CS consisting of 5 subsystems (SB):
- SB11,12,13 represent the three RFID interlock devices of the NS series: SS1, SS2 and SS3
- SB14 represents the safety module CS AR-08
- SB15 represents the two contactors KM1 and KM2 in redundant architecture (cat. 4)



The safety function 2 is performed by 2 subsystems (SB):
- SB21 represents the CS AM-01 safety module for motor standstill monitoring
- SB22 represents the three NS series RFID interlock devices



PFH_D calculation for SB15
$MTTF_D$ KM1,KM2 = 371 years.
DC = 99%, the contacts of KM1 and KM2 are monitored by the CS safety module via the feedback circuit.
For the CCF parameter we assume a score higher than 65 (acc. to EN ISO 13849-1 - Annex F).
A category 4 circuit with $MTTF_D$ = 371 and high diagnostic coverage (DC = 99%) corresponds to a failure probability of PFH_D = 6.3E-09 and a PL "e".

Calculation of the total PFH_D of the SRP/CS safety function 1
$PFH_{DTOT} = PFH_{DSB11} + PFH_{DSB12} + PFH_{DSB13} + PFH_{DSB14} + PFH_{DSB15}$ = 1E-08
It corresponds to PL "e".

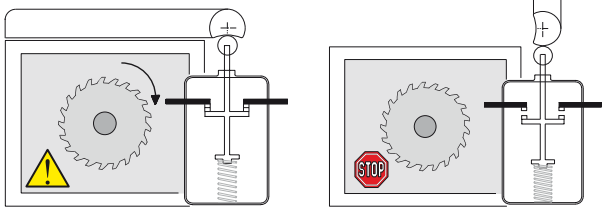
Calculation of the total PFH_D of the SRP/CS safety function 2
$PFH_{DTOT} = PFH_{DSB21} + PFH_{DSB22}$ = 8.9E-09
That would correspond to PL "e". However, considering that the motor standstill monitoring module is characterised by a PL "d", and that the unlock command takes place via a single-channel architecture, the entire SRP/CS is downgraded to this value, therefore PL "d".

Calculation example performed with SISTEMA software, downloadable free of charge at www.pizzato.com

7 - Positive opening, redundancy, diversification and self-monitoring

Positive mode and negative mode.
According to the standard EN ISO 12100, if a moving mechanical component inevitably moves another component along with it, either by direct contact or via rigid elements, these components are said to be connected in the **positive** mode. Instead, if the movement of a mechanical component simply allows another element to move freely, without using direct force (for example by gravity force, spring effect, etc.), that connection is said to be connected in the **negative** mode.

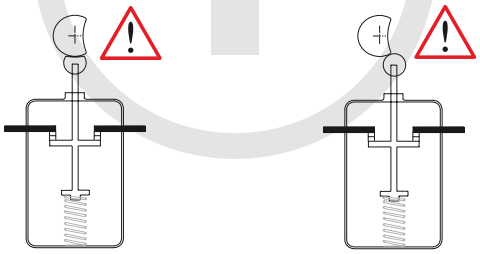
Positive mode



Machine in operation
Gate closed

Machine standstill
Gate open

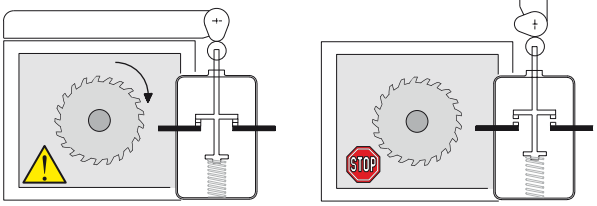
Dangerous failures: The machine continues operation.



Worn-out roller

Misaligned roller

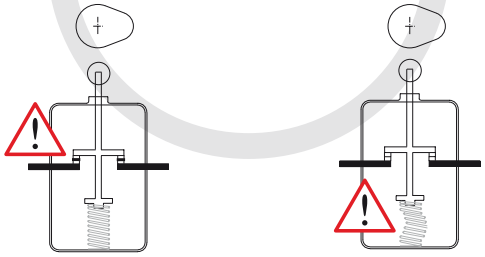
Negative mode



Machine in operation
Gate closed

Machine standstill
Gate open

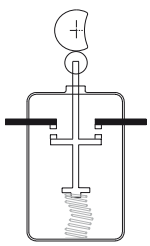
Dangerous failures: The machine continues operation.



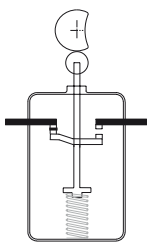
Welded contacts

Damaged spring

With positive mode, preventive maintenance can be performed, thereby avoiding the dangerous failures described above. With negative mode, on the other hand, failures can occur within the switch and are therefore difficult to detect.
In the event of an internal failure (welded contacts or a damaged spring), the contacts will still open in positive mode in spite of the damage and the machine will be stopped.

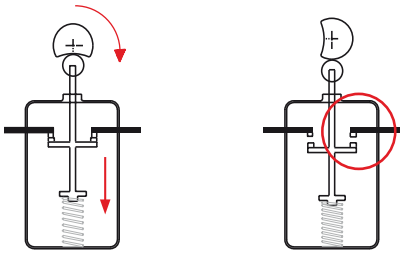


Damaged spring → Machine standstill



Welded contacts → Machine standstill

Use of switches in safety applications
If only one switch is used in a safety application, the switch must be actuated in positive mode. In order to be used for safety applications, the opening contact (normally closed) must be with "**positive opening**". All switches with the symbol ⊖ are provided with NC contacts with positive opening.



No flexible connection between the moving contacts and the actuator on which the actuating force is exerted.

In case of two or more switches, they should operate in opposite modes, for example:
- The first with an NC contact (normally closed contact), actuated by the guard in positive mode.
- The other with an NO contact (normally open contact), actuated by the guard in negative mode.

This is a common practice, though it does not exclude the possible use of two switches that are actuated in positive mode (see diversification).

Diversification
In redundant systems, safety is increased through **diversification**. This can be obtained by using two switches with different design and/or technology; failures with the same cause can thereby be prevented. Some examples of diversification are: the use of a switch working with positive switching mode combined with another working in negative switching mode; a switch with mechanical actuation combined with another with non-mechanical actuation (e.g. electronic sensor); two switches, both with mechanical actuator working in positive mode but with a different actuation principle (e.g. a key switch FR 693-M2 combined with a pin switch FR 1896-M2).

Redundancy
Redundancy implies the use of more than one device or system to make sure that, in case of a failure in one device, there is another one available to perform the required safety functions. If the first failure is not detected, an additional failure may lead to the loss of the safety function.

Self-monitoring
Self-monitoring consists in an automatic control performed to check the functioning of all devices involved in the machine working-cycle. This way the next working cycle can be either accepted or rejected.

Redundancy and self-monitoring
Combining **redundancy** and **self-monitoring** in the same system makes sure that a first failure in the safety circuit does not lead to the loss of safety functions. This first failure will be detected at the next re-start or, in any case, before a second failure which may lead to the loss of the safety function.

Definitions according to the EN 60947-1 and EN 60947-5-1 standards

Control switches
Devices or operating mechanism for controlling the operation of equipment, including signalling, interlocking, etc.

Utilization category
Combination of specified requirements related to the conditions in which the switching device fulfils its purpose.

Operating cycle
Sequence of two operations, one for opening and one for closing.

Rated current Ie
This current depends on the rated operating voltage, the rated frequency, the utilization category and the type of protective enclosure, if present.

Thermal current Ith
Maximum current for heating tests on equipment without enclosure, in free air. Its value shall be least to equal to the maximum value of the rated operational current Ie of the equipment without enclosure, in eight-hour duty.

Electrical endurance
Number of on-load operating cycles, under the conditions defined by the corresponding product standard, which can be carried out without repair or replacement.

Mechanical endurance
Number of no-load operating cycles (i.e. without current on the main contacts), under the conditions defined by the corresponding product standard, which can be carried out without repair or replacement of mechanical parts.

Contact elements
The parts, fixed or movable, conducting or insulating, of a control switch necessary to close and open one single conducting path of a circuit.

Single interruption contact elements
Contact element opening or closing the circuit's conducting path at one point only.

Double interruption contact elements
Contact element opening or closing the circuit's conducting path at two points in series.

Make-contact elements (normally open)
Contact element closing a circuit's conducting path when the control switch is actuated.

Break-contact elements (normally closed)
Contact element opening a circuit's conducting path when the control switch is actuated.

Change-over contact elements
Contact element combination including one make-contact element and one break-contact element.

Electrically separated contact elements
Contact elements of the same control switch which are well isolated from each other and therefore can be connected to electric circuits with different voltages.

Contact elements with independent action (snap action)
Contact element of a manual or automatic device for control circuits where the motion speed of the contact is substantially independent from the motion speed of the actuator.

Contact elements with dependent action (slow action)
Contact element of a manual or automatic device for control circuits where the motion speed of the contact depends on the motion speed of the actuator.

Minimum actuating force
Minimum force to be applied to the actuator that will cause all contacts to reach their switched position.

Position switch
Control switch whose controller is actuated by a moving part of the machine, when this part arrives to a set position.

Foot switch
Control switch whose actuator is actuated by exerting force with a foot on the pedal.

Pre-travel of the actuator
The maximum travel of the actuator which does not cause any travel of the contact elements.

Ambient temperature
The air temperature surrounding the complete switching device, under prescribed conditions.

Rated operating voltage Ue
Voltage which, combined with the rated operational current Ie, determinates the application of the equipment and the referred utilization categories.

Rated insulation voltage Ui
Reference voltage for the dielectric test voltage and the creepage distances along surfaces.

