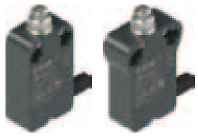
2015-2016

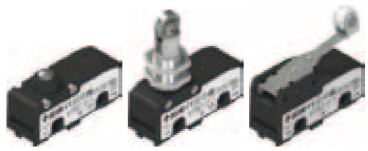
General Catalogue Detection

Index General Catalogue Detection

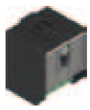
4 Prewired modular position switches



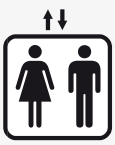
5 Microswitches



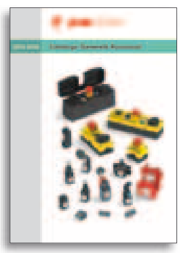
6 Switches for special applications



Devices for elevators



The dedicated
catalogue
is available.



7 Accessories

8 Appendix

200 PASSIONATE PROFESSIONALS

It is people, with their professionalism and dedication that make a great company. This profound conviction has always guided Pizzato Elettrica in their choice of employees and collaborators. 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.

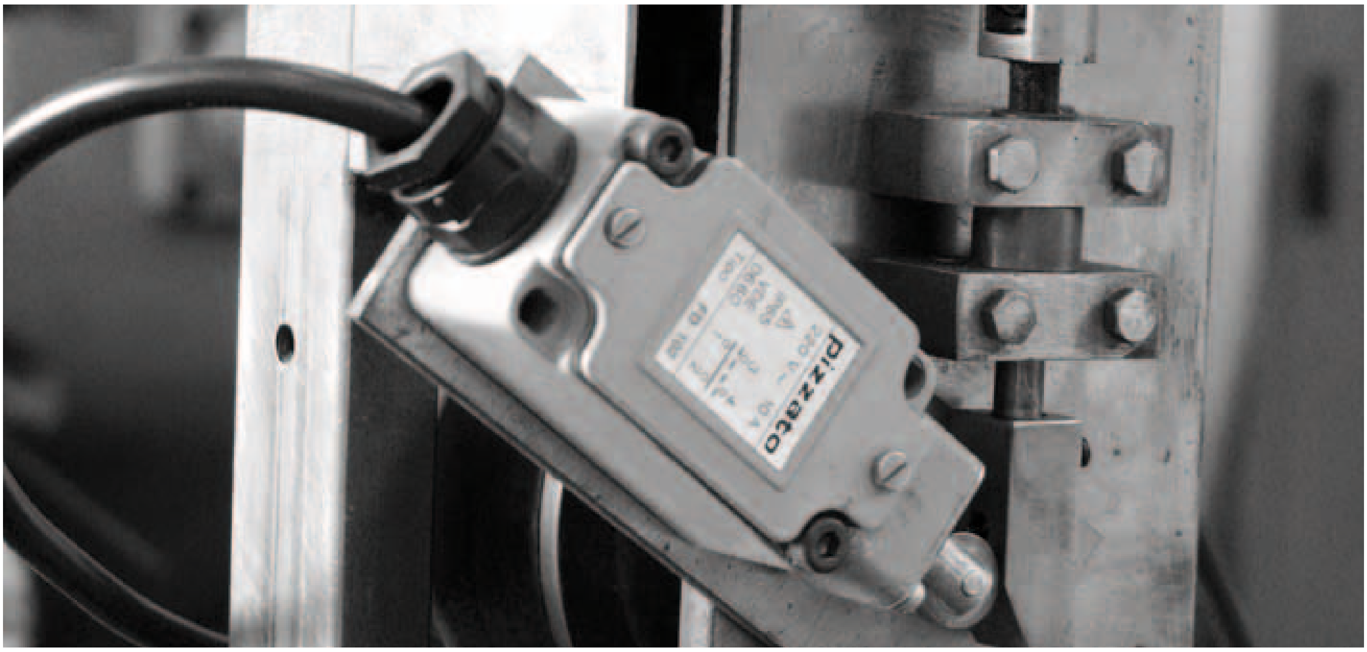
100% MADE IN ITALY

An entrepreneurial company such as Pizzato Elettrica, which has grown day after day thanks to the "culture of doing" of a family that benefited from approaching its work with tenacity, intelligence and far-sightedness, has its foundations in a system of solid and deeply-shared values. The pillars that form the basis of the company's work have remained constant and constitute Pizzato Elettrica's fundamental guiding principles.

• TERRITORIAL ROOTS. Pizzato Elettrica is a successful example of the ripe entrepreneurship that characterises the North-East of Italy and Veneto in particular, an area that is tellingly referred to as "Italy's locomotive". The territory is highly productive in every sector, from agriculture to high technology, and makes a fundamental contribution to the generation of Italian wealth; where 100 is the average per capita value added produced at the national level, the figure here has consistently been between 110 and 135. The productivity rate is among the highest in Europe and originates from a tradition of diffuse and markedly export-oriented entrepreneurship.

• ORIENTATION TO EXCELLENCE. Innovation and development: this company philosophy is at the heart of the operations and product quality assessments that Pizzato Elettrica performs in a 360 degree manner, and is also manifest in the heightened propensity for research and innovation that characterises its design work. Every product development in Pizzato Elettrica is born with the aim of bringing a secure, reliable and innovative choice to the market: those using Pizzato Elettrica products do so in the certainty that they are of certified quality as fruits of a process that is scrupulously controlled at every stage.

• ATTENTION TO THE CLIENT. In order to be successful, a product must respond to the specific needs of those who will use it: quality alone is not enough. Market developments must be carefully monitored so that one can understand, in advance, which new applications will prove truly useful. This is why Pizzato Elettrica has always cultivated close synergies with the companies that choose it as a supplier, using this continuous dialogue to identify the potential developments of its product range so as to render it highly flexible, complete and able to offer optimal solutions to diverse needs.



1984: AN ENTREPRENEURIAL STORY BEGINS

16 NOVEMBER 1984. This is the date that marks the beginning of a long entrepreneurial story: the story of a family that was able to build a company and allow it to grow consistently, one step at a time, to reach important results, guided by a profound work ethic and a marked spirit of initiative.

• 80s. The company was initially called Pizzato, owned by the Pizzato B. & C. general partnership with headquarters in Marostica. It was immediately able to assert itself on the market thanks to the quality of its products. In the short space of four years, the firm had already developed to the point of making a fundamental upgrade: on 18 April 1988, it became Ltd. company and was re-named Pizzato Elettrica, a brand shortly destined to become renowned and appreciated nationwide. During the year 1988, its 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 turned to the international market: in 1989, the commercialisation of products was extended to the USA.

• 90s. The range of products continued to be upgraded and specialised with the introduction of new machinery and the growing input of technology. In 1994, Pizzato Elettrica introduced its first line of prewired switches with immediate success. 1996 and 1997 were important years in the development of safety devices, a sector that became strategic when new European directives on working environments were introduced. Pizzato Elettrica immediately became an Italian leader in this regard, thanks to its evolved safety switches and switches with solenoid. Meanwhile (1995), its second plant, geared towards the moulding of plastic materials, was also born. The brand was now ready to approach the new frontiers of the international market: South Africa in 1995 and Australia in 1997. As a confirmation of its innovative spirit, Pizzato Elettrica was among the first companies to believe in the strong potential of the Web, presenting itself online with a well-constructed and multi-functional site as early as 1996. This exciting, constant growth culminated in 1998 with the construction of the third plant, dedicated to the assembly department.

• 00s. The new millennium heralded the search for quality certifications: the ISO 9002 was achieved in April 2000, followed by the ISO 9001 achieved in November 2002. In the meanwhile, technological evolution continued: in 2000, the design studio began using 3D CAD systems. This allowed new avant garde product models to be developed, such as safety modules (2002) and switches conforming to the European ATEX directives (2005), laid out for equipment operating in potentially explosive environments.
In 2006, the HP switch, the result of an innovative engineering design project combining safety and style in a single product, was introduced to the market.
In 2007, the company extended its range of products for machine safety, introducing two new series of magnetic safety sensors, suitable for the monitoring of protections and repairs.
The initial months of 2009 have witnessed the introduction of the new prewired modular switches NA-NB-NF series.
In 2010 Pizzato Elettrica introduced the new EROUND line control and signalling devices, therefore remarkably widening its offer within the man-machine interface sector.
In 2011, the first pre-programmed safety modules of the GEMNIS CS MF series are introduced.
In 2012, the company integrates its offering in the machine safety field, thanks to the ST series sensors with RFID technology and to the programmable safety modules of the GEMNIS CS MP series.
In 2013, the range of hinge safety switches was expanded with the AISI 316L stainless steel HX switches.
2014 saw the launch on the market of the RFID safety switches with NG series block and of the safety handle of the P-KUBE 2 line for NG series switches.
Thanks to the robust interlocking system, the NG series switches ensure a maximum locking force of the Fzh actuator that is equivalent to 7500 N.
The new safety handle P-KUBE 2, which is installed in combination with the RFID safety switch with NG series block, provides an integrated locking system of the protections with related access control to dangerous areas.

59,000,000 PARTS SOLD WORLDWIDE

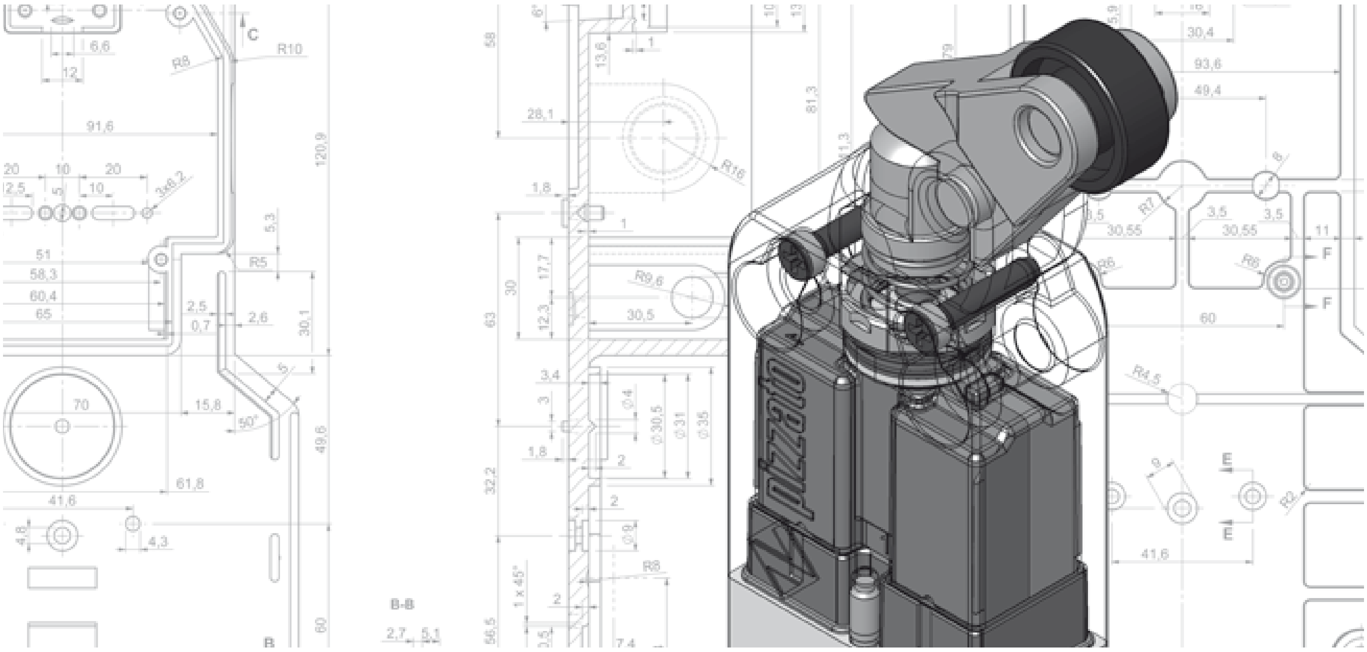
Pizzato Elettrica's product catalogue contains about 7,000 items, with more than 1,300 special codes developed for devices personalised according to clients' specific needs.
Pizzato Elettrica devices can be grouped, according to typology, into three main macro-categories:

• POSITION SWITCHES. They are installed on a daily basis on any type of industrial machinery, for applications in the wood, metal, plastic, elevators, automotive, naval sectors, 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.
The product range that Pizzato Elettrica can offer in the field of position switches is one of the widest in the world. Moreover, the use of high quality materials, high reliability technologies as twin bridge contact blocks and the protection degree IP67, make this range of position switches one of the most technologically evolved.
Furthermore since 2005 Pizzato Elettrica has also started to produce versions of its switches with specific features for some sectors as follows: switches with ATEX homologations and switches for high temperature.

• 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, so 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), has been widened by the introduction of coded magnetic sensors, switches with solenoid provided with anti-panic release device, hinged safety switches and new safety handles. Recent products include the RFID safety sensors of the ST series, the stainless steel hinge safety switches of the HX series, the RFID switches with block of the NG series, and the safety handle of the P-KUBE 2 line.

• MAN-MACHINE INTERFACE. Thanks to the recent introduction of the EROUND control and signalling devices, Pizzato Elettrica considerably widens its offer in the man-machine interface sector.
The new design, the attention to details and the elegance of the product combined with its maximum safety and reliability, take the series to the forefront of the market.
The wide range that our Company offers in the man-machine interface sector includes single and modular foot switches with many patented joint kits.

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



140 NEW PROJECTS COMPLETED

There's a key word in the development of latest-generation devices: Mechatronics. This new science has grown in recent years, reaching some of the most important research centres, both national and international, right here in Veneto. It is based on the fusion of the principles of Mechanics with those of Electronics in the design of instruments that guarantee great precision, high performance, versatility and constant improvement.

This is why, in recent years, all new models have indeed been created following careful Mechatronics studies, undertaken directly by the highly specialised technicians and engineers that form part of the R&D department.

The evolution of Pizzato Elettrica's product lines thus proceeds on a double platform: on one side, there are the internally-researched innovative materials and technologies; on the other, the particular needs that emerge from continuous dialogue with big competitors and, above all, clients. Indeed, requests for specific personalisations of a product are quite common: Pizzato Elettrica's duty is to respond to these needs as best it can, guaranteeing maximum flexibility and openness with regards to 'custom made' projects too.

10 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 organs. 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 mark, in concordance with the European Directives.

• ISO 9001 CERTIFICATION. The company's production system conforms 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.

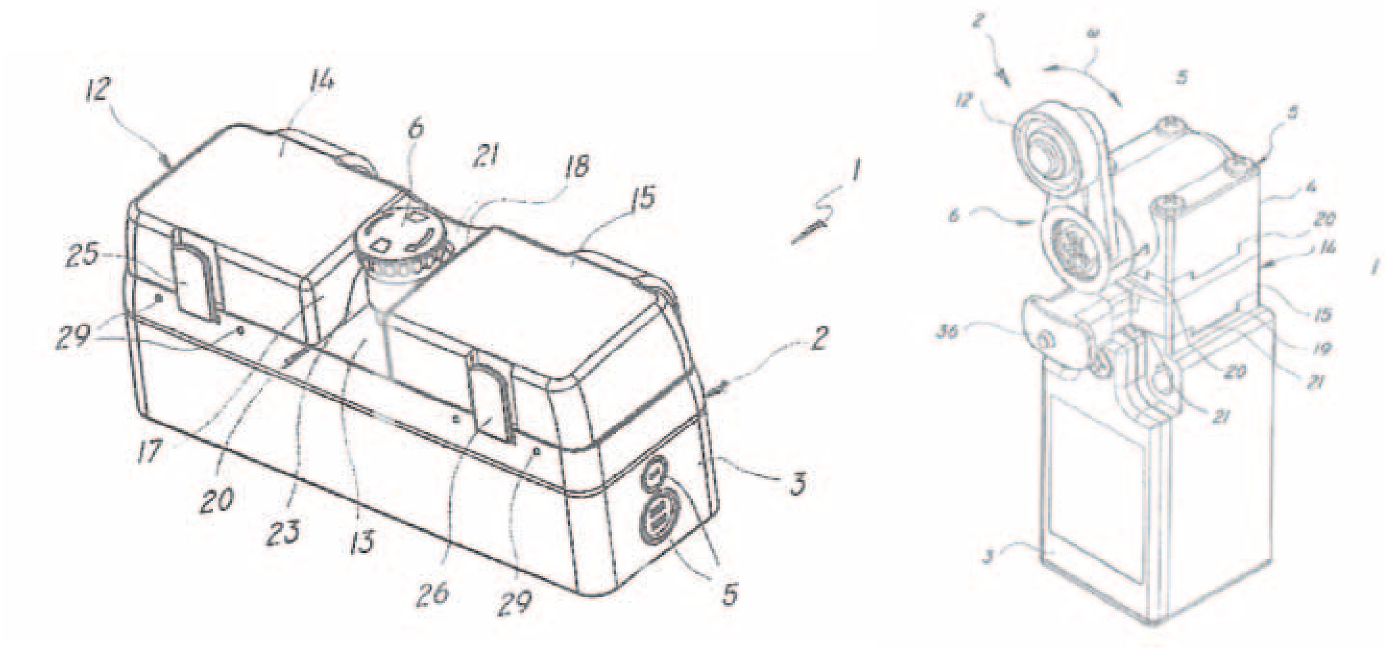
• CSQ, CISQ AND IQNET. The CSQ system is part of the CISQ (Italian Certification of Quality Systems) federation, which consists of the primary certification bodies operating in Italy and its various product sectors. CISQ is the Italian representative within IQNet, the biggest international Quality Systems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

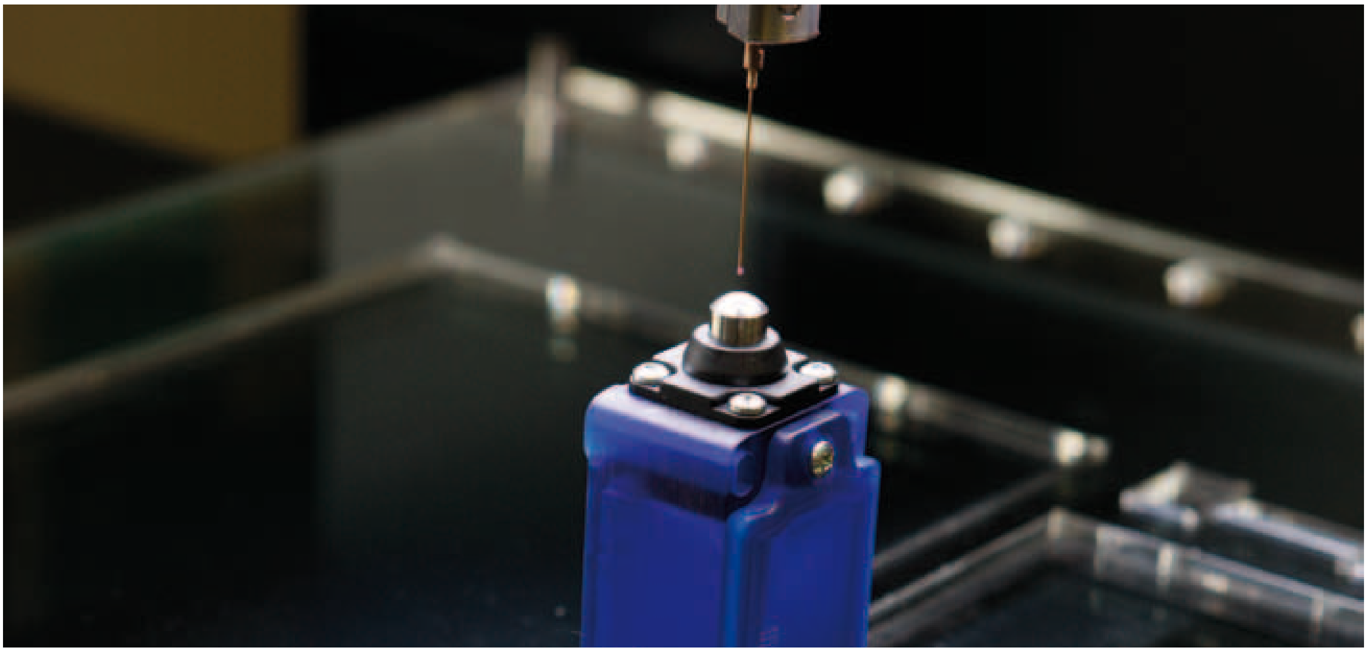
140 REGISTERED PATENTS

The fact that Pizzato Elettrica has, over 30 years, been able to take on a leadership role at the European level is also a result of continuous research and innovation, which its labs and internal design studios undertake on a daily basis.

This is a strategic sector that is exploited to the maximum thanks to a constant process of innovation: indeed, this undoubtedly represents the most important value added. This is why, on average, Pizzato Elettrica develops innovative projects to be covered by international patents each year: a route that the company has been following since its birth, immediately understanding the importance of registering and protecting ideas in order to approach the market with the added strength of being truly ‘different’ from its competitors.

The company’s ideas are what have distinguished it and allowed it to come to occupy a highly important market position, through the tens of patents that have been developed and registered. An ever evolving know-how that is renewed daily, as demonstrated, for example, by the more recent innovations introduced in the safety device sector. This field is due to change significantly in the coming years through profound technological developments: a path that Pizzato Elettrica once again intends to take before time, outlining new principles destined to respond to the international market trends of the future.





20,800 HOURS DEDICATED TO RESEARCH PER YEAR

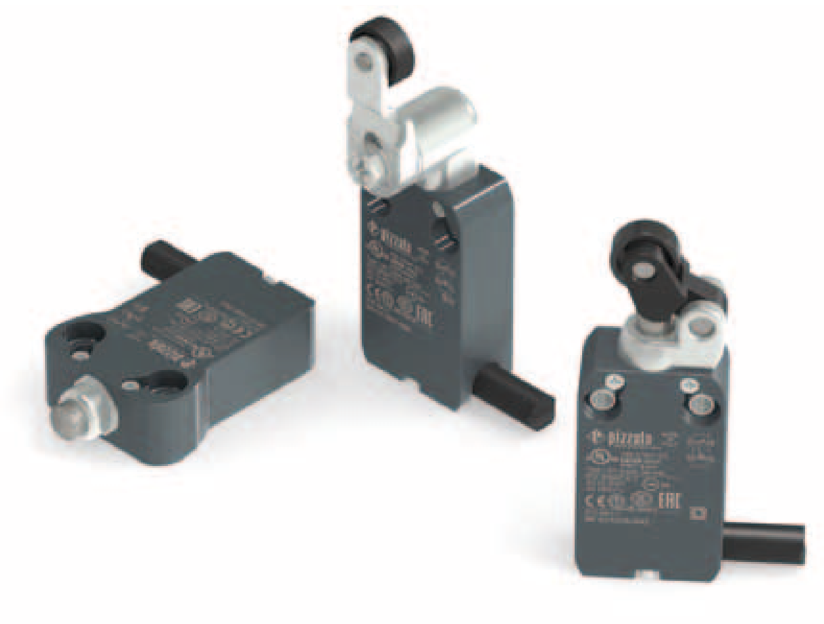
Behind every new product lies a careful research and design process that aims to find technologically advanced solutions that can improve the device.

This evolution would not have been possible if Pizzato Elettrica hadn't acquired increasingly well-adapted instruments over time, thus keeping pace with the latest technological frontiers. In this sense, the number of computers used daily within the company is particularly significant: an average of almost one computer per employee (workers included!) represents an exhaustive index of a highly computerised company.

The design effort utilises the most evolved 3D CAD software; the efficiency of the Electrical and Mechanical labs, which operate in strict synergy, allows for immediate assessments to be undertaken for the development and perfection of every functional aspect of the prototypes.

The switches undergo the most thorough of checks, which evaluate their efficiency in extreme conditions too: this ensures that Pizzato Elettrica's clients will have access to a genuinely safe, reliable product.

Measurements are taken using over 200 precision tools, which allow for every single component and every characteristic of the finished products to be evaluated: from measures of humidity and temperature to weight and force, to electrical levels, flammability, mechanical duration, magnetic characteristics, microscopic surveys, the level of IP protection and EMC electromagnetic compatibility.



1,000 TECHNICAL SUPPORT ANSWERS PER MONTH

Pizzato Elettrica sees itself as a company that is as attentive to customers needs as it is to the development of its products.

This is why significant resources have always been dedicated to the development of the technical assistance service, giving the company the role of a highly qualified technological partner that is able to fully support technicians and designers.

Pizzato Elettrica offices can be contacted by telephone from Monday to Friday and offer both information and advice relating to the choice of products, the technical characteristics and the correct installation, ensuring to the customers a direct technical assistance service.

WWW.PIZZATO.COM

Pizzato Elettrica was one of the first Italian firms of its sector to believe in Internet, developing a web site since 1996.
Pizzato Elettrica website is now available in four languages (Italian, English, French, and German) and it includes plenty of technical data, technical information and news about products and services provided by the company.

- General Catalogue
- Certificates, brochures and leaflets of new products
- Search engine for codes
- List of new products
- Form to require technical and commercial information
- Article cross reference
- Frequently asked questions (FAQ)
- Company profile
- List of trade fairs
- Download 2D CAD drawings in DXF format
- Download 3D CAD drawings in STEP format
- Download Pizzato Elettrica libraries for the SISTEMA software
- Video section with installation examples
- Section dedicated to Machine Safety, explanations of standards and prescriptions for product operation
- Quick News section, with all the latest news on products and services by Pizzato Elettrica
- Newsletter

MORE THAN 40 MEETINGS ORGANISED EACH YEAR

EXHIBITIONS

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.

MEETINGS

Pizzato Elettrica, in addition to offering a qualified technical assistance, sees itself as dynamic company attentive to customers needs organising several meetings and training courses, with a particular focus on machinery safety standards.

MULTILINGUAL DOCUMENTATION

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

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

77,000 PACKAGES SHIPPED PER YEAR

In order to be able to bring its products to distributors and clients operating all over the world, Pizzato Elettrica's guiding principles are speed and efficiency.

These objectives informed the company's creation of a computerised merchandise transfer system, which is managed automatically by an appositely developed company software that is geared towards specific operational needs.

Over 77,000 parcels are sorted by the logistic center each year: a significant volume of merchandise reflecting the needs of an evermore rapid and competitive market.

All shipments and transfers are traced via a barcode system that can immediately identify the contents of any parcel. A pre-arranged system that is easily modulated: this flexibility has also proved key in providing a quick response to particularly urgent shipment requests.

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

TECHNICAL AND COMMERCIAL SERVICE

TECHNICAL OFFICES

Pizzato Elettrica technical offices provide a 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:	from Monday to Friday 08.00-12.00 / 14.00-18.00 CET
phone:	+39.0424.470.930
fax:	+39.0424.470.955
e-mail:	tech@pizzato.com

Spoken languages: |

SALES OFFICES

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

Office hours:	from Monday to Friday 08.00-12.00 / 14.00-18.00 CET
phone:	+39.0424.470.930
fax:	+39.0424.470.955
e-mail:	info@pizzato.com

Spoken languages: | | | | |

Position switches restyling
FD series

- New anthracite grey colour
- Indelible laser marking
- Cover integrated seal
- Protection degree IP67
- Non-loosable cover screws

▸ 19

Position switches restyling
FP series

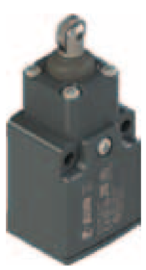
- Stainless steel plates for fixing screws
- New anthracite grey colour
- Cover and non-loosable cover screw
- Indelible laser marking
- Protection degree IP67

▸ 29

Position switches restyling
FL series

- New anthracite grey colour
- Indelible laser marking
- Cover integrated seal
- Protection degree IP67
- Non-loosable cover screws

▸ 39



Position switches restyling
FC series

- New anthracite grey colour
- Indelible laser marking
- Cover integrated seal
- Protection degree IP67
- Non-loosable cover screw

▸ 49

In conformity with standard EN ISO 14119

- All products are compliant with standard EN ISO 14119
- The classifications of the devices have been included in each series in accordance with the new standard
- New safety screws OneWay and Torx, for a correct installation according to the EN ISO 14119 anti-tampering directive

M20 / M16

New metric thread

- All catalogue products with metric thread
- Warehouse handling of the metric products
- All accessories are available with metric thread
- M20 or M16 threads depending on the product series

M12 connectors available for the FC series

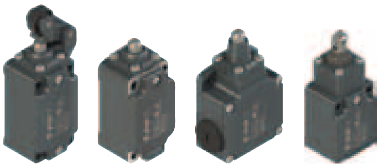
- M12 4- or 5-pole connectors also available for the FC compact series
- Pre-installed metal or plastic connectors
- IP67 protection grade connectors
- For rapid replacement without wiring errors

▸ 49

New type approvals

- New EAC certification for the Russian Customs Union
- Simplified export for Russia, Belarus, and Kazakistan
- New IMQ type-approval for MK series microswitches
- The IMQ type-approval also certifies the positive opening of the MK series

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 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.
The product range that Pizzato Elettrica can offer in the field of position switches is one of the widest in the world. Moreover, the use of high quality materials, high reliability technologies as twin bridge contact blocks and the protection degree IP67, 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 according to IEC 60529. They can therefore be used in all environments where the maximum protection of the housing is required.

Extended temperature range

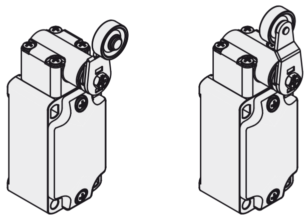
-40°C This range of switches is also available in a special version with an ambient operating temperature range of -40°C to +80°C.
They can be used for applications in cold stores, sterilisers and other devices with low temperature environments. Special materials that have been used to realize these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

Laser engraving

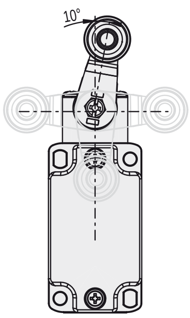
All devices are indelibly marked with a dedicated laser system that allows the marking to be also suitable for extreme environments. This system that does not use labels, prevents the loss of plate data and the marking is more resistant over time.

Overturning levers

For switches with swivelling lever the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.

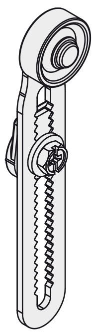


Adjustable levers



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.

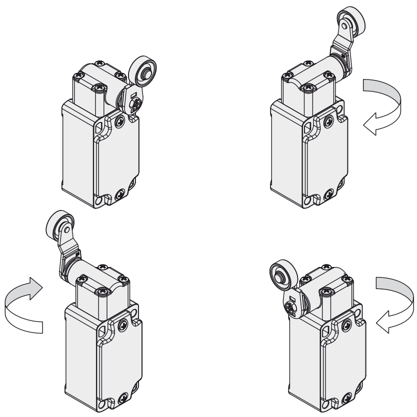
Adjustable safety lever



The code 56 adjustable lever (and variants) has a notching that prevents the sliding also in case the retaining screw becomes loose.
The particular positive locking makes it suitable for safety applications.

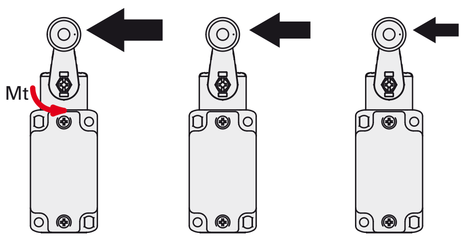
Orientable heads

In all switches, it is possible to rotate the head in 90° steps.



Increased or reduced actuating force

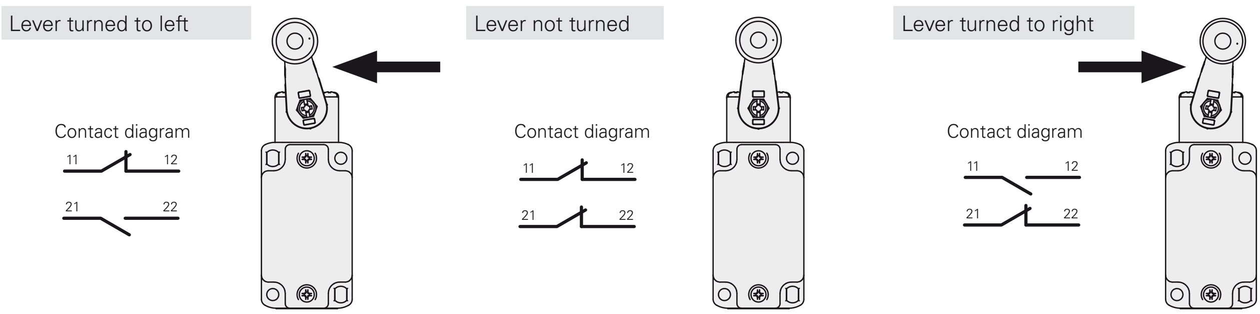
For actuators with swivelling levers, versions with increased or reduced actuating force are available on request. This feature allows selection of a switch perfectly tailored for the application. For further information contact the Technical Department.



Increased force | Standard force | Reduced force

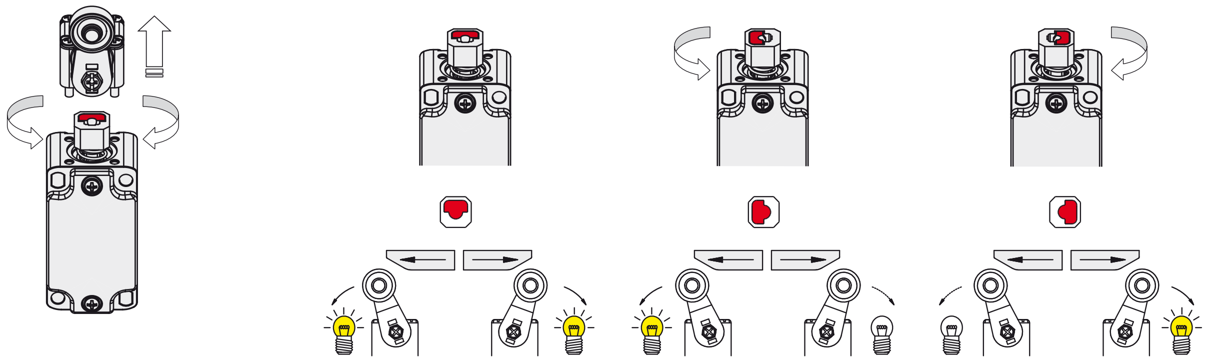
Independent contacts

The contact block 16 has two NC contacts, **both with positive opening** activated independently according to the lever turning direction.

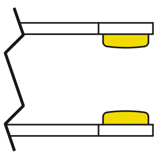


Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving the internal plunger (contact block 16 excluded).



Gold-plated contacts

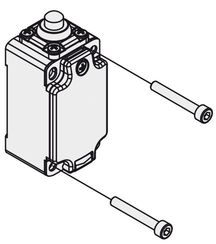


The contact blocks of these devices can be supplied gold-plated upon request. It is ideal for all applications with low voltages or currents and it ensures greater contact reliability. The high-thickness coating > 1 micron ensures the mechanical endurance of the coating over time.

Contact blocks

Contact blocks with captive screws, finger protection, twin bridge contacts and double interruption for a higher contact reliability. Available in multiple variants with shifted activation strokes, which can be simultaneous or overlapping. They are suitable for different kinds of applications.

Stainless steel fixing plates



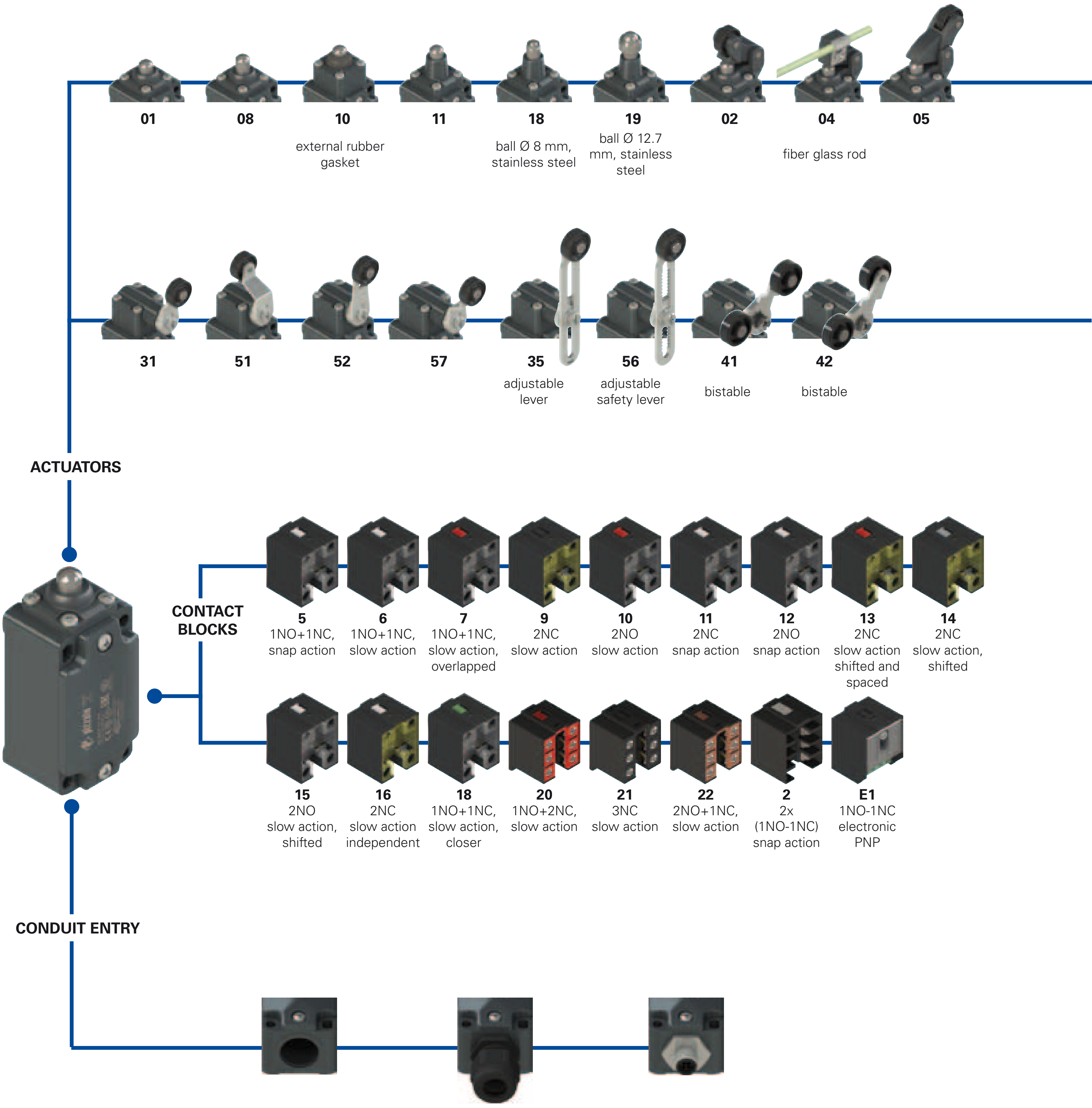
The technopolymer switches of the FP series come with two robust stainless steel fixing plates. This solution makes it possible to avoid the underhead washer and ensures that the fixing of the switch is more stable over time.

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. It is an ideal solution for environments with the presence of aggressive chemical agents or saline mist. See page 219.

Selection diagram



Threaded conduit entry

M2	M20x1.5 (standard)
	PG 13.5

With cable gland

K23	for cables Ø 6…Ø 12 mm
K27	for cables Ø 3…Ø 7 mm

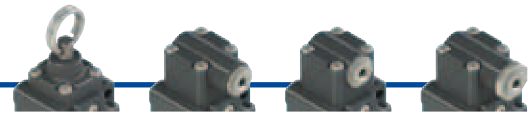
With M12 metal connector

K40	8 poles
K50	5 poles

product options

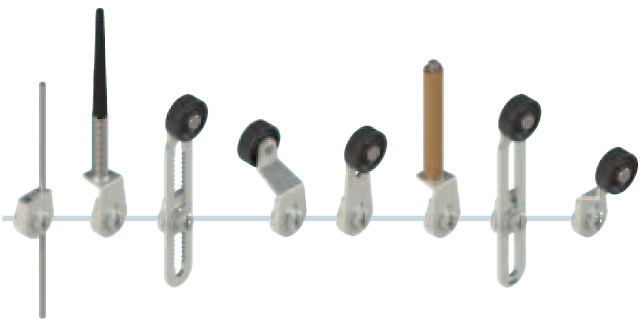
accessory sold separately

15	16	20	21	25	34	32	33	36	53
stainless steel roller external rubber gasket	stainless steel roller					round rod stainless steel	square rod	fiber glass rod	porcelain roller



76	38	58	40
rope switch for signalling	without actuator	without actuator	bistable without actuator

LOOSE ACTUATORS
See page 27



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 blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

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

Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating (not for contact block 2)

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 e 36)

Pre-installed cable glands or connectors	
	without cable gland or connector (standard)
K23	cable gland for cables Ø 6…Ø 12 mm
K27	cable gland for cables Ø 3…Ø 7 mm
K40	M12 metal connector, 8 poles
K50	M12 metal connector, 5 poles

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

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

Markings and quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230000
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing

Metal housing, baked powder coating	
One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 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 conformity 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.