Rated impulse withstand voltage Uimp
The highest peak value of an impulse voltage, of a prescribed shape and polarity, which does not cause destructive discharge under the specified test conditions.

Contact block
Contact element or contact elements combination which can be combined with similar units, operated by a common actuating system

Markings and quality marks

CE marking

The CE marking is a mandatory declaration made by the manufacturer of a product in order to indicate that the product satisfies all requirements foreseen by the directives (regulated by the European Community) in terms of safety and quality. Therefore, it ensures National bodies of the EU countries about the fulfilment of obligations laid down in the agreements.

IMQ mark

The IMQ (Italian Institute of the Quality Mark) is an association in Italy (independent third body) whose task is to check and certify the compliance of materials and equipment with safety standards (CEI standards in the electric and electronic sector). This voluntary conformity certification is a guarantee of quality, safety and technical value.

UL mark

UL (Underwriters Laboratories Inc.) is an independent non-profit body that tests materials, devices, products, equipment, constructions, methods and systems with regard to their risk for human life and goods according to the standard in force in the United States and Canada. Decisions made by UL are often recognized by many governing authorities concerning the compliance with local safety regulations.

CCC mark

The CQC is the organization in the Chinese Popular Republic whose task is to check and certify the low voltage electrical material.
This organization issues the product mark CCC which certifies the passing of electrical/mechanical conformity tests by products and the compliance of the company quality system with required standards. To obtain the mark, the Chinese body makes preliminary company visits as well as periodical check inspections. Position switches cannot be sold in the Chinese territory without this mark.

TÜV SÜD mark

TÜV SÜD is an international authority claiming long-standing experience in the certification of operating safety for electrical, electromechanical and electronic products. In the course of type approval, TÜV SÜD closely inspects the quality throughout all the stages concerning product development, from software design and completion, to production and to the tests conducted according to ISO/IEC standards. The operating safety certification is obtained voluntarily and has a high technical value, since it not only certifies the electrical safety of the product, but also its specific operating suitability for use in safety applications according to the IEC 61508 standard.

EAC mark

The EAC certificate of conformity is a certificate issued by a Customs Union certification body formed by Russia, Belarus and Kazakhstan, with which the conformity of a product is certified with the essential safety requirements laid down by one or more Technical Regulations (Directives) of the Customs Union.

International and European Standards

EN 50041: Low voltage switchgear and controlgear for industrial use. Control switches. Position switches 42.5x80 mm. Dimensions and features
EN 50047: Low voltage switchgear and controlgear for industrial use. Control switches. Position switches 30x55 mm. Dimensions and features
EN ISO 14119: Safety of machinery. Interlocking devices associated with guards. Design and selection principles.
EN ISO 12100: Safety of machinery. General design principles. Risk assessment and risk reduction.
EN ISO 13849-1: Safety of machinery. Safety-related parts of control systems. Part 1: General principles for design.
EN ISO 13850: Safety of machinery. Emergency stop devices, functional aspects. Design principles.
EN 61000-6-3 (equivalent to IEC 61000-6-3): Electromagnetic compatibility. Generic emission standard. Part 1: residential, commercial and light-industrial environments.
EN 61000-6-2 (equivalent to IEC 61000-6-2): Electromagnetic compatibility. Generic immunity standard. Part 2: Industrial environments.
EN ISO 13855: Safety of machinery. Positioning of safeguards with respect to the approach speeds of parts of the human body.
EN 1037: Safety of machinery. Prevention of unexpected start-up.
EN 574: Safety of machinery. Two-hand control devices. Functional aspects. Principles for design.
EN 60947-1 (equivalent to IEC 60947-1): Low-voltage switchgear and controlgear. Part 1: General rules.
EN 60947-5-1 (equivalent to IEC 60947-5-1): Low-voltage switchgear and controlgear. Part 5: Devices for control and operation circuits. Section 1: Electromechanical control circuit devices.
EN 60947-5-2: Low-voltage switchgear and controlgear. Part 5-2: Control circuit devices and switching elements - Proximity switches
EN 60947-5-3: Low-voltage switchgear and controlgear. Part 5-3: Control circuit devices and switching elements - Requirements for proximity devices with defined behaviour under fault conditions (PDF)
EN 60204-1 (equivalent to IEC 60204-1): Safety of machinery. Electrical equipment of machines. Part 1: General rules.
EN 60529 (equivalent to IEC 60529): Protection degree of the housings (IP codes).
ISO 20653: Road vehicles-degrees of protection (IP CODE)
EN 62326-1 (equivalent to IEC 62326-1): Printed boards. Part 1: Generic specification
EN 60664-1 (equivalent to IEC 60664-1): Insulation coordination for equipment within low-voltage systems
Part 1: Principles, requirements and tests.
EN 61508 (equivalent to IEC 61508): Functional safety of electrical, electronic and programmable electronic systems for safety applications.
EN 62061 (equivalent to IEC 62061): Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems.
EN 60079-0 (equivalent to IEC 60079-0): Electrical devices for potentially explosive atmospheres. General rules
EN 60079-11 (equivalent to IEC 60079-11): Electrical apparatus for potentially explosive atmospheres. Intrinsic safety "i"
EN 60079-31 (equivalent to IEC 60079-31): Electrical apparatus for potentially explosive atmospheres. Type of protection: "n".
EN 60079-28 (equivalent to IEC 60079-28): Electrical apparatus for use in the presence of combustible dust. Part 1-1: Construction and testing
BG-GS-ET-15: Prescriptions about how to test switches with forced contact opening to be used in safety applications (German standard).
UL 508: Standards for industrial control equipment. (American standard).
CSA 22-2 No.14: Standards for industrial control equipment. (Canadian standard).

European directives

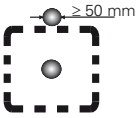
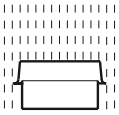
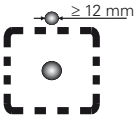
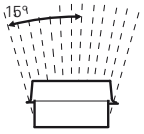
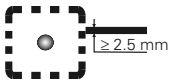
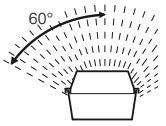
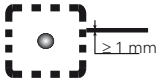
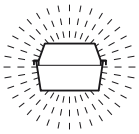
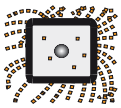
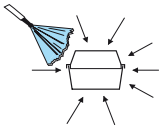
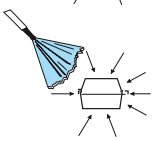
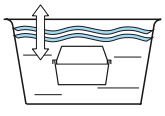
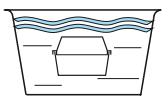
2014/35/EU	Directive on low-voltage switchgear and controlgear
2006/42/EC	Machinery Directive
2014/30/EU	Directive on electromagnetic compatibility
94/9/EC	ATEX Directive

Regulatory Organisations

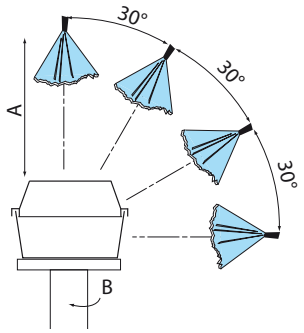
CEI	Comitato Elettrotecnico Italiano (IT)	**NF**	Normes Françaises (FR)
CSA	Canadian Standard Association (CAN)	**VDE**	Verband Deutscher Elektrotechniker (DE)
CENELEC	European Committee for Electrotechnical Standardisation	**UNI**	Ente Nazionale Italiano di Unificazione (IT)
CEN	European Committee for Standardisation	**UL**	Underwriter's Laboratories (USA)
IEC	International Electrotechnical Commission	**TÜV**	Technischer Überwachungs-Verein (DE)

Protection degree of housings for electrical material according to EN 60529

The table reports the required protection degrees according to the IEC 60529, EN 60529, CEI 70-1 standards.
The protection degrees are indicated by the abbreviation IP and 2 following digits. 2 additional letters can be reported indicating protection of persons or other features. The first digit shows the degree of protection against penetration of external solid materials. The second digit identifies instead the protection degree against liquid penetration.

1st digit	Description	Protection for the machine	Protection for persons	2nd digit	Description	Protection for the machine
0		Not protected	Not protected	**0**		Not protected
1		Protected against solid objects greater than 50 mm	Against access to hazardous parts with the back of a hand (Ø 50 mm)	**1**		Protected against vertically falling water drops
2		Protected against solid objects greater than 12 mm	Against access to hazardous parts with a finger (Ø 12 mm)	**2**		Protected against water drops falling at max. 15° angle
3		Protected against solid objects greater than 2.5 mm	Against access to hazardous parts with a tool (Ø 2.5 mm)	**3**		Protected against rain drops falling at max. 60° angle
4		Protected against solid objects greater than 1 mm	Against access to hazardous parts with a wire (Ø 1 mm)	**4**		Protected against splash water from any direction
5		Protected against dust	Against access to hazardous parts with a wire (Ø 1 mm)	**5**		Protected against water jets from any direction
6		Totally protected against dust	Against access to hazardous parts with a wire (Ø 1 mm)	**6**		Protected against powerful water jets from any direction (e.g. waves)
				7		Protected against temporary water immersion (30 minutes at one-meter depth)
				8		Protected against continuous immersion in water

Protection degree IP69K according to ISO 20653



ISO 20653 envisages a particularly strenuous test. This test simulates the conditions of pressure washing in industrial environments with water jets having pressure between 80 and 100 bar, flow rate between 14 and 16 l/min. and a temperature of 80°C.

Test specifications:

Rotation speed (B):	5 ± 1 rpm
Distance from water jet (A):	100 +50/-0 mm
Water flow rate:	15 ± 1 l/min
Water pressure:	9000 ± 1000 kPa
Water temperature:	80 ± 5 °C
Test duration:	30 s per position

Housing data in accordance with UL (UL 508) and CSA (C22-2 no.14) approvals

The features required for a housing are determined by a specific environmental designation and other features such as the kind of gasket or the use of solvent materials.

Type	Intended use and description
1	Mainly for indoor utilization, supplied with protection against contact with the internal mechanism and against a limited quantity of falling dirt.
4X	Suitable for both indoor and outdoor use, provided with protection degree against falling rain, water splashes and direct coming water from a pipe. No damage caused by ice formation on the hosing. Corrosion-resistant.
12	Indoor utilization, provided with a protection degree against dust, dirt, flying fibres, dripping water and outside condensation of non-corrosive fluids.
13	Indoor utilization, supplied with a protection degree against gauze, dust penetration, outside condensation and sprinkling of water, oil and non-corrosive fluids.

Pollution degree (of environmental conditions) according to EN 60947-1

According to the EN 60947-1 standard, the pollution degree is a conventional number based on the quantity of conducting hygroscopic dust, ionized gas or salt, and on the relative humidity and its frequency of occurrence resulting in hygroscopic absorption or condensation of moisture leading to reduction in dielectric strength and/or surface resistivity. In equipment to be used inside a housing or having an integral enclosure as part of the device, the pollution degree applies to the inner part of housing. With the purpose of evaluating the air and surface insulation distances, the following four pollution degrees are defined:

Degree	Description
1	No pollution or only dry and non-conductive pollution occurs.
2	Normally, only non-conductive pollution is present. Occasionally some temporary conductivity caused by condensation may occur.
3	Some conductive pollution is present, or some dry non-conductive pollution that becomes conductive because of condensation.
4	Pollution causes persistent conductivity, for instance due to conductive dust or rain or snow.

Where not otherwise specified by the applicable standards for the product, equipment for industrial applications are generally intended for their use in environment with pollution degree 3. Nevertheless, other degrees can be considered, depending on the micro-environment or on particular applications.

Use in alternating and direct current of auxiliary devices acc. to EN 60947-5-1

Alternating current use

Utilization category	Description
AC12	Control of resistive loads and solid state loads with insulation by optocouplers.
AC13	Control of solid state loads with transformer isolation
AC14	Control of electromagnetic loads, power ≤ 72 VA
AC15	Control of electromagnetic loads, power ≥ 72 VA

Direct current use

Utilization category	Intended use
DC12	Control of resistive loads and solid state loads with insulation by optocouplers.
DC13	Control of electromagnetic loads without economy resistors in circuit
DC14	Control of electromagnetic loads with economy resistors in circuit

Alphanumeric index of product codes

Legend:

FA ••••-EX5 The dots indicate a generic alphanumeric character

Changed article codes

Legend:

FA 4101-•DN → NA B110AB-DN• The codes in grey have been replaced by the code after the arrow

Old article	New article
FA 4101-•DN →	NA B110AB-DN•
FA 4101-KDM →	NA B110AB-DMK
FA 4102-•DN →	NA B110CP-DN•
FA 4102-KDM →	NA B110CP-DMK
FA 4108-•DN →	NA B110AE-DN•
FA 4108-KDM →	NA B110AE-DMK
FA 4110-•DN →	NA B110EB-DN•
FA 4110-KDM →	NA B110EB-DMK
FA 4111-•DN →	NA B110FB-DN•
FA 4111-KDM →	NA B110FB-DMK
FA 4112-•DN →	NA B110FB-DN•H0
FA 4112-KDM →	NA B110FB-DMKH0
FA 4113-•DN →	NA B110EE-DN•
FA 4113-KDM →	NA B110EE-DMK
FA 4115-•DN →	NA B110BB-DN•
FA 4115-KDM →	NA B110BB-DMK
FA 4117-•DN →	NA B110BB-DN•H0
FA 4117-KDM →	NA B110BB-DMKH0
FA 4120-•DN →	NA B110HB-DN•
FA 4120-KDM →	NA B110HB-DMK
FA 4125-•DN →	NA B110HE-DN•
FA 4125-KDM →	NA B110HE-DMK
FA 4130-•DN →	NA B112KA-DN•
FA 4130-KDM →	NA B112KA-DMK
FA 4131-•DN →	NA B112KC-DN•
FA 4131-KDM →	NA B112KC-DMK
FA 4133-•DN →	NA B112LB-DN•
FA 4133-KDM →	NA B112LB-DMK
FA 4134-•DN →	NA B112LL-DN•
FA 4134-KDM →	NA B112LL-DMK
FA 4140-•DN →	NA B112KD-DN•
FA 4140-KDM →	NA B112KD-DMK
FA 4150-•DN →	NA B112LE-DN•
FA 4150-KDM →	NA B112LE-DMK
FA 4151-•DN →	NA B112KE-DN•
FA 4151-KDM →	NA B112KE-DMK
FA 4152-•DN →	NA B112KF-DN•
FA 4152-KDM →	NA B112KF-DMK
FA 4154-•DN →	NA B112KG-DN•
FA 4154-KDM →	NA B112KG-DMK
FA 4155-•DN →	NA B112KP-DN•
FA 4155-KDM →	NA B112KP-DMK
FA 4156-•DN →	NA B112KP-DN•
FA 4156-KDM →	NA B112KP-DMK
FA 4157-•DN →	NA B112KH-DN•
FA 4157-KDM →	NA B112KH-DMK
FA 4169-•DN →	NA B112LH-DN•
FA 4169-KDM →	NA B112LH-DMK
FA 4501-•DN →	NA B110AB-DN•
FA 4501-KDM →	NA B110AB-DMK
FA 4502-•DN →	NA B110CP-DN•
FA 4502-KDM →	NA B110CP-DMK
FA 4508-•DN →	NA B110AE-DN•
FA 4508-KDM →	NA B110AE-DMK
FA 4510-•DN →	NA B110EB-DN•
FA 4510-KDM →	NA B110EB-DMK
FA 4511-•DN →	NA B110FB-DN•
FA 4511-KDM →	NA B110FB-DMK
FA 4512-•DN →	NA B110FB-DN•H0
FA 4512-KDM →	NA B110FB-DMKH0
FA 4513-•DN →	NA B110EE-DN•
FA 4513-KDM →	NA B110EE-DMK
FA 4515-•DN →	NA B110BB-DN•
FA 4515-KDM →	NA B110BB-DMK
FA 4517-•DN →	NA B110BB-DN•H0