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

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)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	type aM fuse 10 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

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

Direct current: DC13

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

with M12 connector 5 poles

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Protection against short circuits:	type gG fuse 4 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

with M12 connector 8 poles

Thermal current (Ith):	2 A
Rated insulation voltage (Ui):	30 Vac 36 Vdc
Protection against short circuits:	type gG fuse 2 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24
Ie (A)	2

Direct current: DC13

Ue (V)	24
Ie (A)	2

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

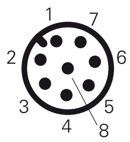
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

Connection diagram for M12 connectors

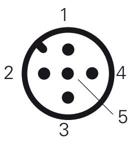
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8 poles

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

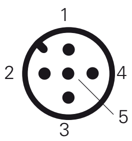
Contact block 5
1NO+1NC



M12 connector, 5 poles

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

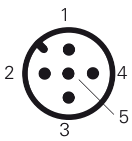
Contact block 6
1NO+1NC



M12 connector, 5 poles

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

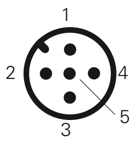
Contact block 7
1NO+1NC



M12 connector, 5 poles

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

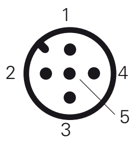
Contact block 9
2NC



M12 connector, 5 poles

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

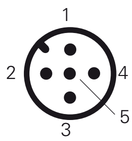
Contact block 10
2NO



M12 connector, 5 poles

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

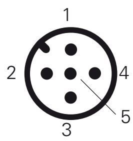
Contact block 11
2NC



M12 connector, 5 poles

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

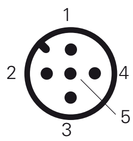
Contact block 12
2NO



M12 connector, 5 poles

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

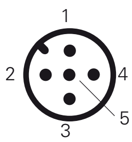
Contact block 13
2NC



M12 connector, 5 poles

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

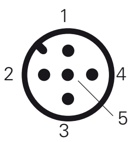
Contact block 14
2NC



M12 connector, 5 poles

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

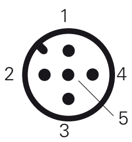
Contact block 15
2NO



M12 connector, 5 poles

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

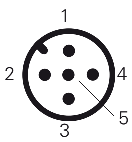
Contact block 16
2NC



M12 connector, 5 poles

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

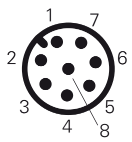
Contact block 18
1NO+1NC



M12 connector, 5 poles

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

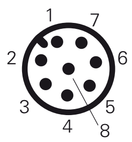
Contact block 20
2NC+1NO



M12 connector, 8 poles

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

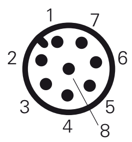
Contact block 21
3NC



M12 connector, 8 poles

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

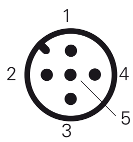
Contact block 22
1NC+2NO



M12 connector, 8 poles

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

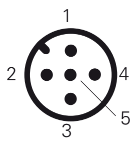
Contact block 33
1NC+1NO



M12 connector, 5 poles

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

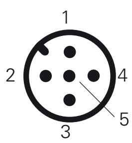
Contact block 34
2NC



M12 connector, 5 poles

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

Contact block E1
PNP



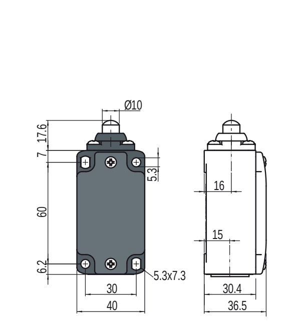
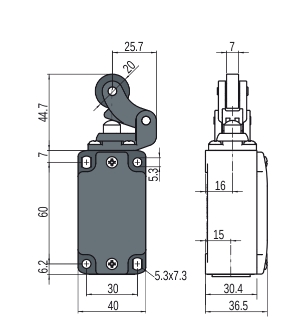
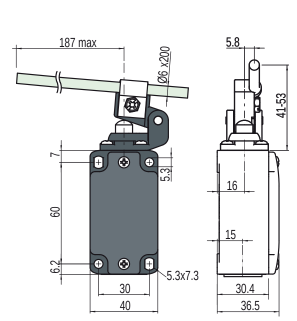
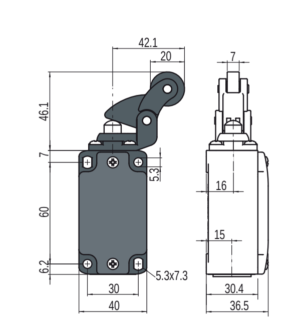
M12 connector, 5 poles

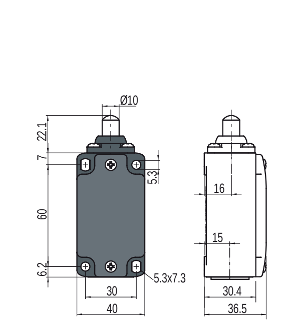
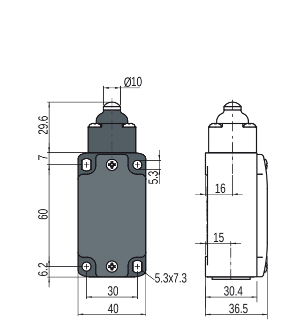
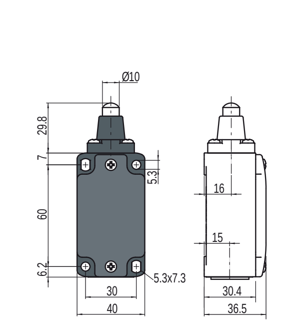
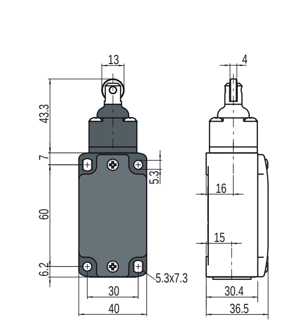
Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

Position switches **FD** series

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- ⏃ = electronic PNP

			With stainless steel roller on request		With stainless steel roller on request
					
Contact blocks					
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 237 - type 4	page 237 - type 3	0.5 m/s	page 237 - type 3
Min. force		8 N (25 N →)	6 N (25 N →)	0.17 Nm	6 N (25 N →)
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 1	page 238 - group 2

			With external rubber gasket		With external rubber gasket
					
Contact blocks					
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 237 - type 4	page 237 - type 4	page 237 - type 4	page 237 - type 2
Min. force		8 N (25 N →)	11 N (25 N →)	8 N (25 N →)	11 N (25 N →)
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 1

All measures in the drawings are in mm

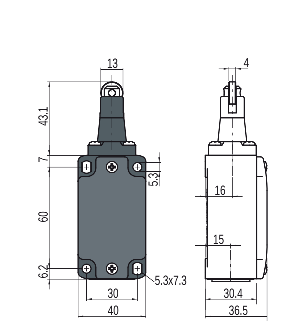
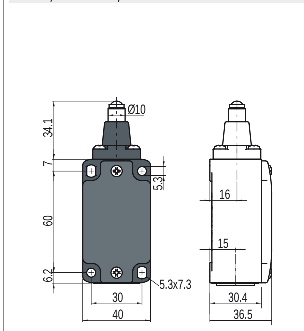
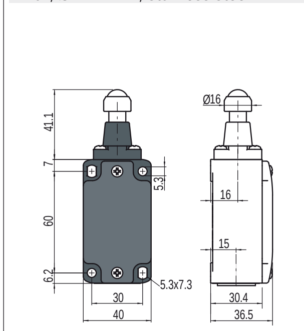
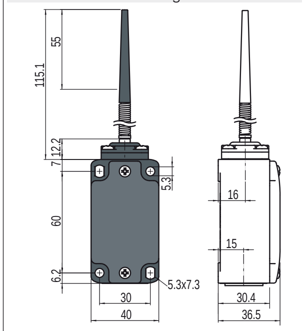
Items with code on **green** background are stock items

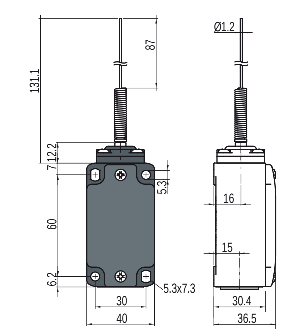
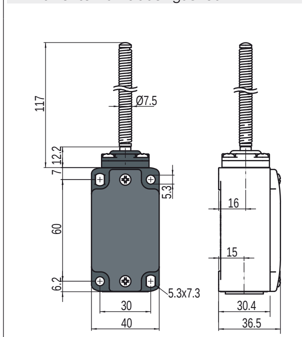
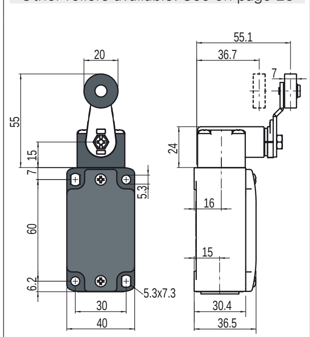
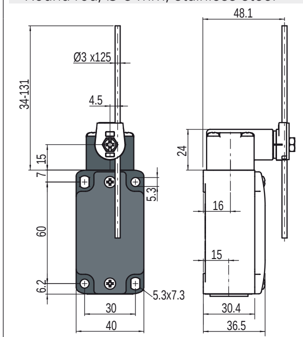
Accessories See page 225

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

Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- electronic PNP

Contact blocks			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 237 - type 2	page 237 - type 4	page 237 - type 4	1 m/s
Min. force		8 N (25 N)	8 N (25 N)	8 N (25 N)	0.09 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

Contact blocks		With external rubber gasket	With external rubber gasket	Other rollers available. See on page 28	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 237 - type 1	1.5 m/s
Min. force		0.08 Nm	0.14 Nm	0.1 Nm (0.25 Nm)	0.1 Nm
Travel diagrams		page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 4

All measures in the drawings are in mm

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

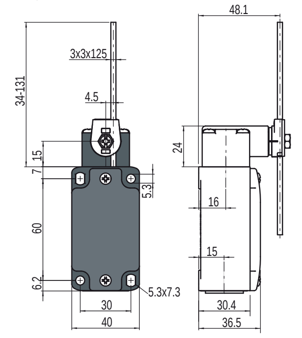
Accessories See page 225

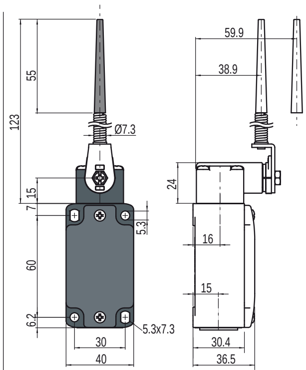
The 2D/3D files are available at **www.pizzato.com**

Contact type:

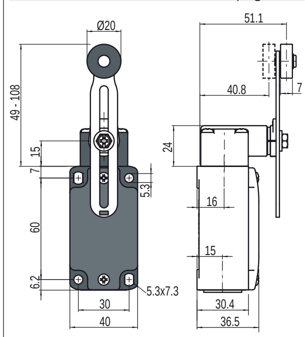
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP

Square rod, 3x3 mm

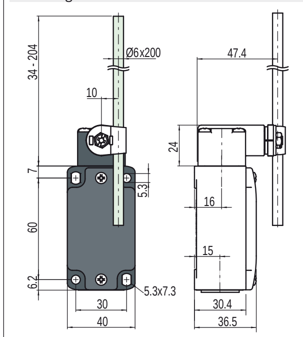




Other rollers available. See on page 28

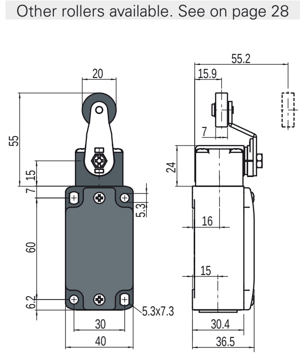


Fiber glass rod

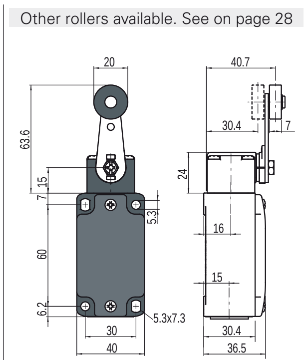


Contact blocks									
5	R	FD 533-M2	1NO+1NC	FD 534-M2	1NO+1NC	FD 535-M2 → (1)	1NO+1NC	FD 536-M2	1NO+1NC
6	L	FD 633-M2	1NO+1NC	FD 634-M2	1NO+1NC	FD 635-M2 → (1)	1NO+1NC	FD 636-M2	1NO+1NC
7	LO	FD 733-M2	1NO+1NC	FD 734-M2	1NO+1NC	FD 735-M2 → (1)	1NO+1NC	FD 736-M2	1NO+1NC
9	L	FD 933-M2	2NC	FD 934-M2	2NC	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	(electronic)	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 237 - type 1		1.5 m/s	
Min. force		0.1 Nm		0.1 Nm		0.1 Nm (0.25 Nm →)		0.1 Nm	
Travel diagrams		page 238 - group 4		page 238 - group 4		page 238 - group 4		page 238 - group 4	

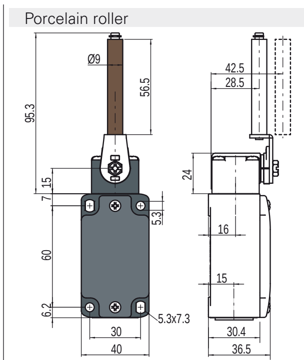
Other rollers available. See on page 28



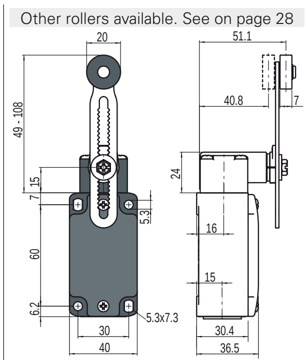
Other rollers available. See on page 28



Porcelain roller



Other rollers available. See on page 28



Contact blocks									
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	(electronic)	FD E151-M2	1NO-1NC	FD E152-M2	1NO-1NC	FD E153-E11M2V9	1NO-1NC	FD E156-M2	1NO-1NC
Max. speed		page 237 - type 1		page 237 - type 1		0.5 m/s		page 237 - type 1	
Min. 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 238 - group 4		page 238 - group 4		page 238 - group 5		page 238 - group 4	

(1) Positive opening only with actuator set to max. See page 27.

All measures in the drawings are in mm

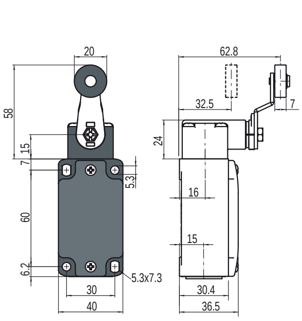
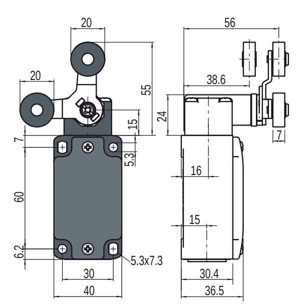
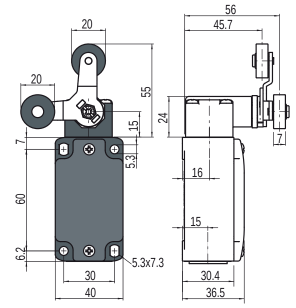
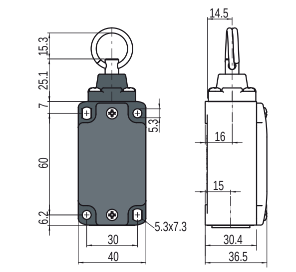
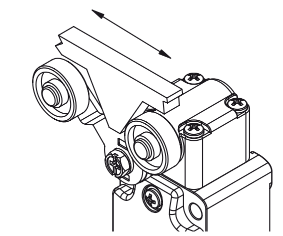
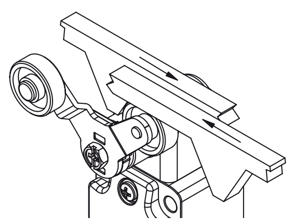
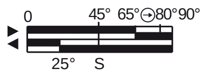
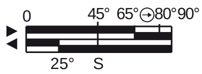
Items with code on **green** background are stock items

Accessories See page 225

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP

		Other rollers available. See on page 28		With stainless steel roller on request	With stainless steel roller on request	Rope switch for signalling	
							
Contact blocks							
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 single track lyra lever	Bistable switch with dual track lyra lever	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			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)	S = mechanical switching point positive opening on contact 21-22 only	S = mechanical switching point positive opening on contact 21-22 only	FD 276-M2	2x(1NO-1NC)
E1		FD E157-M2	1NO-1NC				
Max. speed		page 237 - type 1		0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s	
Min. 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 238 - group 4				page 238 - group 6	

All measures in the drawings are in mm

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

Accessories See page 225

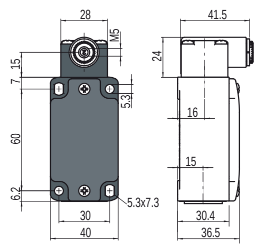
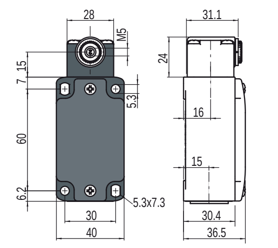
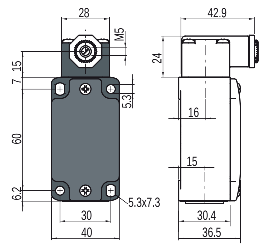
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

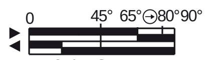
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP

Regular head	Compact head	
		

Contact blocks

		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	
Min. force		0.1 Nm (0.25 Nm (→))		0.06 Nm (0.25 Nm (→))		0.5 m/s with cam at 30°
Travel diagrams		page 238 - group 4		page 238 - group 4		0.21 Nm (0.36 Nm (→))

Bistable switch



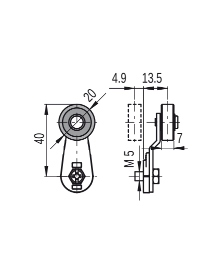
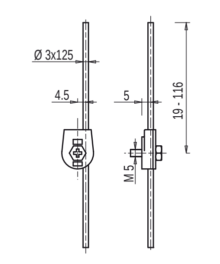
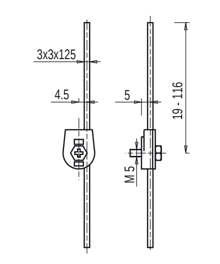
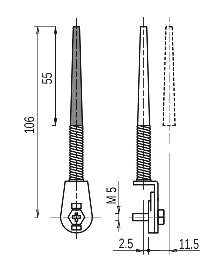
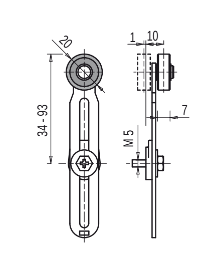
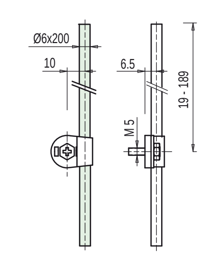
S mechanical switching point
positive opening on contact 21-22 only

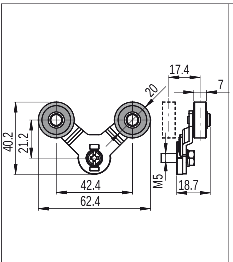
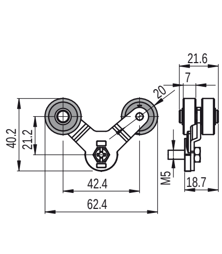
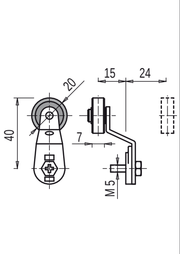
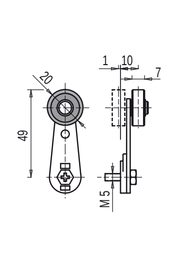
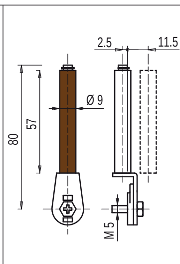
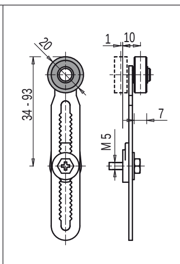
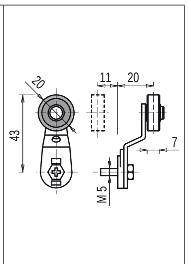
IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

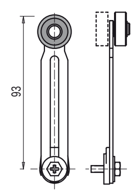
All measures in the drawings are in mm

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

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 fiber glass rod
					
VF L31 (→)	VF L32 (3)	VF L33 (3)	VF L34	VF L35 (→) (1) (3)	VF L36 (3)

Single track lyra actuator	Dual track lyra actuator	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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- [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 could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.
- [4] The actuator cannot be rotated to the inside because it will mechanically interfere with the switch head.



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

Accessories See page 225

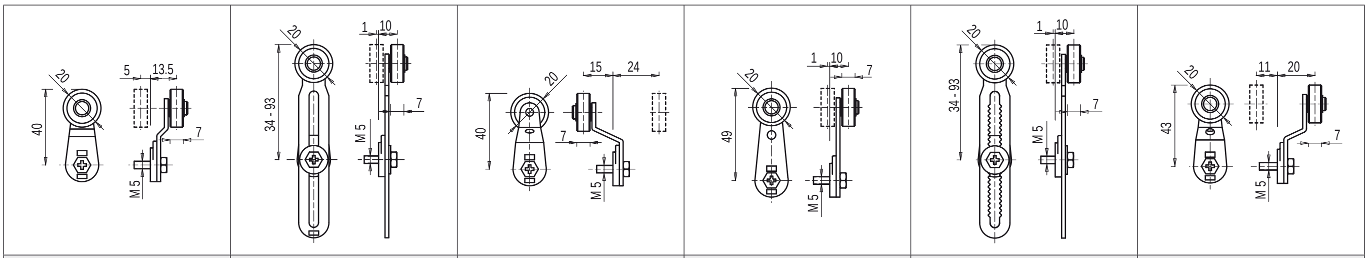
The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

All measures in the drawings are in mm

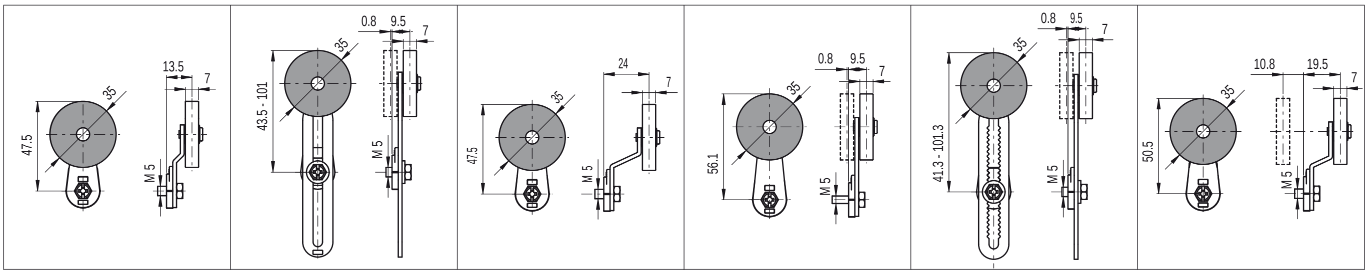
IMPORTANT: These loose actuators can be used with items of series FD, FP, FL, FC only.

Stainless steel rollers, Ø 20 mm



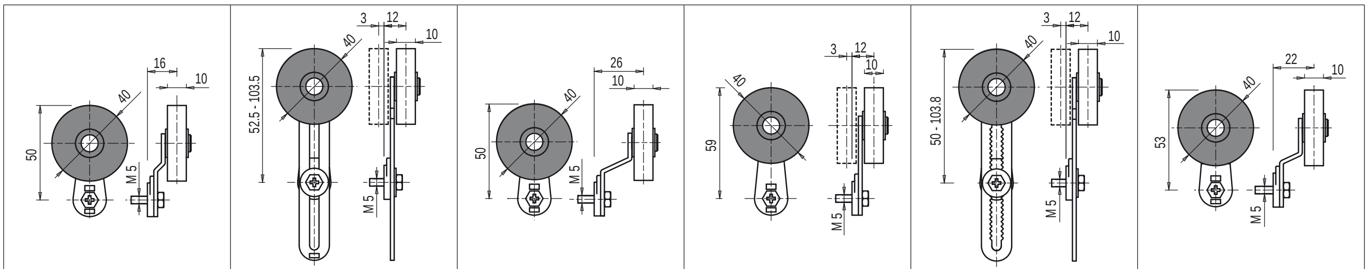
VF L31-R24	VF L35-R24 (1) (3)	VF L51-R24	VF L52-R24	VF L56-R24 (3)	VF L57-R24

Technopolymer rollers, Ø 35 mm



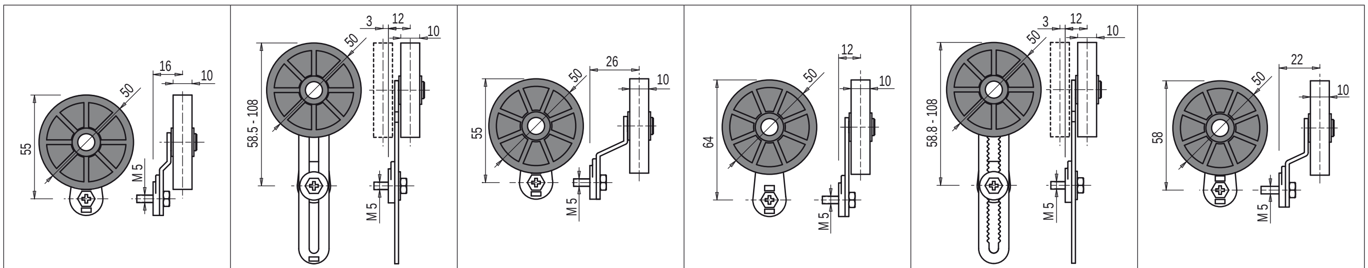
VF L31-R25 (4)	VF L35-R25 (1) (3)	VF L51-R25 (4)	VF L52-R25	VF L56-R25 (3)	VF L57-R25

Rubber rollers, Ø 40 mm



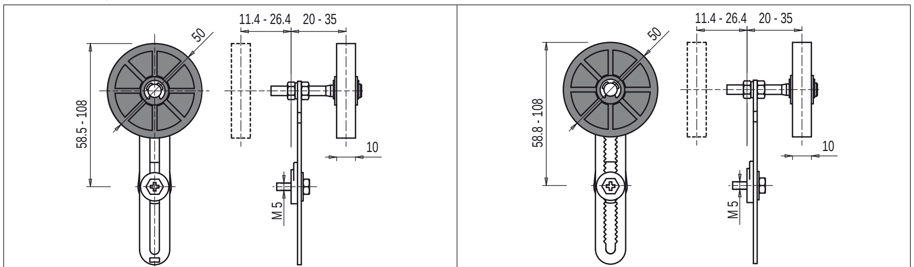
VF L31-R5 (4)	VF L35-R5 (1) (3)	VF L51-R5 (4)	VF L52-R5	VF L56-R5 (3)	VF L57-R5 (4)

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

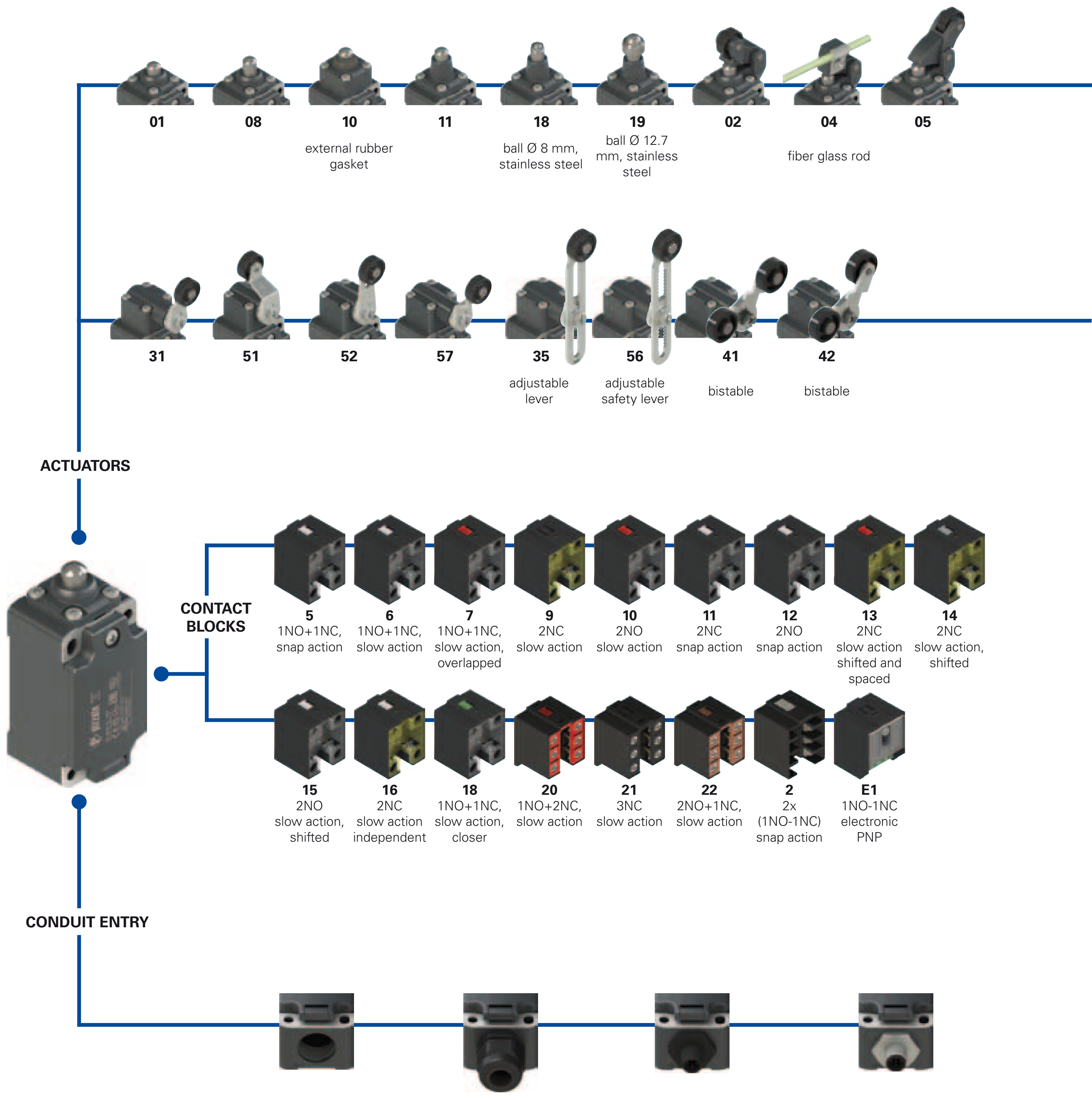


VF L35-R27 (1) (3)	VF L56-R27 (3)

Accessories See page 225

➔ The 2D/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…Ø 12 mm
K27	for cables Ø 3…Ø 7 mm

With M12 plastic connector

K70	4 poles, bottom
K45	8 poles, bottom

With M12 metal connector

K40	8 poles, bottom
K60	4 poles, bottom

product options
accessory sold separately

15 stainless steel roller external rubber gasket

16 stainless steel roller

20

21

25

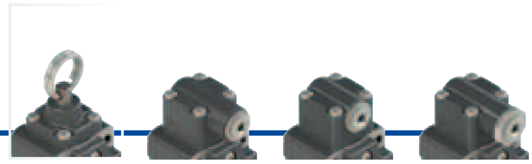
34

32 round rod stainless steel

33 square rod

36 fiber glass rod

53 porcelain roller



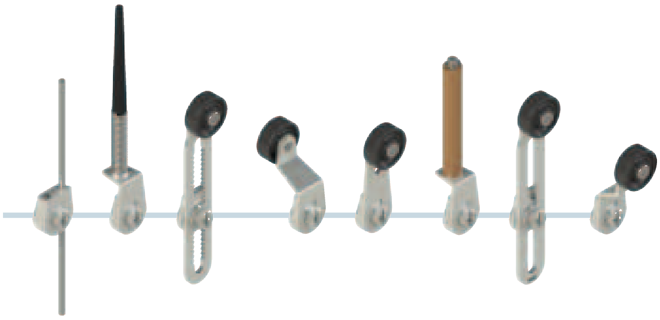
76 rope switch for signalling

38 without actuator

58 without actuator

40 bistable without actuator

LOOSE ACTUATORS
See page 37



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 blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

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

Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating (not for contact block 2)

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 e 36)

Pre-installed cable glands or connectors	
	without cable gland or connector (standard)
K23	cable gland for cables Ø 6…Ø 12 mm
K27	cable gland for cables Ø 3…Ø 7 mm
K45	M12 plastic connector, 8 poles
K70	M12 plastic connector, 4 poles

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

Technical data

Housing

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

One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 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 conformity 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.

Main features

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

Markings and quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230014
EAC approval:	RU C-IT ДМ94.В.01024

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

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)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	type aM fuse 10 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

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

Direct current: DC13

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

with connector M12, 4 poles

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Protection against short circuits:	type gG fuse 4 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

with connector M12, 8 poles

Thermal current (Ith):	2 A
Rated insulation voltage (Ui):	30 Vac 36 Vdc
Protection against short circuits:	type gG fuse 2 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24
Ie (A)	2

Direct current: DC13

Ue (V)	24
Ie (A)	2

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

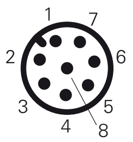
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

Connection diagram for M12 connectors

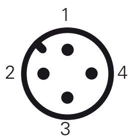
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8 poles

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

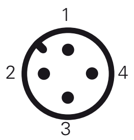
Contact block 5
1NO+1NC



M12 connector, 4 poles

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

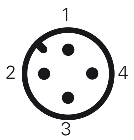
Contact block 6
1NO+1NC



M12 connector, 4 poles

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

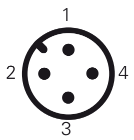
Contact block 7
1NO+1NC



M12 connector, 4 poles

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

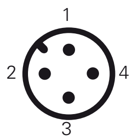
Contact block 9
2NC



M12 connector, 4 poles

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

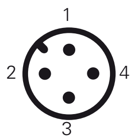
Contact block 10
2NO



M12 connector, 4 poles

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

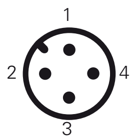
Contact block 11
2NC



M12 connector, 4 poles

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

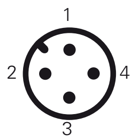
Contact block 12
2NO



M12 connector, 4 poles

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

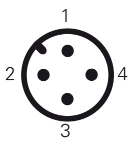
Contact block 13
2NC



M12 connector, 4 poles

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

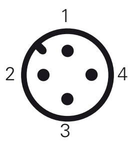
Contact block 14
2NC



M12 connector, 4 poles

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

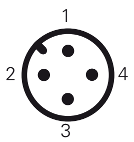
Contact block 15
2NO



M12 connector, 4 poles

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

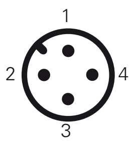
Contact block 16
2NC



M12 connector, 4 poles

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

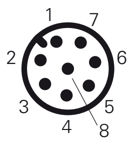
Contact block 18
1NO+1NC



M12 connector, 4 poles

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

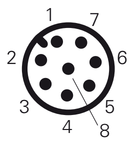
Contact block 20
2NC+1NO



M12 connector, 8 poles

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

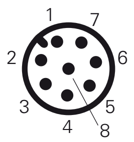
Contact block 21
3NC



M12 connector, 8 poles

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

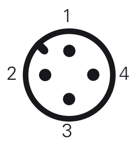
Contact block 22
1NC+2NO



M12 connector, 8 poles

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

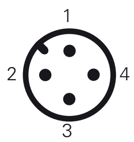
Contact block 33
1NC+1NO



M12 connector, 4 poles

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

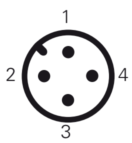
Contact block 34
2NC



M12 connector, 4 poles

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

Contact block E1
PNP

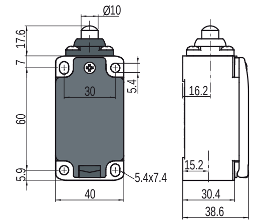
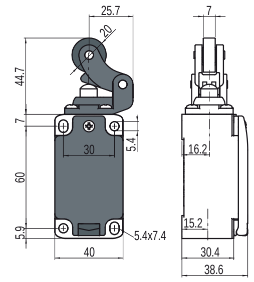
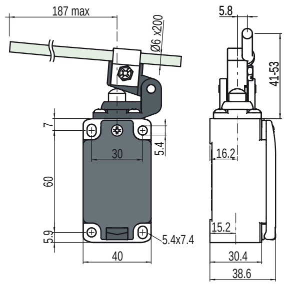
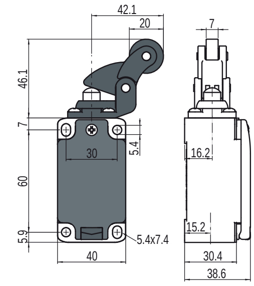


M12 connector, 4 poles

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

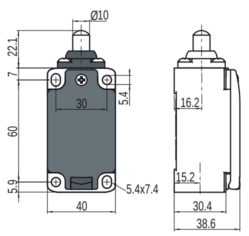
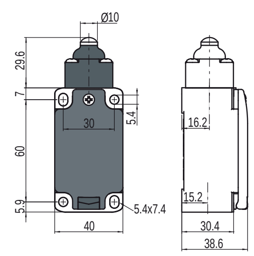
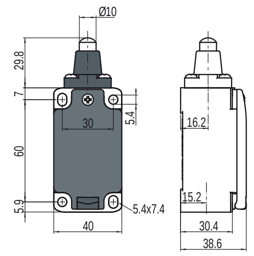
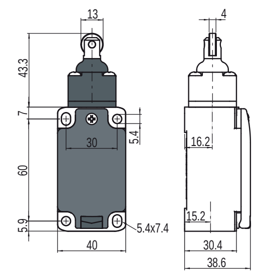
Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- 人 = electronic PNP

	With stainless steel roller on request		With stainless steel roller on request
			

Contact blocks

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	人	FP E101-M2	1NO-1NC	FP E102-M2	1NO-1NC	FP E104-M2	1NO-1NC	FP E105-M2	1NO-1NC
Max. speed		page 237 - type 4		page 237 - type 3		0.5 m/s		page 237 - type 3	
Min. force		8 N (25 N →)		6 N (25 N →)		0.17 Nm		6 N (25 N →)	
Travel diagrams		page 238 - group 1		page 238 - group 2		page 238 - group 1		page 238 - group 2	

	With external rubber gasket		With external rubber gasket
			

Contact blocks

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	人	FP E108-M2	1NO-1NC	FP E110-M2	1NO-1NC	FP E111-M2	1NO-1NC	FP E115-M2	1NO-1NC
Max. speed		page 237 - type 4		page 237 - type 4		page 237 - type 4		page 237 - type 2	
Min. force		8 N (25 N →)		11 N (25 N →)		8 N (25 N →)		11 N (25 N →)	
Travel diagrams		page 238 - group 1		page 238 - group 1		page 238 - group 1		page 238 - group 1	

All measures in the drawings are in mm

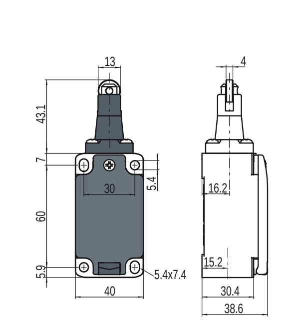
Items with code on **green** background are stock items

Accessories See page 225

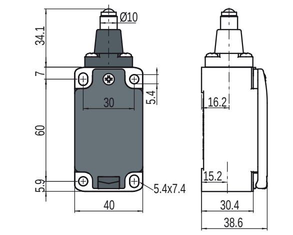
→ The 2D/3D files are available at **www.pizzato.com**

Contact type:

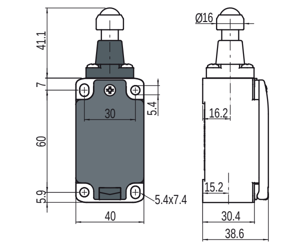
- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- electronic PNP



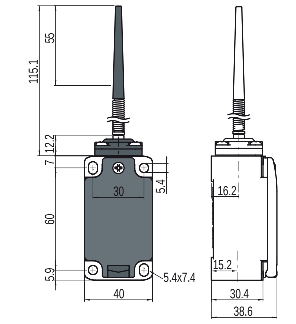
Ball, Ø 8 mm, stainless steel



Ball, Ø 12.7 mm, stainless steel

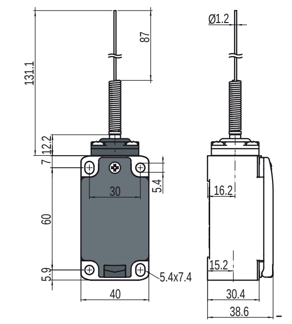


With external rubber gasket

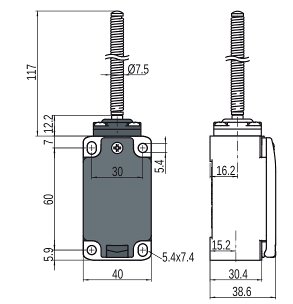


Contact blocks			Ball, Ø 8 mm, stainless steel	Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
5	R	FP 516-M2 → 1NO+1NC	FP 518-M2 → 1NO+1NC	FP 519-M2 → 1NO+1NC	FP 520-M2 1NO+1NC
6	L	FP 616-M2 → 1NO+1NC	FP 618-M2 → 1NO+1NC	FP 619-M2 → 1NO+1NC	
7	LO	FP 716-M2 → 1NO+1NC	FP 718-M2 → 1NO+1NC	FP 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 237 - type 2	page 237 - type 4	page 237 - type 4	1 m/s
Min. force		8 N (25 N →)	8 N (25 N →)	8 N (25 N →)	0.09 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

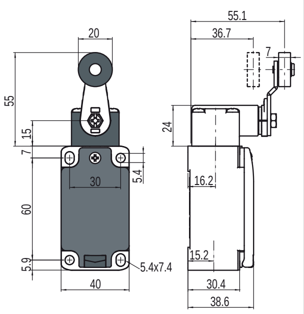
With external rubber gasket



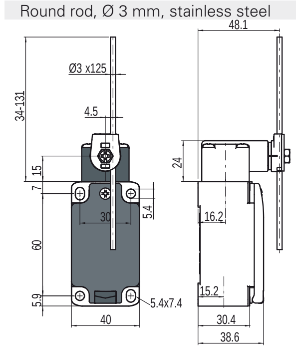
With external rubber gasket



Other rollers available. See on page 38



Round rod, Ø 3 mm, stainless steel



Contact blocks		With external rubber gasket	With external rubber gasket	Other rollers available. See on page 38	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 237 - type 1	1.5 m/s
Min. force		0.08 Nm	0.14 Nm	0.1 Nm (0.25 Nm →)	0.1 Nm
Travel diagrams		page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 4

All measures in the drawings are in mm

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

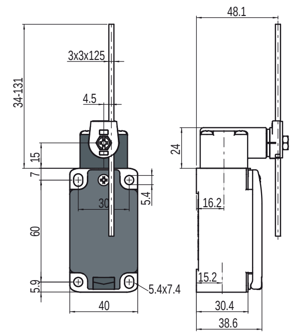
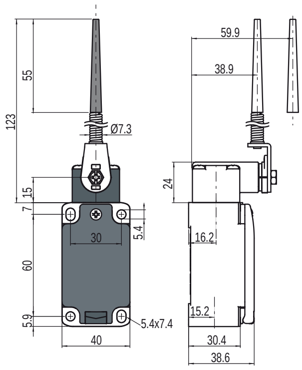
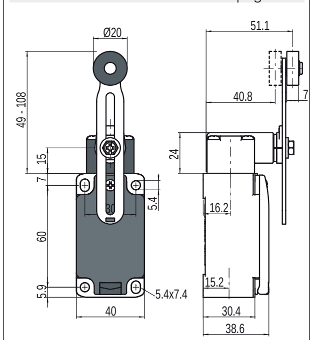
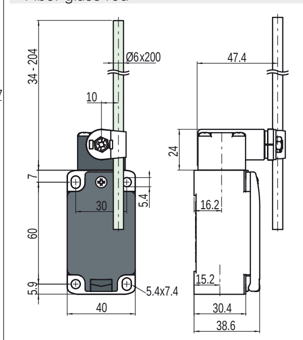
Accessories See page 225

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

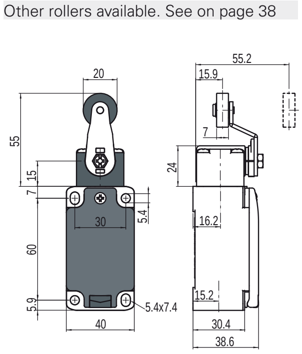
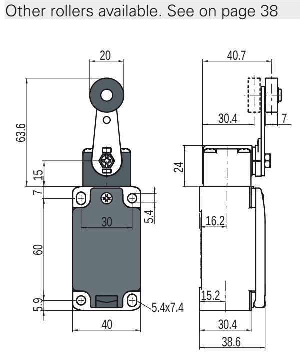
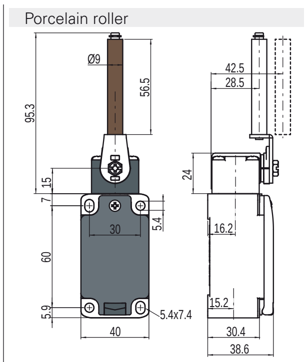
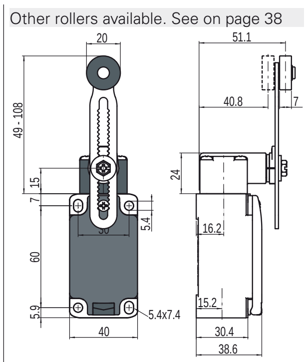
Position switches **FP** series

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- ⅄ = electronic PNP

	Square rod, 3x3 mm		Other rollers available. See on page 38	Fiber glass rod
				

Contact blocks									
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 237 - type 1		1.5 m/s	
Min. force		0.1 Nm		0.1 Nm		0.1 Nm (0.25 Nm ➜)		0.1 Nm	
Travel diagrams		page 238 - group 4		page 238 - group 4		page 238 - group 4		page 238 - group 4	

	Other rollers available. See on page 38	Other rollers available. See on page 38	Porcelain roller	Other rollers available. See on page 38
				

Contact blocks									
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 237 - type 1		page 237 - type 1		0.5 m/s		page 237 - type 1	
Min. 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 238 - group 4		page 238 - group 4		page 238 - group 5		page 238 - group 4	

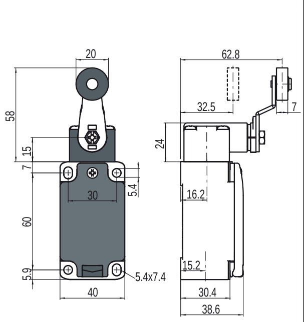
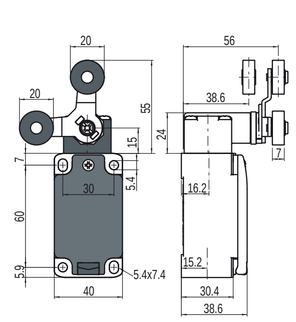
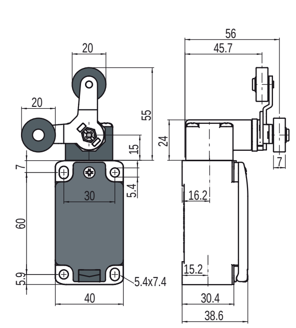
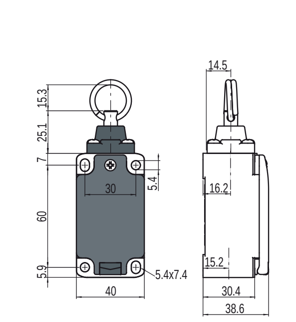
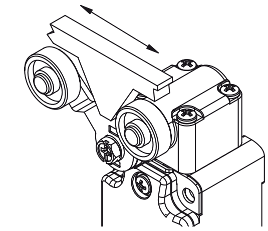
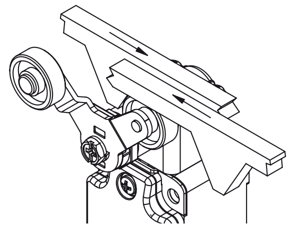
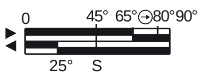
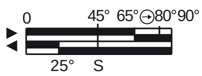
(1) Positive opening only with actuator set to max. See page 37.