FA 4517-KDM →	NA B110BB-DMKH0
FA 4520-•DN →	NA B110HB-DN•
FA 4520-KDM →	NA B110HB-DMK
FA 4525-•DN →	NA B110HE-DN•
FA 4525-KDM →	NA B110HE-DMK
FA 4530-•DN →	NA B112KA-DN•
FA 4530-KDM →	NA B112KA-DMK
FA 4531-•DN →	NA B112KC-DN•
FA 4531-KDM →	NA B112KC-DMK
FA 4533-•DN →	NA B112LB-DN•
FA 4533-KDM →	NA B112LB-DMK
FA 4534-•DN →	NA B112LL-DN•
FA 4534-KDM →	NA B112LL-DMK
FA 4540-•DN →	NA B112KD-DN•
FA 4540-KDM →	NA B112KD-DMK
FA 4550-•DN →	NA B112LE-DN•
FA 4550-KDM →	NA B112LE-DMK
FA 4551-•DN →	NA B112KE-DN•
FA 4551-KDM →	NA B112KE-DMK
FA 4552-•DN →	NA B112KF-DN•
FA 4552-KDM →	NA B112KF-DMK
FA 4554-•DN →	NA B112KG-DN•
FA 4554-KDM →	NA B112KG-DMK
FA 4555-•DN →	NA B112KP-DN•
FA 4555-KDM →	NA B112KP-DMK
FA 4556-•DN →	NA B112KP-DN•
FA 4556-KDM →	NA B112KP-DMK
FA 4557-•DN →	NA B112KH-DN•
FA 4557-KDM →	NA B112KH-DMK
FA 4569-•DN →	NA B112LH-DN•
FA 4569-KDM →	NA B112LH-DMK
FA 4601-•DN →	NA G110AB-DN•
FA 4601-KDM →	NA G110AB-DMK
FA 4602-•DN →	NA G110CP-DN•
FA 4602-KDM →	NA G110CP-DMK
FA 4608-•DN →	NA G110AE-DN•
FA 4608-KDM →	NA G110AE-DMK
FA 4610-•DN →	NA G110EB-DN•
FA 4610-KDM →	NA G110EB-DMK
FA 4611-•DN →	NA G110FB-DN•
FA 4611-KDM →	NA G110FB-DMK
FA 4612-•DN →	NA G110FB-DN•H0
FA 4612-KDM →	NA G110FB-DMKH0
FA 4613-•DN →	NA G110EE-DN•
FA 4613-KDM →	NA G110EE-DMK
FA 4615-•DN →	NA G110BB-DN•
FA 4615-KDM →	NA G110BB-DMK
FA 4617-•DN →	NA G110BB-DN•H0
FA 4617-KDM →	NA G110BB-DMKH0
FA 4630-•DN →	NA G112KA-DN•
FA 4630-KDM →	NA G112KA-DMK
FA 4631-•DN →	NA G112KC-DN•
FA 4631-KDM →	NA G112KC-DMK
FA 4633-•DN →	NA G112LB-DN•
FA 4633-KDM →	NA G112LB-DMK
FA 4634-•DN →	NA G112LL-DN•
FA 4634-KDM →	NA G112LL-DMK
FA 4640-•DN →	NA G112KD-DN•
FA 4640-KDM →	NA G112KD-DMK
FA 4650-•DN →	NA G112LE-DN•
FA 4650-KDM →	NA G112LE-DMK
FA 4651-•DN →	NA G112KE-DN•
FA 4651-KDM →	NA G112KE-DMK
FA 4652-•DN →	NA G112KF-DN•
FA 4652-KDM →	NA G112KF-DMK
FA 4654-•DN →	NA G112KG-DN•
FA 4654-KDM →	NA G112KG-DMK
FA 4655-•DN →	NA G112KP-DN•
FA 4655-KDM →	NA G112KP-DMK
FA 4656-•DN →	NA G112KP-DN•
FA 4656-KDM →	NA G112KP-DMK
FA 4657-•DN →	NA G112KH-DN•
FA 4657-KDM →	NA G112KH-DMK
FA 4669-•DN →	NA G112LH-DN•
FA 4669-KDM →	NA G112LH-DMK
FA 4801-•DN →	NA L110AB-DN•
FA 4801-KDM →	NA L110AB-DMK
FA 4802-•DN →	NA L110CP-DN•
FA 4802-KDM →	NA L110CP-DMK
FA 4808-•DN →	NA L110AE-DN•
FA 4808-KDM →	NA L110AE-DMK
FA 4810-•DN →	NA L110EB-DN•
FA 4810-KDM →	NA L110EB-DMK
FA 4811-•DN →	NA L110FB-DN•
FA 4811-KDM →	NA L110FB-DMK
FA 4812-•DN →	NA L110FB-DN•H0
FA 4812-KDM →	NA L110FB-DMKH0
FA 4813-•DN →	NA L110EE-DN•
FA 4813-KDM →	NA L110EE-DMK
FA 4815-•DN →	NA L110BB-DN•
FA 4815-KDM →	NA L110BB-DMK
FA 4817-•DN →	NA L110BB-DN•H0
FA 4817-KDM →	NA L110BB-DMKH0
FA 4820-•DN →	NA L110HB-DN•
FA 4820-KDM →	NA L110HB-DMK
FA 4825-•DN →	NA L110HE-DN•
FA 4825-KDM →	NA L110HE-DMK
FA 4830-•DN →	NA L112KA-DN•
FA 4830-KDM →	NA L112KA-DMK
FA 4831-•DN →	NA L112KC-DN•
FA 4831-KDM →	NA L112KC-DMK
FA 4833-•DN →	NA L112LB-DN•
FA 4833-KDM →	NA L112LB-DMK
FA 4834-•DN →	NA L112LL-DN•
FA 4834-KDM →	NA L112LL-DMK
FA 4840-•DN →	NA L112KD-DN•
FA 4840-KDM →	NA L112KD-DMK
FA 4850-•DN →	NA L112LE-DN•
FA 4850-KDM →	NA L112LE-DMK
FA 4851-•DN →	NA L112KE-DN•
FA 4851-KDM →	NA L112KE-DMK
FA 4852-•DN →	NA L112KF-DN•
FA 4852-KDM →	NA L112KF-DMK
FA 4854-•DN →	NA L112KG-DN•
FA 4854-KDM →	NA L112KG-DMK
FA 4855-•DN →	NA L112KP-DN•
FA 4855-KDM →	NA L112KP-DMK
FA 4856-•DN →	NA L112KP-DN•
FA 4856-KDM →	NA L112KP-DMK
FA 4857-•DN →	NA L112KH-DN•
FA 4857-KDM →	NA L112KH-DMK
FA 4869-•DN →	NA L112LH-DN•
FA 4869-KDM →	NA L112LH-DMK
FB 4101-•SN →	NB B110AB-DN•
FB 4101-KSM →	NB B110AB-SMK
FB 4102-•SN →	NB B110CP-DN•
FB 4102-KSM →	NB B110CP-SMK
FB 4108-•SN →	NB B110AE-DN•
FB 4108-KSM →	NB B110AE-SMK
FB 4110-•SN →	NB B110EB-DN•
FB 4110-KSM →	NB B110EB-SMK
FB 4111-•SN →	NB B110FB-DN•
FB 4111-KSM →	NB B110FB-SMK
FB 4112-•SN →	NB B110FB-DN•H0
FB 4112-KSM →	NB B110FB-SMKH0
FB 4113-•SN →	NB B110EE-DN•
FB 4113-KSM →	NB B110EE-SMK
FB 4115-•SN →	NB B110BB-DN•
FB 4115-KSM →	NB B110BB-SMK
FB 4117-•SN →	NB B110BB-DN•H0
FB 4117-KSM →	NB B110BB-SMKH0
FB 4120-•SN →	NB B110HB-DN•
FB 4120-KSM →	NB B110HB-SMK
FB 4125-•SN →	NB B110HE-DN•
FB 4125-KSM →	NB B110HE-SMK
FB 4130-•SN →	NB B112KA-DN•
FB 4130-KSM →	NB B112KA-SMK
FB 4131-•SN →	NB B112KC-DN•
FB 4131-KSM →	NB B112KC-SMK
FB 4133-•SN →	NB B112LB-DN•
FB 4133-KSM →	NB B112LB-SMK
FB 4134-•SN →	NB B112LL-DN•
FB 4134-KSM →	NB B112LL-SMK
FB 4140-•SN →	NB B112KD-DN•
FB 4140-KSM →	NB B112KD-SMK
FB 4150-•SN →	NB B112LE-DN•
FB 4150-KSM →	NB B112LE-SMK
FB 4151-•SN →	NB B112KE-DN•
FB 4151-KSM →	NB B112KE-SMK
FB 4152-•SN →	NB B112KF-DN•
FB 4152-KSM →	NB B112KF-SMK
FB 4154-•SN →	NB B112KG-DN•
FB 4154-KSM →	NB B112KG-SMK
FB 4155-•SN →	NB B112KP-DN•
FB 4155-KSM →	NB B112KP-SMK
FB 4156-•SN →	NB B112KP-DN•
FB 4156-KSM →	NB B112KP-SMK
FB 4157-•SN →	NB B112KH-DN•
FB 4157-KSM →	NB B112KH-SMK
FB 4169-•SN →	NB B112LH-DN•
FB 4169-KSM →	NB B112LH-SMK
FB 4501-•SN →	NB B110AB-DN•
FB 4501-KSM →	NB B110AB-SMK
FB 4502-•SN →	NB B110CP-DN•
FB 4502-KSM →	NB B110CP-SMK

Old article	New article
FB 4508-•SN →	NB B110AE-DN•
FB 4508-KSM →	NB B110AE-SMK
FB 4510-•SN →	NB B110EB-DN•
FB 4510-KSM →	NB B110EB-SMK
FB 4511-•SN →	NB B110FB-DN•
FB 4511-KSM →	NB B110FB-SMK
FB 4512-•SN →	NB B110FB-DN•H0
FB 4512-KSM →	NB B110FB-SMKH0
FB 4513-•SN →	NB B110EE-DN•
FB 4513-KSM →	NB B110EE-SMK
FB 4515-•SN →	NB B110BB-DN•
FB 4515-KSM →	NB B110BB-SMK
FB 4517-•SN →	NB B110BB-DN•H0
FB 4517-KSM →	NB B110BB-SMKH0
FB 4520-•SN →	NB B110HB-DN•
FB 4520-KSM →	NB B110HB-SMK
FB 4525-•SN →	NB B110HE-DN•
FB 4525-KSM →	NB B110HE-SMK
FB 4530-•SN →	NB B112KA-DN•
FB 4530-KSM →	NB B112KA-SMK
FB 4531-•SN →	NB B112KC-DN•
FB 4531-KSM →	NB B112KC-SMK
FB 4533-•SN →	NB B112LB-DN•
FB 4533-KSM →	NB B112LB-SMK
FB 4534-•SN →	NB B112LL-DN•
FB 4534-KSM →	NB B112LL-SMK
FB 4540-•SN →	NB B112KD-DN•
FB 4540-KSM →	NB B112KD-SMK
FB 4550-•SN →	NB B112LE-DN•
FB 4550-KSM →	NB B112LE-SMK
FB 4551-•SN →	NB B112KE-DN•
FB 4551-KSM →	NB B112KE-SMK
FB 4552-•SN →	NB B112KF-DN•
FB 4552-KSM →	NB B112KF-SMK
FB 4554-•SN →	NB B112KG-DN•
FB 4554-KSM →	NB B112KG-SMK
FB 4555-•SN →	NB B112KP-DN•
FB 4555-KSM →	NB B112KP-SMK
FB 4556-•SN →	NB B112KP-DN•
FB 4556-KSM →	NB B112KP-SMK
FB 4557-•SN →	NB B112KH-DN•
FB 4557-KSM →	NB B112KH-SMK
FB 4569-•SN →	NB B112LH-DN•
FB 4569-KSM →	NB B112LH-SMK
FB 4601-•SN →	NB G110AB-DN•
FB 4601-KSM →	NB G110AB-SMK
FB 4602-•SN →	NB G110CP-DN•
FB 4602-KSM →	NB G110CP-SMK
FB 4608-•SN →	NB G110AE-DN•
FB 4608-KSM →	NB G110AE-SMK
FB 4610-•SN →	NB G110EB-DN•
FB 4610-KSM →	NB G110EB-SMK
FB 4611-•SN →	NB G110FB-DN•
FB 4611-KSM →	NB G110FB-SMK
FB 4612-•SN →	NB G110FB-DN•H0
FB 4612-KSM →	NB G110FB-SMKH0
FB 4613-•SN →	NB G110EE-DN•
FB 4613-KSM →	NB G110EE-SMK
FB 4615-•SN →	NB G110BB-DN•
FB 4615-KSM →	NB G110BB-SMK
FB 4617-•SN →	NB G110BB-DN•H0
FB 4617-KSM →	NB G110BB-SMKH0
FB 4630-•SN →	NB G112KA-DN•
FB 4630-KSM →	NB G112KA-SMK
FB 4631-•SN →	NB G112KC-DN•
FB 4631-KSM →	NB G112KC-SMK
FB 4633-•SN →	NB G112LB-DN•
FB 4633-KSM →	NB G112LB-SMK
FB 4634-•SN →	NB G112LL-DN•
FB 4634-KSM →	NB G112LL-SMK
FB 4640-•SN →	NB G112KD-DN•
FB 4640-KSM →	NB G112KD-SMK
FB 4650-•SN →	NB G112LE-DN•
FB 4650-KSM →	NB G112LE-SMK
FB 4651-•SN →	NB G112KE-DN•
FB 4651-KSM →	NB G112KE-SMK
FB 4652-•SN →	NB G112KF-DN•
FB 4652-KSM →	NB G112KF-SMK
FB 4654-•SN →	NB G112KG-DN•
FB 4654-KSM →	NB G112KG-SMK
FB 4655-•SN →	NB G112KP-DN•
FB 4655-KSM →	NB G112KP-SMK
FB 4656-•SN →	NB G112KP-DN•
FB 4656-KSM →	NB G112KP-SMK
FB 4657-•SN →	NB G112KH-DN•
FB 4657-KSM →	NB G112KH-SMK
FB 4669-•SN →	NB G112LH-DN•
FB 4669-KSM →	NB G112LH-SMK
FB 4801-•SN →	NB L110AB-DN•
FB 4801-KSM →	NB L110AB-SMK
FB 4802-•SN →	NB L110CP-DN•
FB 4802-KSM →	NB L110CP-SMK
FB 4808-•SN →	NB L110AE-DN•
FB 4808-KSM →	NB L110AE-SMK
FB 4810-•SN →	NB L110EB-DN•
FB 4810-KSM →	NB L110EB-SMK
FB 4811-•SN →	NB L110FB-DN•
FB 4811-KSM →	NB L110FB-SMK
FB 4812-•SN →	NB L110FB-DN•H0
FB 4812-KSM →	NB L110FB-SMKH0
FB 4813-•SN →	NB L110EE-DN•
FB 4813-KSM →	NB L110EE-SMK
FB 4815-•SN →	NB L110BB-DN•
FB 4815-KSM →	NB L110BB-SMK
FB 4817-•SN →	NB L110BB-DN•H0
FB 4817-KSM →	NB L110BB-SMKH0
FB 4820-•SN →	NB L110HB-DN•
FB 4820-KSM →	NB L110HB-SMK
FB 4825-•SN →	NB L110HE-DN•
FB 4825-KSM →	NB L110HE-SMK
FB 4830-•SN →	NB L112KA-DN•
FB 4830-KSM →	NB L112KA-SMK
FB 4831-•SN →	NB L112KC-DN•
FB 4831-KSM →	NB L112KC-SMK
FB 4833-•SN →	NB L112LB-DN•
FB 4833-KSM →	NB L112LB-SMK
FB 4834-•SN →	NB L112LL-DN•
FB 4834-KSM →	NB L112LL-SMK
FB 4840-•SN →	NB L112KD-DN•
FB 4840-KSM →	NB L112KD-SMK
FB 4850-•SN →	NB L112LE-DN•
FB 4850-KSM →	NB L112LE-SMK
FB 4851-•SN →	NB L112KE-DN•
FB 4851-KSM →	NB L112KE-SMK
FB 4852-•SN →	NB L112KF-DN•
FB 4852-KSM →	NB L112KF-SMK
FB 4854-•SN →	NB L112KG-DN•
FB 4854-KSM →	NB L112KG-SMK
FB 4855-•SN →	NB L112KP-DN•
FB 4855-KSM →	NB L112KP-SMK
FB 4856-•SN →	NB L112KP-DN•
FB 4856-KSM →	NB L112KP-SMK
FB 4857-•SN →	NB L112KH-DN•
FB 4857-KSM →	NB L112KH-SMK
FB 4869-•SN →	NB L112LH-DN•
FB 4869-KSM →	NB L112LH-SMK
FF 4101-•DN →	NF B110AB-DN•
FF 4101-•SN →	NF B110AB-DN•
FF 4101-KSM →	NF B110AB-SMK
FF 4101-KDM→	NF B110AB-DMK
FF 4102-•DN →	NF B110CP-DN•
FF 4102-•SN →	NF B110CP-DN•
FF 4102-KSM →	NF B110CP-SMK
FF 4102-KDM→	NF B110CP-DMK
FF 4108-•DN →	NF B110AE-DN•
FF 4108-•SN →	NF B110AE-DN•
FF 4108-KSM →	NF B110AE-SMK
FF 4108-KDM→	NF B110AE-DMK
FF 4110-•DN →	NF B110EB-DN•
FF 4110-•SN →	NF B110EB-DN•
FF 4110-KSM →	NF B110EB-SMK
FF 4110-KDM→	NF B110EB-DMK
FF 4111-•DN →	NF B110FB-DN•
FF 4111-•SN →	NF B110FB-DN•
FF 4111-KSM →	NF B110FB-SMK
FF 4111-KDM→	NF B110FB-DMK
FF 4112-•DN →	NF B110FB-DN•H0
FF 4112-•SN →	NF B110FB-DN•H0
FF 4112-KSM →	NF B110FB-SMKH0
FF 4112-KDM→	NF B110FB-DMKH0
FF 4113-•DN →	NF B110EE-DN•
FF 4113-•SN →	NF B110EE-DN•
FF 4113-KSM →	NF B110EE-SMK
FF 4113-KDM→	NF B110EE-DMK
FF 4115-•DN →	NF B110BB-DN•
FF 4115-•SN →	NF B110BB-DN•
FF 4115-KSM →	NF B110BB-SMK
FF 4115-KDM→	NF B110BB-DMK
FF 4117-•DN →	NF B110BB-DN•H0
FF 4117-•SN →	NF B110BB-DN•H0
FF 4117-KSM →	NF B110BB-SMKH0
FF 4117-KDM→	NF B110BB-DMKH0
FF 4120-•DN →	NF B110HB-DN•
FF 4120-•SN →	NF B110HB-DN•
FF 4120-KSM →	NF B110HB-SMK
FF 4120-KDM→	NF B110HB-DMK
FF 4125-•DN →	NF B110HE-DN•
FF 4125-•SN →	NF B110HE-DN•
FF 4125-KSM →	NF B110HE-SMK
FF 4125-KDM→	NF B110HE-DMK
FF 4130-•DN →	NF B112KA-DN•
FF 4130-•SN →	NF B112KA-DN•
FF 4130-KSM →	NF B112KA-SMK
FF 4130-KDM→	NF B112KA-DMK
FF 4131-•DN →	NF B112KC-DN•
FF 4131-•SN →	NF B112KC-DN•
FF 4131-KSM →	NF B112KC-SMK
FF 4131-KDM→	NF B112KC-DMK
FF 4133-•DN →	NF B112LB-DN•
FF 4133-•SN →	NF B112LB-DN•
FF 4133-KSM →	NF B112LB-SMK
FF 4133-KDM→	NF B112LB-DMK
FF 4134-•DN →	NF B112LL-DN•
FF 4134-•SN →	NF B112LL-DN•
FF 4134-KSM →	NF B112LL-SMK
FF 4134-KDM→	NF B112LL-DMK
FF 4140-•DN →	NF B112KD-DN•
FF 4140-•SN →	NF B112KD-DN•
FF 4140-KSM →	NF B112KD-SMK
FF 4140-KDM→	NF B112KD-DMK
FF 4150-•DN →	NF B112LE-DN•
FF 4150-•SN →	NF B112LE-DN•
FF 4150-KSM →	NF B112LE-SMK
FF 4150-KDM→	NF B112LE-DMK
FF 4151-•DN →	NF B112KE-DN•
FF 4151-•SN →	NF B112KE-DN•
FF 4151-KSM →	NF B112KE-SMK
FF 4151-KDM→	NF B112KE-DMK
FF 4152-•DN →	NF B112KF-DN•
FF 4152-•SN →	NF B112KF-DN•
FF 4152-KSM →	NF B112KF-SMK
FF 4152-KDM→	NF B112KF-DMK
FF 4154-•DN →	NF B112KG-DN•
FF 4154-•SN →	NF B112KG-DN•
FF 4154-KSM →	NF B112KG-SMK
FF 4154-KDM→	NF B112KG-DMK
FF 4155-•DN →	NF B112KP-DN•
FF 4155-•SN →	NF B112KP-DN•
FF 4155-KSM →	NF B112KP-SMK
FF 4155-KDM→	NF B112KP-DMK
FF 4156-•DN →	NF B112KP-DN•
FF 4156-•SN →	NF B112KP-DN•
FF 4156-KSM →	NF B112KP-SMK
FF 4156-KDM→	NF B112KP-DMK
FF 4157-•DN →	NF B112KH-DN•
FF 4157-•SN →	NF B112KH-DN•
FF 4157-KSM →	NF B112KH-SMK
FF 4157-KDM→	NF B112KH-DMK
FF 4169-•DN →	NF B112LH-DN•
FF 4169-•SN →	NF B112LH-DN•
FF 4169-KSM →	NF B112LH-SMK
FF 4169-KDM→	NF B112LH-DMK
FF 4501-•DN →	NF B110AB-DN•
FF 4501-•SN →	NF B110AB-DN•
FF 4501-KSM →	NF B110AB-SMK
FF 4501-KDM→	NF B110AB-DMK
FF 4502-•DN →	NF B110CP-DN•
FF 4502-•SN →	NF B110CP-DN•
FF 4502-KSM →	NF B110CP-SMK
FF 4502-KDM→	NF B110CP-DMK
FF 4508-•DN →	NF B110AE-DN•
FF 4508-•SN →	NF B110AE-DN•
FF 4508-KSM →	NF B110AE-SMK
FF 4508-KDM→	NF B110AE-DMK
FF 4510-•DN →	NF B110EB-DN•
FF 4510-•SN →	NF B110EB-DN•
FF 4510-KSM →	NF B110EB-SMK
FF 4510-KDM→	NF B110EB-DMK
FF 4511-•DN →	NF B110FB-DN•