All measures in the drawings are in mm

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

Accessories See page 225

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

Contact type: R = snap action; L = slow action; LO = slow action overlapped; LS = slow action shifted; LV = slow action shifted and spaced; LI = slow action independent; LA = slow action closer; = electronic PNP		Other rollers available. See on page 38	With stainless steel roller on request	With stainless steel roller on request	Rope switch for signalling
Contact blocks					
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 single track lyra lever	Bistable switch with dual track lyra lever	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			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	S = mechanical switching point positive opening on contact 21-22 only	S = mechanical switching point positive opening on contact 21-22 only	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 237 - type 1	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Min. 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 238 - group 4			page 238 - group 6

All measures in the drawings are in mm

Accessories See page 225

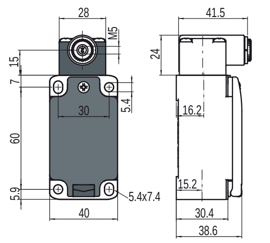
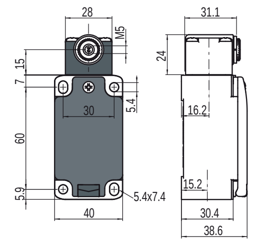
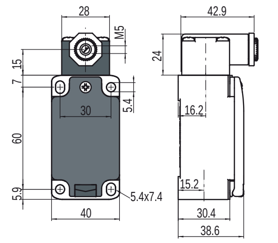
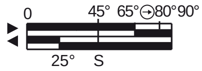
→ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP

Contact blocks		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	Bistable switch
7	LO	FP 738-M2 (→) 1NO+1NC	FP 758-M2 (→) 1NO+1NC	
9	L	FP 938-M2 (→) 2NC	FP 958-M2 (→) 2NC	S = mechanical switching point
10	L	FP 1038-M2 2NO	FP 1058-M2 2NO	positive opening on contact 21-22 only
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	(electronic)	FP E138-M2 1NO+1NC	FP E158-M2 1NO+1NC	
Min. force		0.1 Nm (0.25 Nm (→))	0.06 Nm (0.25 Nm (→))	0.5 m/s with cam at 30°
Travel diagrams		page 238 - group 4	page 238 - group 4	0.21 Nm (0.36 Nm (→))

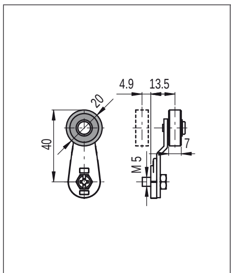
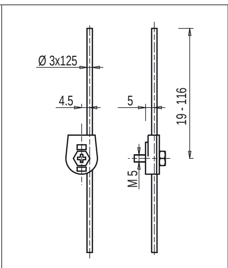
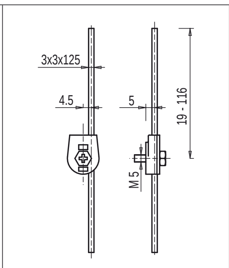
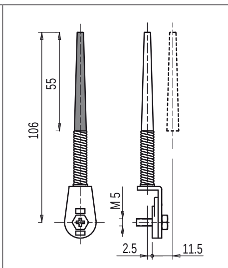
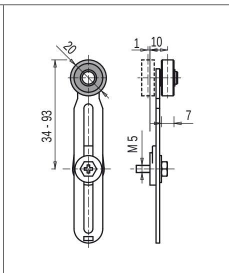
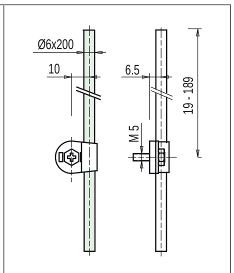
IMPORTANT

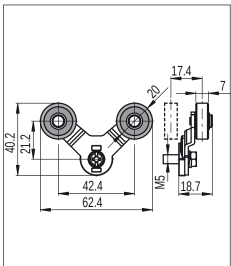
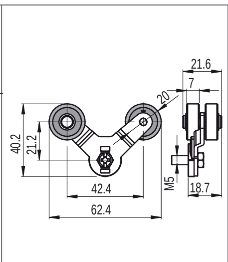
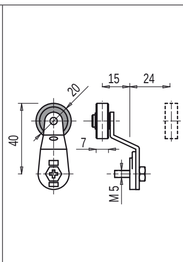
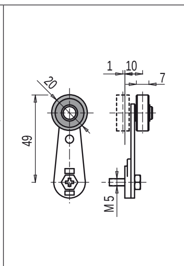
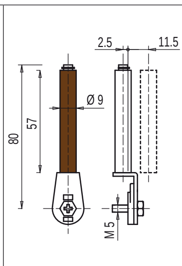
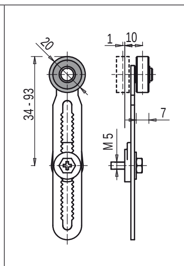
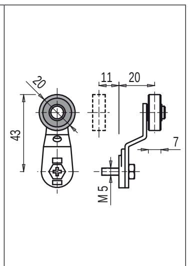
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

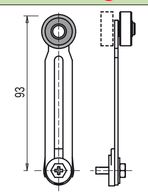
All measures in the drawings are in mm

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

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 fiber glass rod
					
VF L31 (→)	VF L32 (3)	VF L33 (3)	VF L34	VF L35 (→) (1) (3)	VF L36 (3)

Single track lyra actuator	Dual track lyra actuator	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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (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 could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.
- (4) The actuator cannot be rotated to the inside because it will mechanically interfere with the switch head.



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

Accessories See page 225

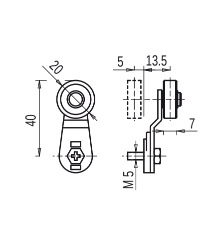
→ The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

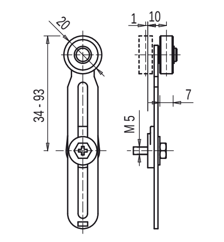
All measures in the drawings are in mm

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

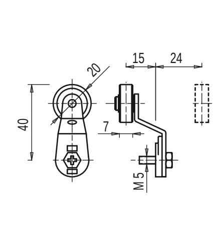
Stainless steel rollers, Ø 20 mm



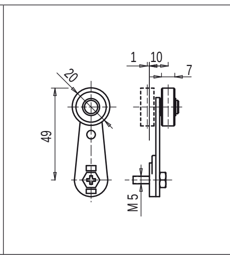
VF L31-R24



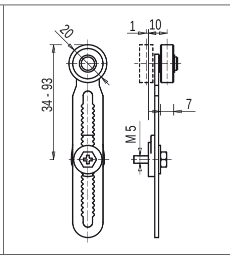
VF L35-R24 (1) (3)



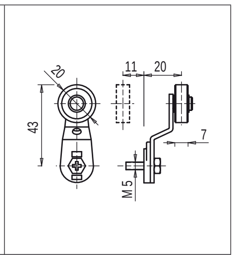
VF L51-R24



VF L52-R24

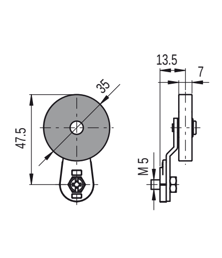


VF L56-R24 (3)

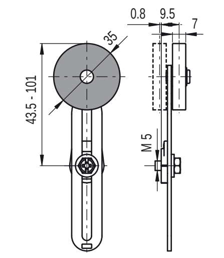


VF L57-R24

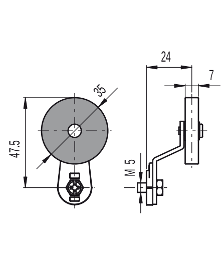
Technopolymer rollers, Ø 35 mm



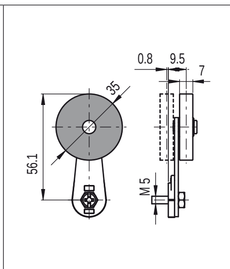
VF L31-R25 (4)



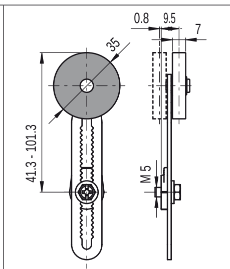
VF L35-R25 (1) (3)



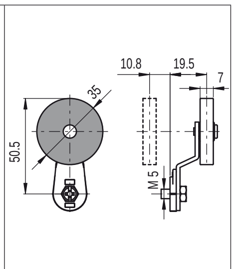
VF L51-R25 (4)



VF L52-R25

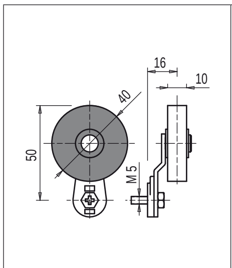


VF L56-R25 (3)

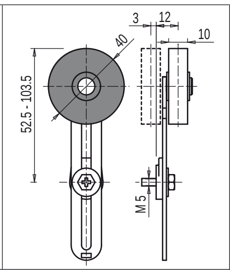


VF L57-R25

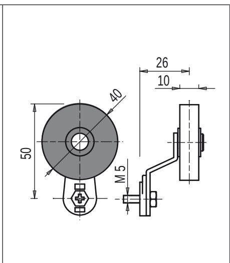
Rubber rollers, Ø 40 mm



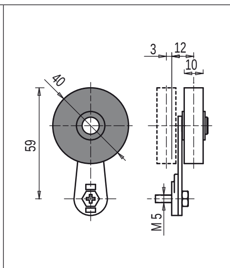
VF L31-R5 (4)



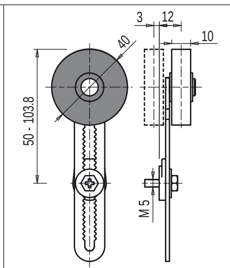
VF L35-R5 (1) (3)



VF L51-R5 (4)



VF L52-R5



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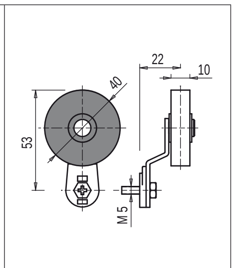
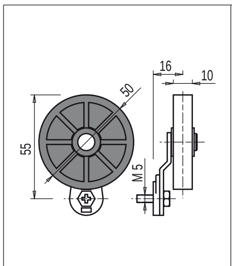
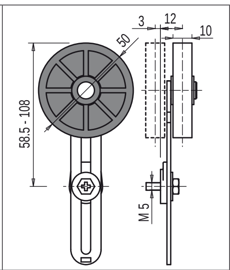


VF L57-R5 (4)

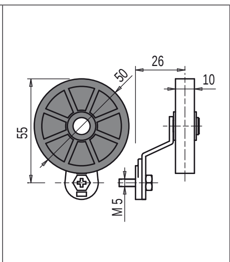
Rubber rollers, Ø 50 mm



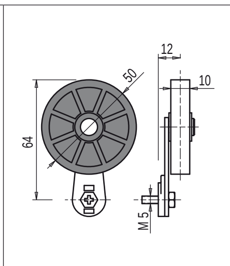
VF L31-R26 (4)



VF L35-R26 (1) (3)



VF L51-R26 (4)



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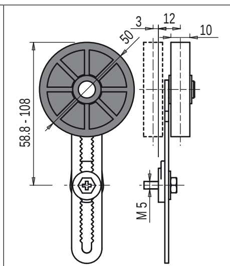
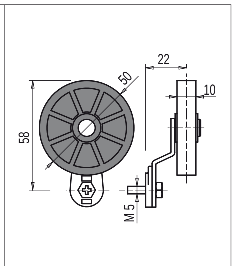
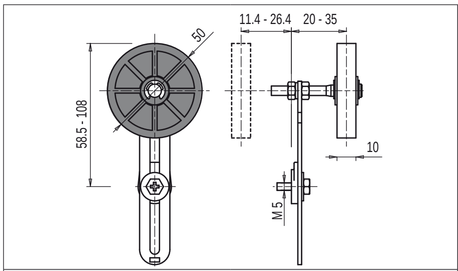


VF L56-R26 (3)

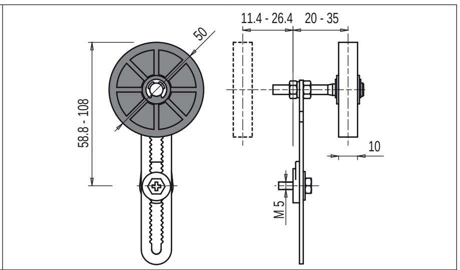


VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm



VF L35-R27 (1) (3)

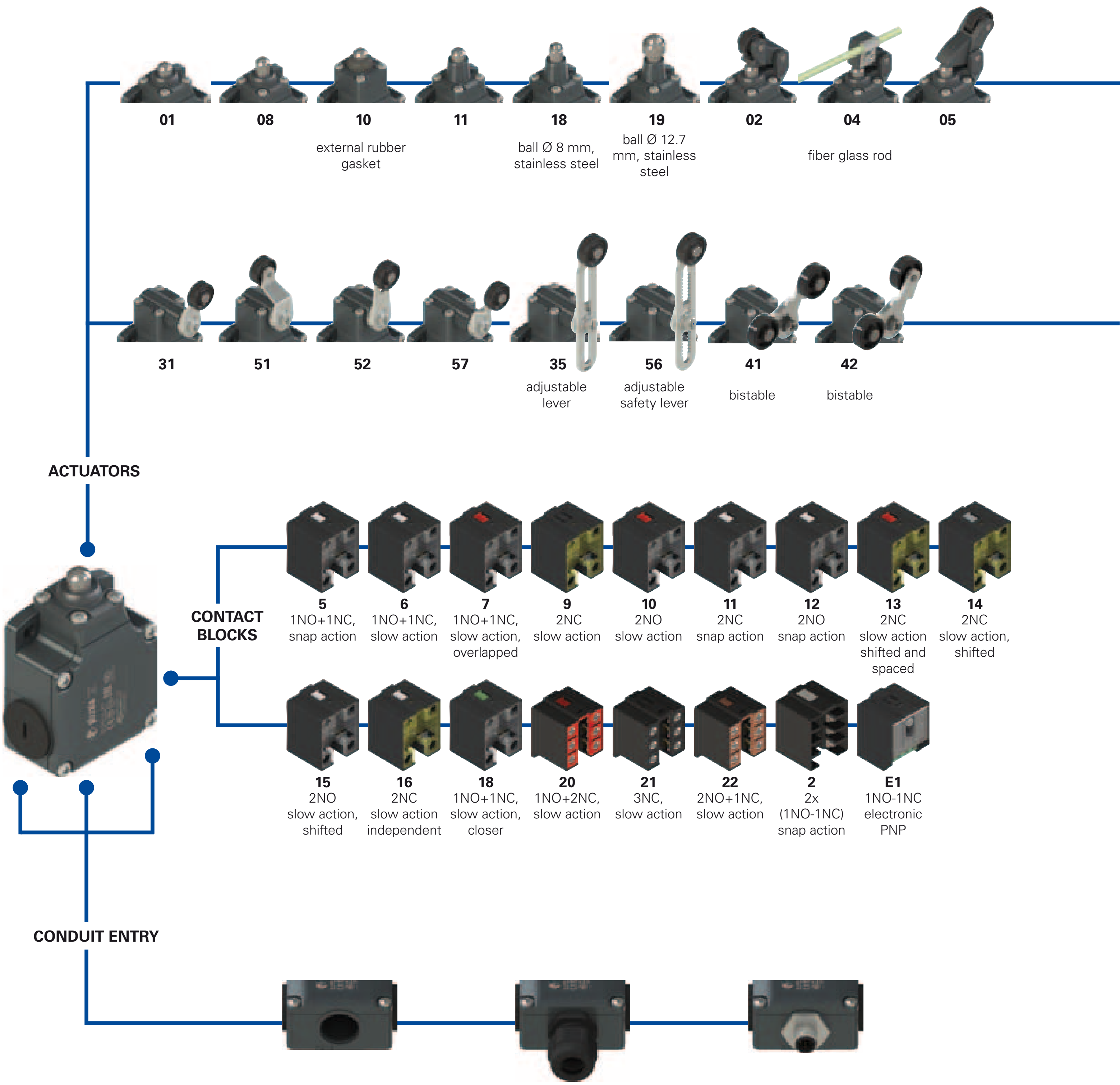


VF L56-R27 (3)

Accessories See page 225

➔ The 2D/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 from Ø 6 to Ø 12 mm from below
K123	for cables from Ø 6 to Ø 12 mm from the right
K223	for cables from Ø 6 to Ø 12 mm from the left
K27	for cables from Ø 3 to Ø 7 mm from below
K127	for cables from Ø 3 to Ø 7 mm from the right
K227	for cables from Ø 3 to Ø 7 mm from the left

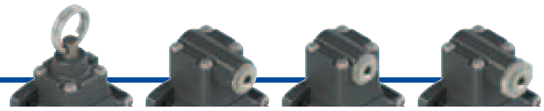
With M12 metal connector

K40	8 poles, bottom
K41	8 poles, right
K42	8 poles, left
K50	5 poles, bottom
K51	5 poles, right
K52	5 poles, left

product options

accessory sold separately

15	16	20	21	25	34	32	33	36	53
stainless steel roller external rubber gasket	stainless steel roller					round rod stainless steel	square rod	fiber glass rod	porcelain roller



76	38	58	40
rope switch for signalling	without actuator	without actuator	bistable without actuator

LOOSE ACTUATORS
See page 47

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 blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

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

Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating (not for contact block 2)

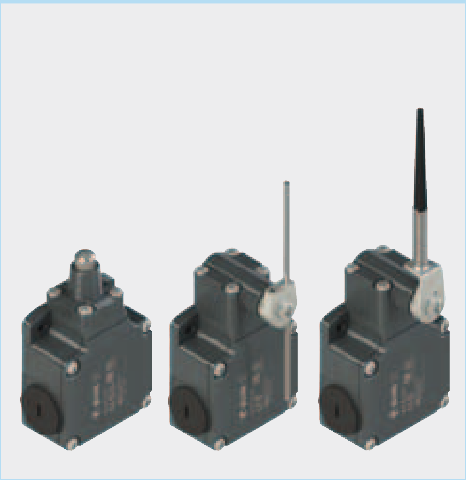
Threaded conduit entries	
M2	M20x1.5 (standard)
	PG 13.5

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 e 36)

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

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



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

Markings and quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230000
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing

Metal housing, baked powder coating

Three threaded conduit entries:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 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 conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA 22.2 No.14 .
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14, GB14048.5-2001.

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

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)	
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)	
Conditional short circuit current:	1000 A according to EN 60947-5-1	
Protection against short circuits:	type aM fuse 10 A 500 V	
Pollution degree:	3	

Alternating current: AC15 (50÷60 Hz)			
Ue (V)	250	400	500
Ie (A)	6	4	1
Direct current: DC13			
Ue (V)	24	125	250
Ie (A)	6	1.1	0.4

with connector M12, 5 poles

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Protection against short circuits:	type gG fuse 4 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)			
Ue (V)	24	120	250
Ie (A)	4	4	4
Direct current: DC13			
Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

with connector M12, 8 poles

Thermal current (Ith):	2 A
Rated insulation voltage (Ui):	30 Vac 36 Vdc
Protection against short circuits:	type gG fuse 2 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)	
Ue (V)	24
Ie (A)	2
Direct current: DC13	
Ue (V)	24
Ie (A)	2

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

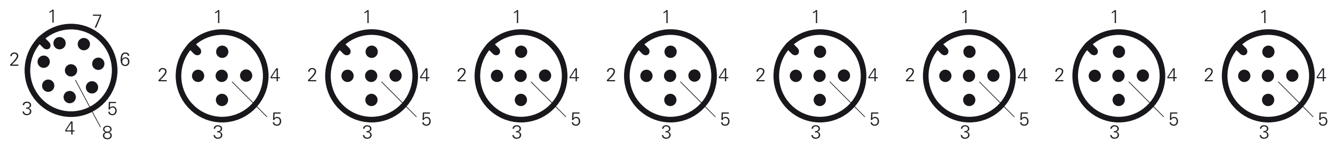
Characteristics approved by UL

Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

Connection diagram for M12 connectors



Contact block 2 – 1NO-1NC+1NO-1NC – M12 connector, 8 poles

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

Contact block 5 – 1NO+1NC – M12 connector, 5 poles

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

Contact block 6 – 1NO+1NC – M12 connector, 5 poles

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

Contact block 7 – 1NO+1NC – M12 connector, 5 poles

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

Contact block 9 – 2NC – M12 connector, 5 poles

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

Contact block 10 – 2NO – M12 connector, 5 poles

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

Contact block 11 – 2NC – M12 connector, 5 poles

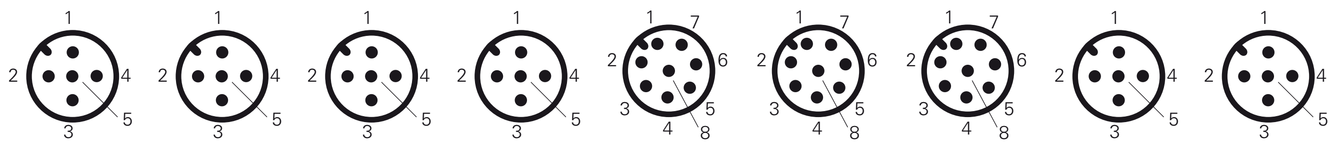
Contacts	Pin no.
NC	1-2
NC	3-4
ground	5

Contact block 12 – 2NO – M12 connector, 5 poles

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

Contact block 13 – 2NC – M12 connector, 5 poles

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



Contact block 14 – 2NC – M12 connector, 5 poles

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

Contact block 15 – 2NO – M12 connector, 5 poles

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

Contact block 16 – 2NC – M12 connector, 5 poles

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

Contact block 18 – 1NO+1NC – M12 connector, 5 poles

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

Contact block 20 – 2NC+1NO – M12 connector, 8 poles

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

Contact block 21 – 3NC – M12 connector, 8 poles

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

Contact block 22 – 1NC+2NO – M12 connector, 8 poles

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

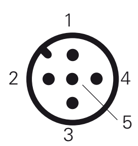
Contact block 33 – 1NC+1NO – M12 connector, 5 poles

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

Contact block 34 – 2NC – M12 connector, 5 poles

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

Contact block E1 – PNP



M12 connector, 5 poles

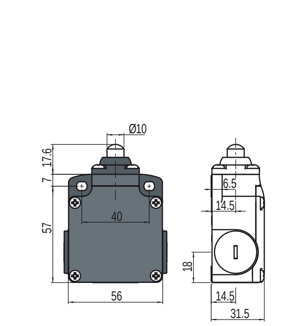
Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

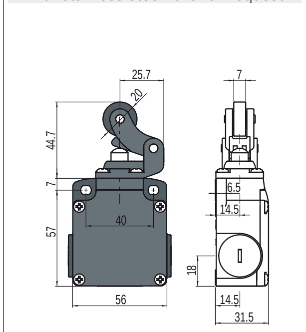
Position switches FL series

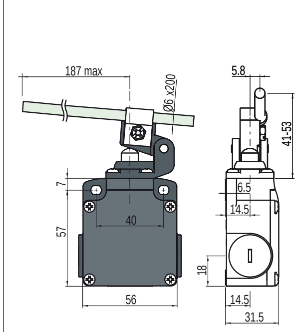
Contact type:

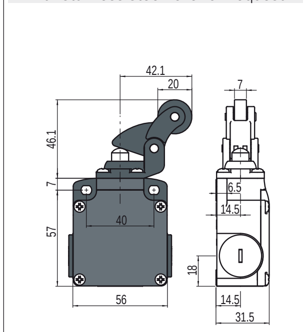
- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- (electronic symbol) = electronic PNP

				With stainless steel roller on request				With stainless steel roller on request	



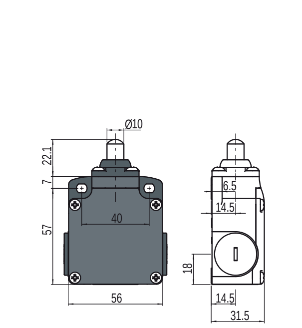


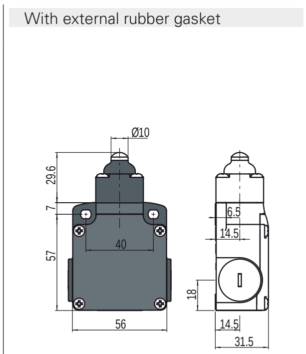


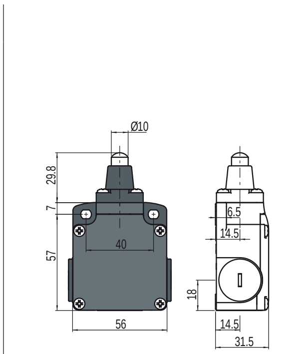


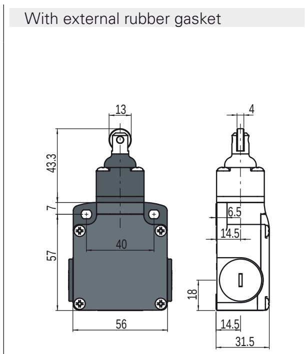
Contact blocks									
5	R	FL 501-M2	→ 1NO+1NC	FL 502-M2	→ 1NO+1NC	FL 504-M2	1NO+1NC	FL 505-M2	→ 1NO+1NC
6	L	FL 601-M2	→ 1NO+1NC	FL 602-M2	→ 1NO+1NC	FL 604-M2	1NO+1NC	FL 605-M2	→ 1NO+1NC
7	LO	FL 701-M2	→ 1NO+1NC	FL 702-M2	→ 1NO+1NC	FL 704-M2	1NO+1NC	FL 705-M2	→ 1NO+1NC
9	L	FL 901-M2	→ 2NC	FL 902-M2	→ 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	(electronic)	FL E101-M2	1NO-1NC	FL E102-M2	1NO-1NC	FL E104-M2	1NO-1NC	FL E105-M2	1NO-1NC
Max. speed		page 237 - type 4		page 237 - type 3		0.5 m/s		page 237 - type 3	
Min. force		8 N (25 N →)		6 N (25 N →)		0.17 Nm		6 N (25 N →)	
Travel diagrams		page 238 - group 1		page 238 - group 2		page 238 - group 1		page 238 - group 2	

				With external rubber gasket				With external rubber gasket	









Contact blocks									
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	(electronic)	FL E108-M2	1NO-1NC	FL E110-M2	1NO-1NC	FL E111-M2	1NO-1NC	FL E115-M2	1NO-1NC
Max. speed		page 237 - type 4		page 237 - type 4		page 237 - type 4		page 237 - type 2	
Min. force		8 N (25 N →)		11 N (25 N →)		8 N (25 N →)		11 N (25 N →)	
Travel diagrams		page 238 - group 1		page 238 - group 1		page 238 - group 1		page 238 - group 1	

All measures in the drawings are in mm

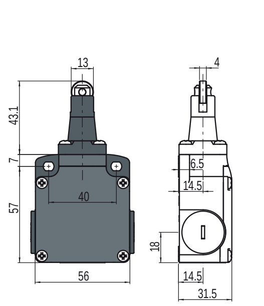
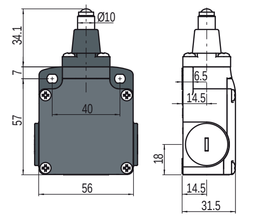
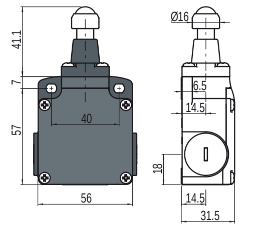
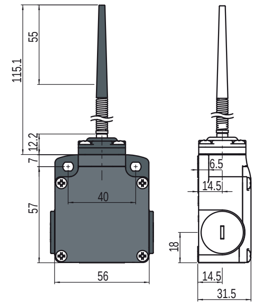
Items with code on **green** background are stock items

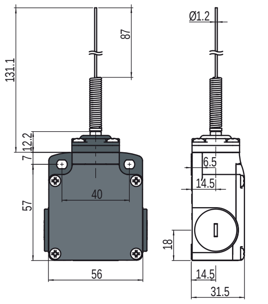
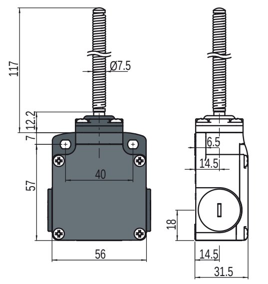
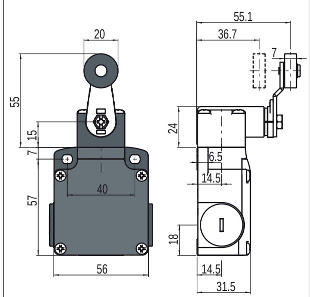
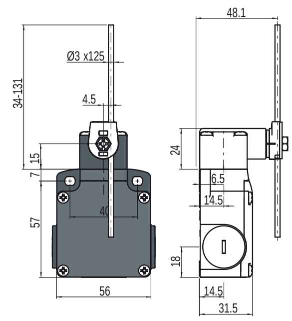
Accessories See page 225

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP

			Ball, Ø 8 mm, stainless steel	Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
					
Contact blocks					
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 237 - type 2	page 237 - type 4	page 237 - type 4	1 m/s
Min. force		8 N (25 N (→))	8 N (25 N (→))	8 N (25 N (→))	0.09 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

		With external rubber gasket	With external rubber gasket	Other rollers available. See on page 48	Round rod, Ø 3 mm, stainless steel
					
Contact blocks					
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 237 - type 1	1.5 m/s
Min. force		0.08 Nm	0.14 Nm	0.1 Nm (0.25 Nm (→))	0.1 Nm
Travel diagrams		page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 4

All measures in the drawings are in mm

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

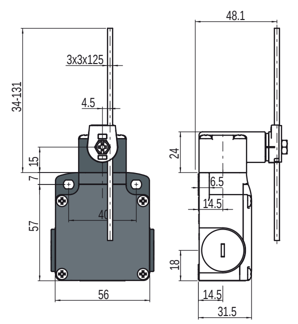
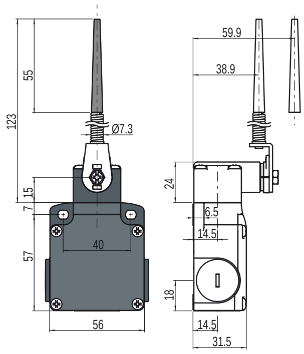
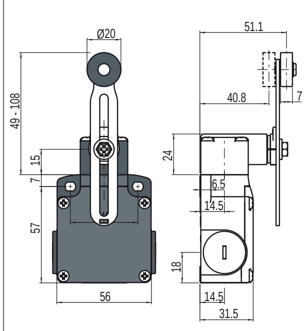
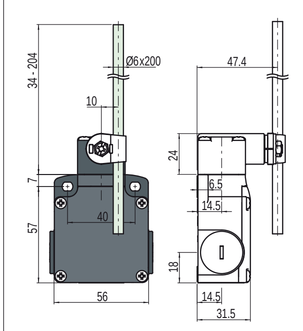
Accessories See page 225

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

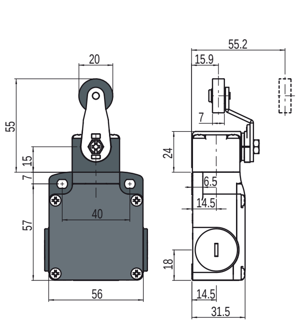
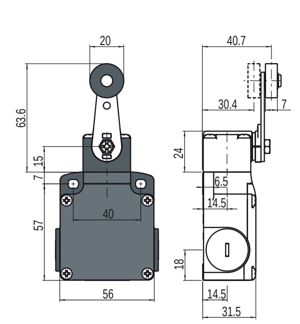
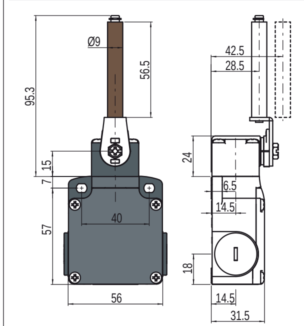
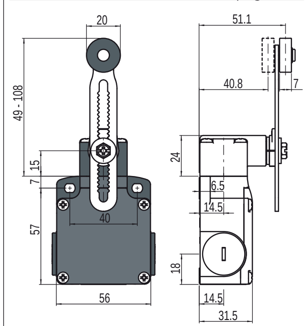
Position switches FL series

Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- ⅄ = electronic PNP

		Square rod, 3x3 mm			Other rollers available. See on page 48	Fiber glass rod
						

Contact blocks									
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 237 - type 1		1.5 m/s	
Min. force		0.1 Nm		0.1 Nm		0.1 Nm (0.25 Nm →)		0.1 Nm	
Travel diagrams		page 238 - group 4		page 238 - group 4		page 238 - group 4		page 238 - group 4	

		Other rollers available. See on page 48	Other rollers available. See on page 48	Porcelain roller	Other rollers available. See on page 48
					

Contact blocks									
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 237 - type 1		page 237 - type 1		0.5 m/s		page 237 - type 1	
Min. 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 238 - group 4		page 238 - group 4		page 238 - group 5		page 238 - group 4	

(1) Positive opening only with actuator set to max. See page 47.

All measures in the drawings are in mm

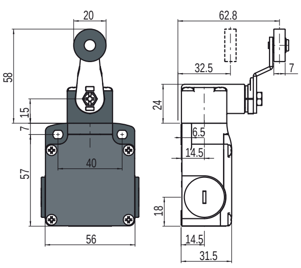
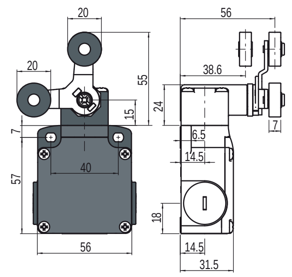
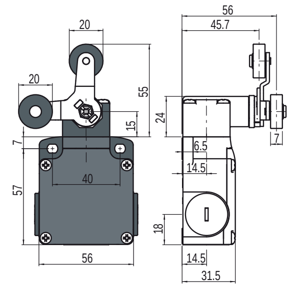
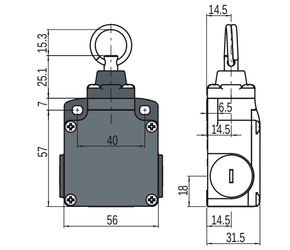
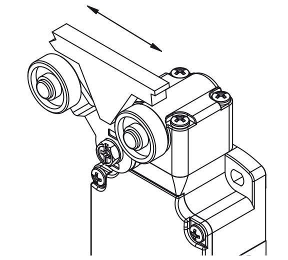
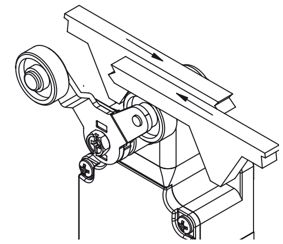
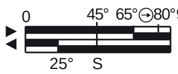
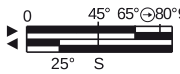
Items with code on **green** background are stock items

Accessories See page 225

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP

Contact blocks		Other rollers available. See on page 48	With stainless steel roller on request	With stainless steel roller 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 single track lyra lever	Bistable switch with dual track lyra lever	FL 676-M2 1NO+1NC
7	LO	FL 757-M2 ⊖ 1NO+1NC			FL 776-M2 1NO+1NC
9	L	FL 957-M2 ⊖ 2NC			FL 976-M2 2NO
10	L	FL 1057-M2 2NO			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)	S = mechanical switching point positive opening on contact 21-22 only	S = mechanical switching point positive opening on contact 21-22 only	FL 276-M2 2x(1NO-1NC)
E1	(electronic)	FL E157-M2 1NO-1NC			
Max. speed		page 237 - type 1	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Min. 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 238 - group 4			page 238 - group 6

All measures in the drawings are in mm

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

Accessories See page 225

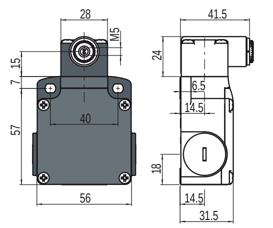
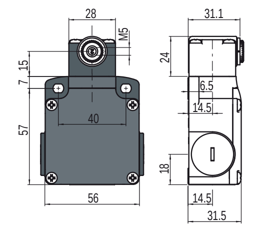
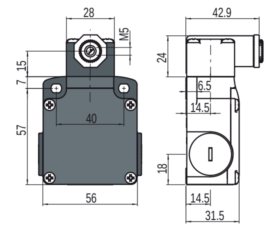
→ The 2D/3D files are available at **www.pizzato.com**

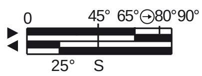
Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- = electronic PNP

	Regular head	Compact head	
			

Contact blocks		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 contact 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	
Min. force		0.1 Nm (0.25 Nm (→))	0.06 Nm (0.25 Nm (→))	0.5 m/s with cam at 30°
Travel diagrams		page 238 - group 4	page 238 - group 4	0.21 Nm (0.36 Nm (→))

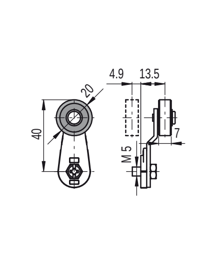
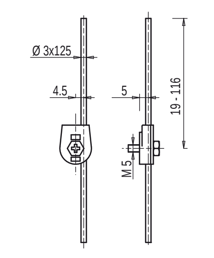
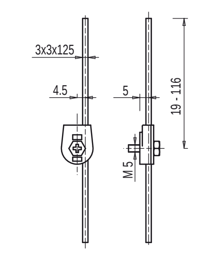
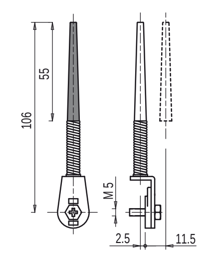
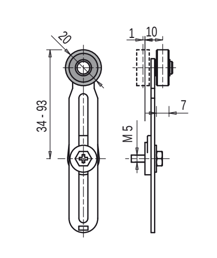
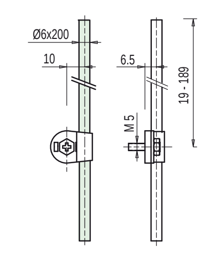
All measures in the drawings are in mm

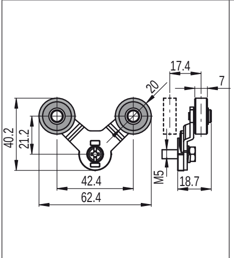
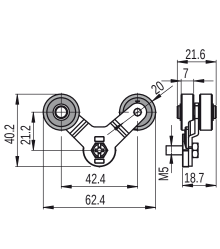
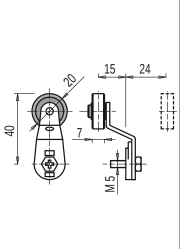
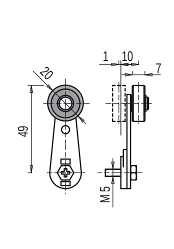
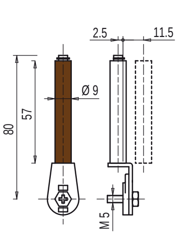
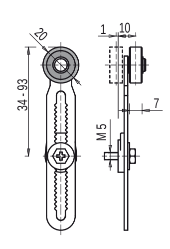
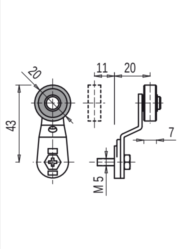
IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

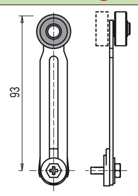
All measures in the drawings are in mm

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

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 fiber glass rod
					
VF L31 (→)	VF L32 (3)	VF L33 (3)	VF L34	VF L35 (→) (1) (3)	VF L36 (3)

Single track lyra actuator	Dual track lyra actuator	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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (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 could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.
- (4) The actuator cannot be rotated to the inside because it will mechanically interfere with the switch head.