Changed article codes

Old article	New article
FF 4511-•SN →	NF B110FB-DN•
FF 4511-KSM →	NF B110FB-SMK
FF 4511-KDM→	NF B110FB-DMK
FF 4512-•DN →	NF B110FB-DN•H0
FF 4512-•SN →	NF B110FB-DN•H0
FF 4512-KSM →	NF B110FB-SMKH0
FF 4512-KDM→	NF B110FB-DMKH0
FF 4513-•DN →	NF B110EE-DN•
FF 4513-•SN →	NF B110EE-DN•
FF 4513-KSM →	NF B110EE-SMK
FF 4513-KDM→	NF B110EE-DMK
FF 4515-•DN →	NF B110BB-DN•
FF 4515-•SN →	NF B110BB-DN•
FF 4515-KSM →	NF B110BB-SMK
FF 4515-KDM→	NF B110BB-DMK
FF 4517-•DN →	NF B110BB-DN•H0
FF 4517-•SN →	NF B110BB-DN•H0
FF 4517-KSM →	NF B110BB-SMKH0
FF 4517-KDM→	NF B110BB-DMKH0
FF 4520-•DN →	NF B110HB-DN•
FF 4520-•SN →	NF B110HB-DN•
FF 4520-KSM →	NF B110HB-SMK
FF 4520-KDM→	NF B110HB-DMK
FF 4525-•DN →	NF B110HE-DN•
FF 4525-•SN →	NF B110HE-DN•
FF 4525-KSM →	NF B110HE-SMK
FF 4525-KDM→	NF B110HE-DMK
FF 4530-•DN →	NF B112KA-DN•
FF 4530-•SN →	NF B112KA-DN•
FF 4530-KSM →	NF B112KA-SMK
FF 4530-KDM→	NF B112KA-DMK
FF 4531-•DN →	NF B112KC-DN•
FF 4531-•SN →	NF B112KC-DN•
FF 4531-KSM →	NF B112KC-SMK
FF 4531-KDM→	NF B112KC-DMK
FF 4533-•DN →	NF B112LB-DN•
FF 4533-•SN →	NF B112LB-DN•
FF 4533-KSM →	NF B112LB-SMK
FF 4533-KDM→	NF B112LB-DMK
FF 4534-•DN →	NF B112LL-DN•
FF 4534-•SN →	NF B112LL-DN•
FF 4534-KSM →	NF B112LL-SMK
FF 4534-KDM→	NF B112LL-DMK
FF 4540-•DN →	NF B112KD-DN•
FF 4540-•SN →	NF B112KD-DN•
FF 4540-KSM →	NF B112KD-SMK
FF 4540-KDM→	NF B112KD-DMK
FF 4550-•DN →	NF B112LE-DN•
FF 4550-•SN →	NF B112LE-DN•
FF 4550-KSM →	NF B112LE-SMK
FF 4550-KDM→	NF B112LE-DMK
FF 4551-•DN →	NF B112KE-DN•
FF 4551-•SN →	NF B112KE-DN•
FF 4551-KSM →	NF B112KE-SMK
FF 4551-KDM→	NF B112KE-DMK
FF 4552-•DN →	NF B112KF-DN•
FF 4552-•SN →	NF B112KF-DN•
FF 4552-KSM →	NF B112KF-SMK
FF 4552-KDM→	NF B112KF-DMK
FF 4554-•DN →	NF B112KG-DN•
FF 4554-•SN →	NF B112KG-DN•
FF 4554-KSM →	NF B112KG-SMK
FF 4554-KDM→	NF B112KG-DMK
FF 4555-•DN →	NF B112KP-DN•
FF 4555-•SN →	NF B112KP-DN•
FF 4555-KSM →	NF B112KP-SMK
FF 4555-KDM→	NF B112KP-DMK
FF 4556-•DN →	NF B112KP-DN•
FF 4556-•SN →	NF B112KP-DN•
FF 4556-KSM →	NF B112KP-SMK
FF 4556-KDM→	NF B112KP-DMK
FF 4557-•DN →	NF B112KH-DN•
FF 4557-•SN →	NF B112KH-DN•
FF 4557-KSM →	NF B112KH-SMK
FF 4557-KDM→	NF B112KH-DMK
FF 4569-•DN →	NF B112LH-DN•
FF 4569-•SN →	NF B112LH-DN•
FF 4569-KSM →	NF B112LH-SMK
FF 4569-KDM→	NF B112LH-DMK
FF 4601-•DN →	NF G110AB-DN•
FF 4601-•SN →	NF G110AB-DN•
FF 4601-KSM →	NF G110AB-SMK
FF 4601-KDM→	NF G110AB-DMK
FF 4602-•DN →	NF G110CP-DN•
FF 4602-•SN →	NF G110CP-DN•
FF 4602-KSM →	NF G110CP-SMK
FF 4602-KDM→	NF G110CP-DMK
FF 4608-•DN →	NF G110AE-DN•
FF 4608-•SN →	NF G110AE-DN•
FF 4608-KSM →	NF G110AE-SMK
FF 4608-KDM→	NF G110AE-DMK
FF 4610-•DN →	NF G110EB-DN•
FF 4610-•SN →	NF G110EB-DN•
FF 4610-KSM →	NF G110EB-SMK
FF 4610-KDM→	NF G110EB-DMK
FF 4611-•DN →	NF G110FB-DN•
FF 4611-•SN →	NF G110FB-DN•
FF 4611-KSM →	NF G110FB-SMK
FF 4611-KDM→	NF G110FB-DMK
FF 4612-•DN →	NF G110FB-DN•H0
FF 4612-•SN →	NF G110FB-DN•H0
FF 4612-KSM →	NF G110FB-SMKH0
FF 4612-KDM→	NF G110FB-DMKH0
FF 4613-•DN →	NF G110EE-DN•
FF 4613-•SN →	NF G110EE-DN•
FF 4613-KSM →	NF G110EE-SMK
FF 4613-KDM→	NF G110EE-DMK
FF 4615-•DN →	NF G110BB-DN•
FF 4615-•SN →	NF G110BB-DN•
FF 4615-KSM →	NF G110BB-SMK
FF 4615-KDM→	NF G110BB-DMK
FF 4617-•DN →	NF G110BB-DN•H0
FF 4617-•SN →	NF G110BB-DN•H0
FF 4617-KSM →	NF G110BB-SMKH0
FF 4617-KDM→	NF G110BB-DMKH0
FF 4630-•DN →	NF G112KA-DN•
FF 4630-•SN →	NF G112KA-DN•
FF 4630-KSM →	NF G112KA-SMK
FF 4630-KDM→	NF G112KA-DMK
FF 4631-•DN →	NF G112KC-DN•
FF 4631-•SN →	NF G112KC-DN•
FF 4631-KSM →	NF G112KC-SMK
FF 4631-KDM→	NF G112KC-DMK
FF 4633-•DN →	NF G112LB-DN•
FF 4633-•SN →	NF G112LB-DN•
FF 4633-KSM →	NF G112LB-SMK
FF 4633-KDM→	NF G112LB-DMK
FF 4634-•DN →	NF G112LL-DN•
FF 4634-•SN →	NF G112LL-DN•
FF 4634-KSM →	NF G112LL-SMK
FF 4634-KDM→	NF G112LL-DMK
FF 4640-•DN →	NF G112KD-DN•
FF 4640-•SN →	NF G112KD-DN•
FF 4640-KSM →	NF G112KD-SMK
FF 4640-KDM→	NF G112KD-DMK
FF 4650-•DN →	NF G112LE-DN•
FF 4650-•SN →	NF G112LE-DN•
FF 4650-KSM →	NF G112LE-SMK
FF 4650-KDM→	NF G112LE-DMK
FF 4651-•DN →	NF G112KE-DN•
FF 4651-•SN →	NF G112KE-DN•
FF 4651-KSM →	NF G112KE-SMK
FF 4651-KDM→	NF G112KE-DMK
FF 4652-•DN →	NF G112KF-DN•
FF 4652-•SN →	NF G112KF-DN•
FF 4652-KSM →	NF G112KF-SMK
FF 4652-KDM→	NF G112KF-DMK
FF 4654-•DN →	NF G112KG-DN•
FF 4654-•SN →	NF G112KG-DN•
FF 4654-KSM →	NF G112KG-SMK
FF 4654-KDM→	NF G112KG-DMK
FF 4655-•DN →	NF G112KP-DN•
FF 4655-•SN →	NF G112KP-DN•
FF 4655-KSM →	NF G112KP-SMK
FF 4655-KDM→	NF G112KP-DMK
FF 4656-•DN →	NF G112KP-DN•
FF 4656-•SN →	NF G112KP-DN•
FF 4656-KSM →	NF G112KP-SMK
FF 4656-KDM→	NF G112KP-DMK
FF 4657-•DN →	NF G112KH-DN•
FF 4657-•SN →	NF G112KH-DN•
FF 4657-KSM →	NF G112KH-SMK
FF 4657-KDM→	NF G112KH-DMK
FF 4669-•DN →	NF G112LH-DN•
FF 4669-•SN →	NF G112LH-DN•
FF 4669-KSM →	NF G112LH-SMK
FF 4669-KDM→	NF G112LH-DMK
FF 4801-•DN →	NF L110AB-DN•
FF 4801-•SN →	NF L110AB-DN•
FF 4801-KSM →	NF L110AB-SMK
FF 4801-KDM→	NF L110AB-DMK
FF 4802-•DN →	NF L110CP-DN•
FF 4802-•SN →	NF L110CP-DN•
FF 4802-KSM →	NF L110CP-SMK
FF 4802-KDM→	NF L110CP-DMK
FF 4808-•DN →	NF L110AE-DN•
FF 4808-•SN →	NF L110AE-DN•
FF 4808-KSM →	NF L110AE-SMK
FF 4808-KDM→	NF L110AE-DMK
FF 4810-•DN →	NF L110EB-DN•
FF 4810-•SN →	NF L110EB-DN•
FF 4810-KSM →	NF L110EB-SMK
FF 4810-KDM→	NF L110EB-DMK
FF 4811-•DN →	NF L110FB-DN•
FF 4811-•SN →	NF L110FB-DN•
FF 4811-KSM →	NF L110FB-SMK
FF 4811-KDM→	NF L110FB-DMK
FF 4812-•DN →	NF L110FB-DN•H0
FF 4812-•SN →	NF L110FB-DN•H0
FF 4812-KSM →	NF L110FB-SMKH0
FF 4812-KDM→	NF L110FB-DMKH0
FF 4813-•DN →	NF L110EE-DN•
FF 4813-•SN →	NF L110EE-DN•
FF 4813-KSM →	NF L110EE-SMK
FF 4813-KDM→	NF L110EE-DMK
FF 4815-•DN →	NF L110BB-DN•
FF 4815-•SN →	NF L110BB-DN•
FF 4815-KSM →	NF L110BB-SMK
FF 4815-KDM→	NF L110BB-DMK
FF 4817-•DN →	NF L110BB-DN•H0
FF 4817-•SN →	NF L110BB-DN•H0
FF 4817-KSM →	NF L110BB-SMKH0
FF 4817-KDM→	NF L110BB-DMKH0
FF 4820-•DN →	NF L110HB-DN•
FF 4820-•SN →	NF L110HB-DN•
FF 4820-KSM →	NF L110HB-SMK
FF 4820-KDM→	NF L110HB-DMK
FF 4825-•DN →	NF L110HE-DN•
FF 4825-•SN →	NF L110HE-DN•
FF 4825-KSM →	NF L110HE-SMK
FF 4825-KDM→	NF L110HE-DMK
FF 4830-•DN →	NF L112KA-DN•
FF 4830-•SN →	NF L112KA-DN•
FF 4830-KSM →	NF L112KA-SMK
FF 4830-KDM→	NF L112KA-DMK
FF 4831-•DN →	NF L112KC-DN•
FF 4831-•SN →	NF L112KC-DN•
FF 4831-KSM →	NF L112KC-SMK
FF 4831-KDM→	NF L112KC-DMK
FF 4833-•DN →	NF L112LB-DN•
FF 4833-•SN →	NF L112LB-DN•
FF 4833-KSM →	NF L112LB-SMK
FF 4833-KDM→	NF L112LB-DMK
FF 4834-•DN →	NF L112LL-DN•
FF 4834-•SN →	NF L112LL-DN•
FF 4834-KSM →	NF L112LL-SMK
FF 4834-KDM→	NF L112LL-DMK
FF 4840-•DN →	NF L112KD-DN•
FF 4840-•SN →	NF L112KD-DN•
FF 4840-KSM →	NF L112KD-SMK
FF 4840-KDM→	NF L112KD-DMK
FF 4850-•DN →	NF L112LE-DN•
FF 4850-•SN →	NF L112LE-DN•
FF 4850-KSM →	NF L112LE-SMK
FF 4850-KDM→	NF L112LE-DMK
FF 4851-•DN →	NF L112KE-DN•
FF 4851-•SN →	NF L112KE-DN•
FF 4851-KSM →	NF L112KE-SMK
FF 4851-KDM→	NF L112KE-DMK
FF 4852-•DN →	NF L112KF-DN•