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

Accessories See page 225

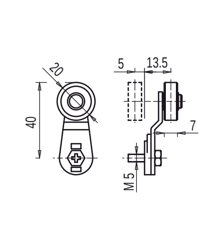
➔ The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

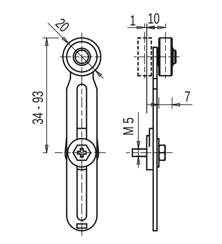
All measures in the drawings are in mm

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

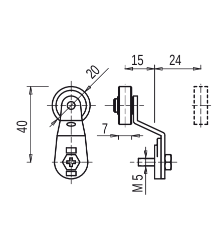
Stainless steel rollers, Ø 20 mm



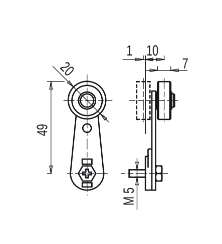
VF L31-R24



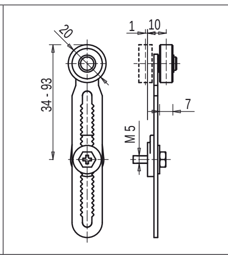
VF L35-R24 (1) (3)



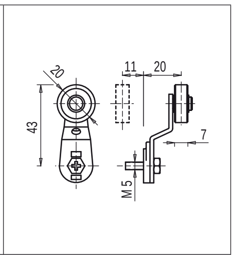
VF L51-R24



VF L52-R24

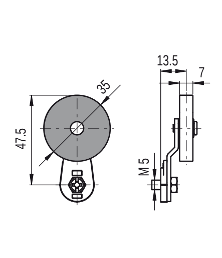


VF L56-R24 (3)

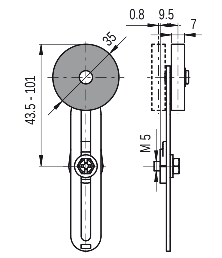


VF L57-R24

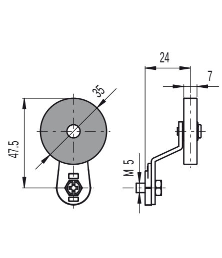
Technopolymer rollers, Ø 35 mm



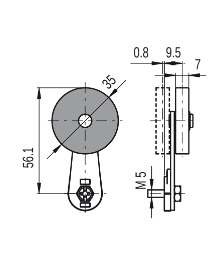
VF L31-R25 (4)



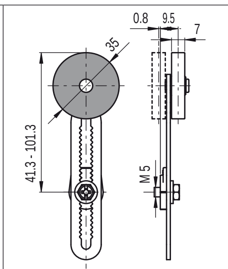
VF L35-R25 (1) (3)



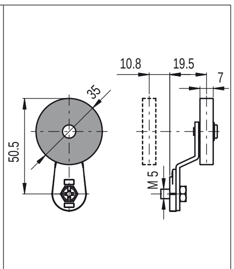
VF L51-R25 (4)



VF L52-R25

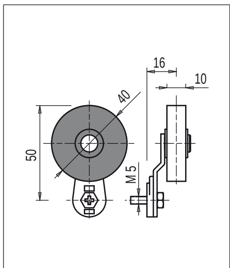


VF L56-R25 (3)

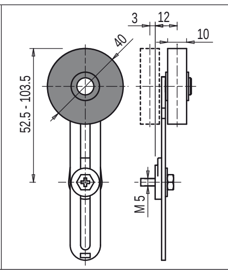


VF L57-R25

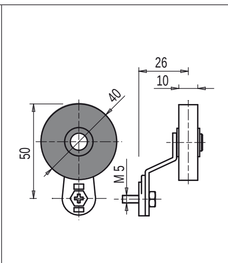
Rubber rollers, Ø 40 mm



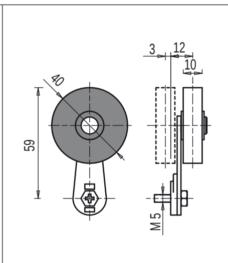
VF L31-R5 (4)



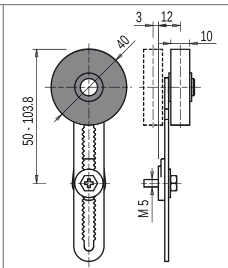
VF L35-R5 (1) (3)



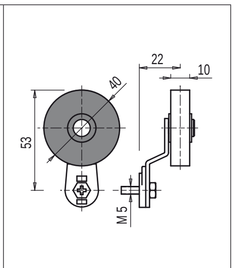
VF L51-R5 (4)



VF L52-R5

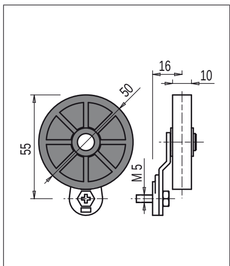


VF L56-R5 (3)

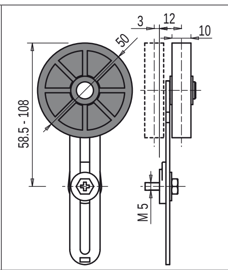


VF L57-R5 (4)

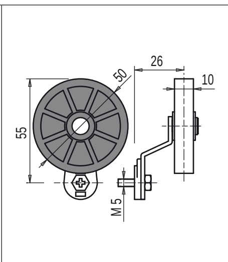
Rubber rollers, Ø 50 mm



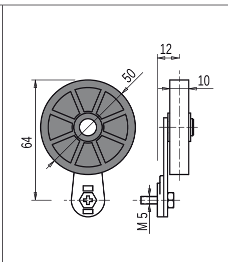
VF L31-R26 (4)



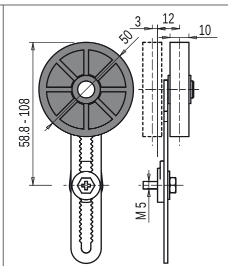
VF L35-R26 (1) (3)



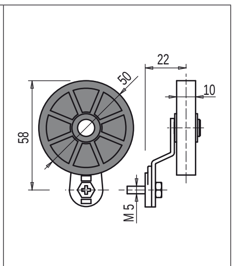
VF L51-R26 (4)



VF L52-R26 (4)

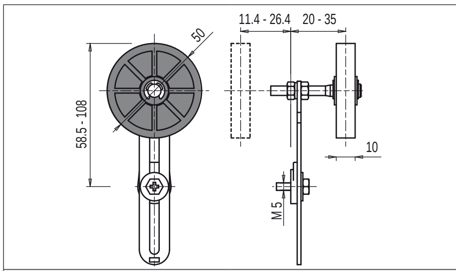


VF L56-R26 (3)

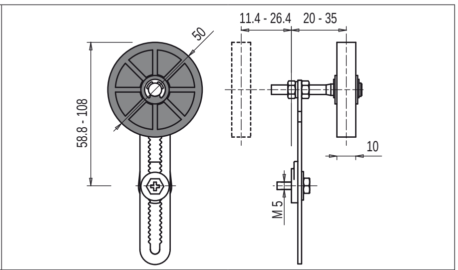


VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm



VF L35-R27 (1) (3)

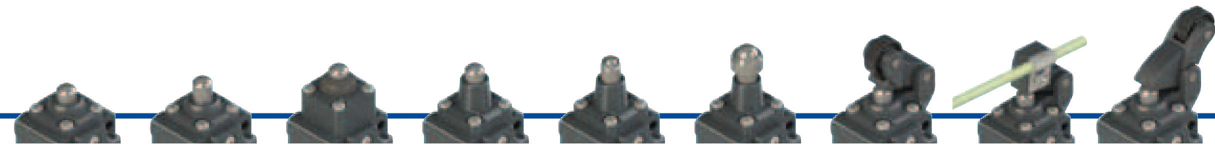


VF L56-R27 (3)

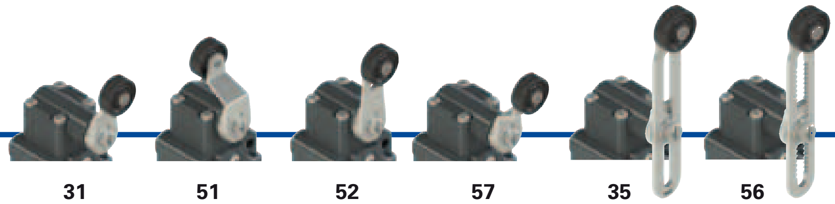
Accessories See page 225

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

Selection diagram



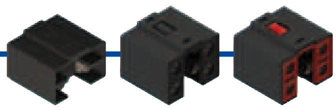
01	08	10	11	18	19	02	04	05
		external rubber gasket		ball Ø 8 mm, stainless steel	ball Ø 12.7 mm, stainless steel		fiber glass rod	



31	51	52	57	35	56
				adjustable lever	adjustable safety lever

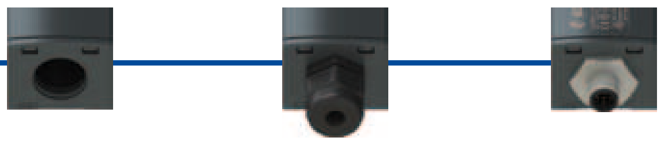
ACTUATORS

CONTACT BLOCKS



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

CONDUIT ENTRY



Threaded conduit entry

M2	M20x1.5 (standard)
	PG 11

With cable gland

K23	for cables Ø 6…Ø 12 mm
K27	for cables Ø 3…Ø 7 mm

With M12 metal connector

K50	5 poles, bottom

product options

accessory sold separately

15	16	20	21	25	34	32	33	36	53
stainless steel roller external rubber gasket	stainless steel roller					round rod stainless steel	square rod	fiber glass rod	porcelain roller

76	38	58
rope switch for signalling	without actuator	without actuator

LOOSE ACTUATORS
See page 55

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 blocks

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

Actuators

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

Contact type

	silver contacts (standard)
G	silver contacts with 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

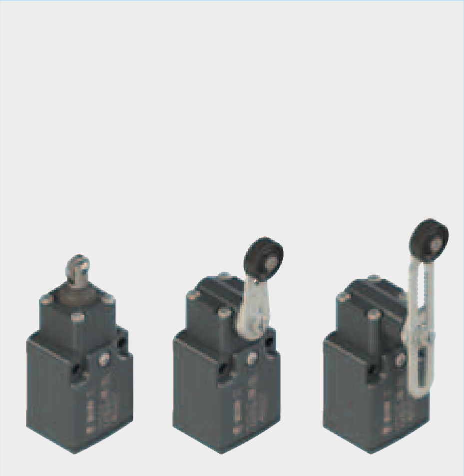
Rollers

	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 e 36)

Pre-installed cable glands

	without cable gland (standard)
K23	cable gland for cables Ø 6…Ø 12 mm
K27	cable gland for cables Ø 3…Ø 7 mm
K50	M12 metal connector, 5 poles

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



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, baked powder coating	
One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 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 conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA 22.2 No.14 .
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14, GB14048.5-2001.

Markings and quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230000
EAC approval:	RU C-IT ДМ94.B.01024

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

	Electrical data		Utilization category
without connector	Thermal current (Ith):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (Ui):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 33, 34)	Ue (V) 250 400 500 Ie (A) 6 4 1
	Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV(contact blocks 33, 34)	Direct current: DC13
	Conditional short circuit current:	1000 A according 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 poles			Alternating current: AC15 (50÷60 Hz)
	Thermal current (Ith):	4 A	Ue (V) 24 120 250
	Rated insulation voltage (Ui):	250 Vac 300 Vdc	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

Characteristics approved by IMQ

Rated insulation voltage (Ui): 500 Vac
400 Vac (for contact blocks 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 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

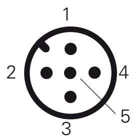
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

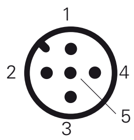
Please contact our technical service for the list of approved products.

Connection diagram for M12 connectors

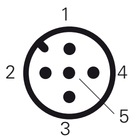
Contact block 3 1NC-1NO		Contact block 33 1NC+1NO		Contact block 34 2NC	



M12 connector, 5 poles



M12 connector, 5 poles

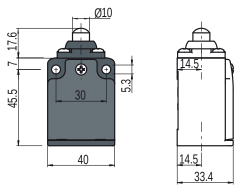


M12 connector, 5 poles

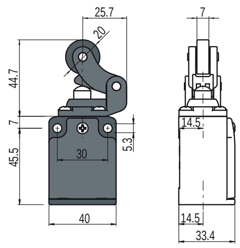
Contacts	Pin no.	Contacts	Pin no.	Contacts	Pin no.
NC	1-2	NC	1-2	NC	1-2
NO	3-4	NO	3-4	NC	3-4
ground	5	ground	5	ground	5

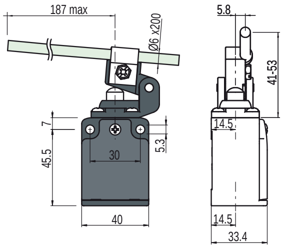
Contact type:

R = snap action
L = slow action

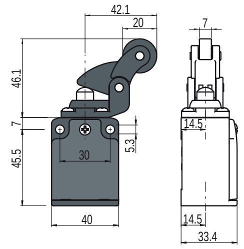


With stainless steel roller on request

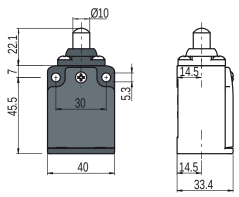




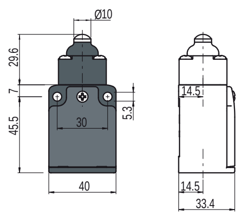
With stainless steel roller on request

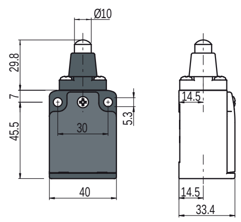


Contact blocks					
3	R	FC 301-M2 1NO-1NC	FC 302-M2 1NO-1NC	FC 304-M2 1NO-1NC	FC 305-M2 1NO-1NC
33	L	FC 3301-M2 ➔ 1NO+1NC	FC 3302-M2 ➔ 1NO+1NC	FC 3304-M2 1NO+1NC	FC 3305-M2 ➔ 1NO+1NC
34	L	FC 3401-M2 ➔ 2NC	FC 3402-M2 ➔ 2NC	FC 3404-M2 2NC	FC 3405-M2 ➔ 2NC
Max. speed		page 237 - type 4	page 237 - type 3	0.5 m/s	page 237 - type 3
Min. force		6 N (25 N ➔)	4 N (25 N ➔)	0.17 Nm	4 N (25 N ➔)
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 1	page 238 - group 2

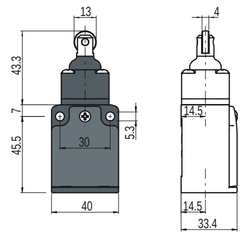


With external rubber gasket

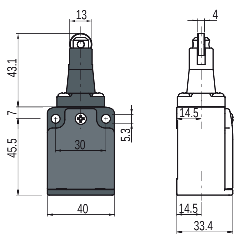




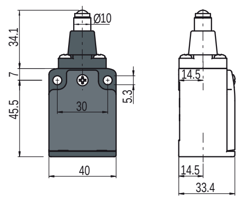
With external rubber gasket



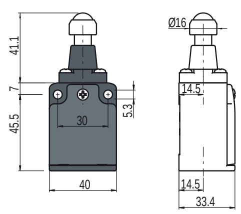
Contact blocks					
3	R	FC 308-M2 1NO-1NC	FC 310-M2 1NO-1NC	FC 311-M2 1NO-1NC	FC 315-M2 1NO-1NC
33	L	FC 3308-M2 ➔ 1NO+1NC	FC 3310-M2 ➔ 1NO+1NC	FC 3311-M2 ➔ 1NO+1NC	FC 3315-M2 ➔ 1NO+1NC
34	L	FC 3408-M2 ➔ 2NC	FC 3410-M2 ➔ 2NC	FC 3411-M2 ➔ 2NC	FC 3415-M2 ➔ 2NC
Max. speed		page 237 - type 4	page 237 - type 4	page 237 - type 4	page 237 - type 2
Min. force		6 N (25 N ➔)	7 N (25 N ➔)	6 N (25 N ➔)	7 N (25 N ➔)
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 1



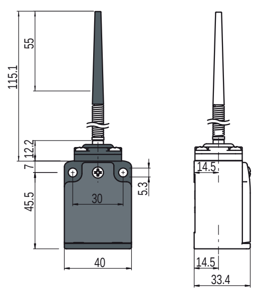
Ball, Ø 8 mm, stainless steel



Ball, Ø 12.7 mm, stainless steel



With external rubber gasket



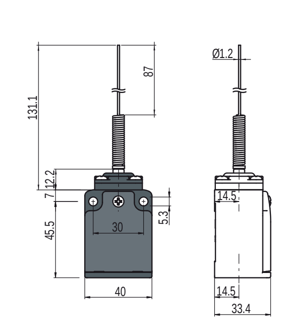
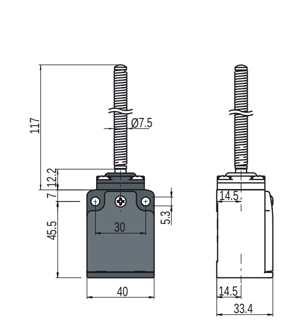
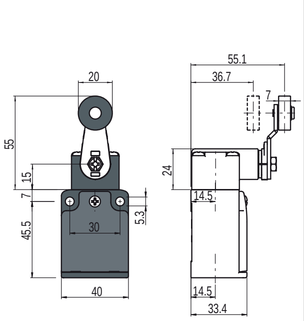
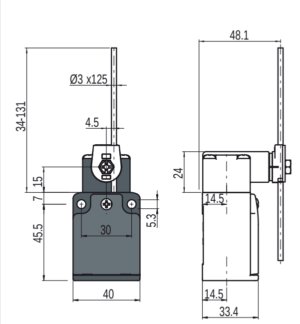
Contact blocks					
3	R	FC 316-M2 1NO-1NC	FC 318-M2 1NO-1NC	FC 319-M2 1NO-1NC	FC 320-M2 1NO-1NC
33	L	FC 3316-M2 ➔ 1NO+1NC	FC 3318-M2 ➔ 1NO+1NC	FC 3319-M2 ➔ 1NO+1NC	FC 3320-M2 1NO+1NC
34	L	FC 3416-M2 ➔ 2NC	FC 3418-M2 ➔ 2NC	FC 3419-M2 ➔ 2NC	FC 3420-M2 2NC
Max. speed		page 237 - type 2	page 237 - type 4	page 237 - type 4	1 m/s
Min. force		6 N (25 N ➔)	6 N (25 N ➔)	6 N (25 N ➔)	0.07 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

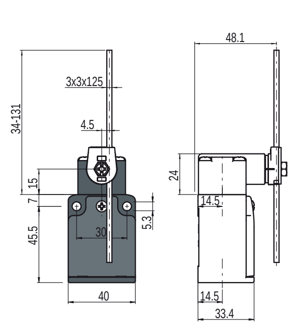
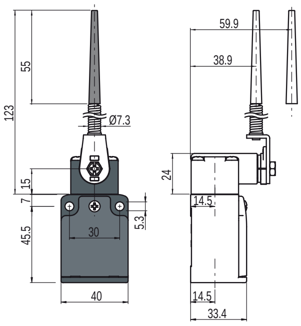
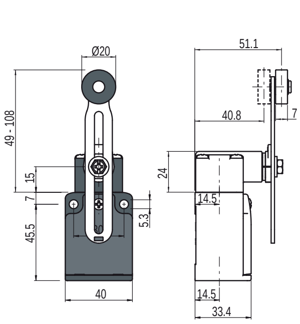
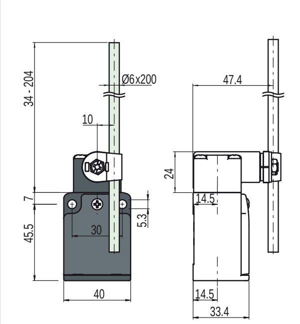
All measures in the drawings are in mm

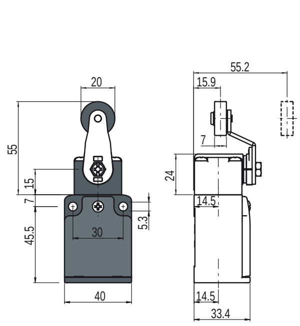
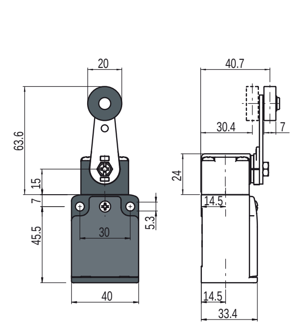
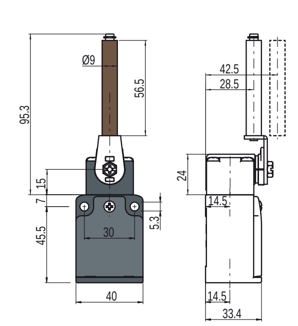
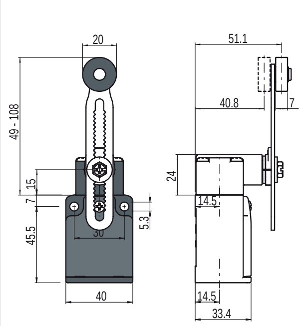
Items with code on **green** background are stock items

Accessories See page 225

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

Contact type: R = snap action, L = slow action	With external rubber gasket	With external rubber gasket	Other rollers available. See on page 56	Round rod, Ø 3 mm, stainless steel
Contact blocks				
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 237 - type 1	1.5 m/s
Min. force	0.06 Nm	0.1 Nm	0.09 Nm (0.25 Nm →)	0.09 Nm
Travel diagrams	page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 4

	Square rod, 3x3 mm		Other rollers available. See on page 56	Fiber glass rod
Contact blocks				
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 237 - type 1	1.5 m/s
Min. force	0.09 Nm	0.09 Nm	0.09 Nm (0.25 Nm →)	0.09 Nm
Travel diagrams	page 238 - group 4	page 238 - group 4	page 238 - group 4	page 238 - group 4

	Other rollers available. See on page 56	Other rollers available. See on page 56	Porcelain roller	Other rollers available. See on page 56
Contact blocks				
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 237 - type 1	page 237 - type 1	0.5 m/s	page 237 - type 1
Min. 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 238 - group 4	page 238 - group 4	page 238 - group 5	page 238 - group 4

(1) Positive opening only with actuator set to max. See page 55.

All measures in the drawings are in mm

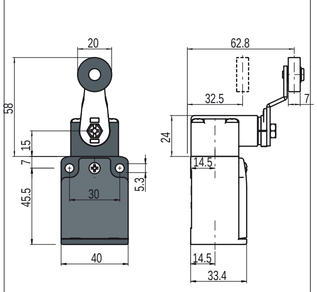
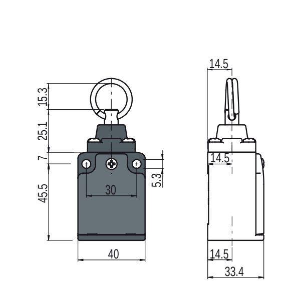
Items with code on **green** background are stock items

Accessories See page 225

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

Contact type:

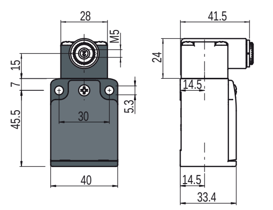
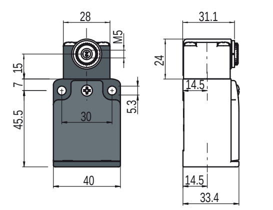
R = snap action
L = slow action

	Other rollers available. See on page 56	Rope switch for signalling
		
Contact blocks		
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 237 - type 1	0.5 m/s
Min. force	0.09 Nm (0.25 Nm (→))	initial 20 N - final 40 N
Travel diagrams	page 238 - group 4	page 238 - group 6

All measures in the drawings are in mm

Position switches with revolving lever without actuator

All measures in the drawings are in mm

	Regular head	Compact head
		
Contact blocks		
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
Min. force	0.09 Nm (0.25 Nm (→))	0.05 Nm (0.25 Nm (→))
Travel diagrams	page 238 - group 4	page 238 - group 4

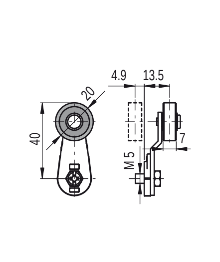
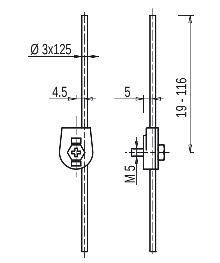
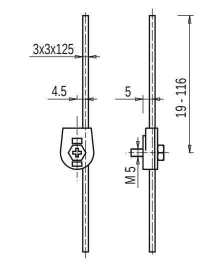
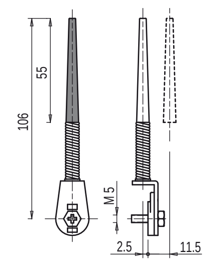
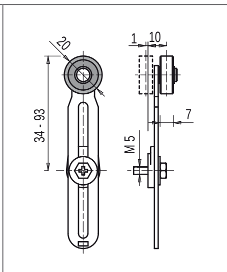
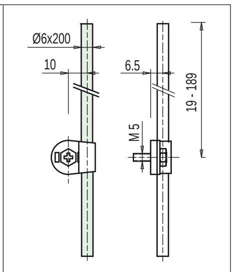
IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

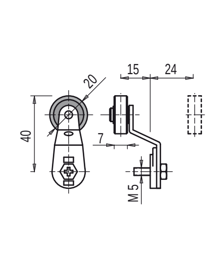
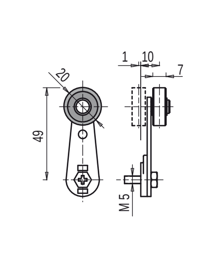
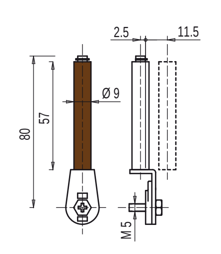
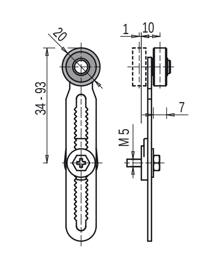
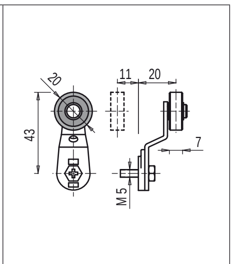
All measures in the drawings are in mm

Loose actuators

All measures in the drawings are in mm

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

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 fiber glass 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 225

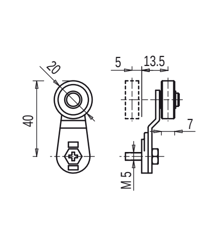
➔ The 2D/3D files are available at **www.pizzato.com**

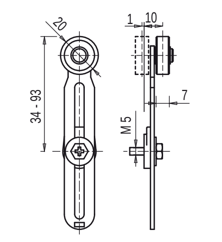
Special loose actuators

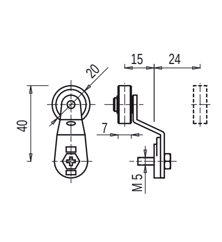
All measures in the drawings are in mm

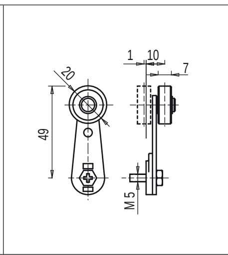
IMPORTANT: These loose actuators can be used with items of series FD, FP, FL, FC only.

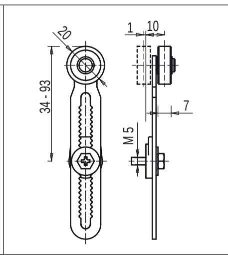
Stainless steel rollers, Ø 20 mm

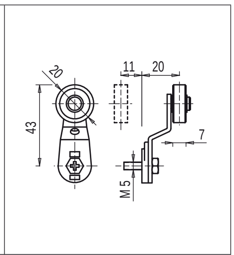

VF L31-R24


VF L35-R24 (1) (3)

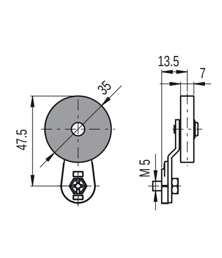

VF L51-R24

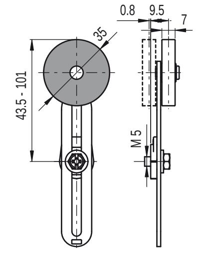

VF L52-R24

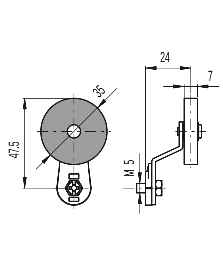

VF L56-R24 (3)

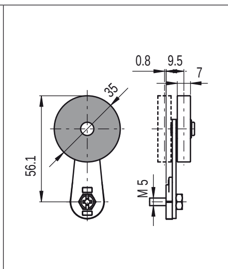

VF L57-R24

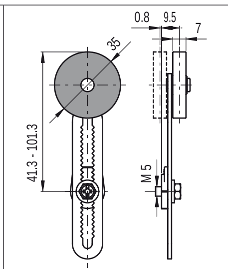
Technopolymer rollers, Ø 35 mm

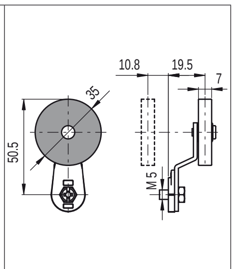

VF L31-R25 (4)


VF L35-R25 (1) (3)

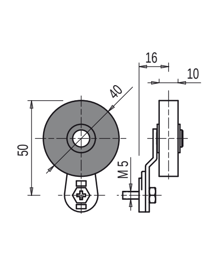

VF L51-R25 (4)

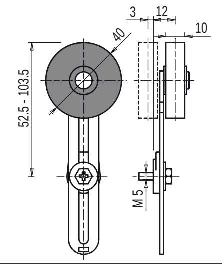

VF L52-R25

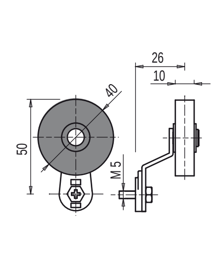

VF L56-R25 (3)

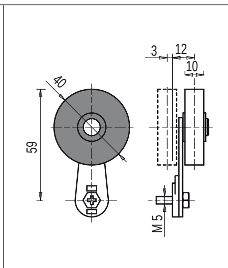

VF L57-R25

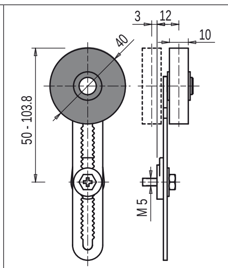
Rubber rollers, Ø 40 mm

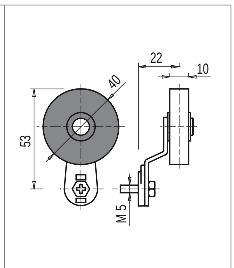

VF L31-R5 (4)


VF L35-R5 (1) (3)

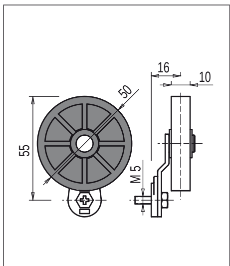

VF L51-R5 (4)

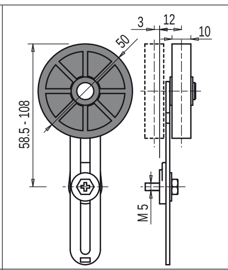

VF L52-R5

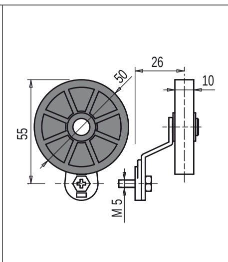

VF L56-R5 (3)

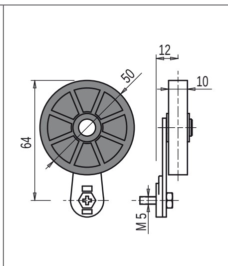

VF L57-R5 (4)

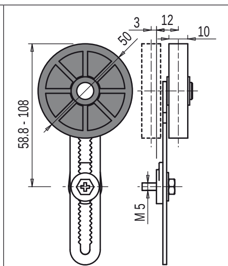
Rubber rollers, Ø 50 mm

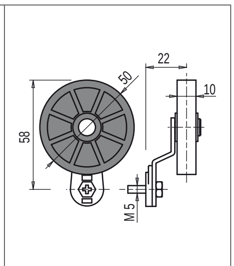

VF L31-R26 (4)


VF L35-R26 (1) (3)

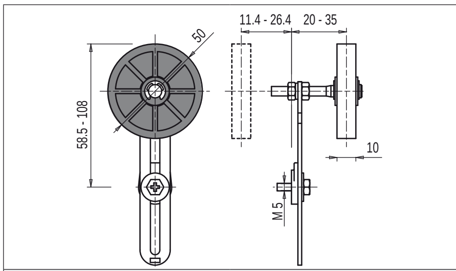

VF L51-R26 (4)

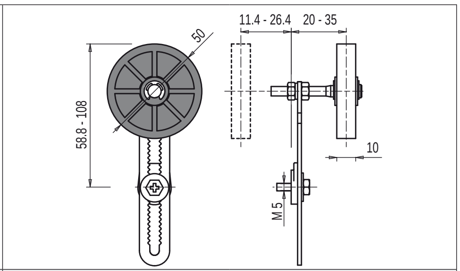

VF L52-R26 (4)


VF L56-R26 (3)

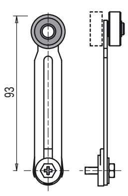

VF L57-R26 (4)

Protruding rubber rollers, Ø 50 mm


VF L35-R27 (1) (3)


VF L56-R27 (3)

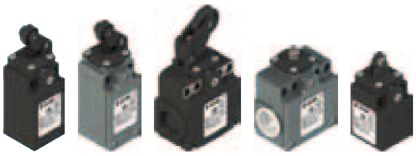
- (1) Actuator VF L35 can only be used in safety applications if adjusted to its max. length, as shown in figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (2) The position switch obtained by assembling switch FC •58-M2 (e.g. FC 358-M2, 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 could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.
- (4) The actuator cannot be rotated to the inside because it will mechanically interfere with the switch head.



Accessories See page 225

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

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 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.
The product range that Pizzato Elettrica can offer in the field of position switches is one of the widest in the world. Moreover, the use of high quality materials, high reliability technologies as twin bridge contact blocks and the protection degree IP67, 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 IEC 60529. They can therefore be used in all environments where the maximum protection of the housing is required.

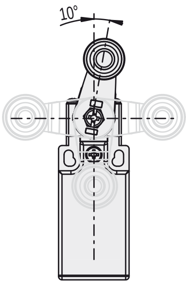
Extended temperature range

-40°C

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

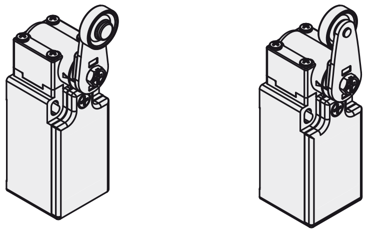
Adjustable levers

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.



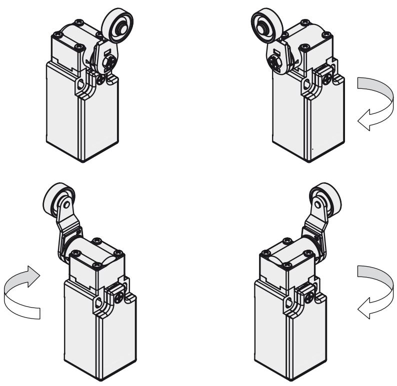
Overturning levers

For switches with swivelling lever the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.

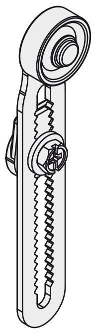


Orientable heads

In all switches, it is possible to rotate the head in 90° steps.



Adjustable safety lever



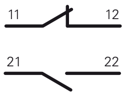
The code 56 adjustable lever (and variants) has a notching that prevents the sliding also in case the retaining screw becomes loose.
The particular positive locking makes it suitable for safety applications.

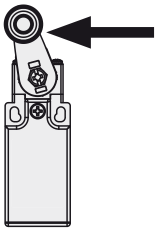
Independent contacts

The contact block 16 has two NC contacts**, both with positive opening** activated independently according to the operating direction of the lever.

Lever turned to left

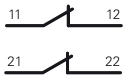
Contact diagram

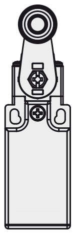




Lever not turned

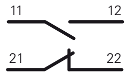
Contact diagram

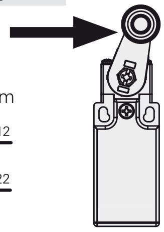




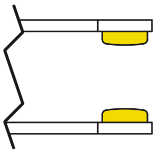
Lever turned to right

Contact diagram





Gold-plated contacts

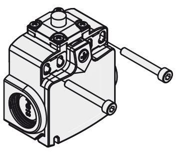


The contact blocks of these devices can be supplied gold-plated upon request. It is ideal for all applications with low voltages or currents and it ensures greater contact reliability. The high-thickness coating > 1 micron ensures the mechanical endurance of the coating over time.

Contact blocks

Contact blocks with captive screws, finger protection, twin bridge contacts and double interruption for a higher contact reliability. Available in multiple variants with shifted activation strokes, which can be simultaneous or overlapping. They are suitable for different kinds of applications.

Fixing plates



The technopolymer switches of the FX series come with two robust fixing plates. This solution makes it possible to avoid the underhead washer and ensures that the fixing of the switch is more stable over time.

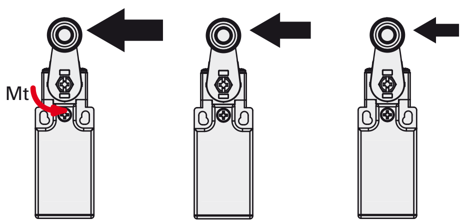
Stainless steel external metallic parts

AISI 304

Upon request some of these devices can be supplied with stainless steel external metallic parts instead of the usual zinc-plated steel. It is an ideal solution for environments with the presence of aggressive chemical agents or saline mist. See page 219.

Increased or reduced actuating force

For actuators with swivelling levers, versions with increased or reduced actuating force are available on request. This feature allows selection of a switch perfectly tailored for the application. For further information contact the Technical Department.

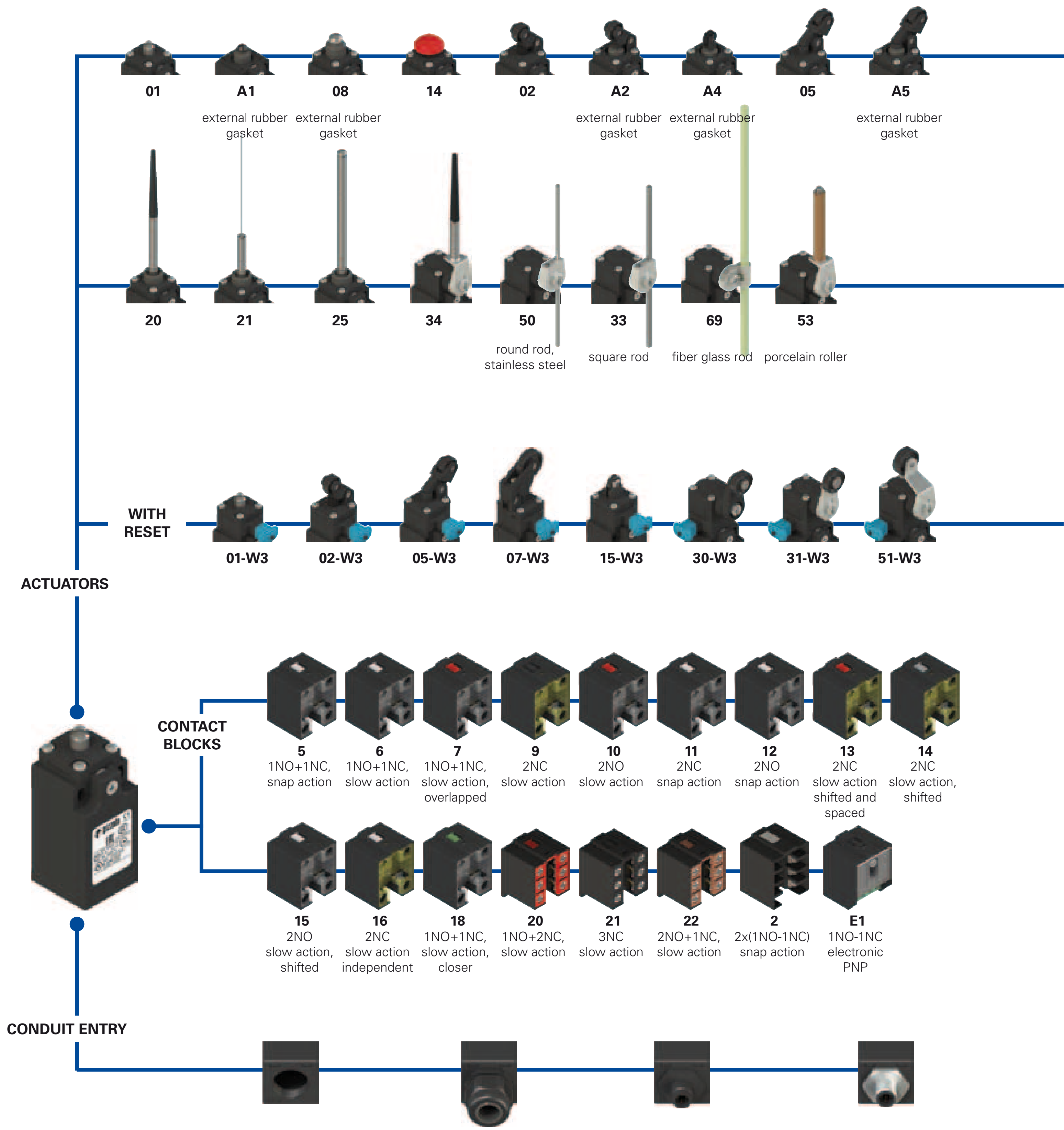


Increased force

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…Ø 12 mm
K27	for cables Ø 3…Ø 7 mm

With M12 plastic connector

K70	4 poles, bottom
K45	8 poles, bottom

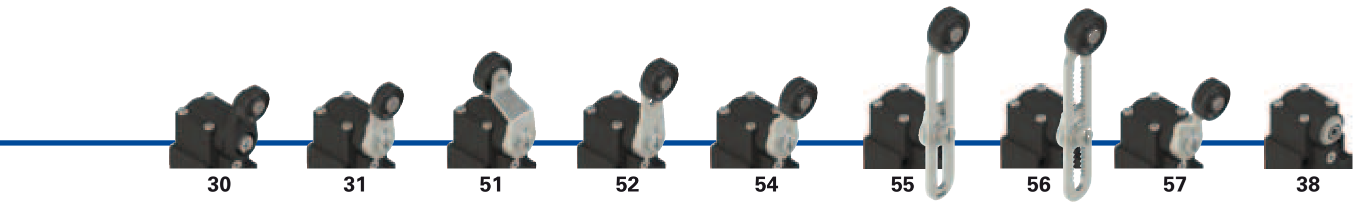
With M12 metal connector

K40	8 poles, bottom
K60	4 poles, bottom

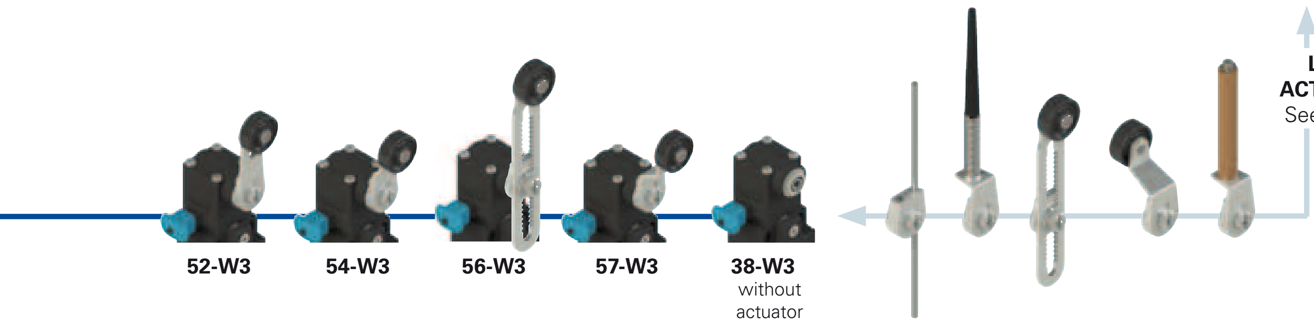
product options

accessory sold separately

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

LOOSE ACTUATORS
See page 69

Code structure

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

article: **FR 502** - options: W3XG **M2** options: K70R23T6

FR 502-W3XGM2K70R23T6

Housing	
FR	technopolymer, one conduit entry

Contact blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

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

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 with 1 µm gold coating (not for contact block 2)

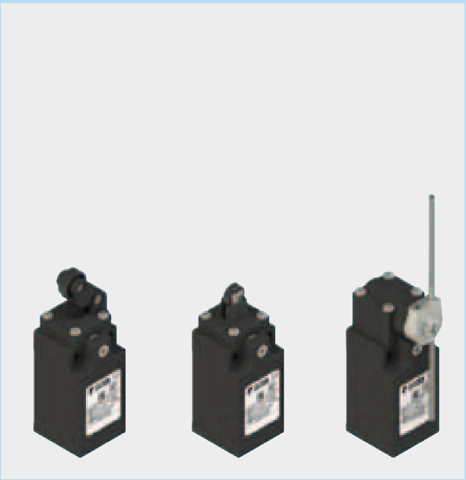
Threaded conduit entry	
M2	M20x1.5 (standard)
M1	M16x1.5
	PG 13.5
A	PG 11
M3	1/2 NPT

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

Pre-installed cable glands or connectors	
	without cable gland or connector (standard)
K23	cable gland for cables Ø 6…Ø 12 mm
K70	M12 plastic connector, 4 poles

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

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)



Technical data

Housing

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

One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 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 conformity 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.

In conformity with the requirements of:
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.

Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Main features

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

Markings and quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2007010305230013
EAC approval:	RU C-IT ДМ94.В.01024

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 240. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

	Electrical data		Utilization category
without connector	Thermal current (Ith): Rated insulation voltage (Ui): Rated impulse withstand voltage (U_{imp}): Conditional short circuit current: Protection against short circuits: Pollution degree:	10 A 500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 2, 11, 12, 20, 21, 22, 33, 34) 6 kV 4 kV (contact blocks 20, 21, 22, 33, 34) 1000 A according to EN 60947-5-1 type aM fuse 10 A 500 V 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 250 400 500 Ie (A) 6 4 1 Direct current: DC13 Ue (V) 24 125 250 Ie (A) 6 1.1 0.4
with connector M12, 4 poles	Thermal current (Ith): Rated insulation voltage (Ui): Protection against short circuits: Pollution degree:	4 A 250 Vac 300 Vdc type gG fuse 4 A 500 V 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 120 250 Ie (A) 4 4 4 Direct current: DC13 Ue (V) 24 125 250 Ie (A) 4 1.1 0.4
with connector M12, 8 poles	Thermal current (Ith): Rated insulation voltage (Ui): Protection against short circuits: Pollution degree:	2 A 30 Vac 36 Vdc type gG fuse 2 A 500 V 3	Alternating current: AC15 (50÷60 Hz) Ue (V) 24 Ie (A) 2 Direct current: DC13 Ue (V) 24 Ie (A) 2

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

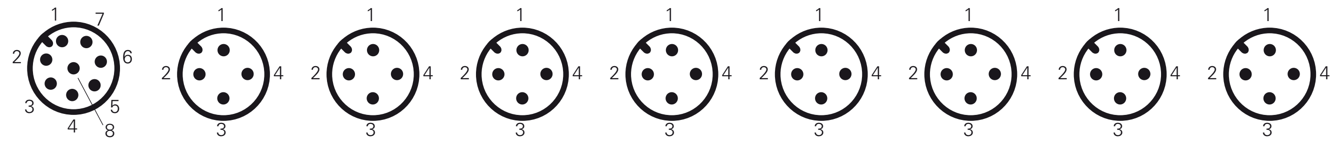
Characteristics approved by UL

Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

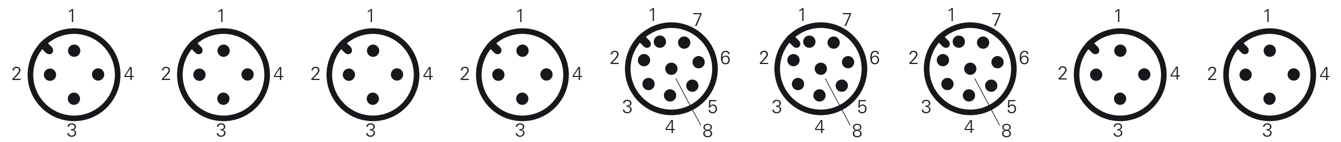
In conformity with standard: UL 508, CSA 22.2 No.14

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

Connection diagram for M12 connectors

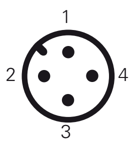


Contact block 2 1NO-1NC+1NO-1NC		Contact block 5 1NO+1NC		Contact block 6 1NO+1NC		Contact block 7 1NO+1NC		Contact block 9 2NC		Contact block 10 2NO		Contact block 11 2NC		Contact block 12 2NO		Contact block 13 2NC	
M12 connector, 8 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles	
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.**
NO	3-4	NC	1-2	NC	1-2	NC	1-2	NC	1-2	NO	1-2	NC	1-2	NO	1-2	NC (1°)	1-2
NC	5-6	NO	3-4	NO	3-4	NO	3-4	NC	3-4	NO	3-4	NC	3-4	NO	3-4	NC (2°)	3-4
NC	7-8																
NO	1-2																



Contact block 14 2NC		Contact block 15 2NO		Contact block 16 2NC		Contact block 18 1NO+1NC		Contact block 20 2NC+1NO		Contact block 21 3NC		Contact block 22 1NC+2NO		Contact block 33 1NC+1NO		Contact block 34 2NC	
M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 4 poles		M12 connector, 4 poles	
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.**
NC (1°)	1-2	NO (1°)	1-2	NC, lever at the right	1-2	NC	1-2	NC	3-4	NC	3-4	NC	3-4	NC	1-2	NC	1-2
NC (2°)	3-4	NO (2°)	3-4	NC, lever to the left	3-4	NO	3-4	NC	5-6	NC	5-6	NO	5-6	NO	3-4	NC	3-4
								NO	7-8	NC	7-8	NO	7-8				

Contact block E1
PNP

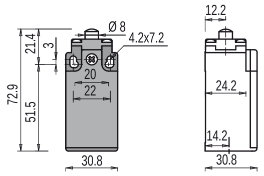
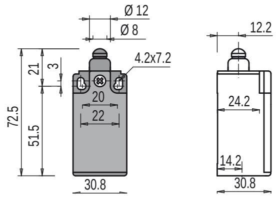
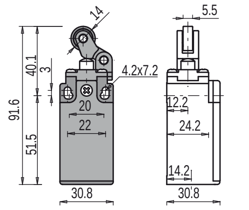
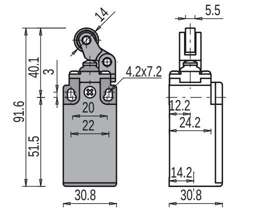


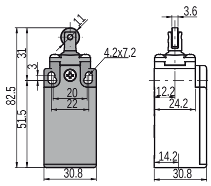
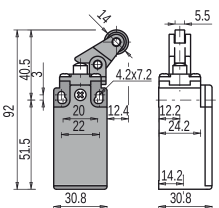
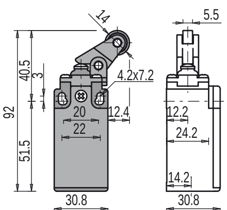
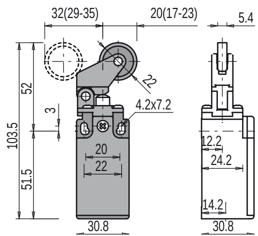
M12 connector, 4 poles

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **⅄** = electronic PNP

Contact blocks			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 239 - type 4	page 239 - type 4	page 239 - type 3	page 239 - type 3
Min. force		8 N (25 N (→))	6 N (25 N (→))	6 N (25 N (→))	4.3 N (25 N (→))
Travel diagrams		page 240 - group 1	page 240 - group 1	page 240 - group 2	page 240 - group 2

Contact blocks		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 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 239 - type 5	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		6 N (25 N (→))	6 N (25 N (→))	4.3 N (25 N (→))	4 N (25 N (→))
Travel diagrams		page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 3

All measures in the drawings are in mm

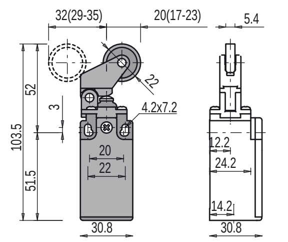
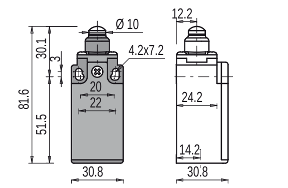
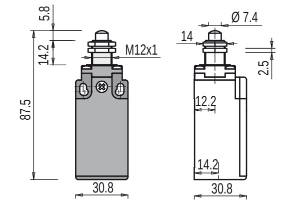
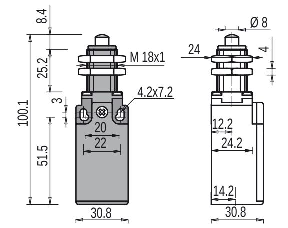
Items with code on **green** background are stock items

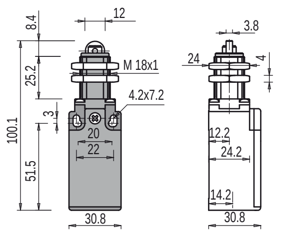
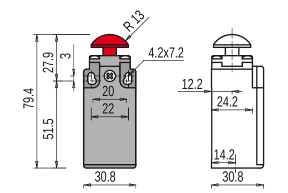
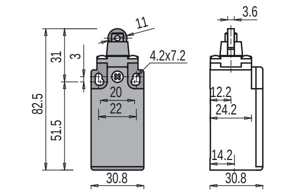
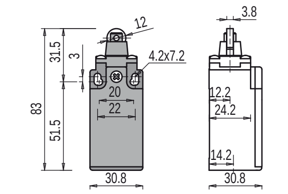
Accessories See page 225

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

Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- electronic PNP

Contact blocks		With external rubber gasket		With external rubber gasket		Fixed only by 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 239 - type 3		page 239 - type 4		page 239 - type 4		page 239 - type 4	
Min. force		3 N (25 N)		8 N (25 N)		8 N (25 N)		8 N (25 N)	
Travel diagrams		page 240 - group 3		page 240 - group 1		page 240 - group 1		page 240 - group 1	

Contact blocks						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 239 - type 2		page 239 - type 4		page 239 - type 2		page 239 - type 2	
Min. force		8 N (25 N)		8 N (25 N)		8 N (25 N)		8 N (25 N)	
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 1		page 240 - group 1	

All measures in the drawings are in mm

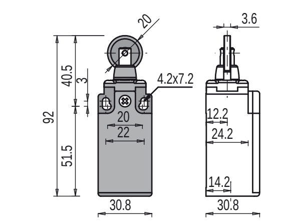
Items with code on **green** background are stock items

Accessories See page 225

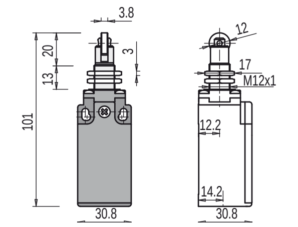
The 2D/3D files are available at **www.pizzato.com**

Contact type:

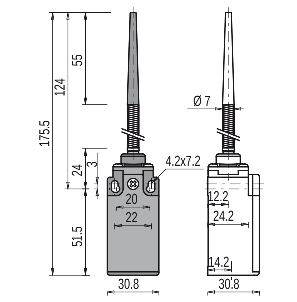
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP



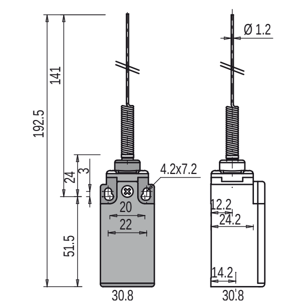
Fixed only by threaded head in vertical position



With external rubber gasket

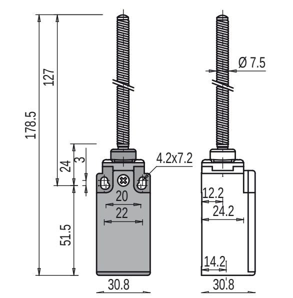


With external rubber gasket

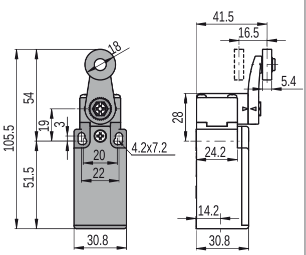


Contact blocks					
5	R	FR 516-M2 1NO+1NC	FR 517-M2 1NO+1NC	FR 520-M2 1NO+1NC	FR 521-M2 1NO+1NC
6	L	FR 616-M2 1NO+1NC	FR 617-M2 1NO+1NC		
7	LO	FR 716-M2 1NO+1NC	FR 717-M2 1NO+1NC		
9	L	FR 916-M2 2NC	FR 917-M2 2NC		
10	L	FR 1016-M2 2NO	FR 1017-M2 2NO	FR 1020-M2 2NO	FR 1021-M2 2NO
11	R	FR 1116-M2 2NC	FR 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 239 - type 2	page 239 - type 2	1 m/s	1 m/s
Min. force		8 N (25 N)	8 N (25 N)	0.07 Nm	0.07 Nm
Travel diagrams		page 240 - group 1	page 240 - group 1	page 240 - group 4	page 240 - group 4

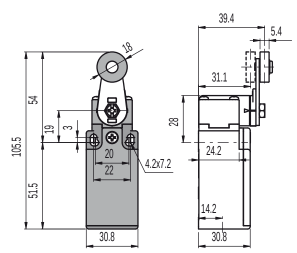
With external rubber gasket



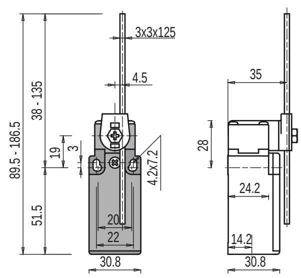
With Ø 20 mm stainless steel roller on request



Other rollers available. See on page 70



Square rod, 3x3 mm



Contact blocks					
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 239 - type 1	page 239 - type 1	1.5 m/s
Min. force		0.12 Nm	0.06 Nm (0.25 Nm)	0.06 Nm (0.25 Nm)	0.06 Nm
Travel diagrams		page 240 - group 4	page 240 - group 5	page 240 - group 5	page 240 - group 5

All measures in the drawings are in mm

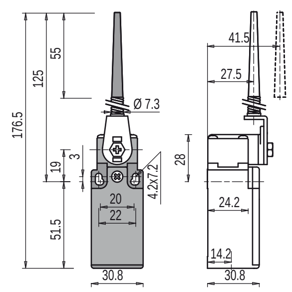
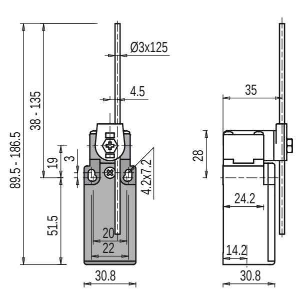
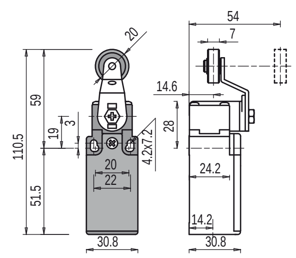
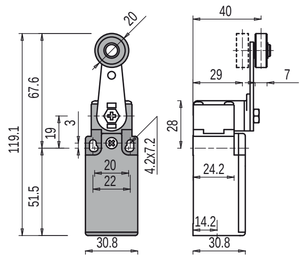
Items with code on **green** background are stock items

Accessories See page 225

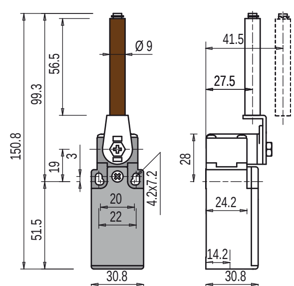
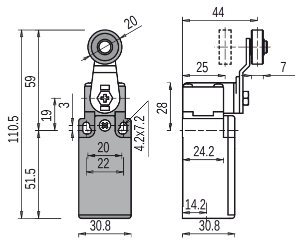
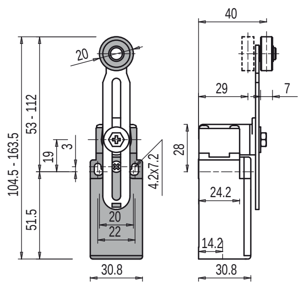
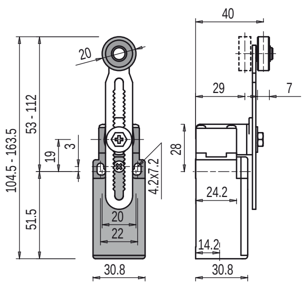
The 2D/3D files are available at **www.pizzato.com**

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **⏚** = electronic PNP

			Round rod, Ø 3 mm, stainless steel	Other rollers available. See on page 70	Other rollers available. See on page 70
					

Contact blocks									
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 239 - type 1		page 239 - type 1	
Min. force		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm (→))		0.06 Nm (0.25 Nm (→))	
Travel diagrams		page 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 5	

		Porcelain roller	Other rollers available. See on page 70	Other rollers available. See on page 70	Other rollers available. See on page 70
					

Contact blocks									
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 239 - type 1		page 239 - type 1		page 239 - type 1	
Min. 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 240 - group 6		page 240 - group 5		page 240 - group 5		page 240 - group 5	

(1) Positive opening only with actuator set to max. See page 69.

All measures in the drawings are in mm

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

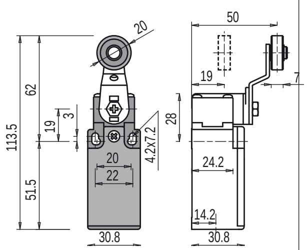
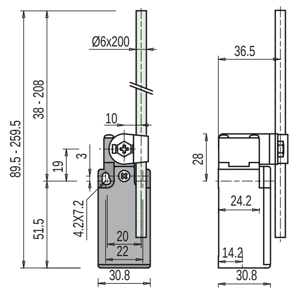
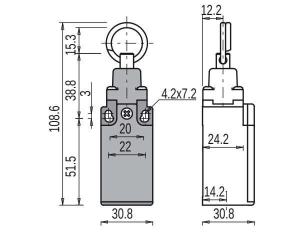
Accessories See page 225

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

Position switches **FR** series

Contact type:

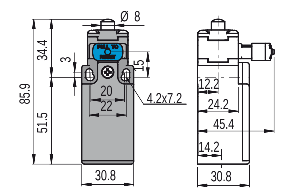
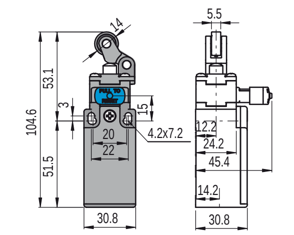
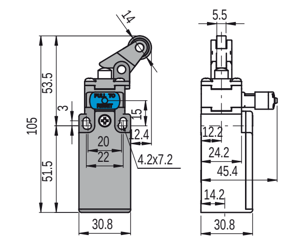
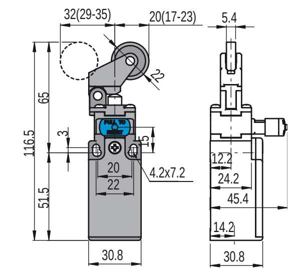
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP

Contact blocks		Other rollers available. See on page 70		Fiber glass 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 239 - type 1		1.5 m/s		0.5 m/s		
Min. force		0.06 Nm (0.25 Nm →)		0.06 Nm		initial 20 N - final 40 N		
Travel diagrams		page 240 - group 5		page 240 - group 5		page 240 - group 7		

Position switches **FR** series with reset

Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping.
The device is a block inserted between the switch body and the head, and could be rotated independently from this last one. This new device has following advantages:

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

Contact blocks				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 239 - type 4		page 239 - type 3		page 239 - type 3		page 239 - type 3	
Min. force		4.5 N (25 N →)		4 N (25 N →)		4 N (25 N →)		2.5 N (25 N →)	
Travel diagrams		page 241 - group 1		page 241 - group 2		page 241 - group 2		page 241 - group 3	

All measures in the drawings are in mm

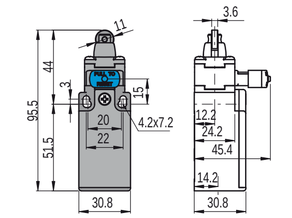
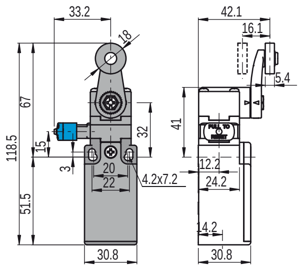
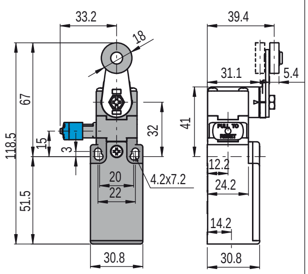
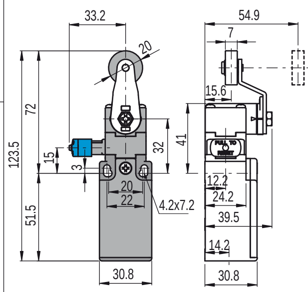
Items with code on **green** background are stock items

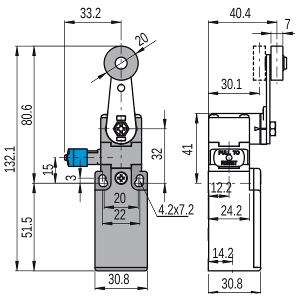
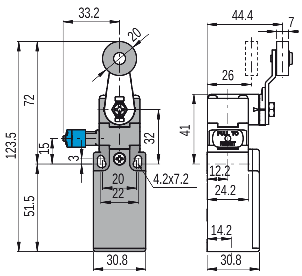
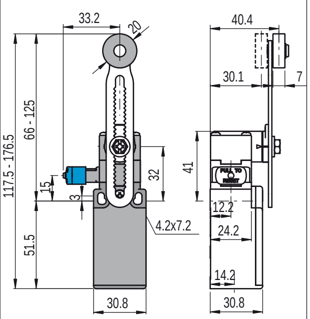
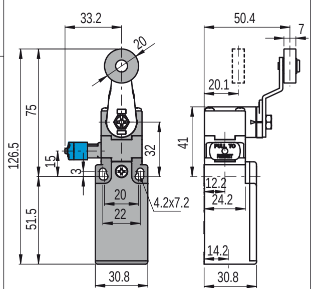
Accessories See page 225

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

Contact type:

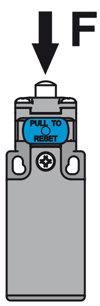
R = snap action
L = slow action

Contact blocks		With Ø 12 mm stainless steel roller on request		With Ø 20 mm stainless steel roller on request		Other rollers available. See on page 70		Other rollers available. See on page 70	
									
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 239 - type 2		page 239 - type 1		page 239 - type 1		page 239 - type 1	
Min. 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 241 - group 1		page 241 - group 4		page 241 - group 4		page 241 - group 4	

Contact blocks		Other rollers available. See on page 70		Other rollers available. See on page 70		Other rollers available. See on page 70		Other rollers available. See on page 70	
									
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 239 - type 1		page 239 - type 1		page 239 - type 1		page 239 - type 1	
Min. 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 241 - group 4		page 241 - group 4		page 241 - group 4		page 241 - group 4	

All measures in the drawings are in mm

Increased actuating force



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

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

Accessories See page 225

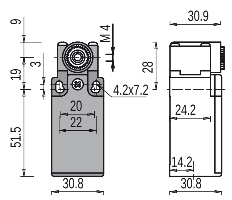
→ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

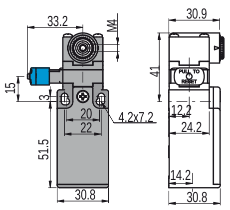
All measures in the drawings are in mm

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP



With manual reset knob



Contact blocks				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	(electronic)	FR E138-M2	1NO-1NC		
Min. force		0.06 Nm (0.25 Nm (→))		0.07 Nm (0.25 Nm (→))	
Travel diagrams		page 240 - group 5		page 241 - group 4	

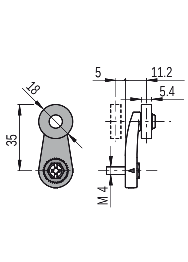
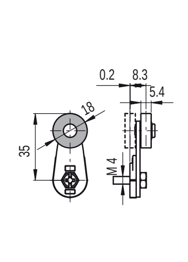
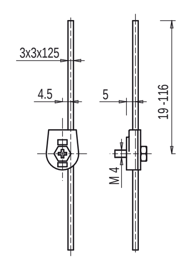
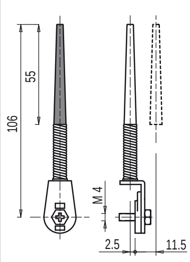
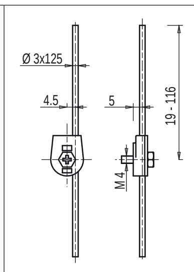
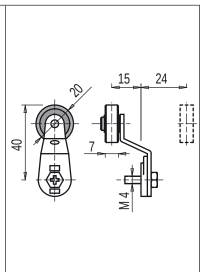
All measures in the drawings are in mm

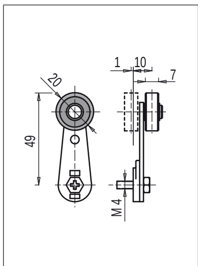
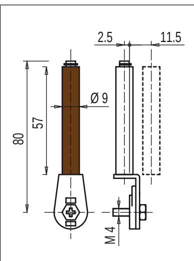
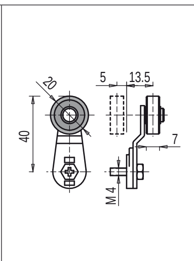
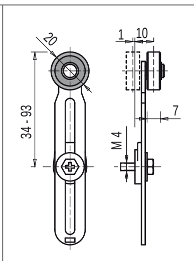
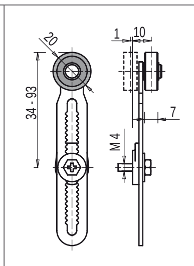
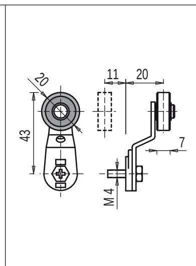
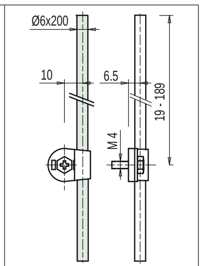
IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

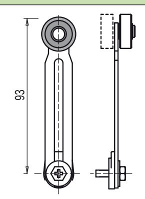
All measures in the drawings are in mm

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

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 fiber glass 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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF LE56.
- (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 mechanically interfere with the switch head.



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

Accessories See page 225

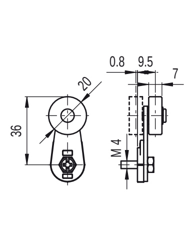
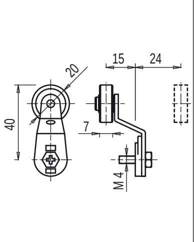
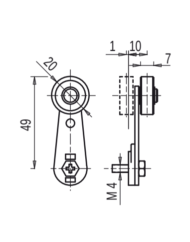
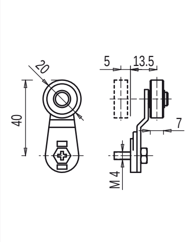
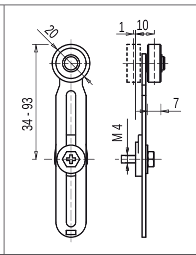
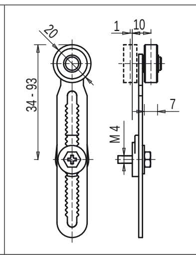
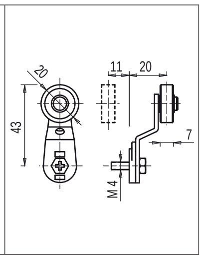
➔ The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

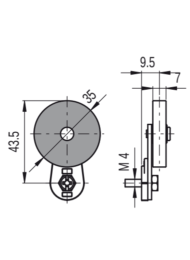
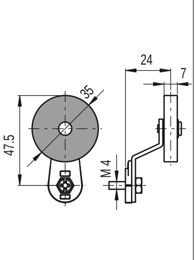
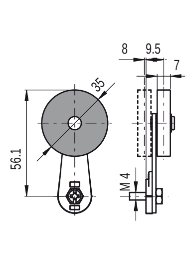
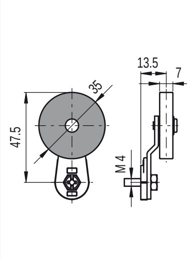
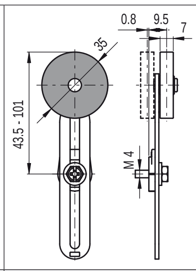
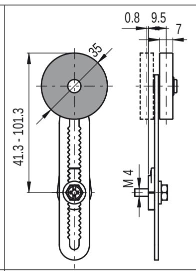
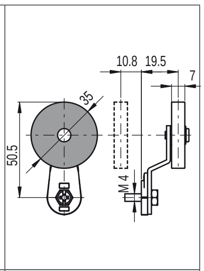
All measures in the drawings are in mm

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

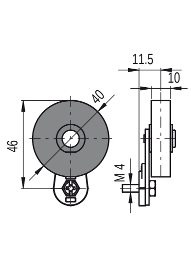
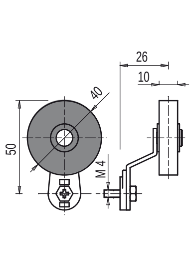
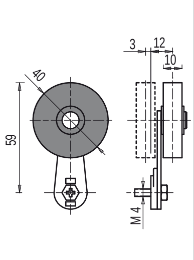
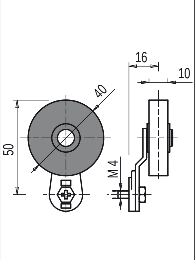
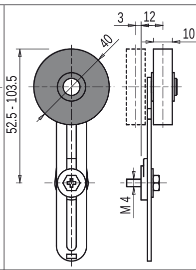
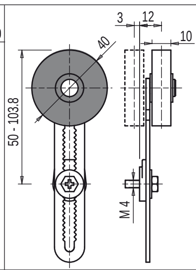
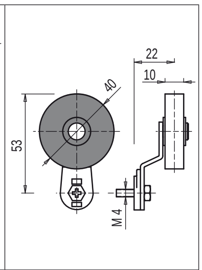
Stainless steel rollers, Ø 20 mm

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

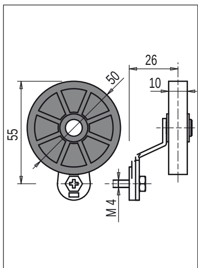
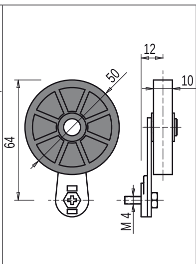
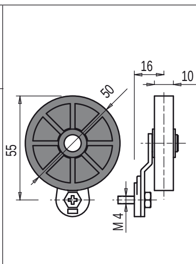
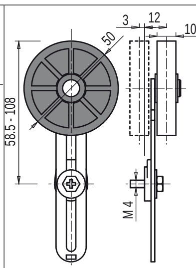
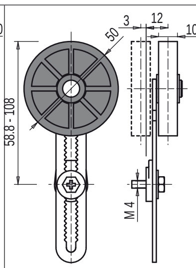
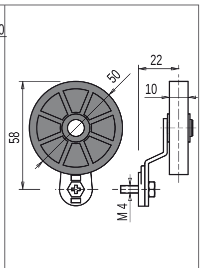
Technopolymer rollers, Ø 35 mm

						
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

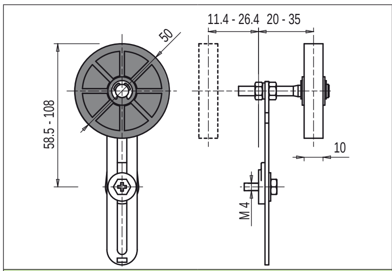
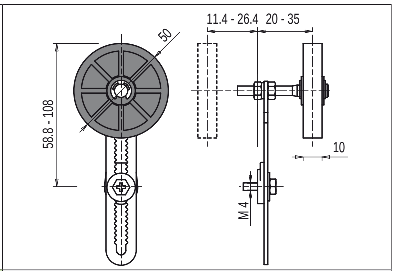
Rubber rollers, Ø 40 mm

						
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

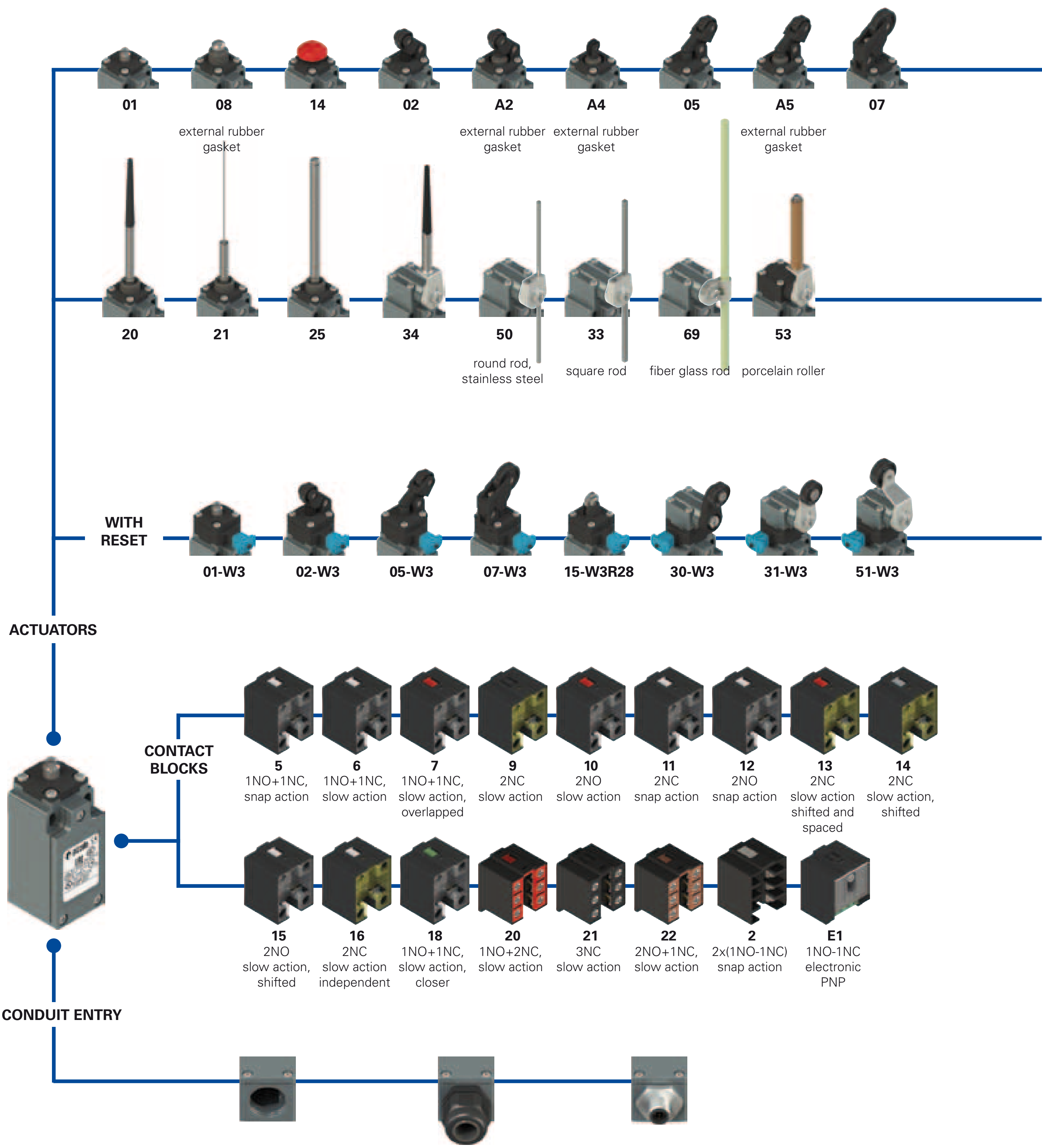
	
VF LE55-R27 (1)	VF LE56-R27

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

Accessories See page 225

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

Selection diagram



Threaded conduit entry

M2	M20x1.5 (standard)
	PG 13.5

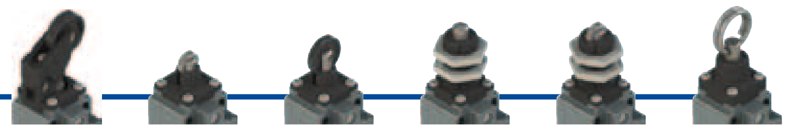
With cable gland

K23	for cables Ø 6…Ø 12 mm
K27	for cables Ø 3…Ø 7 mm

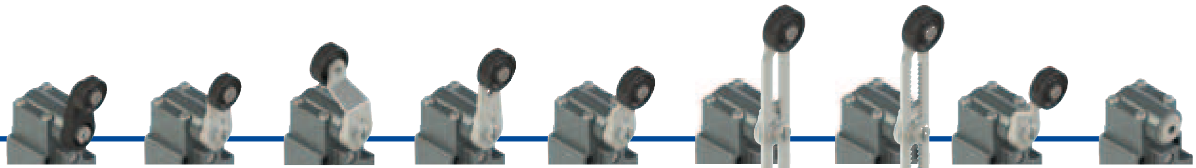
With M12 metal connector

K40	8 poles, bottom
K50	5 poles, bottom

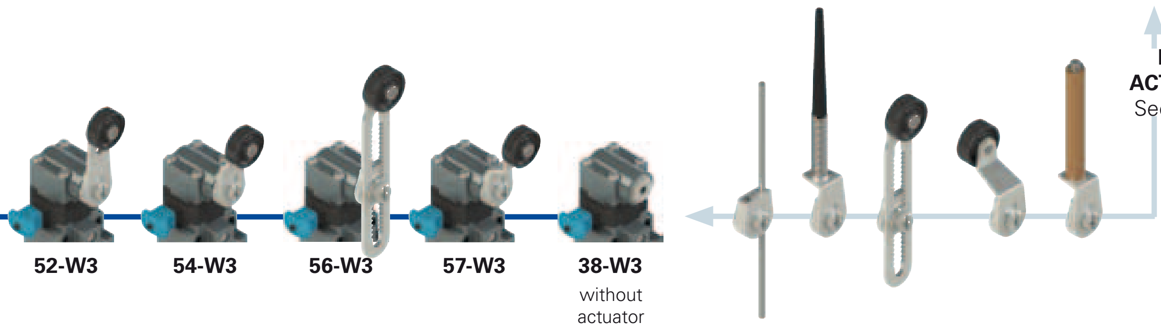
product options
accessory sold separately



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 adjustable lever | 56 adjustable safety lever | 57 | 38 without actuator



52-W3 | 54-W3 | 56-W3 | 57-W3 | 38-W3 without actuator

LOOSE ACTUATORS
See page 81

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 blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

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

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

Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating (not for contact block 2)

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

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

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

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

Markings and quality marks:

IMQ approval:	EG609
UL approval:	E131787
CCC approval:	2007010305229998
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing

Metal housing, baked powder coating	
One threaded conduit entry:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm^2	(1 x AWG 22)
	max.	2 x 1.5 mm^2	(2 x AWG 16)
Contact block 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18:	min.	1 x 0.5 mm^2	(1 x AWG 20)
	max.	2 x 2.5 mm^2	(2 x AWG 14)
Contact block 2:	min.	1 x 0.5 mm^2	(1 x AWG 20)
	max.	2 x 1.5 mm^2	(2 x AWG 16)

In conformity 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.