Old article	New article
FF 4852-•SN →	NF L112KF-DN•
FF 4852-KDM →	NF L112KF-DMK
FF 4852-KSM →	NF L112KF-SMK
FF 4854-•DN →	NF L112KG-DN•
FF 4854-•SN →	NF L112KG-DN•
FF 4854-KDM →	NF L112KG-DMK
FF 4854-KSM →	NF L112KG-SMK
FF 4855-•DN →	NF L112KP-DN•
FF 4855-•SN →	NF L112KP-DN•
FF 4855-KDM →	NF L112KP-DMK
FF 4855-KSM →	NF L112KP-SMK
FF 4856-•DN →	NF L112KP-DN•
FF 4856-•SN →	NF L112KP-DN•
FF 4856-KDM →	NF L112KP-DMK
FF 4856-KSM →	NF L112KP-SMK
FF 4857-•DN →	NF L112KH-DN•
FF 4857-•SN →	NF L112KH-DN•
FF 4857-KDM →	NF L112KH-DMK
FF 4857-KSM →	NF L112KH-SMK
FF 4869-•DN →	NF L112LH-DN•
FF 4869-•SN →	NF L112LH-DN•
FF 4869-KDM →	NF L112LH-DMK
FF 4869-KSM →	NF L112LH-SMK
FK ••••-W →	FK ••••-W3
FK ••••-W1 →	FK ••••-W3
FK •15-1 →	FK •15-M1R28
FK •15-1W3 →	FK •15-W3M2R28
FM ••••-W →	FM ••••-W3
FM ••••-W1 →	FM ••••-W3
FM •01-72 →	FM •F1-M2
FM •15 →	FM •15-M2R28
FM •15-1M2-EX7 →	FM •15-M2R28-EX7
FM •15-W3 →	FM •15-W3M2R28
FR ••••-W →	FR ••••-W3
FR ••••-W1 →	FR ••••-W3
FR •01-72 →	FR •F1-M2
FR •15-1 →	FR •15-M2R28
FR •15-1W3 →	FR •15-W3M2R28
FX ••••-W →	FX ••••-W3
FX ••••-W1 →	FX ••••-W3
FX •01-72 →	FX •F1-M2
FX •15-1 →	FX •15-M2R28
FX •15-1W3 →	FX •15-W3M2R28
FZ ••••-W →	FZ ••••-W3
FZ ••••-W1 →	FZ ••••-W3
FZ •01-72 →	FZ •F1-M2
FZ •15 →	FZ •15-M2R28
FZ •15-W3 →	FZ •15-W3M2R28
VF L••-1 →	VF L••-R24
VF L••-2 →	VF L••-R25
VF L••-3 →	VF L••-R26
VF L••-4 →	VF L••-R27
VF LE••-1 →	VF LE••-R24
VF LE••-2 →	VF LE••-R25
VF LE••-3 →	VF LE••-R26
VF LE••-4 →	VF LE••-R27
VF IL•••••• →	VF SL••••••

General terms and conditions of sale

Order procedures:
Purchasing orders must always be sent in writing (fax, e-mail). We reserve the right to not accept e-mail orders in case of missing characteristics necessary to correctly identify the sender or to not process them in case of virus infected attachments or attachments of dubious origin.

Minimum order amount:
Unless specifically agreed, the minimum order amount for deliveries in Italy is EUR 200 net (VAT excluded). For orders of less than EUR 200, a EUR 10 fee will be deducted towards the costs if the delivery occurs in Italy and San Marino; for deliveries abroad, the fee will be EUR 30.

Prices:
The prices quoted in the price list do not include VAT, custom taxes or any other charges. Unless otherwise agreed, the prices quoted in the price list are not binding and may undergo changes without prior notice.

Order quantities:
Some products are shipped in packs. The ordered quantities of these items must be multiples of the quantities contained in the packages.

Order cancellation/changes:
Order changes might be accepted depending on the job order status. Changes or cancellation of special article orders will not be accepted.

Supply:
The supply includes only what is expressly stated in the order confirmation. As per article 1461 of the Italian Civil Code, we reserve the right to stop supply in case of changes in the customer's financial standing.

Delivery:
The delivery is indicated in the order confirmation and reports the period in which the goods can be available at the factories of Pizzato Elettrica and not the date of arrival at the customer's premises. This date is an approximate value and cannot be used as a reason of the order non-fulfilment.

Packaging:
Packaging is free. For more than six boxes pallets can be necessary for the transport.

Shipment:
Goods always travel at risk of the buyer, even if the goods are sold carriage paid. The customer must check that the forwarder delivers the number of boxes indicated in the delivery note, that the boxes are intact and that the weight corresponds to what is stated in the documents. In case of any inconsistencies, always accept the goods SUBJECT TO VERIFICATION, clearly specifying the type of damage. Any discrepancy or mistakes should be reported in writing within 8 days of receipt of the goods at info@pizzato.com.

Warranty:
The warranty has a validity of 12 months starting from the delivery date of the material. The warranty does not cover improper use of the material, negligence or wrong installation/assembling. The warranty does not cover parts subjected to wear or products used beyond the technological limits described in the catalogue, or items that have not received the right maintenance. Pizzato Elettrica engages itself to repair and/or replace parts or the complete product for those elements that present evident manufacturing defects, provided that they are still covered by warranty. Pizzato Elettrica is only responsible for the value of the product and requests for compensation due to machine downtime, repairs or costs for direct or indirect damages resulting from product malfunctions will not be accepted, even if these occur during the warranty period. It is the responsibility of the manufacturer to evaluate the importance of the products used and the possible damage caused by their malfunction and to adopt the necessary technical measures to minimize consequences on machines also for personal safety purposes (redundancy systems, self-controlled systems, etc). The warranty will be subject to the customer's compliance with the payment terms.
Any samples provided free of charge or bearing the phrase "SAMPLE" must be considered as purely demonstrative and are not covered by the guarantee.