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 240. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

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)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	type aM fuse 10 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

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

Direct current: DC13

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

with M12 con-nector 5 poles

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Protection against short circuits:	type gG fuse 4 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

with M12 con-nector 8 poles

Thermal current (Ith):	2 A
Rated insulation voltage (Ui):	30 Vac 36 Vdc
Protection against short circuits:	type gG fuse 2 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24
Ie (A)	2

Direct current: DC13

Ue (V)	24
Ie (A)	2

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

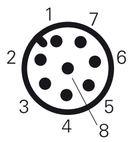
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

Connection diagram for M12 connectors

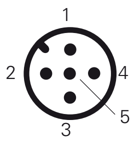
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8 poles

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

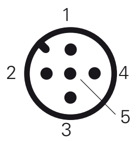
Contact block 5
1NO+1NC



M12 connector, 5 poles

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

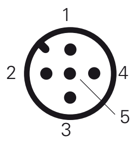
Contact block 6
1NO+1NC



M12 connector, 5 poles

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

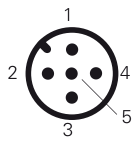
Contact block 7
1NO+1NC



M12 connector, 5 poles

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

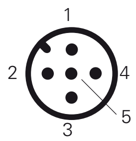
Contact block 9
2NC



M12 connector, 5 poles

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

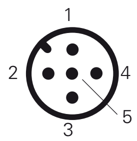
Contact block 10
2NO



M12 connector, 5 poles

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

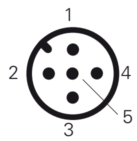
Contact block 11
2NC



M12 connector, 5 poles

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

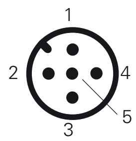
Contact block 12
2NO



M12 connector, 5 poles

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

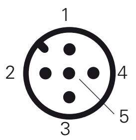
Contact block 13
2NC



M12 connector, 5 poles

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

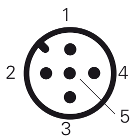
Contact block 14
2NC



M12 connector, 5 poles

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

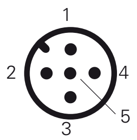
Contact block 15
2NO



M12 connector, 5 poles

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

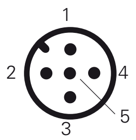
Contact block 16
2NC



M12 connector, 5 poles

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

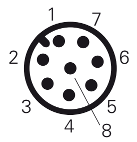
Contact block 18
1NO+1NC



M12 connector, 5 poles

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

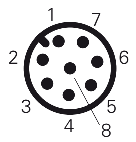
Contact block 20
2NC+1NO



M12 connector, 8 poles

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

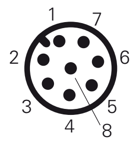
Contact block 21
3NC



M12 connector, 8 poles

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

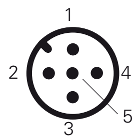
Contact block 22
1NC+2NO



M12 connector, 8 poles

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

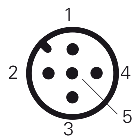
Contact block 33
1NC+1NO



M12 connector, 5 poles

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

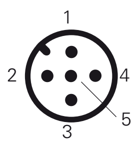
Contact block 34
2NC



M12 connector, 5 poles

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

Contact block E1
PNP

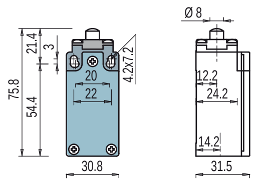
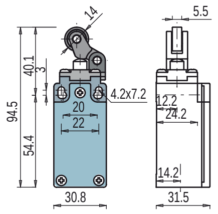
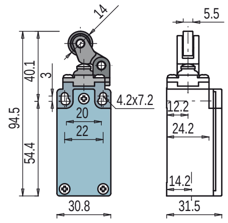
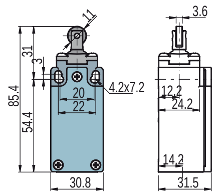


M12 connector, 5 poles

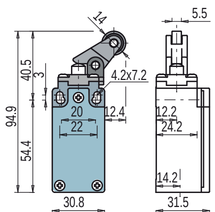
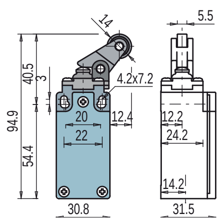
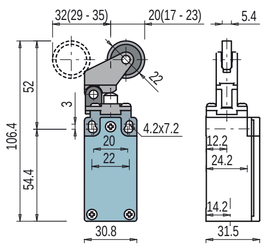
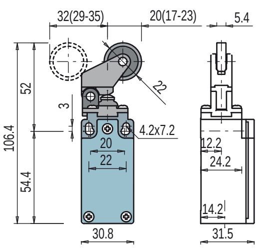
Contacts	Pin no.
+	1
-	3
NC	2
NO	4
ground	5

Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- ⅄ = electronic PNP

			With stainless steel roller on request	With external rubber gasket With stainless steel roller on request	With external rubber gasket
					

Contact blocks									
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 239 - type 4		page 239 - type 3		page 239 - type 3		page 239 - type 5	
Min. force		8 N (25 N →)		6 N (25 N →)		4.3 N (25 N →)		4.3 N (25 N →)	
Travel diagrams		page 240 - group 1		page 240 - group 2		page 240 - group 2		page 240 - group 1	

		With stainless steel roller on request	With external rubber gasket With stainless steel roller on request		With external rubber gasket
					

Contact blocks									
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 239 - type 3		page 239 - type 3		page 239 - type 3		page 239 - type 3	
Min. force		6 N (25 N →)		4.3 N (25 N →)		4 N (25 N →)		3 N (25 N →)	
Travel diagrams		page 240 - group 2		page 240 - group 2		page 240 - group 3		page 240 - group 3	

All measures in the drawings are in mm

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

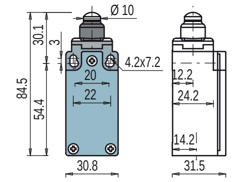
Accessories See page 225

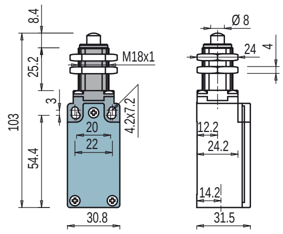
→ The 2D/3D files are available at **www.pizzato.com**

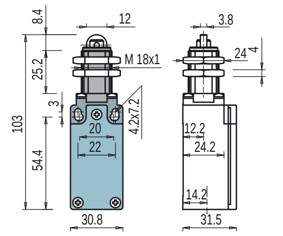
Contact type:

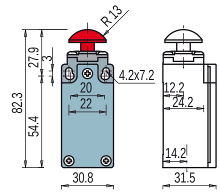
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP

With external rubber gasket





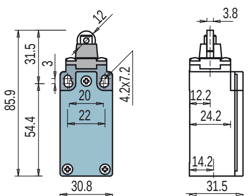


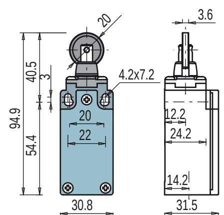


Contact blocks

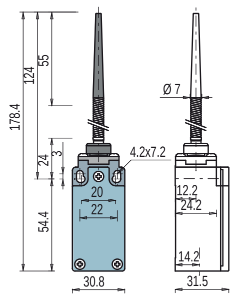
Contact blocks									
5	R	FM 508-M2	→ 1NO+1NC	FM 512-M2	→ 1NO+1NC	FM 513-M2	→ 1NO+1NC	FM 514-M2	→ 1NO+1NC
6	L	FM 608-M2	→ 1NO+1NC	FM 612-M2	→ 1NO+1NC	FM 613-M2	→ 1NO+1NC	FM 614-M2	→ 1NO+1NC
7	LO	FM 708-M2	→ 1NO+1NC	FM 712-M2	→ 1NO+1NC	FM 713-M2	→ 1NO+1NC	FM 714-M2	→ 1NO+1NC
9	L	FM 908-M2	→ 2NC	FM 912-M2	→ 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 239 - type 4		page 239 - type 4		page 239 - type 2		page 239 - type 4	
Min. force		8 N (25 N →)		8 N (25 N →)		8 N (25 N →)		8 N (25 N →)	
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 1		page 240 - group 1	

Roller, Ø 12 mm, stainless steel

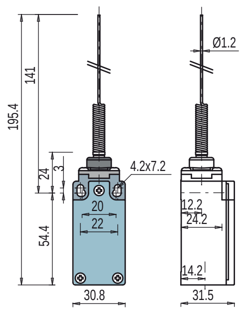




With external rubber gasket



With external rubber gasket



Contact blocks

Contact blocks									
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 239 - type 2		page 239 - type 2		1 m/s		1 m/s	
Min. force		8 N (25 N →)		8 N (25 N →)		0.07 Nm		0.07 Nm	
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 4		page 240 - group 4	

All measures in the drawings are in mm

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

Accessories See page 225

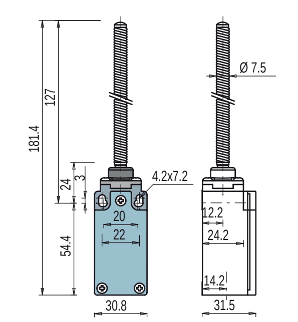
➔ The 2D/3D files are available at **www.pizzato.com**

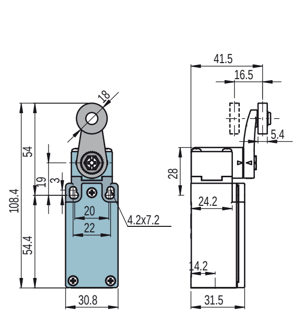
Position switches **FM** series

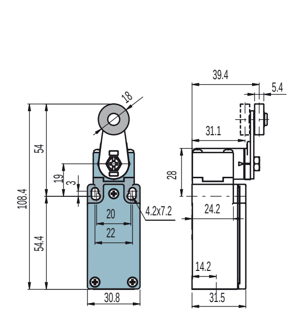
Contact type:

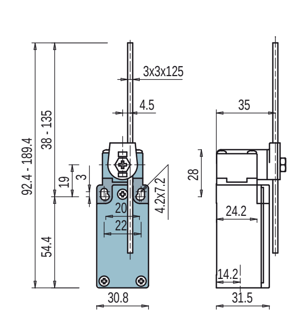
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP

		With external rubber gasket	With Ø 20 mm stainless steel roller on request	Other rollers available. See on page 82	Square rod, 3x3 mm





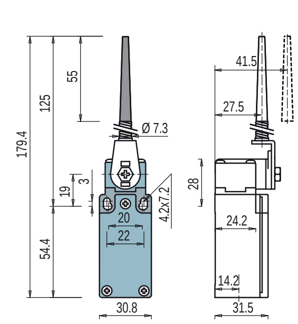


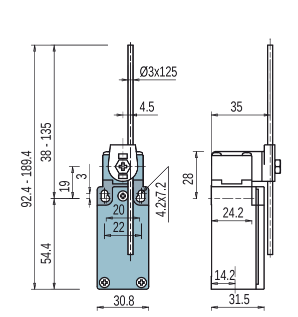


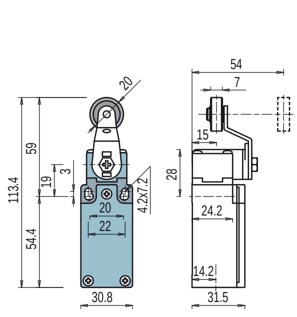
Contact blocks

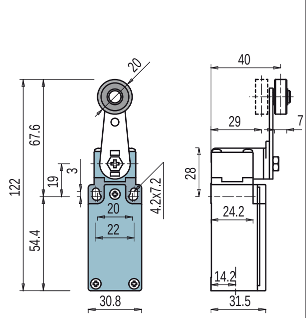
Contact blocks		With external rubber gasket		With Ø 20 mm stainless steel roller on request		Other rollers available. See on page 82		Square rod, 3x3 mm	
5	R	FM 525-M2	1NO+1NC	FM 530-M2	1NO+1NC	**FM 531-M2**	1NO+1NC	FM 533-M2	1NO+1NC
6	L			FM 630-M2	1NO+1NC	FM 631-M2	1NO+1NC	FM 633-M2	1NO+1NC
7	LO			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	(electronic)	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 239 - type 1		page 239 - type 1		1.5 m/s	
Min. force		0.12 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)		0.06 Nm	
Travel diagrams		page 240 - group 4		page 240 - group 5		page 240 - group 5		page 240 - group 5	

			Round rod, Ø 3 mm, stainless steel	Other rollers available. See on page 82	Other rollers available. See on page 82









Contact blocks

Contact blocks				Round rod, Ø 3 mm, stainless steel		Other rollers available. See on page 82		Other rollers available. See on page 82	
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	(electronic)	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 239 - type 1		page 239 - type 1	
Min. force		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm)		0.06 Nm (0.25 Nm)	
Travel diagrams		page 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 5	

All measures in the drawings are in mm

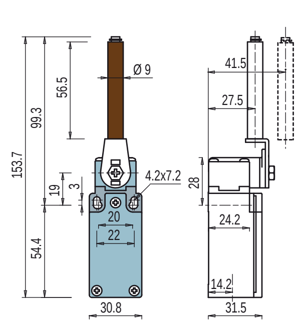
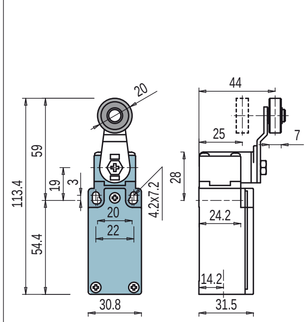
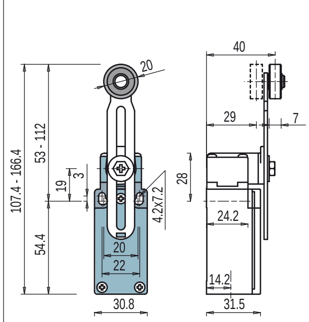
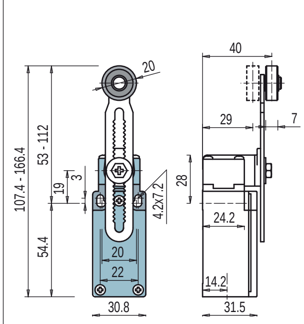
Items with code on **green** background are stock items

Accessories See page 225

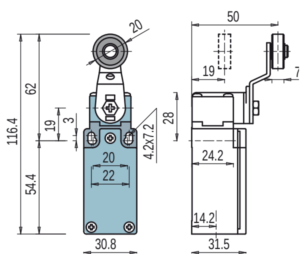
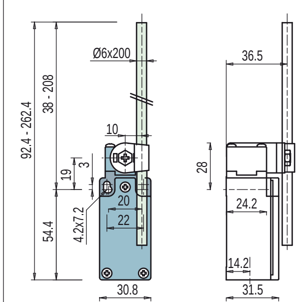
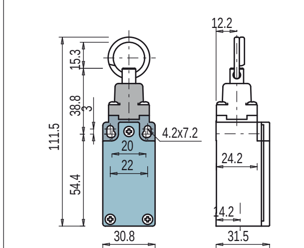
➔ The 2D/3D files are available at **www.pizzato.com**

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **(electronic symbol)** = electronic PNP

	Porcelain roller	Other rollers available. See on page 82	Other rollers available. See on page 82	Other rollers available. See on page 82
				

Contact blocks									
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	(electronic)	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 239 - type 1		page 239 - type 1		page 239 - type 1	
Min. 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 240 - group 6		page 240 - group 5		page 240 - group 5		page 240 - group 5	

	Other rollers available. See on page 82	Fiber glass rod	Rope switch for signalling
			

Contact blocks							
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	(electronic)	FM E157-M2	1NO-1NC	FM E169-M2	1NO-1NC		
Max. speed		page 239 - type 1		1.5 m/s		0.5 m/s	
Min. force		0.06 Nm (0.25 Nm (→))		0.06 Nm		initial 20 N - final 40 N	
Travel diagrams		page 240 - group 5		page 240 - group 5		page 240 - group 7	

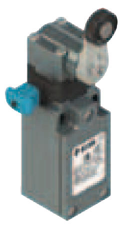
[1] Positive opening only with actuator set to max. See page 81.

All measures in the drawings are in mm

Accessories See page 225

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

Position switches FM series with reset

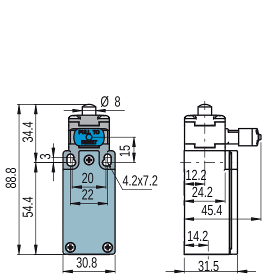
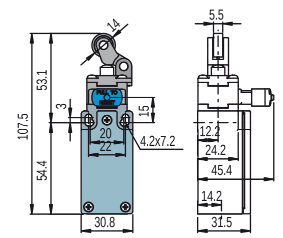
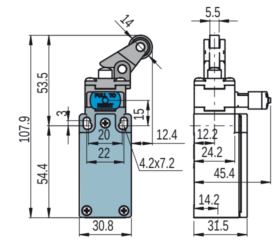
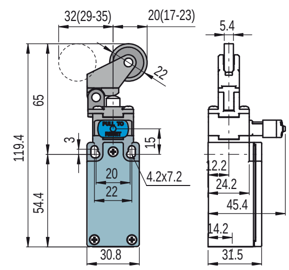


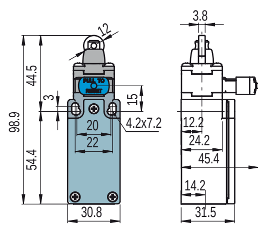
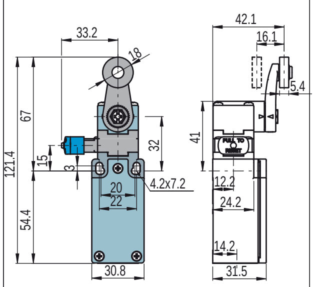
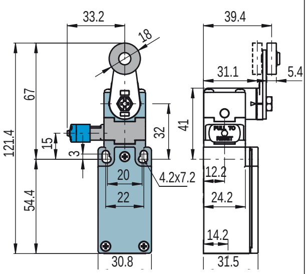
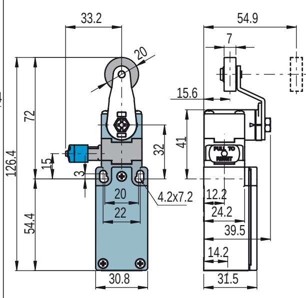
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. The new device is a block inserted between the switch body and the head, and could be rotated independently from this last one. This new device has following advantages:

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

Contact type:

R = snap action
L = slow action

Contact blocks			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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		4.5 N (25 N)	4 N (25 N)	4 N (25 N)	2.5 N (25 N)
Travel diagrams		page 241 - group 1	page 241 - group 2	page 241 - group 2	page 241 - group 3

Contact blocks		With Ø 12 mm stainless steel roller on request 	With Ø 20 mm stainless steel roller on request 	Other rollers available. See on page 82 	Other rollers available. See on page 82 
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 239 - type 2	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 1	page 241 - group 4	page 241 - group 4	page 241 - group 4

All measures in the drawings are in mm

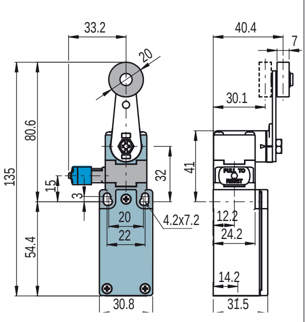
Accessories See page 225

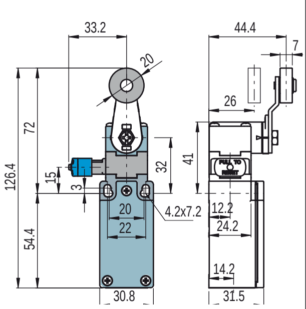
➔ The 2D/3D files are available at **www.pizzato.com**

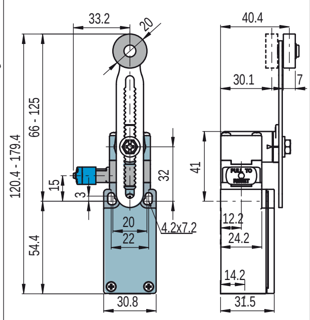
Contact type:

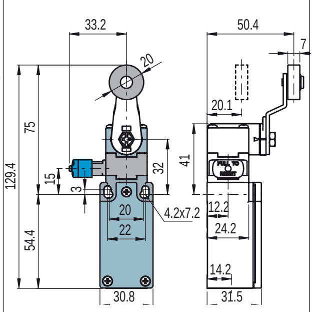
R = snap action
L = slow action

	Other rollers available. See on page 82	Other rollers available. See on page 82	Other rollers available. See on page 82	Other rollers available. See on page 82





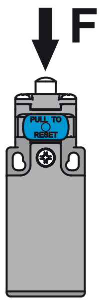




Contact blocks					
6	L	FM 652-W3M2 ➔ 1NO+1NC	FM 654-W3M2 ➔ 1NO+1NC	FM 656-W3M2 ➔ 1NO+1NC	FM 657-W3M2 ➔ 1NO+1NC
9	L	FM 952-W3M2 ➔ 2NC	FM 954-W3M2 ➔ 2NC	FM 956-W3M2 ➔ 2NC	FM 957-W3M2 ➔ 2NC
10	L	FM 1052-W3M2 2NO	FM 1054-W3M2 2NO	FM 1056-W3M2 2NO	FM 1057-W3M2 2NO
20	L	FM 2052-W3M2 ➔ 1NO+2NC	FM 2054-W3M2 ➔ 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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

All measures in the drawings are in mm

Increased actuating force



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

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

Accessories See page 225

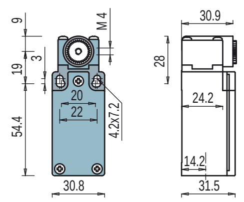
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

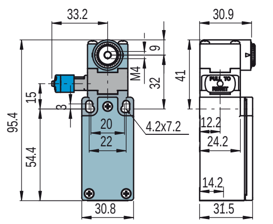
All measures in the drawings are in mm

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP



With manual reset knob



Contact blocks

Contact blocks	Type				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		
Min. force		0.06 Nm (0.25 Nm →)			0.07 Nm (0.25 Nm →)	
Travel diagrams		page 240 - group 5			page 241 - group 4	

All measures in the drawings are in mm

IMPORTANT

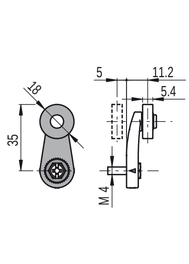
For safety applications: join only switches and actuators marked with symbol → aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

All measures in the drawings are in mm

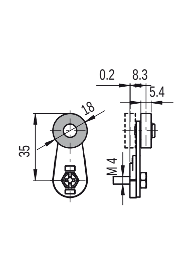
IMPORTANT: These loose actuators can be used with items of series FR, FM, FX, FZ and FK only.

Technopolymer roller Ø 18 mm



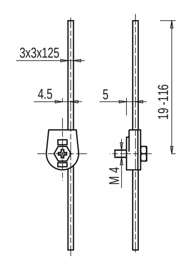
VF LE30 →

Technopolymer roller Ø 18 mm



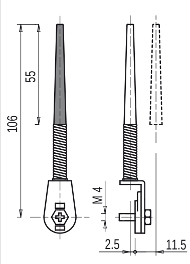
VF LE31 →

Adjustable square rod, 3x3x125 mm



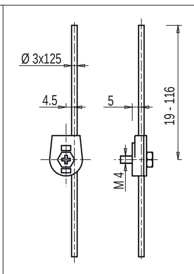
VF LE33

Flexible rod with pointed end



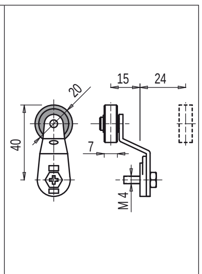
VF LE34

Adjustable round rod Ø 3x125 mm



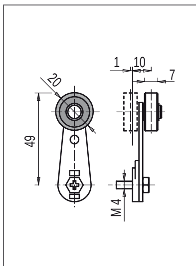
VF LE50

Technopolymer roller Ø 20 mm



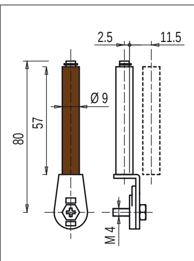
VF LE51 →

Technopolymer roller Ø 20 mm



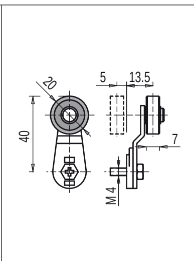
VF LE52 →

Porcelain roller



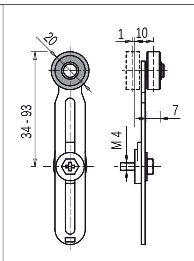
VF LE53 → (2)

Technopolymer roller Ø 20 mm



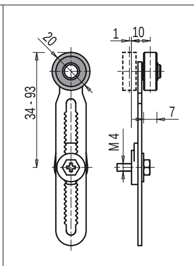
VF LE54 →

Adjustable actuator with technopolymer roller



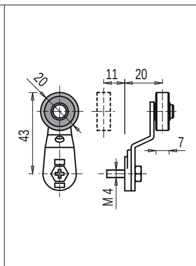
VF LE55 → (1)

Adjustable safety actuator with technopolymer roller



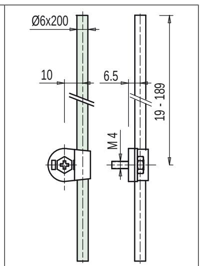
VF LE56 →

Technopolymer roller Ø 20 mm



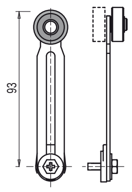
VF LE57 →

Adjustable fiber glass rod



VF LE69

- [1] Actuator VF LE55 can only be used in safety applications if adjusted to its max. length, as shown in figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF LE56.
- [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 mechanically interfere with the switch head.



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

Accessories See page 225

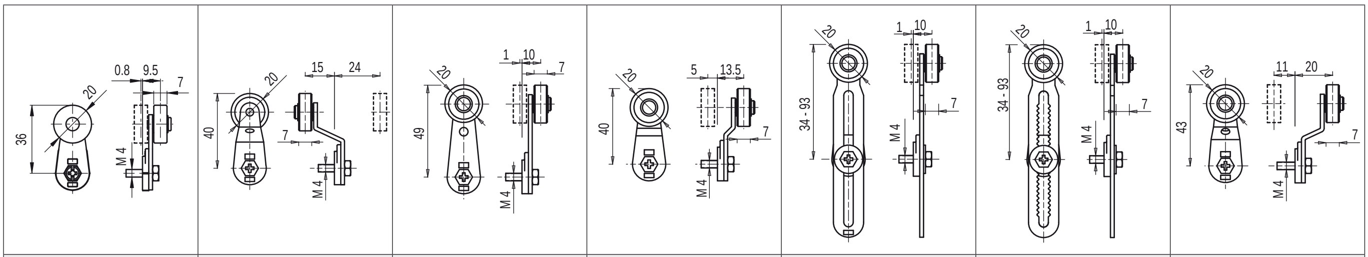
→ The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

All measures in the drawings are in mm

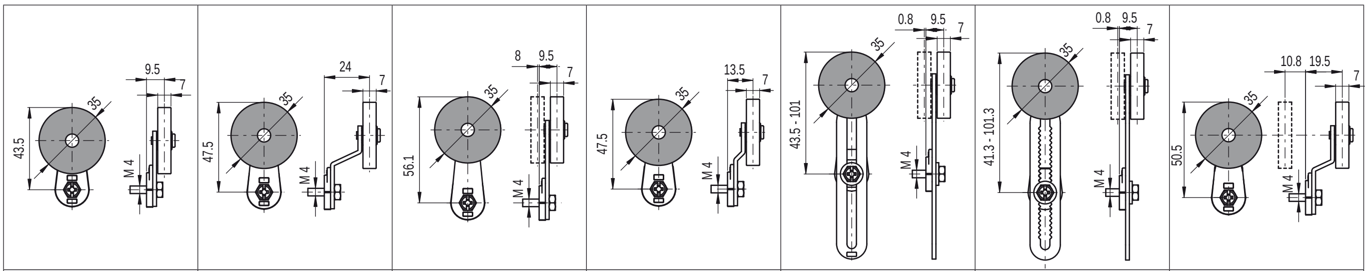
IMPORTANT: These loose actuators can be used with items of series FR, FM, FX, FZ and FK only.

Stainless steel rollers, Ø 20 mm



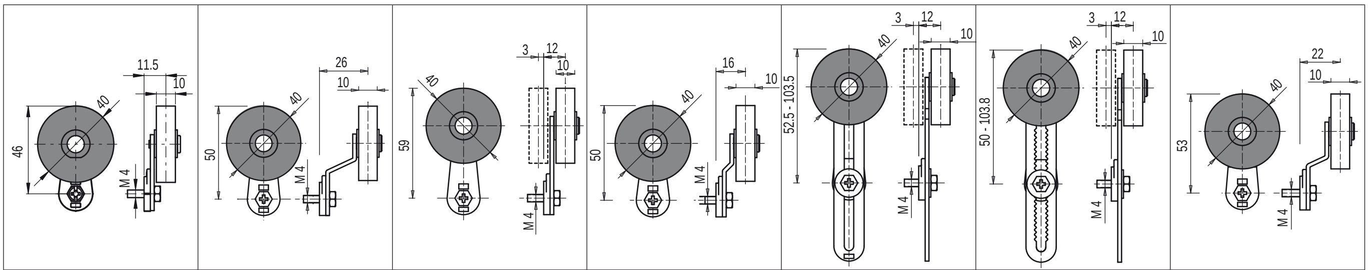
VF LE31-R24	VF LE51-R24	VF LE52-R24	VF LE54-R24	VF LE55-R24 (1)	VF LE56-R24	VF LE57-R24

Technopolymer rollers, Ø 35 mm



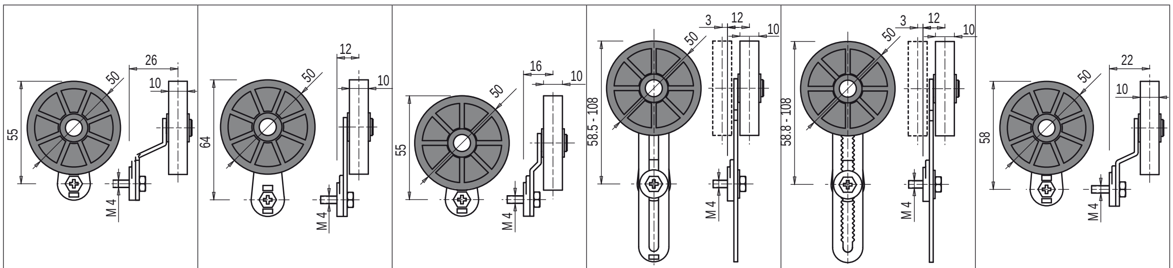
VF LE31-R25 (4)	VF LE51-R25 (4)	VF LE52-R25	VF LE54-R25 (4)	VF LE55-R25 (1)	VF LE56-R25	VF LE57-R25

Rubber rollers, Ø 40 mm



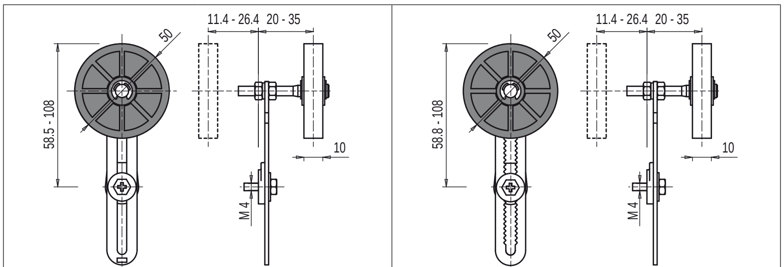
VF LE31-R5 (4)	VF LE51-R5 (4)	VF LE52-R5	VF LE54-R5 (4)	VF LE55-R5 (1)	VF LE56-R5	VF LE57-R5 (4)

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



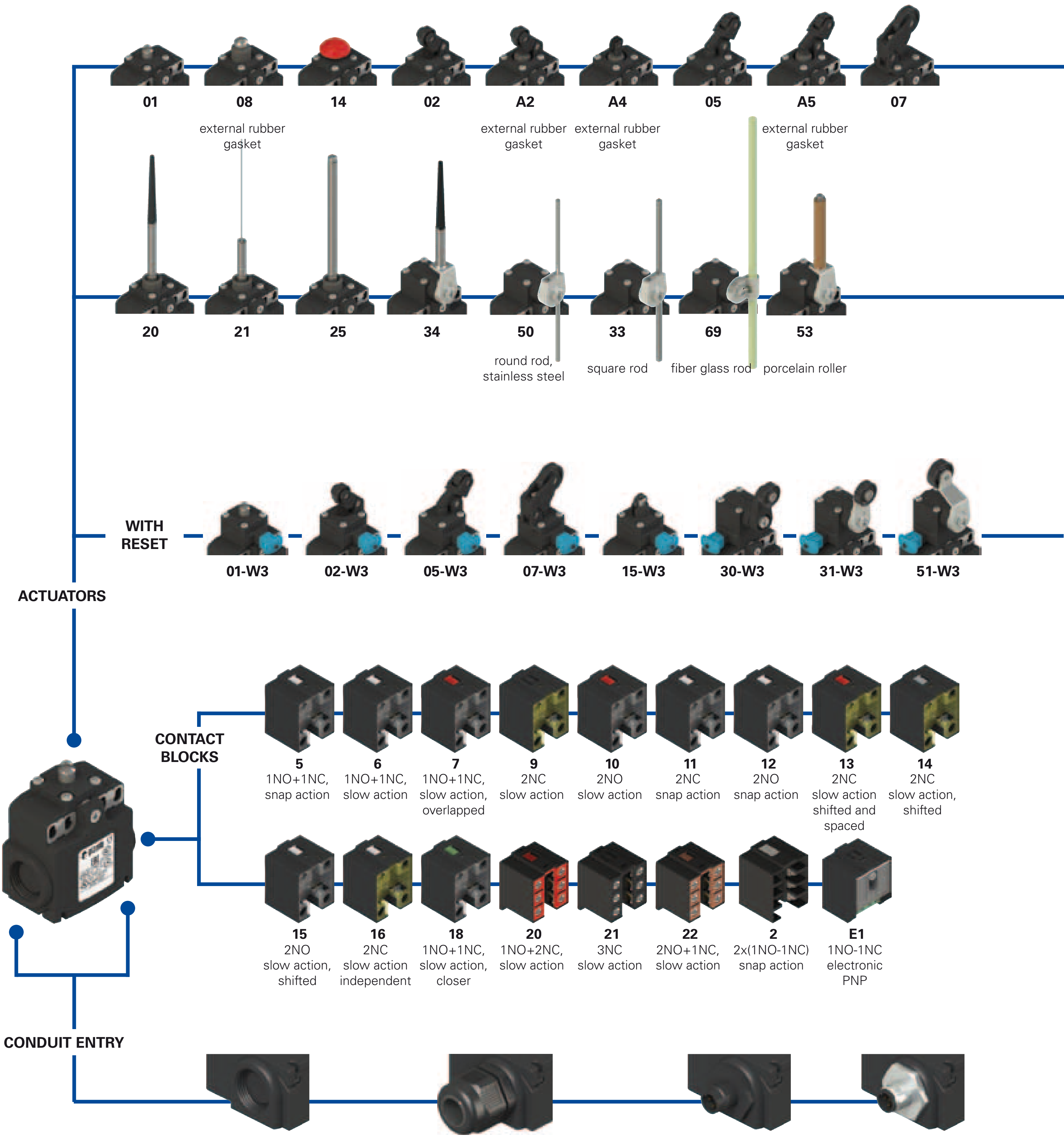
VF LE55-R27 (1)	VF LE56-R27

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

Accessories See page 225

The 2D/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 from Ø 6 to Ø 12 mm from the right
K223	for cables from Ø 6 to Ø 12 mm from the left
K127	for cables from Ø 3 to Ø 7 mm from the right
K227	for cables from Ø 3 to Ø 7 mm from the left

With M12 plastic connector

K71	4 poles, right
K72	4 poles, left
K46	8 poles, right
K47	8 poles, left

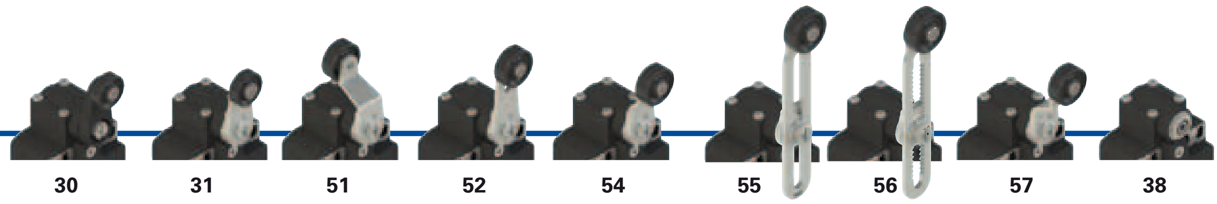
With M12 metal connector

K41	8 poles, right
K42	8 poles, left
K61	4 poles, right
K62	4 poles, left

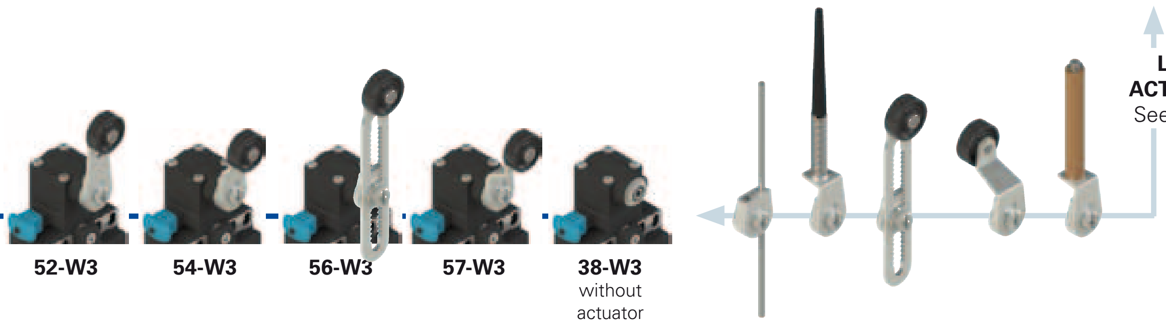
product options

accessory sold separately

A7	15	15-R28	16	12	13	76
external rubber gasket	roller Ø 11 mm	roller Ø 12 mm, stainless steel	roller Ø 20 mm		roller Ø 12 mm, stainless steel	rope switch for signalling



30	31	51	52	54	55	56	57	38
					adjustable lever	adjustable safety lever		without actuator



52-W3	54-W3	56-W3	57-W3	38-W3
				without actuator

LOOSE ACTUATORS
See page 93

Code structure

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

article: FX 502 — options: W3XG — M2 — options: K71R23T6

FX 502-W3XGM2K71R23T6

Housing	
FX	technopolymer, two conduit entries

Contact blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

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

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 with 1 µm gold coating (not for contact block 2)

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

Pre-installed cable glands or connectors	
	without cable gland or connector (standard)
K123	cable gland for cables from Ø 6 to Ø 12 mm from the right
K71	M12 plastic connector, 4 poles, right

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

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)

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

Technical data

Housing

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

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

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 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 conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA 22.2 No.14 .
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14, GB14048.5-2001.

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

Main features

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

Markings and quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2007010305230013
EAC approval:	RU C-IT ДМ94.B.01024

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 240. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

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)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	type aM fuse 10 A 500 V
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

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

Direct current: DC13

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

with connector M12, 4 poles

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Protection against short circuits:	fuse 4 A 500 V type gG
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

with connector M12, 8 poles

Thermal current (Ith):	2 A
Rated insulation voltage (Ui):	30 Vac 36 Vdc
Protection against short circuits:	fuse 2 A 500 V type gG
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24
Ie (A)	2

Direct current: DC13

Ue (V)	24
Ie (A)	2

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

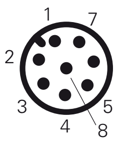
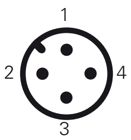
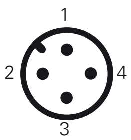
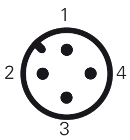
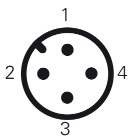
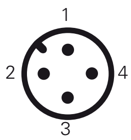
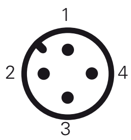
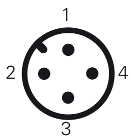
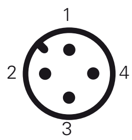
Characteristics approved by UL

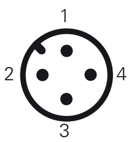
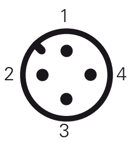
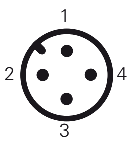
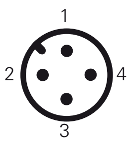
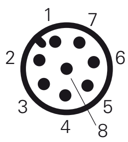
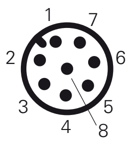
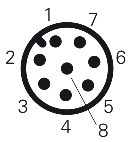
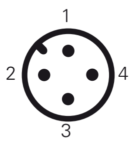
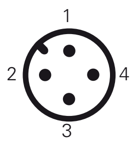
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

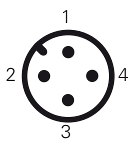
Please contact our technical service for the list of approved products.

Connection diagram for M12 connectors

Contact block 2 1NO-1NC+1NO-1NC		Contact block 5 1NO+1NC		Contact block 6 1NO+1NC		Contact block 7 1NO+1NC		Contact block 9 2NC		Contact block 10 2NO		Contact block 11 2NC		Contact block 12 2NO		Contact block 13 2NC	
																	
M12 connector, 8 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles	
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.**
NO	3-4	NC	1-2	NC	1-2	NC	1-2	NC	1-2	NO	1-2	NC	1-2	NO	1-2	NC (1°)	1-2
NC	5-6	NO	3-4	NO	3-4	NO	3-4	NC	3-4	NO	3-4	NC	3-4	NO	3-4	NC (2°)	3-4
NC	7-8																
NO	1-2																

Contact block 14 2NC		Contact block 15 2NO		Contact block 16 2NC		Contact block 18 1NO+1NC		Contact block 20 2NC+1NO		Contact block 21 3NC		Contact block 22 1NC+2NO		Contact block 33 1NC+1NO		Contact block 34 2NC	
																	
M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 4 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 4 poles		M12 connector, 4 poles	
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.**
NC (1°)	1-2	NO (1°)	1-2	NC, lever at the right	1-2	NC	1-2	NC	3-4	NC	3-4	NC	3-4	NC	1-2	NC	1-2
NC (2°)	3-4	NO (2°)	3-4	NC, lever to the left	3-4	NO	3-4	NC	5-6	NC	5-6	NO	5-6	NO	3-4	NC	3-4
								NO	7-8	NC	7-8	NO	7-8				

Contact block E1
PNP



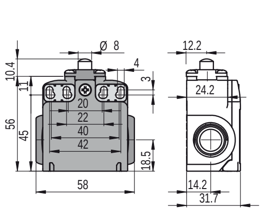
M12 connector, 4 poles

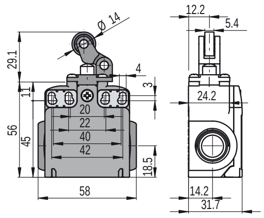
Contacts	**Pin no.**
+	1
-	3
NC	2
NO	4

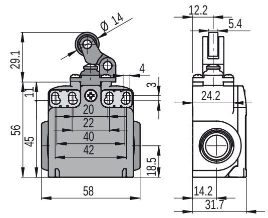
Position switches **FX** series

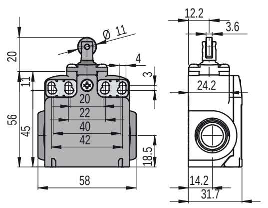
Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LI = slow action independent
- LA = slow action closer
- = electronic PNP

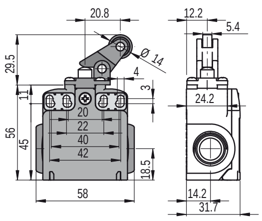


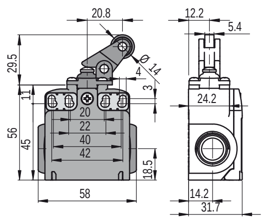


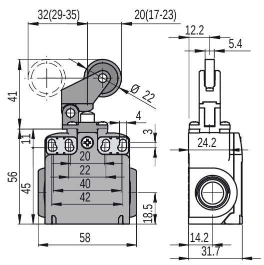


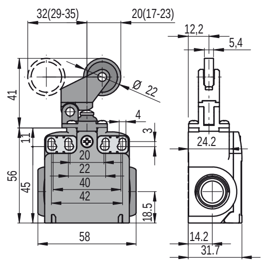


Contact blocks			With stainless steel roller on request	With external rubber gasket With stainless steel roller on request	With external rubber gasket With Ø 12 mm stainless steel roller on request
5	R	FX 501-M2 → 1NO+1NC	FX 502-M2 → 1NO+1NC	FX 5A2-M2 → 1NO+1NC	FX 5A4-M2 → 1NO+1NC
6	L	FX 601-M2 → 1NO+1NC	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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 5
Min. force		8 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 1









Contact blocks		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 239 - type 3	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		6 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)	3 N (25 N →)
Travel diagrams		page 240 - group 2	page 240 - group 2	page 240 - group 3	page 240 - group 3

All measures in the drawings are in mm

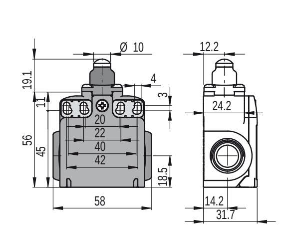
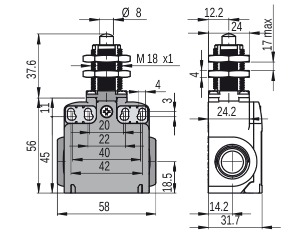
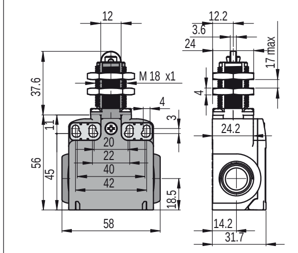
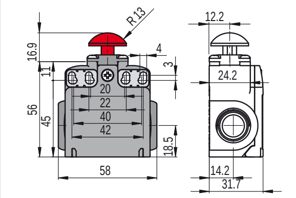
Items with code on **green** background are stock items

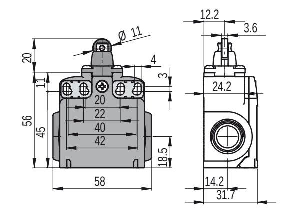
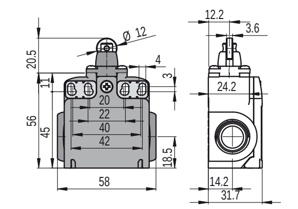
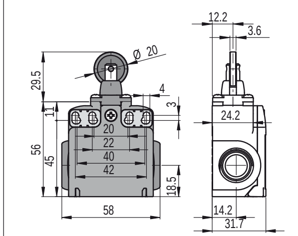
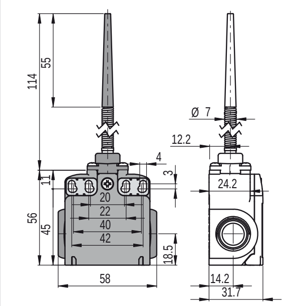
Accessories See page 225

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **⏃** = electronic PNP

Contact blocks		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 239 - type 4		page 239 - type 4		page 239 - type 2		page 239 - type 4	
Min. force		8 N (25 N ➲)		8 N (25 N ➲)		8 N (25 N ➲)		8 N (25 N ➲)	
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 1		page 240 - group 1	

Contact blocks		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 239 - type 2		page 239 - type 2		page 239 - type 2		1 m/s	
Min. force		8 N (25 N ➲)		8 N (25 N ➲)		8 N (25 N ➲)		0.07 Nm	
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 1		page 240 - group 4	

All measures in the drawings are in mm

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

Accessories See page 225

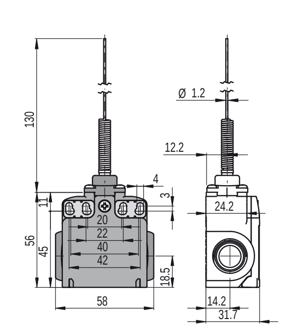
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches **FX** series

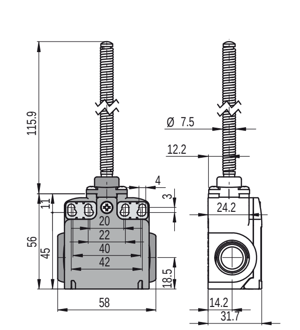
Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **⅄** = electronic PNP

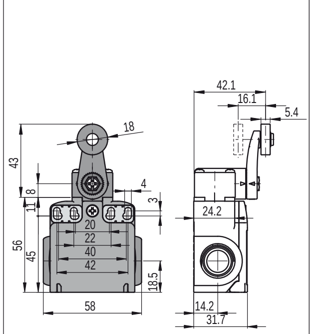
With external rubber gasket



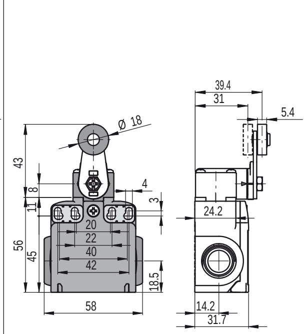
With external rubber gasket



With Ø 20 mm stainless steel roller on request



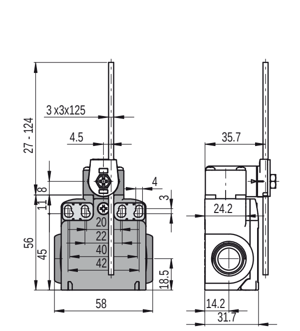
Other rollers available. See on page 94

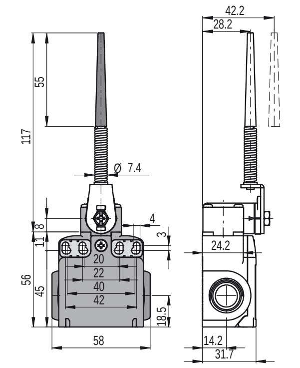


Contact blocks

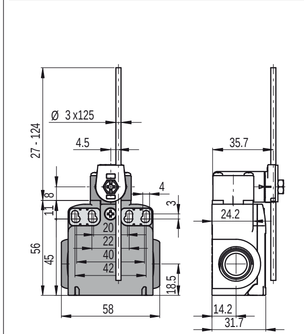
5	R	FX 521-M2	1NO+1NC	FX 525-M2	1NO+1NC	FX 530-M2 (→)	1NO+1NC	FX 531-M2 (→)	1NO+1NC
6	L					FX 630-M2 (→)	1NO+1NC	FX 631-M2 (→)	1NO+1NC
7	LO					FX 730-M2 (→)	1NO+1NC	FX 731-M2 (→)	1NO+1NC
9	L					FX 930-M2 (→)	2NC	FX 931-M2 (→)	2NC
10	L	FX 1021-M2	2NO	FX 1025-M2	2NO	FX 1030-M2	2NO	FX 1031-M2	2NO
11	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 239 - type 1		page 239 - type 1	
Min. force		0.07 Nm		0.12 Nm		0.06 Nm (0.25 Nm (→))		0.06 Nm (0.25 Nm (→))	
Travel diagrams		page 240 - group 4		page 240 - group 4		page 240 - group 5		page 240 - group 5	

Square rod, 3x3 mm

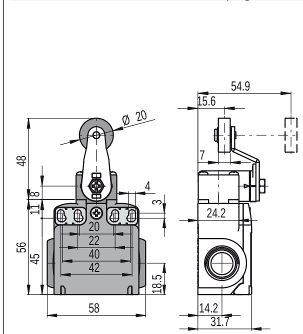




Round rod, Ø 3 mm, stainless steel



Other rollers available. See on page 94



Contact blocks

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 239 - type 1	
Min. force		0.06 Nm		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm (→))	
Travel diagrams		page 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 5	

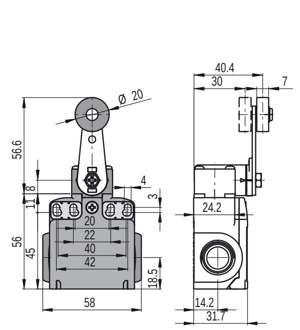
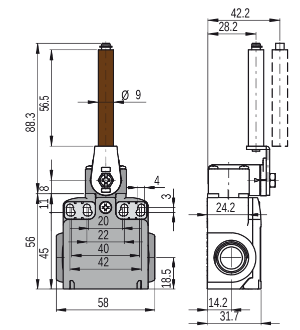
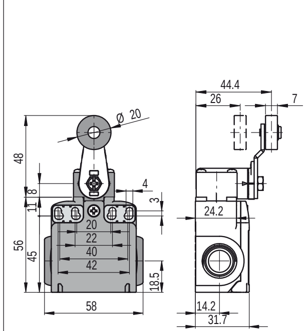
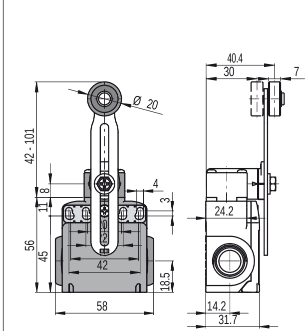
All measures in the drawings are in mm

Accessories See page 225

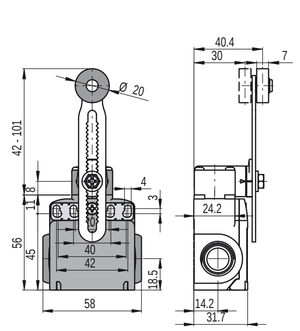
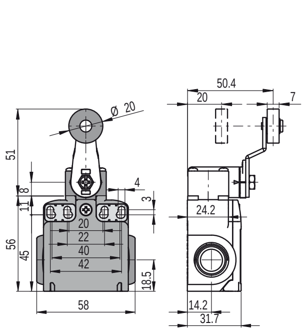
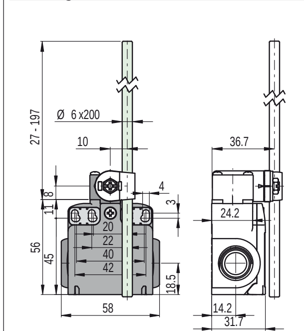
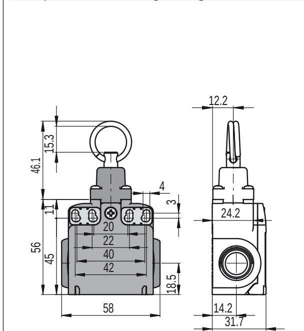
➔ The 2D/3D files are available at **www.pizzato.com**

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (symbol) = electronic PNP

Contact blocks		Other rollers available. See on page 94		Porcelain roller		Other rollers available. See on page 94		Other rollers available. See on page 94	
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	(electronic)	FX E152-M2	1NO-1NC	FX E153-E0M2V9	1NO-1NC	FX E154-M2	1NO-1NC	FX E155-M2	1NO-1NC
Max. speed		page 239 - type 1		0.5 m/s		page 239 - type 1		page 239 - type 1	
Min. 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 240 - group 5		page 240 - group 6		page 240 - group 5		page 240 - group 5	

Contact blocks		Other rollers available. See on page 94		Other rollers available. See on page 94		Fiber glass 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	(electronic)	FX E156-M2	1NO-1NC	FX E157-M2	1NO-1NC	FX E169-M2	1NO-1NC		
Max. speed		page 239 - type 1		page 239 - type 1		1.5 m/s		0.5 m/s	
Min. 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 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 7	

(1) Positive opening only with actuator set to max. See page 93.

All measures in the drawings are in mm

Accessories See page 225

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

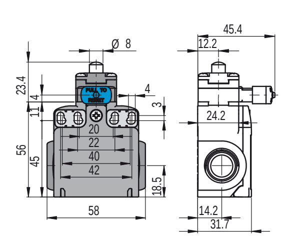
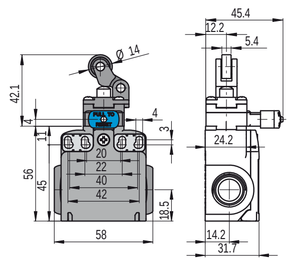
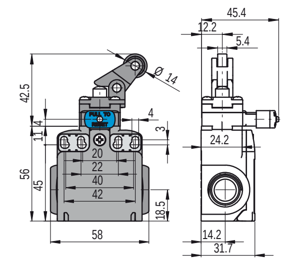
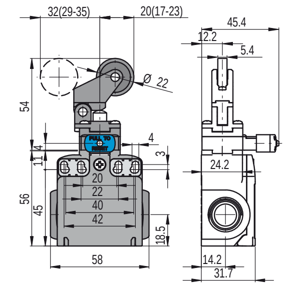
Position switches **FX** series with reset

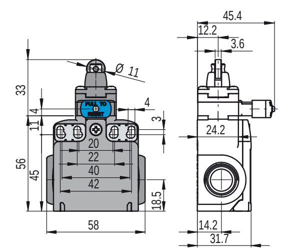
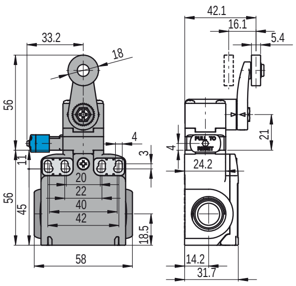
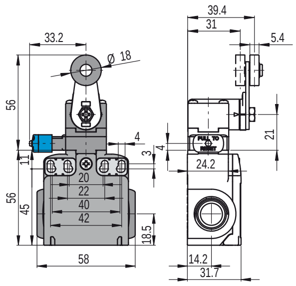
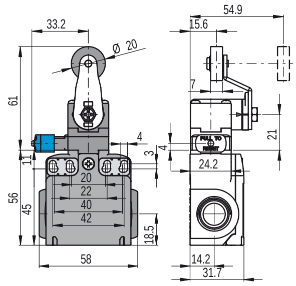
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. The new device is a block inserted between the switch body and the head, and could be rotated independently from this last one. This new device has following advantages:

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

Contact type:

R = snap action
L = slow action

Contact blocks			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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		4.5 N (25 N →)	4 N (25 N →)	4 N (25 N →)	2.5 N (25 N →)
Travel diagrams		page 241 - group 1	page 241 - group 2	page 241 - group 2	page 241 - group 3

		With Ø 12 mm stainless steel roller on request	With Ø 20 mm stainless steel roller on request	Other rollers available. See on page 94	Other rollers available. See on page 94
					
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 239 - type 2	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 1	page 241 - group 4	page 241 - group 4	page 241 - group 4

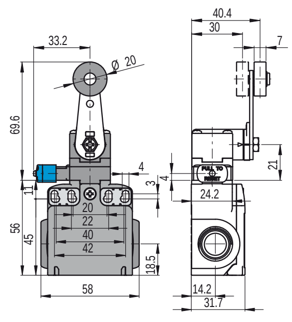
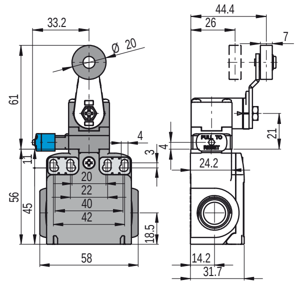
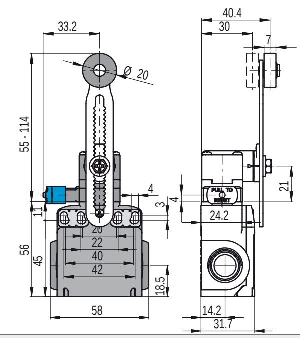
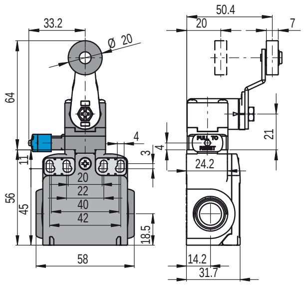
All measures in the drawings are in mm

Accessories See page 225

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

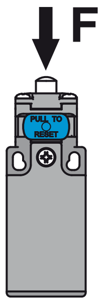
Contact type:

R = snap action
L = slow action

		Other rollers available. See on page 94	Other rollers available. See on page 94	Other rollers available. See on page 94	Other rollers available. See on page 94
					
Contact blocks					
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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

All measures in the drawings are in mm

Increased actuating force



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

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

Accessories See page 225

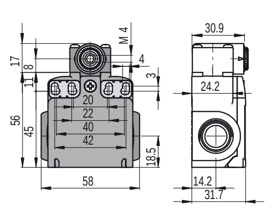
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

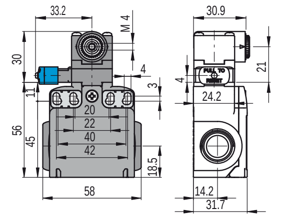
All measures in the drawings are in mm

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP



With manual reset knob



Contact blocks

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	(electronic)	FX E138-M2		1NO-1NC			
Min. force		0.06 Nm (0.25 Nm (→))			0.07 Nm (0.25 Nm (→))		
Travel diagrams		page 240 - group 5			page 241 - group 4		

All measures in the drawings are in mm

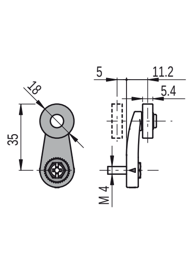
IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

All measures in the drawings are in mm

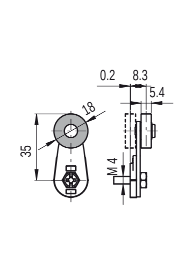
IMPORTANT: These loose actuators can be used with items of series FR, FM, FX, FZ and FK only.

Technopolymer roller Ø 18 mm



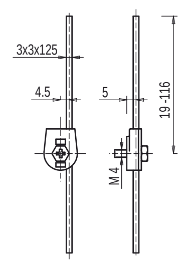
VF LE30 (→)

Technopolymer roller Ø 18 mm



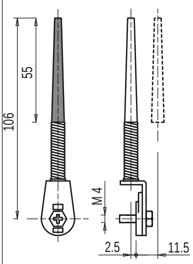
VF LE31 (→)

Adjustable square rod, 3x3x125 mm



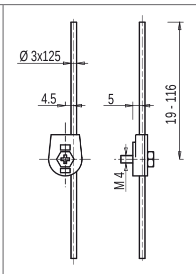
VF LE33

Flexible rod with pointed end



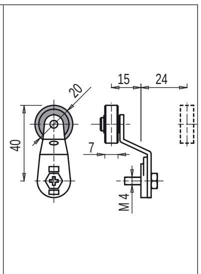
VF LE34

Adjustable round rod Ø 3x125 mm



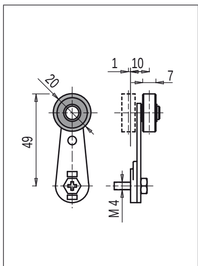
VF LE50

Technopolymer roller Ø 20 mm



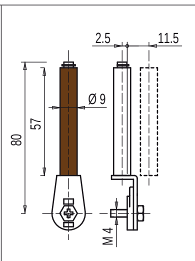
VF LE51 (→)

Technopolymer roller Ø 20 mm



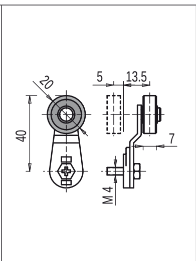
VF LE52 (→)

Porcelain roller



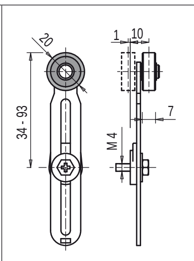
VF LE53 (→) [(2)]

Technopolymer roller Ø 20 mm



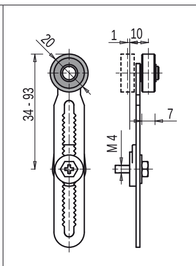
VF LE54 (→)

Adjustable actuator with technopolymer roller



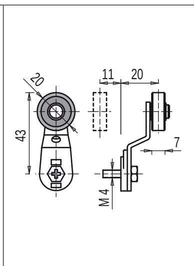
VF LE55 (→) [(1)]

Adjustable safety actuator with technopolymer roller



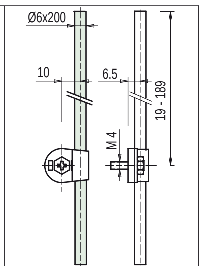
VF LE56 (→)

Technopolymer roller Ø 20 mm



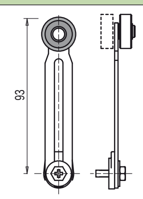
VF LE57 (→)

Adjustable fiber glass rod



VF LE69

- [(1)] Actuator VF LE55 can only be used in safety applications if adjusted to its max. length, as shown in figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF LE56.
- [(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 mechanically interfere with the switch head.



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

Accessories See page 225

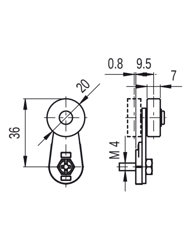
→ The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

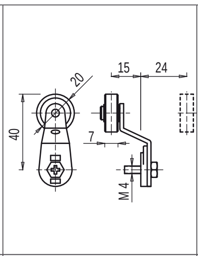
All measures in the drawings are in mm

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

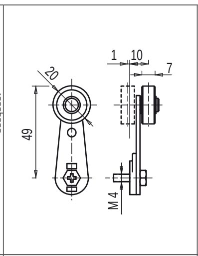
Stainless steel rollers, Ø 20 mm



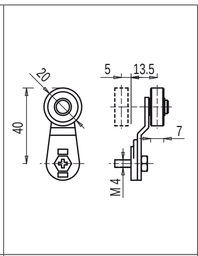
VF LE31-R24



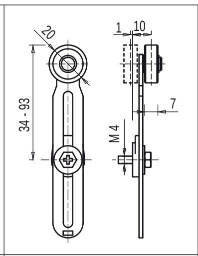
VF LE51-R24



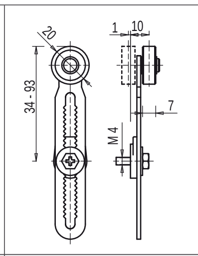
VF LE52-R24



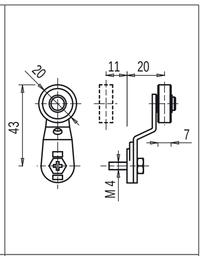
VF LE54-R24



VF LE55-R24 [1]

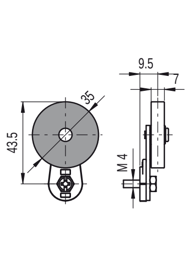


VF LE56-R24

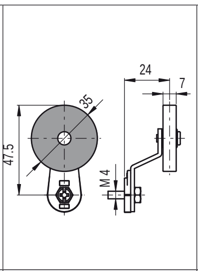


VF LE57-R24

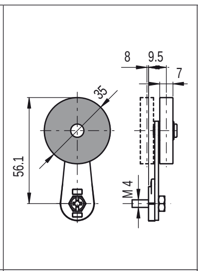
Technopolymer rollers, Ø 35 mm



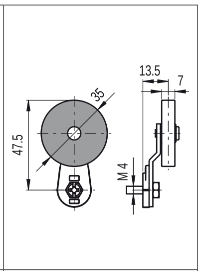
VF LE31-R25 [4]



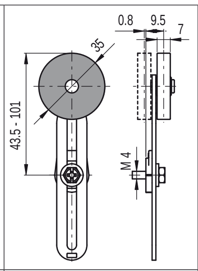
VF LE51-R25 [4]



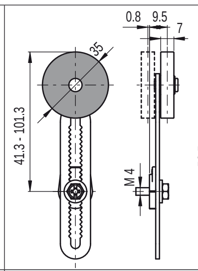
VF LE52-R25



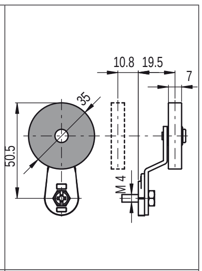
VF LE54-R25 [4]



VF LE55-R25 [1]

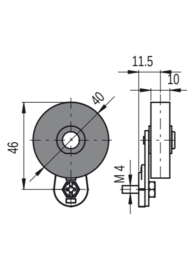


VF LE56-R25

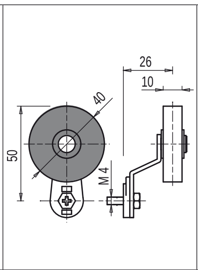


VF LE57-R25

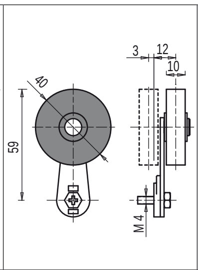
Rubber rollers, Ø 40 mm



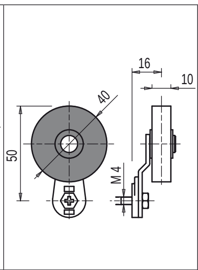
VF LE31-R5 [4]



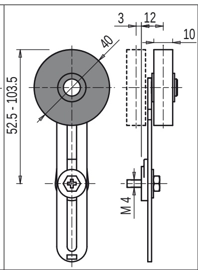
VF LE51-R5 [4]



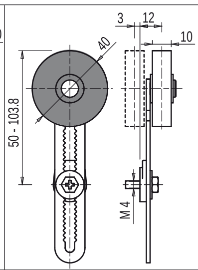
VF LE52-R5



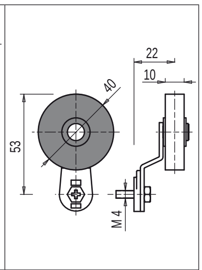
VF LE54-R5 [4]



VF LE55-R5 [1]

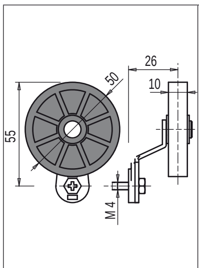


VF LE56-R5

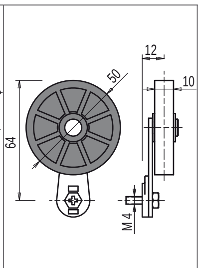


VF LE57-R5 [4]

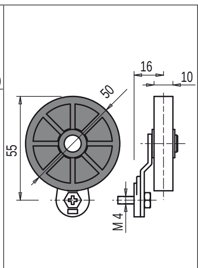
Rubber rollers, Ø 50 mm



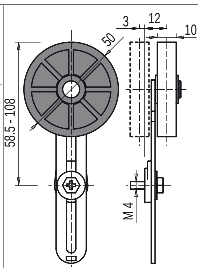
VF LE51-R26 [4]



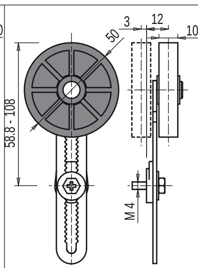
VF LE52-R26 [4]



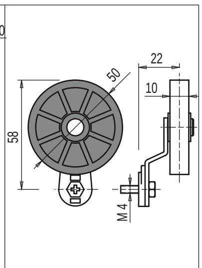
VF LE54-R26 [4]



VF LE55-R26 [1]

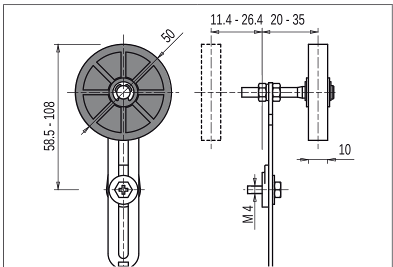


VF LE56-R26

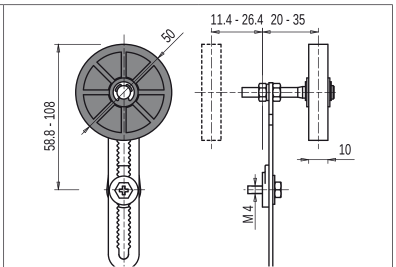


VF LE57-R26 [4]

Protruding rubber rollers, Ø 50 mm



VF LE55-R27 [1]



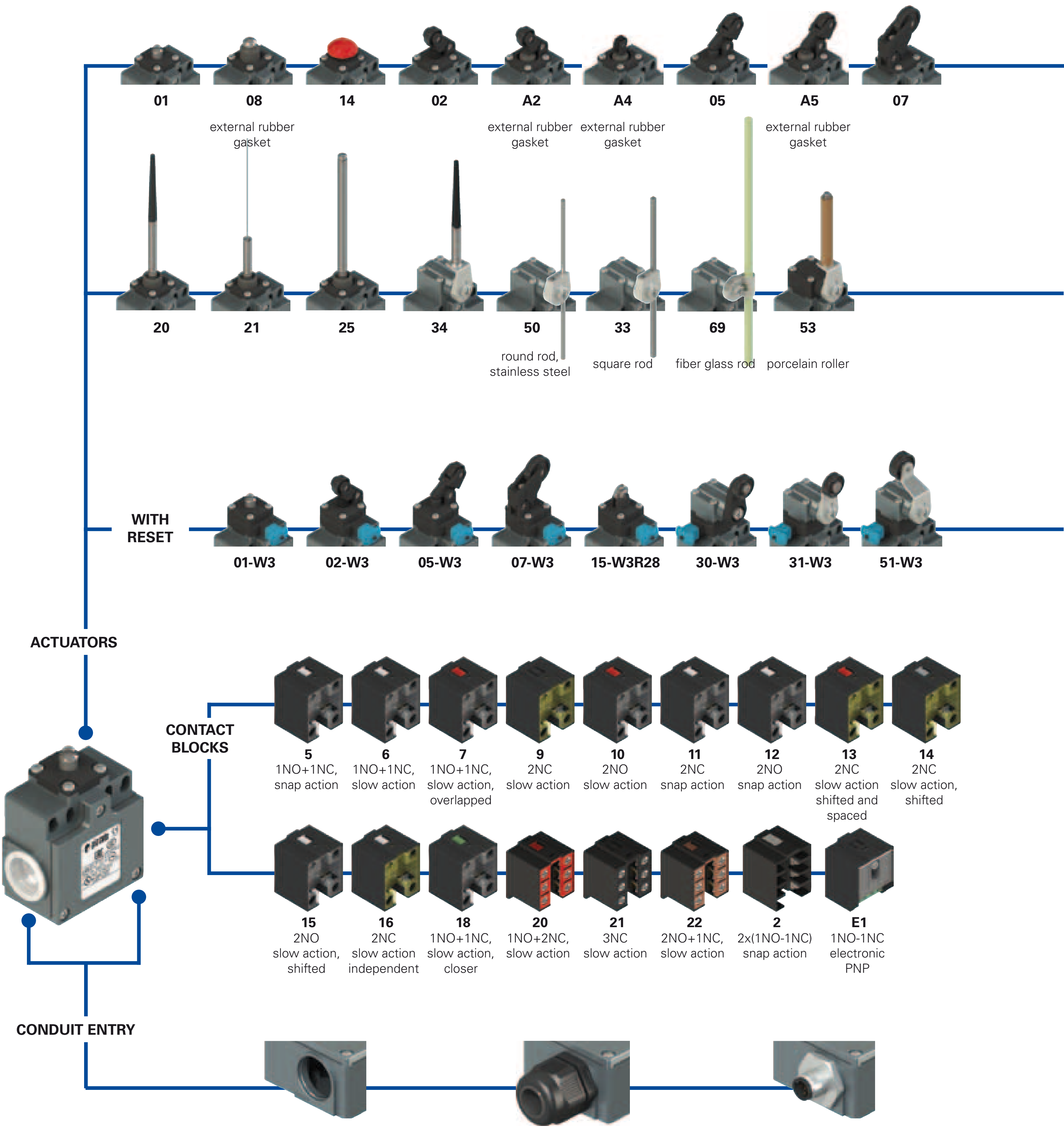
VF LE56-R27

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

Accessories See page 225

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

Selection diagram



Threaded conduit entries

M2	M20x1.5 (standard)
	PG 13.5

With cable gland

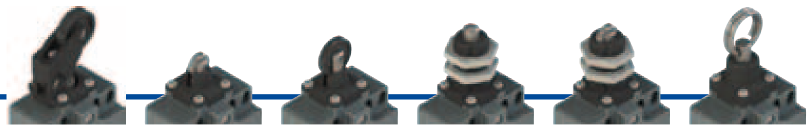
K123	for cables from Ø 6 to Ø 12 mm from the right
K223	for cables from Ø 6 to Ø 12 mm from the left
K127	for cables from Ø 3 to Ø 7 mm from the right
K227	for cables from Ø 3 to Ø 7 mm from the left

With M12 metal connector

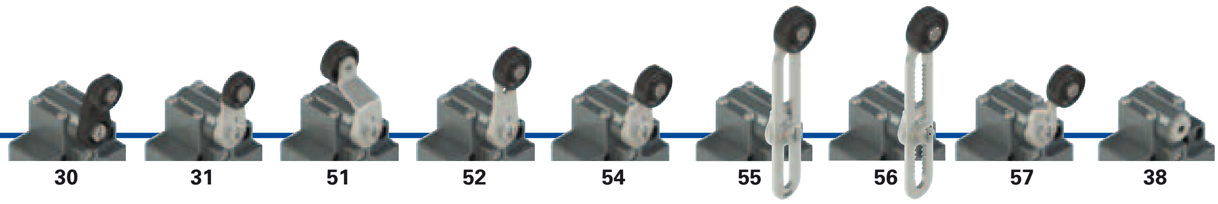
K41	8 poles, right
K42	8 poles, left
K51	5 poles, right
K52	5 poles, left

product options

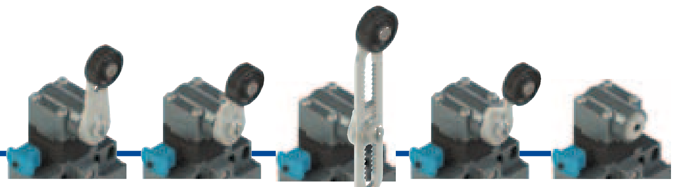
accessory sold separately



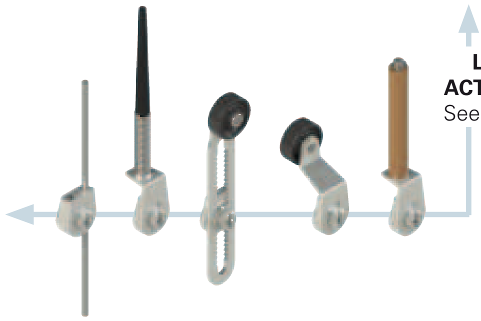
A7	15-R28	16	12	13	76
external rubber gasket	roller Ø 12 mm, stainless steel	roller Ø 20 mm		roller Ø 12 mm, stainless steel	rope switch for signalling



30	31	51	52	54	55	56	57	38
					adjustable lever	adjustable safety lever		without actuator



52-W3	54-W3	56-W3	57-W3	38-W3
				without actuator



LOOSE ACTUATORS
See page 105

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 blocks

5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
...	....

Actuators

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

Reset

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

Contact type

	silver contacts (standard)
G	silver contacts with 1 μm gold coating (not for contact block 2)

Ambient temperature

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

Pre-installed cable glands or connectors

	without cable gland or connector (standard)
K123	cable gland for cables from Ø 6 to Ø 12 mm from the right
K51	M12 metal connector, 5 poles, right

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

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)

Technical data

Housing

Metal housing, baked powder coating	
Two threaded conduit entries:	M20x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 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 conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA 22.2 No.14 .

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

In conformity with the requirements of:
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.

Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

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

Markings and quality marks:

IMQ approval:	EG609
UL approval:	E131787
CCC approval:	2007010305229998
EAC approval:	RU C-IT ДМ94.B.01024

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 240. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

	Electrical data		Utilization category
without connector	Thermal current (Ith):	10 A	Alternating current: AC15 (50÷60 Hz)
	Rated insulation voltage (Ui):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 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 according 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 poles			Alternating current: AC15 (50÷60 Hz)
	Thermal current (Ith):	4 A	Ue (V) 24 120 250
	Rated insulation voltage (Ui):	250 Vac 300 Vdc	Ie (A) 4 4 4
	Protection against short circuits:	type gG fuse 4 A 500 V	Direct current: DC13
	Pollution degree:	3	Ue (V) 24 125 250
			Ie (A) 4 1.1 0.4
with M12 connector 8 poles			Alternating current: AC15 (50÷60 Hz)
	Thermal current (Ith):	2 A	Ue (V) 24
	Rated insulation voltage (Ui):	30 Vac 36 Vdc	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

Characteristics 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

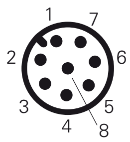
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

Connection diagram for M12 connectors

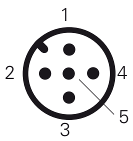
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8 poles

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

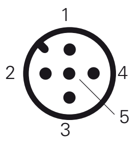
Contact block 5
1NO+1NC



M12 connector, 5 poles

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

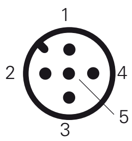
Contact block 6
1NO+1NC



M12 connector, 5 poles

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

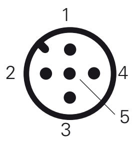
Contact block 7
1NO+1NC



M12 connector, 5 poles

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

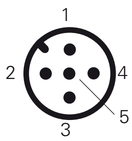
Contact block 9
2NC



M12 connector, 5 poles

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

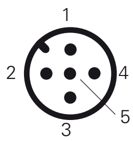
Contact block 10
2NO



M12 connector, 5 poles

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

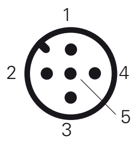
Contact block 11
2NC



M12 connector, 5 poles

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

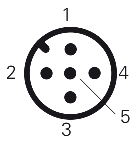
Contact block 12
2NO



M12 connector, 5 poles

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

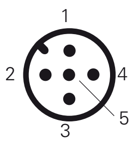
Contact block 13
2NC



M12 connector, 5 poles

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

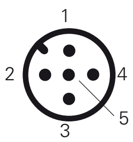
Contact block 14
2NC



M12 connector, 5 poles

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

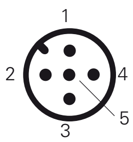
Contact block 15
2NO



M12 connector, 5 poles

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

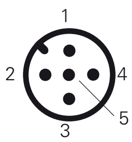
Contact block 16
2NC



M12 connector, 5 poles

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

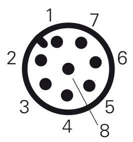
Contact block 18
1NO+1NC



M12 connector, 5 poles

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

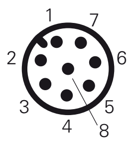
Contact block 20
2NC+1NO



M12 connector, 8 poles

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

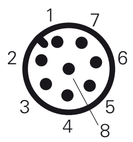
Contact block 21
3NC



M12 connector, 8 poles

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

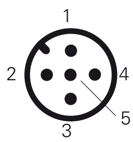
Contact block 22
1NC+2NO



M12 connector, 8 poles

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

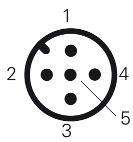
Contact block 33
1NC+1NO



M12 connector, 5 poles

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

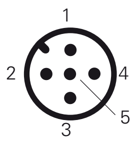
Contact block 34
2NC



M12 connector, 5 poles

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

Contact block E1
PNP

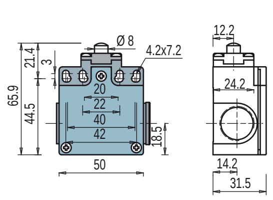
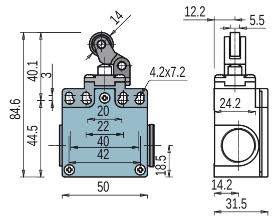
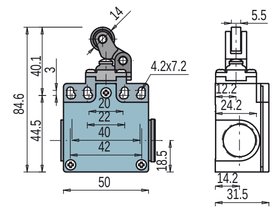
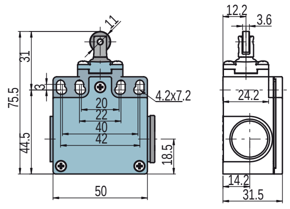


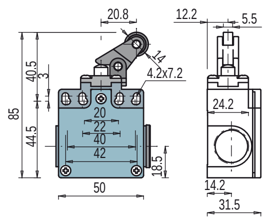
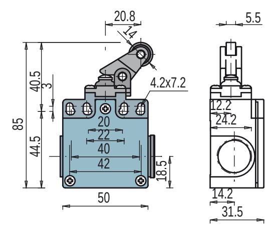
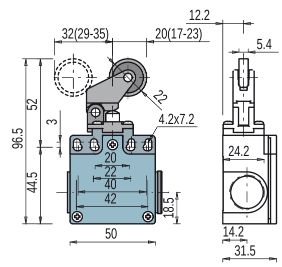
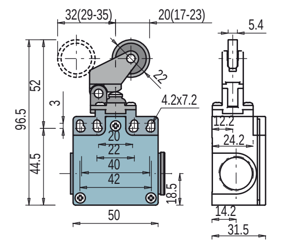
M12 connector, 5 poles

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- (electronic symbol) = electronic PNP

Contact blocks			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	(electronic)	FZ E101-M2 1NO-1NC	FZ E102-M2 1NO-1NC	FZ E1A2-M2 1NO-1NC	FZ E1A4-M2 1NO-1NC
Max. speed		page 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 5
Min. force		8 N (25 N →)	6 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams		page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 1

Contact blocks		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	(electronic)	FZ E105-M2 1NO-1NC	FZ E1A5-M2 1NO-1NC	FZ E107-M2 1NO-1NC	FZ E1A7-M2 1NO-1NC
Max. speed		page 239 - type 3	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		6 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)	3 N (25 N →)
Travel diagrams		page 240 - group 2	page 240 - group 2	page 240 - group 3	page 240 - group 3

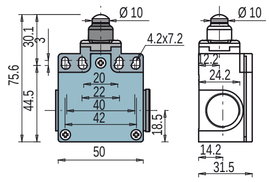
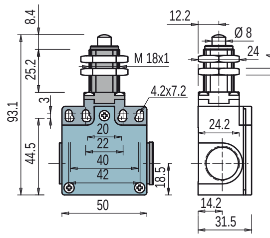
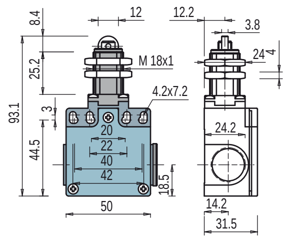
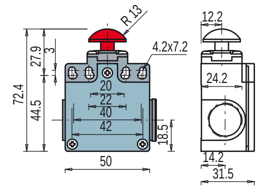
All measures in the drawings are in mm

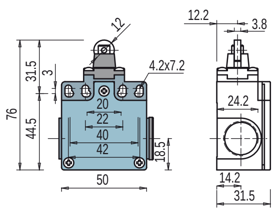
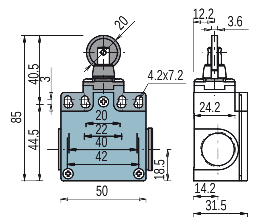
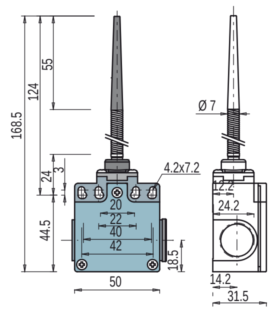
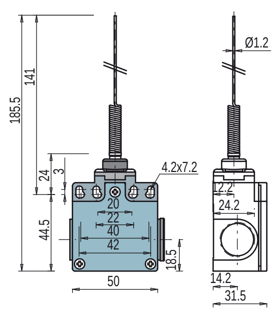
Accessories See page 225

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **⅄** = electronic PNP

				With external rubber gasket							
											
Contact blocks											
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 239 - type 4		page 239 - type 4		page 239 - type 2		page 239 - type 4			
Min. force		8 N (25 N →)		8 N (25 N →)		8 N (25 N →)		8 N (25 N →)			
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 1		page 240 - group 1			

		Roller, Ø 12 mm, stainless steel				With external rubber gasket		With external rubber gasket	
									
Contact blocks									
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 239 - type 2		page 239 - type 2		1 m/s		1 m/s	
Min. force		8 N (25 N →)		8 N (25 N →)		0.07 Nm		0.07 Nm	
Travel diagrams		page 240 - group 1		page 240 - group 1		page 240 - group 4		page 240 - group 4	

All measures in the drawings are in mm

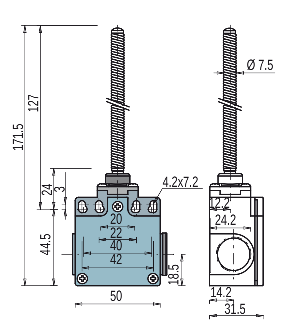
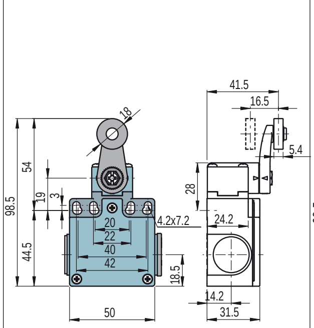
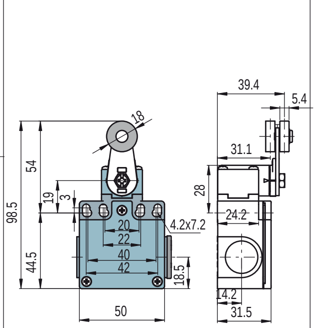
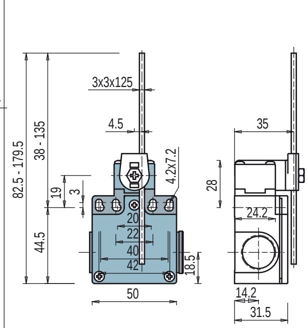
Accessories See page 225

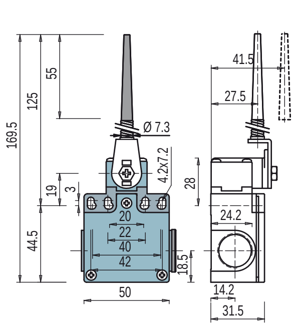
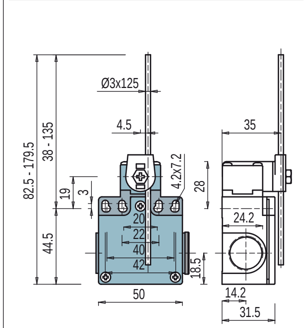
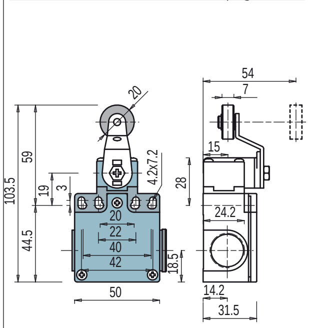
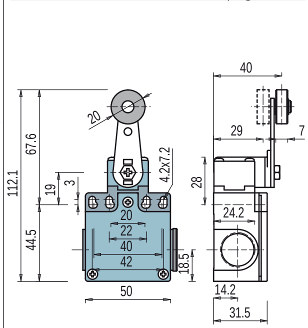
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches **FZ** series

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- **⅄** = electronic PNP

		With external rubber gasket		With Ø 20 mm stainless steel roller on request		Other rollers available. See on page 106		Square rod, 3x3 mm	
									
Contact blocks									
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 239 - type 1		page 239 - type 1		1.5 m/s	
Min. force		0.12 Nm		0.06 Nm (0.25 Nm →)		0.06 Nm (0.25 Nm →)		0.06 Nm	
Travel diagrams		page 240 - group 4		page 240 - group 5		page 240 - group 5		page 240 - group 5	

				Round rod, Ø 3 mm, stainless steel		Other rollers available. See on page 106		Other rollers available. See on page 106	
									
Contact blocks									
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 239 - type 1		page 239 - type 1	
Min. force		0.06 Nm		0.06 Nm		0.06 Nm (0.25 Nm →)		0.06 Nm (0.25 Nm →)	
Travel diagrams		page 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 5	

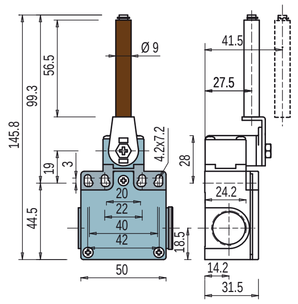
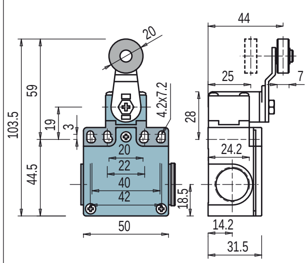
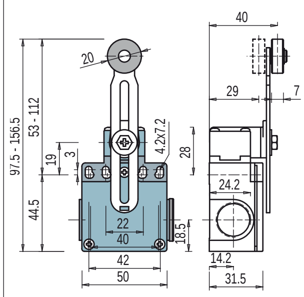
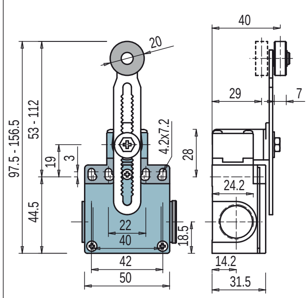
All measures in the drawings are in mm

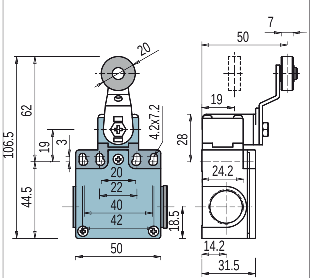
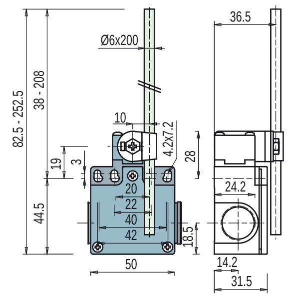
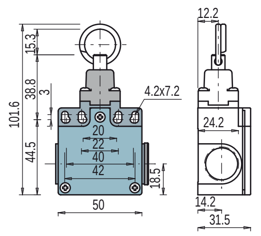
Accessories See page 225

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

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP

		Porcelain roller	Other rollers available. See on page 106	Other rollers available. See on page 106	Other rollers available. See on page 106
					
Contact blocks					
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 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 240 - group 6	page 240 - group 5	page 240 - group 5	page 240 - group 5

		Other rollers available. See on page 106	Fiber glass rod	Rope switch for signalling
				
Contact blocks				
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 239 - type 1	1.5 m/s	0.5 m/s
Min. force		0.06 Nm (0.25 Nm (→))	0.06 Nm	initial 20 N - final 40 N
Travel diagrams		page 240 - group 5	page 240 - group 5	page 240 - group 7

(1) Positive opening only with actuator set to max. See page 105.