Products:
Products can be subjected to technical improvements in any moment without prior notice.

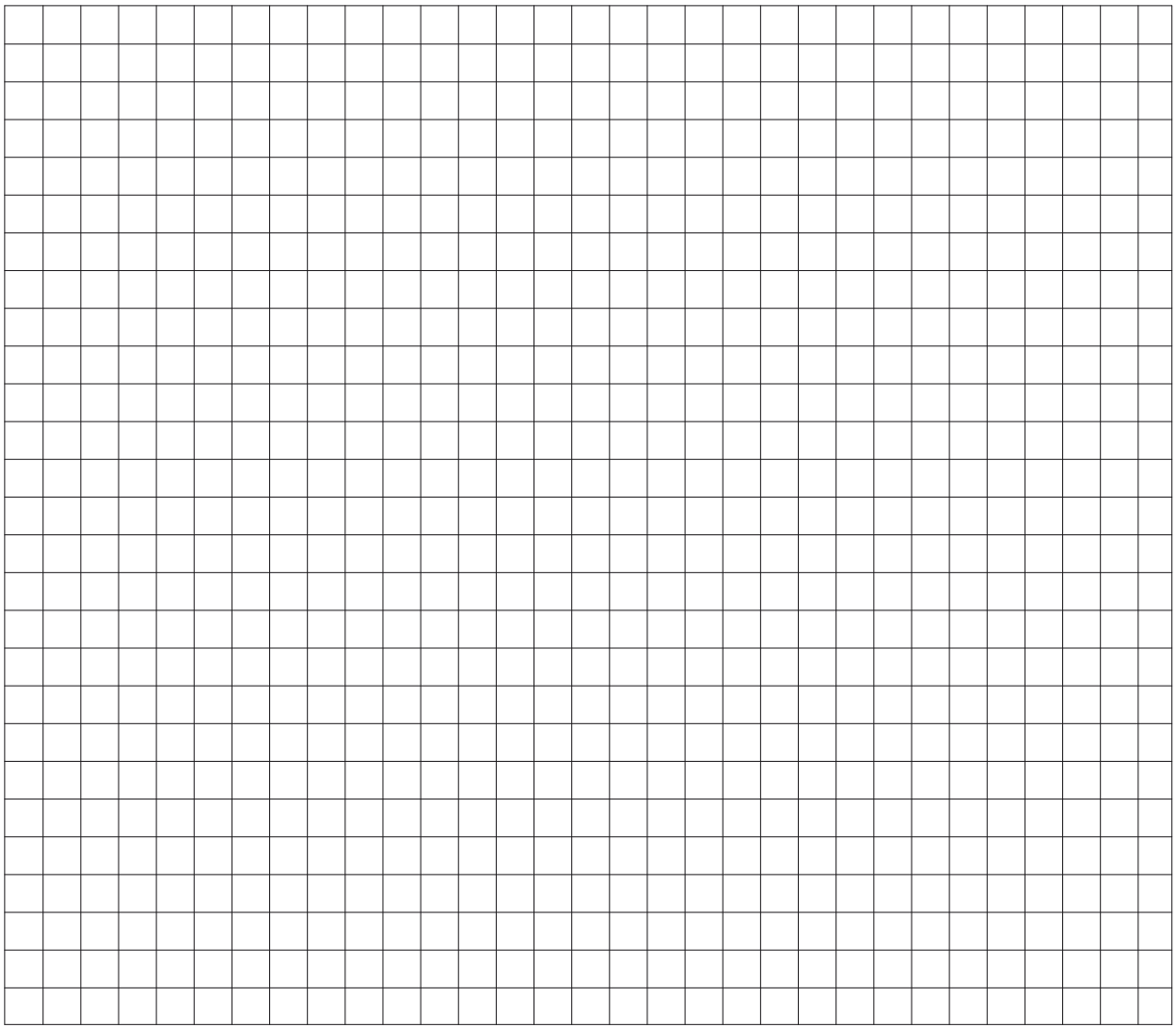
Payment terms:
Payments should be settled within the terms agreed in the order confirmation. The payment method is always at the risk of the buyer, regardless of the means chosen. In case of delayed payment, Pizzato Elettrica reserves the right to stop the delivery of any current orders and charge interest at the rate envisaged by European Directive 2011/7/EU. Any technical or commercial complaints do not entitle the claimant to suspend the due payments.

Returns:
Any products returned for any reason will not be accepted unless they are previously APPROVED and AUTHORISED in writing.
Otherwise, Pizzato Elettrica reserves the right to reject the goods and return them "freight collect" at the expense of the buyer, in the same way by which they were forwarded. Returns have to be sent back within 3 months from the authorization date and no later. After this period, returns will not be accepted. The request to return goods will lead to their sales price being devalued and will be considered if relative to standard items and materials delivered no more than 12 months ago. The returned goods and the relative packaging must be intact and free from damage.

Ownership:
The delivered products remain property of Pizzato Elettrica until full settlement of the invoices.

Proper Law:
The Court of Vicenza shall have jurisdiction in any disputes.
For the updated terms of sale, please consult the website www.pizzato.com

Notes



Notes

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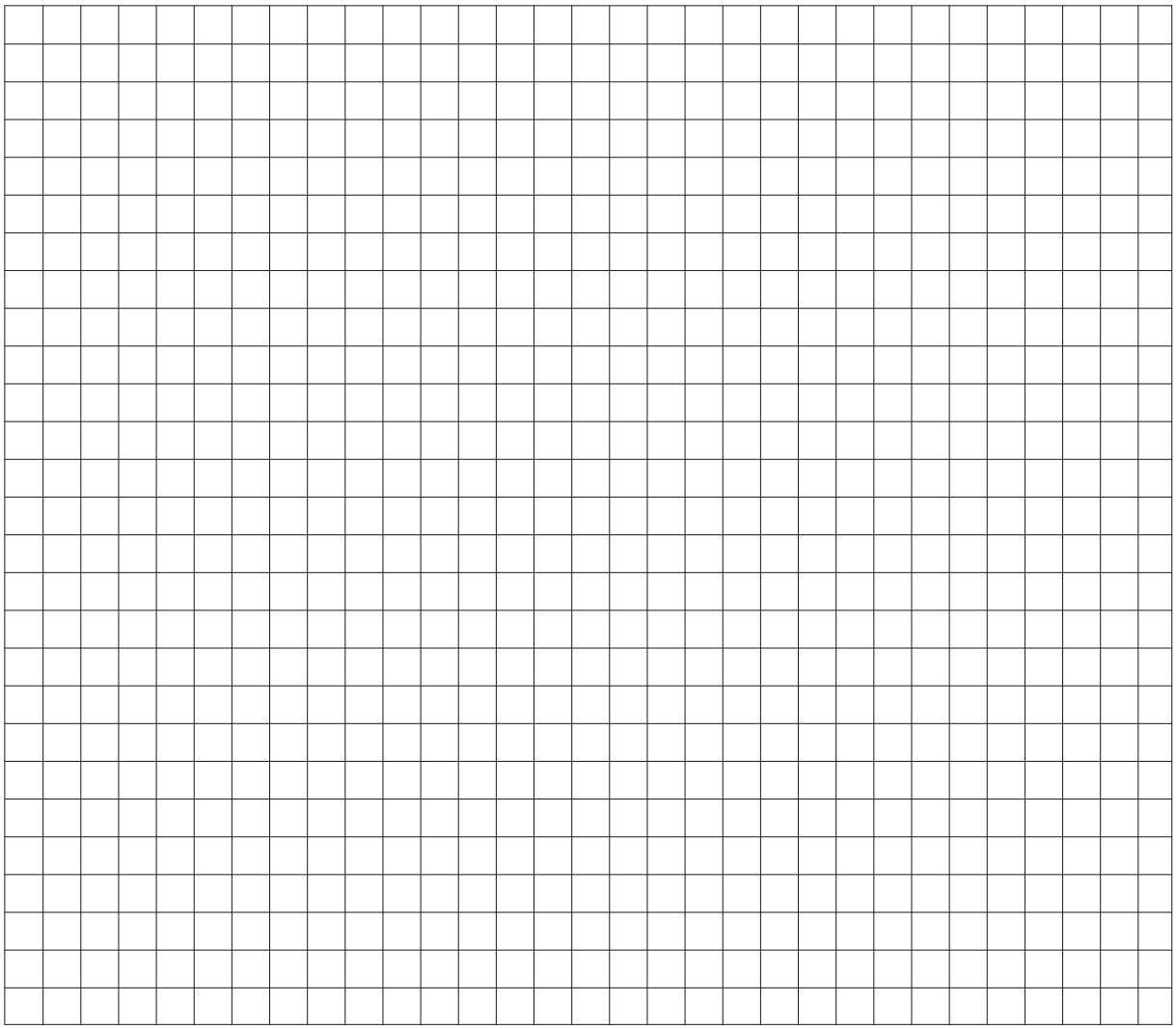

Notes

Any information or application example, connection diagrams included, described in this document are to be intended as purely descriptive.
The choice and application of the products in conformity with the standards, in order to avoid damage to persons or goods, is the user's responsibility.
The drawings and data contained in this catalogue are not binding and we reserve the right, in order to improve the quality of our products, to modify them at any time without prior notice.
They are also property of Pizzato Elettrica and can be reproduced only with our written permission.

General Catalogue
Detection

General Catalogue
HMI

General Catalogue
Safety

General Catalogue
LIFT

DVD

Web
www.pizzato.com

pizzato
PASSION FOR QUALITY

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