All measures in the drawings are in mm

Accessories See page 225

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

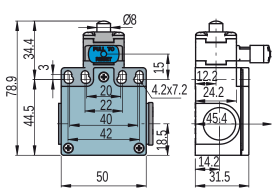
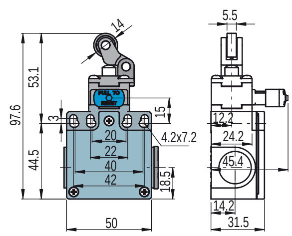
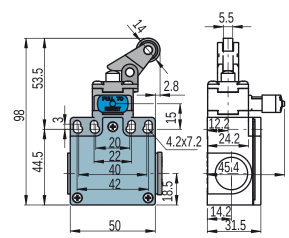
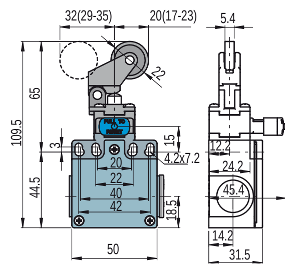
Position switches **FZ** series with reset

Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. The new device is a block inserted between the switch body and the head, and could be rotated independently from this last one. This new device has following advantages:

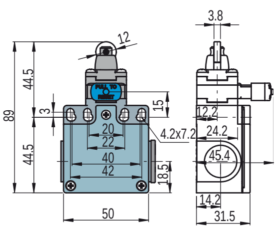
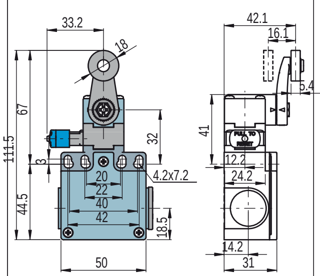
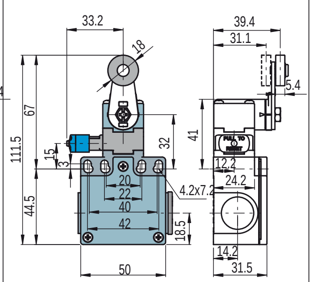
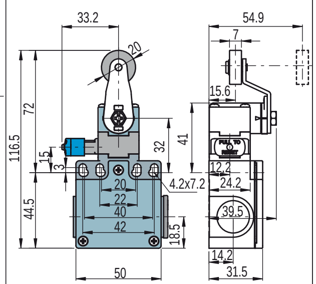
- The reset device can be integrated into almost all standard actuator heads
- Contact bllocks with snap action are no more necessary because the tripping movement is made by the reset device itself
- The reset device can be rotated independently from the head for maximum flexibility during installation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

Contact type:

R = snap action
L = slow action

Contact blocks			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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		4.5 N (25 N)	4 N (25 N)	4 N (25 N)	2.5 N (25 N)
Travel diagrams		page 241 - group 1	page 241 - group 2	page 241 - group 2	page 241 - group 3

Contact blocks		With Ø 12 mm stainless steel roller on request	With Ø 20 mm stainless steel roller on request	Other rollers available. See on page 106	Other rollers available. See on page 106
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 239 - type 2	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 1	page 241 - group 4	page 241 - group 4	page 241 - group 4

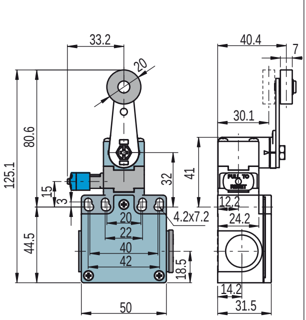
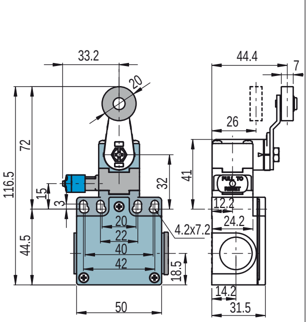
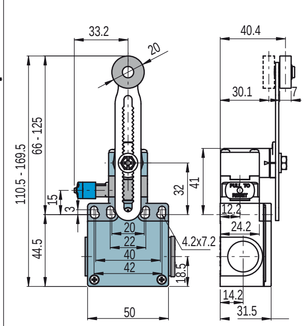
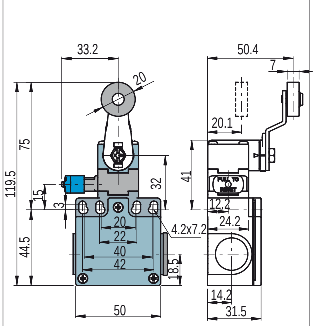
All measures in the drawings are in mm

Accessories See page 225

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

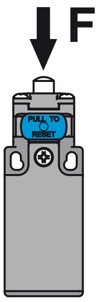
Contact type:

R = snap action
L = slow action

Contact blocks					
		Other rollers available. See on page 106 	Other rollers available. See on page 106 	Other rollers available. See on page 106 	Other rollers available. See on page 106 
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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

All measures in the drawings are in mm

Increased actuating force



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

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

Accessories See page 225

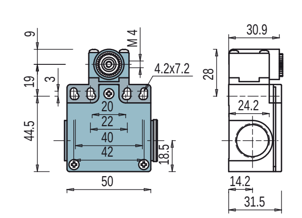
→ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

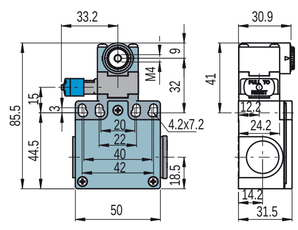
All measures in the drawings are in mm

Contact type:

- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LS** = slow action shifted
- **LV** = slow action shifted and spaced
- **LI** = slow action independent
- **LA** = slow action closer
- = electronic PNP



With manual reset knob



IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Contact blocks					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			
Min. force		0.06 Nm (0.25 Nm (→))			0.07 Nm (0.25 Nm (→))		
Travel diagrams		page 240 - group 5			page 241 - group 4		

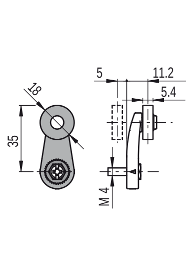
All measures in the drawings are in mm

Loose actuators

All measures in the drawings are in mm

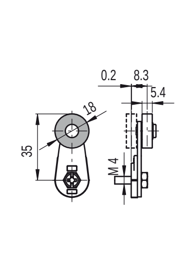
IMPORTANT: These loose actuators can be used with items of series FR, FM, FX, FZ and FK only.

Technopolymer roller Ø 18 mm



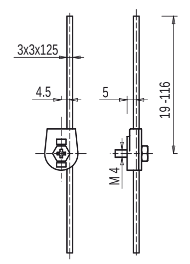
VF LE30 (→)

Technopolymer roller Ø 18 mm



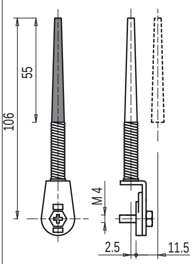
VF LE31 (→)

Adjustable square rod, 3x3x125 mm



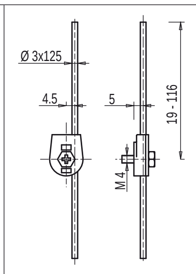
VF LE33

Flexible rod with pointed end



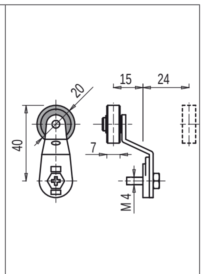
VF LE34

Adjustable round rod Ø 3x125 mm



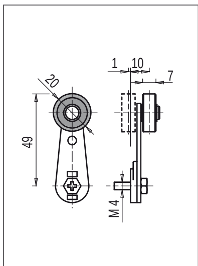
VF LE50

Technopolymer roller Ø 20 mm



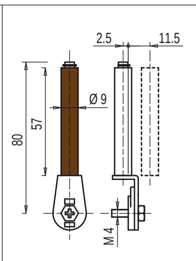
VF LE51 (→)

Technopolymer roller Ø 20 mm



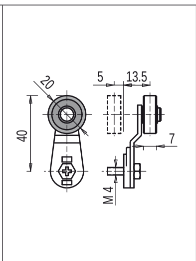
VF LE52 (→)

Porcelain roller



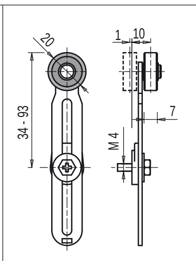
VF LE53 (→) [2]

Technopolymer roller Ø 20 mm



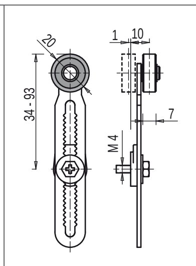
VF LE54 (→)

Adjustable actuator with technopolymer roller



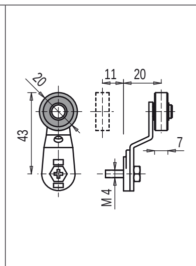
VF LE55 (→) [1]

Adjustable safety actuator with technopolymer roller



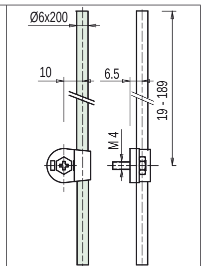
VF LE56 (→)

Technopolymer roller Ø 20 mm



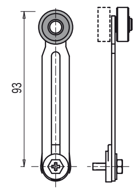
VF LE57 (→)

Adjustable fiber glass rod



VF LE69

- [1] Actuator VF LE55 can only be used in safety applications if adjusted to its max. length, as shown in figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF LE56.
- [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 mechanically interfere with the switch head.



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

Accessories See page 225

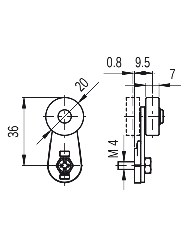
The 2D/3D files are available at **www.pizzato.com**

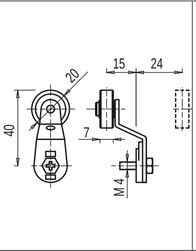
Special loose actuators

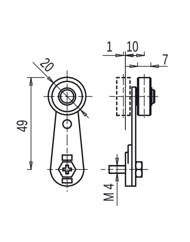
All measures in the drawings are in mm

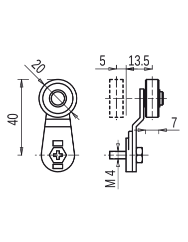
IMPORTANT: These loose actuators can be used with items of series FR, FM, FX, FZ and FK only.

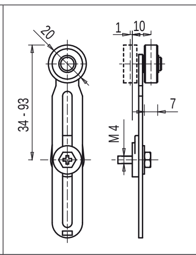
Stainless steel rollers, Ø 20 mm

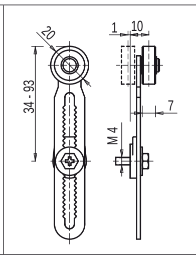

VF LE31-R24

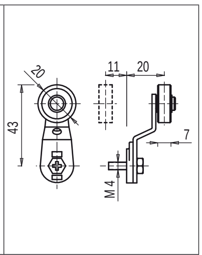

VF LE51-R24


VF LE52-R24

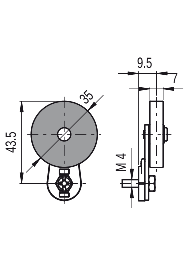

VF LE54-R24

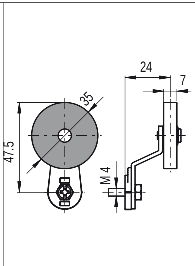

VF LE55-R24 (1)

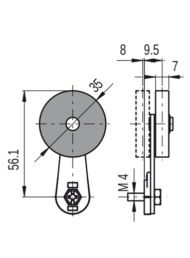

VF LE56-R24

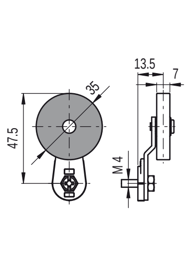

VF LE57-R24

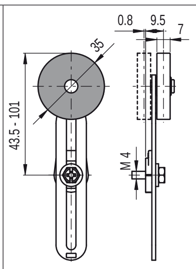
Technopolymer rollers, Ø 35 mm

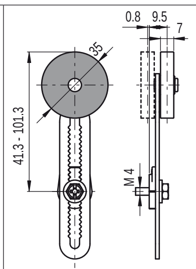

VF LE31-R25 (4)

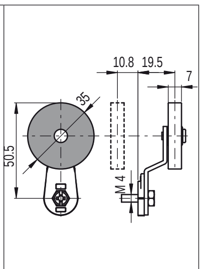

VF LE51-R25 (4)


VF LE52-R25

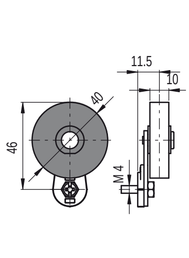

VF LE54-R25 (4)

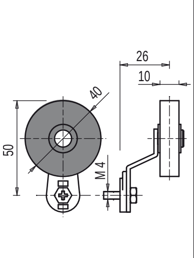

VF LE55-R25 (1)

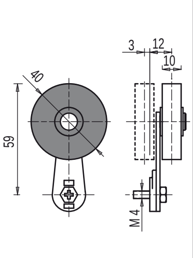

VF LE56-R25

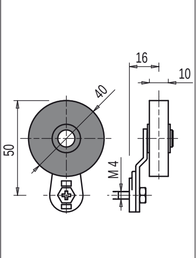

VF LE57-R25

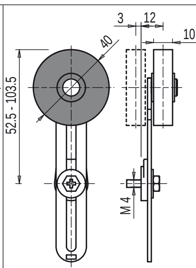
Rubber rollers, Ø 40 mm

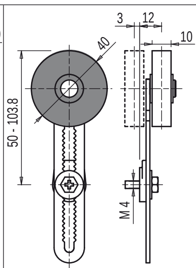

VF LE31-R5 (4)

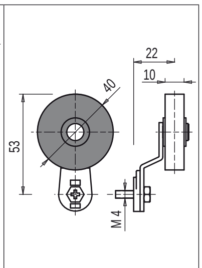

VF LE51-R5 (4)


VF LE52-R5

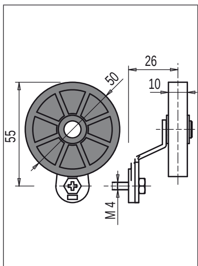

VF LE54-R5 (4)

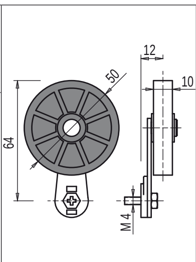

VF LE55-R5 (1)

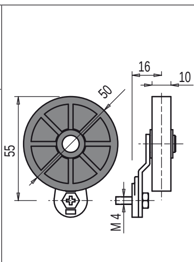

VF LE56-R5

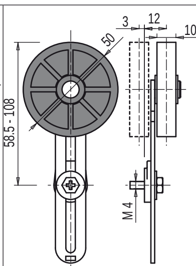

VF LE57-R5 (4)

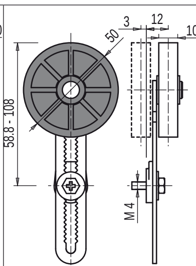
Rubber rollers, Ø 50 mm

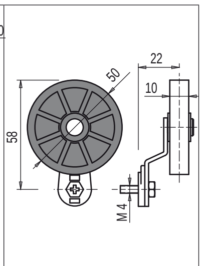

VF LE51-R26 (4)


VF LE52-R26 (4)

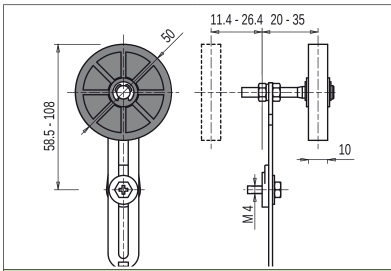

VF LE54-R26 (4)

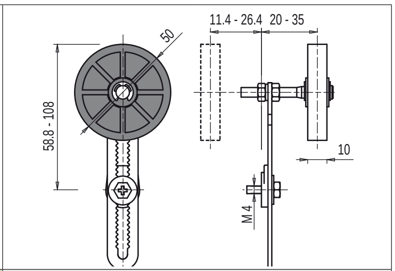

VF LE55-R26 (1)


VF LE56-R26


VF LE57-R26 (4)

Protruding rubber rollers, Ø 50 mm


VF LE55-R27 (1)

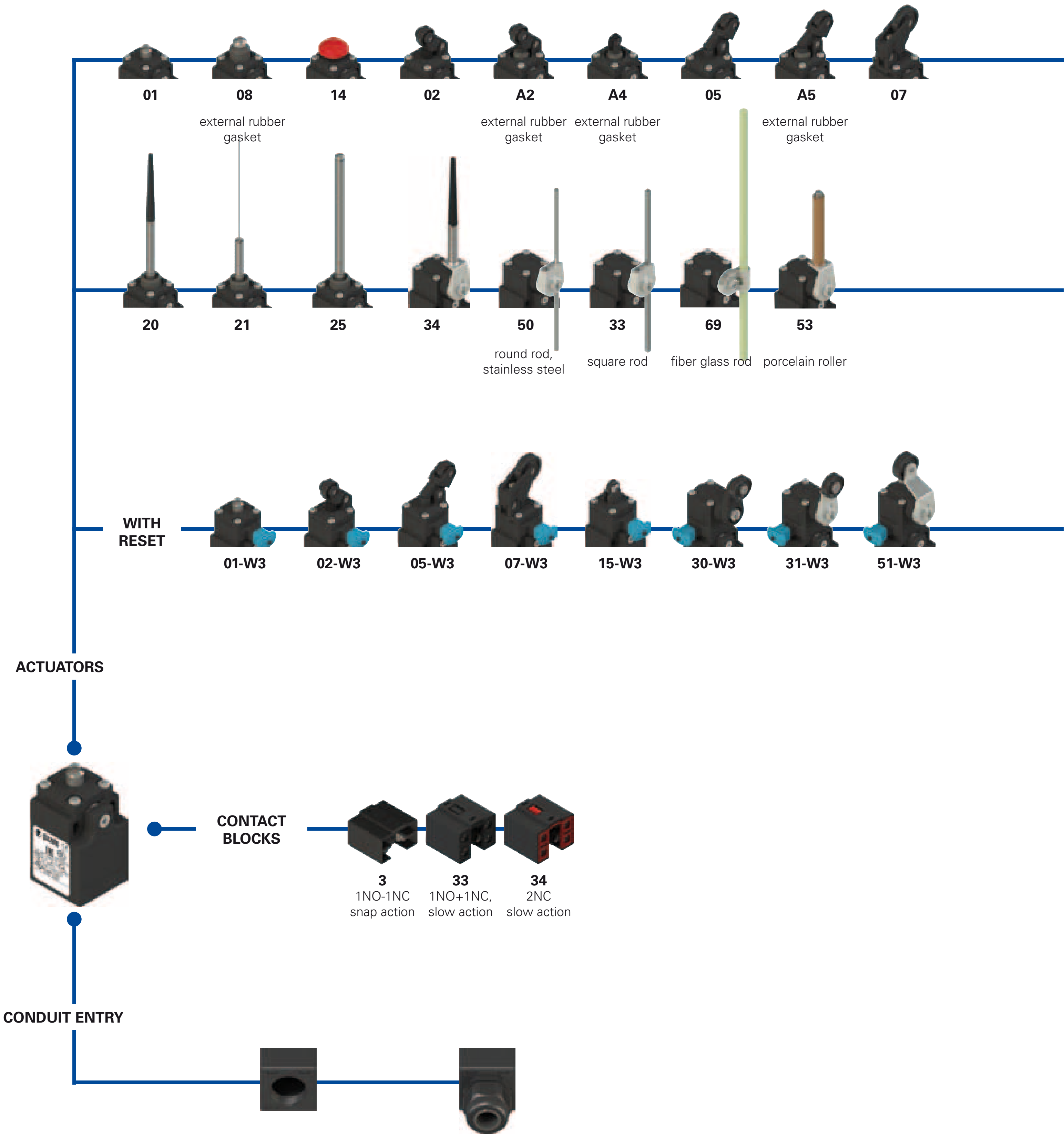

VF LE56-R27

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

Accessories See page 225

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

Selection diagram



Threaded conduit entry

M1	M16x1.5 (standard)
	PG 11

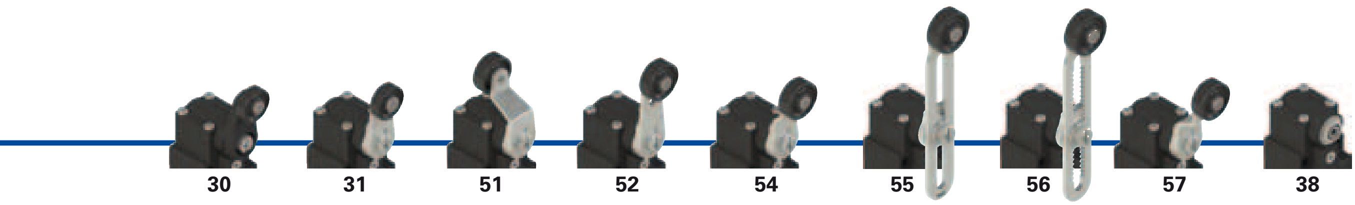
With cable gland

K24	for cables from Ø 5 to Ø 10 mm
K28	for cables Ø 3…Ø 7 mm

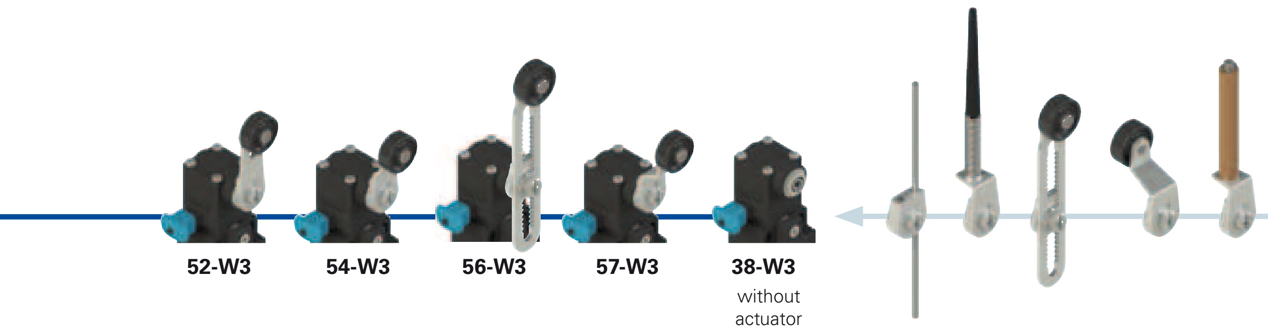
product options

accessory sold separately

A7	15	15-R28	16	10	17	12	13	76
external rubber gasket	roller Ø 11 mm	roller Ø 12 mm, stainless steel	roller Ø 20 mm		roller Ø 12 mm, stainless steel		roller Ø 12 mm, stainless steel	rope switch for signalling



30	31	51	52	54	55	56	57	38
					adjustable lever	adjustable safety lever		without actuator



52-W3	54-W3	56-W3	57-W3	38-W3
				without actuator

LOOSE ACTUATORS
See page 115

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 blocks

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

Actuators

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

Reset

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

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Ambient temperature

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

Pre-installed cable glands

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

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

Threaded conduit entry

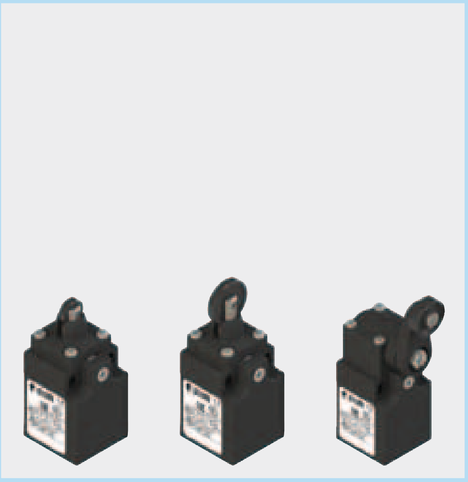
M1	M16x1.5 (standard)
	PG 11

Contact type

	silver contacts (standard)
G	silver contacts with 1 µm gold coating (not for contact block 2)

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)



Technical data

Housing

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

One threaded conduit entry:	M16x1.5 (standard)
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact block 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 conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA 22.2 No.14 .

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

Main features

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

Markings and quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2007010305230013
EAC approval:	RU C-IT ДМ94.B.01024

In conformity with the requirements of:
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.

Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 240. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Electrical data (without connector)

Thermal current (Ith):	10 A
Rated insulation voltage (Ui):	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 according 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

Characteristics approved by IMQ

Rated insulation voltage (Ui): 500 Vac
400 Vac (for contact blocks 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 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

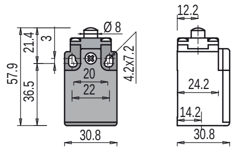
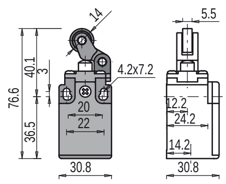
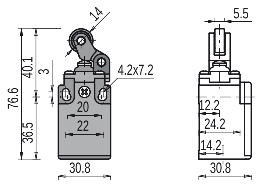
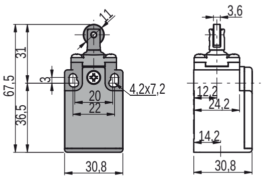
Please contact our technical service for the list of approved products.

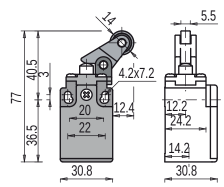
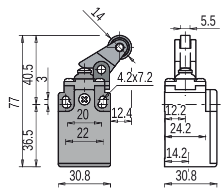
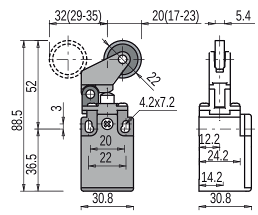
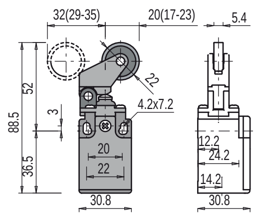
Characteristics approved by UL

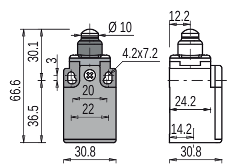
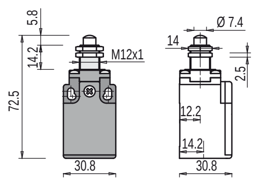
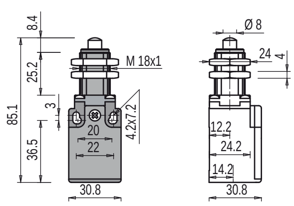
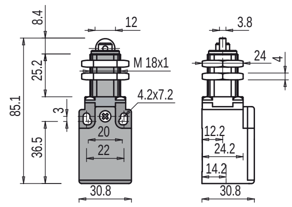
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

Contact type: **R** = snap action, **L** = slow action		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
Contact blocks				
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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 5
Min. force	5 N (25 N →)	4 N (25 N →)	4.3 N (25 N →)	4.3 N (25 N →)
Travel diagrams	page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 1

	With stainless steel roller on request	With external rubber gasket With stainless steel roller on request		With external rubber gasket
Contact blocks				
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 239 - type 3	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force	4 N (25 N →)	4.3 N (25 N →)	4 N (25 N →)	3 N (25 N →)
Travel diagrams	page 240 - group 2	page 240 - group 2	page 240 - group 3	page 240 - group 3

	With external rubber gasket	Fixed only by threaded head in vertical position		
Contact blocks				
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 239 - type 4	page 239 - type 4	page 239 - type 4	page 239 - type 2
Min. force	5 N (25 N →)	5 N (25 N →)	5 N (25 N →)	5 N (25 N →)
Travel diagrams	page 240 - group 1	page 240 - group 1	page 240 - group 1	page 240 - group 1

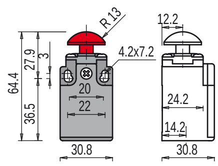
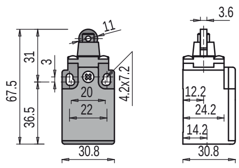
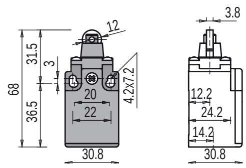
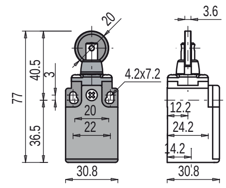
All measures in the drawings are in mm

Accessories See page 225

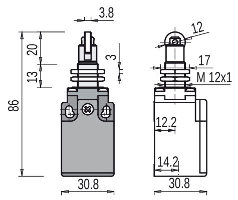
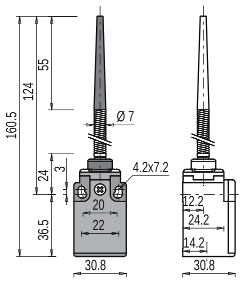
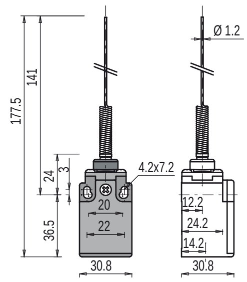
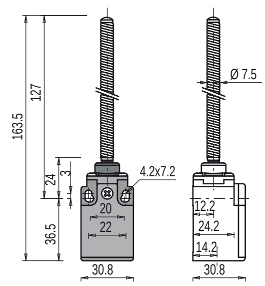
→ The 2D/3D files are available at **www.pizzato.com**

Contact type:

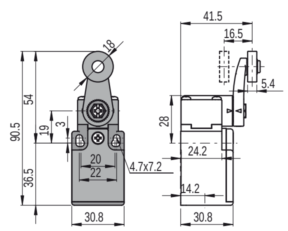
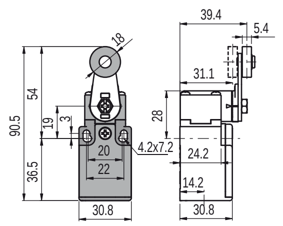
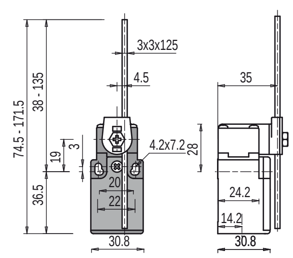
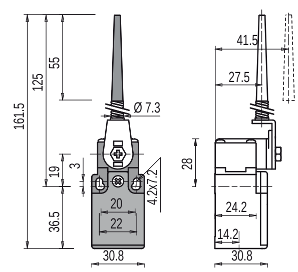
R = snap action
L = slow action

Contact blocks			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 239 - type 4	page 239 - type 2	page 239 - type 2	page 239 - type 2
Min. force		6 N (25 N)	5 N (25 N)	5 N (25 N)	5 N (25 N)
Travel diagrams		page 240 - group 1	page 240 - group 1	page 240 - group 1	page 240 - group 1

Contact blocks		Fixed only by 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 239 - type 2	1 m/s	1 m/s	1 m/s
Min. force		5 N (25 N)	0.05 Nm	0.05 Nm	0.1 Nm
Travel diagrams		page 240 - group 1	page 240 - group 4	page 240 - group 4	page 240 - group 4

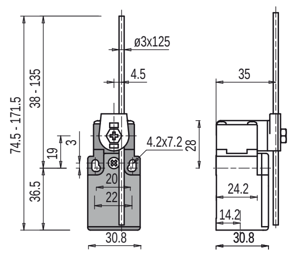
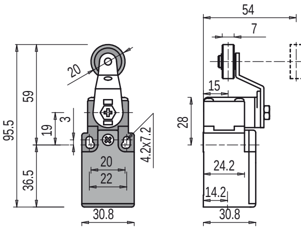
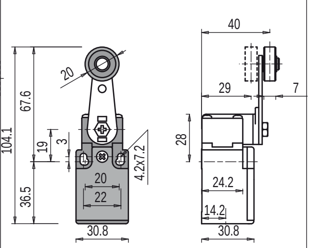
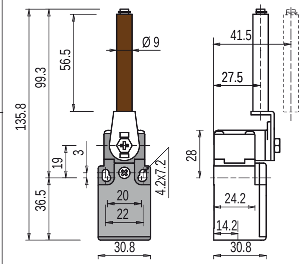
Contact blocks		With Ø 20 mm stainless steel roller on request	Other rollers available. See on page 116	Square rod, 3x3 mm	
3	R	FK 330-M1 1NO-1NC	FK 331-M1 1NO-1NC	FK 333-M1 1NO-1NC	FK 334-M1 1NO-1NC
33	L	FK 3330-M1 1NO+1NC	FK 3331-M1 1NO+1NC	FK 3333-M1 1NO+1NC	FK 3334-M1 1NO+1NC
34	L	FK 3430-M1 2NC	FK 3431-M1 2NC	FK 3433-M1 2NC	FK 3434-M1 2NC
Max. speed		page 239 - type 1	page 239 - type 1	1.5 m/s	1.5 m/s
Min. force		0.05 Nm (0.25 Nm)	0.05 Nm (0.25 Nm)	0.05 Nm	0.05 Nm
Travel diagrams		page 240 - group 5	page 240 - group 5	page 240 - group 5	page 240 - group 5

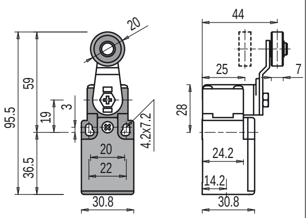
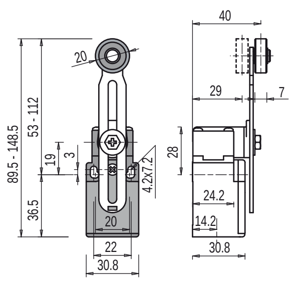
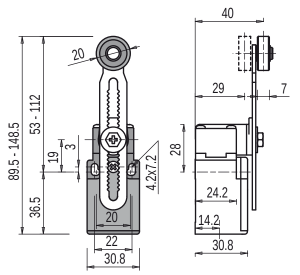
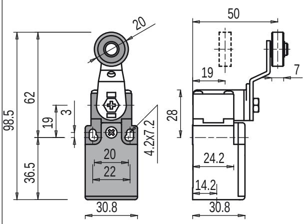
All measures in the drawings are in mm

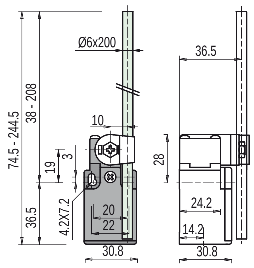
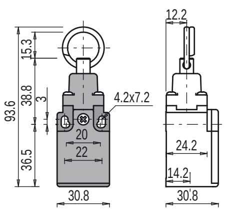
Accessories See page 225

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

Contact type:
R = snap action
L = slow action

Contact blocks		Round rod, Ø 3 mm, stainless steel		Other rollers available. See on page 116		Other rollers available. See on page 116		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 239 - type 1		page 239 - type 1		0.5 m/s	
Min. 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 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 6	

Contact blocks		Other rollers available. See on page 116		Other rollers available. See on page 116		Other rollers available. See on page 116		Other rollers available. See on page 116	
									
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 239 - type 1		page 239 - type 1		page 239 - type 1		page 239 - type 1	
Min. 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 240 - group 5		page 240 - group 5		page 240 - group 5		page 240 - group 5	

Contact blocks		Fiber glass 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	
Min. force		0.05 Nm		initial 20 N - final 40 N	
Travel diagrams		page 240 - group 5		page 240 - group 7	

(1) Positive opening only with actuator set to max. See page 115.

All measures in the drawings are in mm

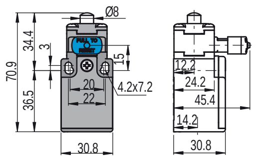
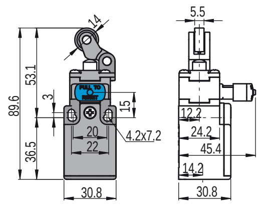
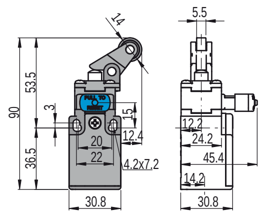
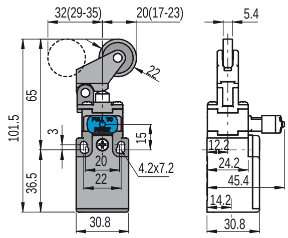
Accessories See page 225

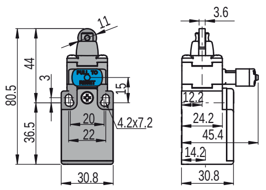
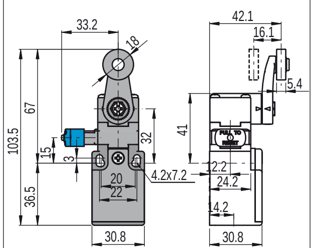
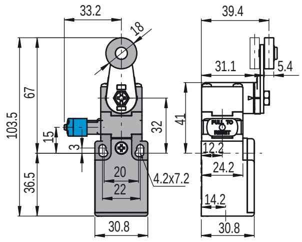
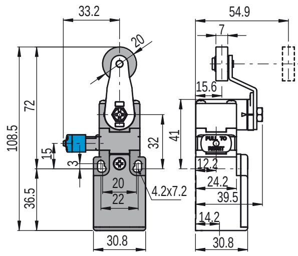
➔ The 2D/3D files are available at **www.pizzato.com**

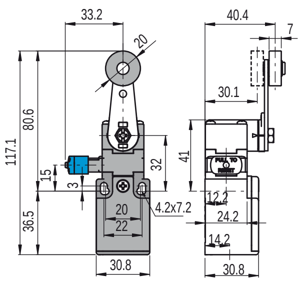
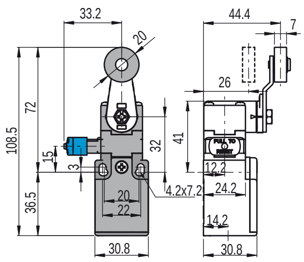
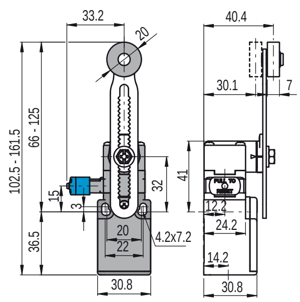
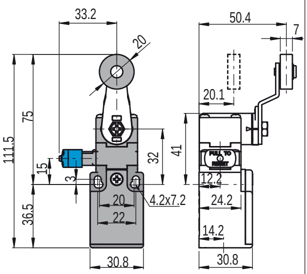
Pizzato Elettrica has developed a reset device code W3 to make perfectly simultaneous the actuator and the contact block tripping. The new device is a block inserted between the switch body and the head, and could be rotated independently from this last one. This new device has following advantages:
- The reset device can be integrated into almost all standard actuator heads
- Contact bllocks with snap action are no more necessary because the tripping movement is made by the reset device itself
- The reset device can be rotated independently from the head for maximum flexibility during installation
- Two driving forces: standard and increased for applications with vibrations
- Mechanical endurance: 1 million operating cycles.

Contact type:

R = snap action
L = slow action

Contact blocks		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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force	4.5 N (25 N →)	4 N (25 N →)	4 N (25 N →)	2.5 N (25 N →)
Travel diagrams	page 241 - group 1	page 241 - group 2	page 241 - group 2	page 241 - group 3

Contact blocks	With Ø 12 mm stainless steel roller on request	With Ø 20 mm stainless steel roller on request	Other rollers available. See on page 116	Other rollers available. See on page 116
				
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 239 - type 2	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 1	page 241 - group 4	page 241 - group 4	page 241 - group 4

Contact blocks	Other rollers available. See on page 116	Other rollers available. See on page 116	Other rollers available. See on page 116	Other rollers available. See on page 116
				
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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

All measures in the drawings are in mm

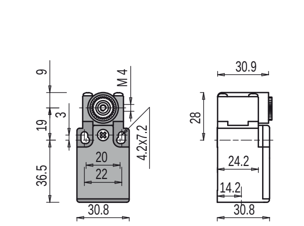
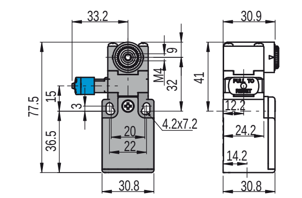
Accessories See page 225

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

Position switches with revolving lever without actuator

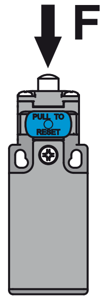
All measures in the drawings are in mm

Contact type:
R = snap action
L = slow action

Contact blocks			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
Min. force		0.05 Nm (0.25 Nm (→))	0.07 Nm (0.25 Nm (→))
Travel diagrams		page 240 - group 5	page 241 - group 4

IMPORTANT
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Increased actuating force



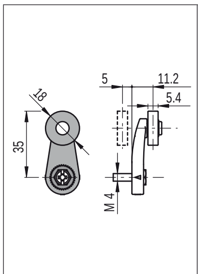
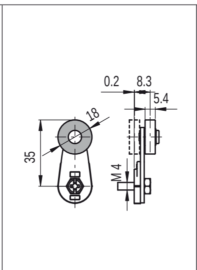
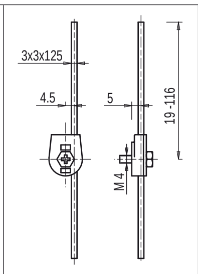
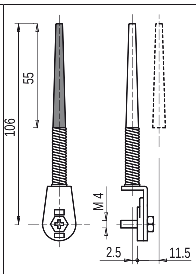
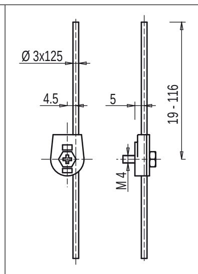
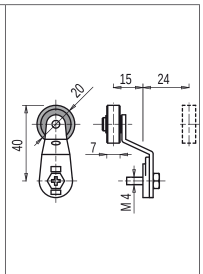
The switch can be delivered with increased actuating force (option W4). Ideal for applications with vibrations.

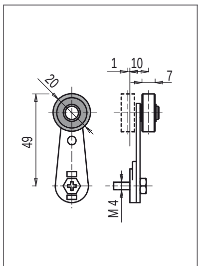
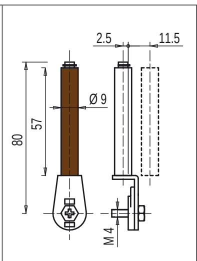
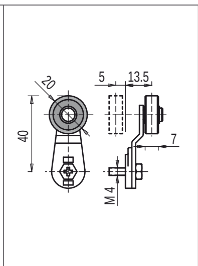
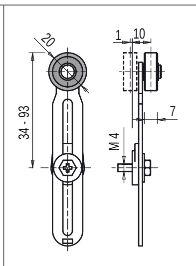
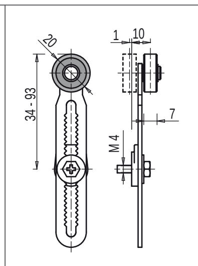
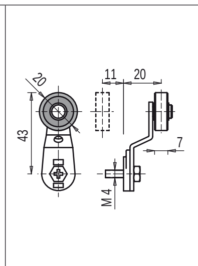
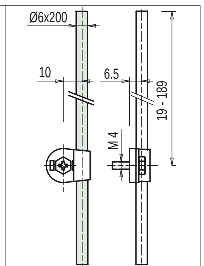
Actuators	Min. force
01, 14, 15, 16	7 N
02, 05	6 N
07	3.5 N
30 ... 57	0.08 Nm

Loose actuators

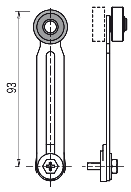
All measures in the drawings are in mm

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

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 fiber glass 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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF LE56.
- (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 mechanically interfere with the switch head.



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

Accessories See page 225

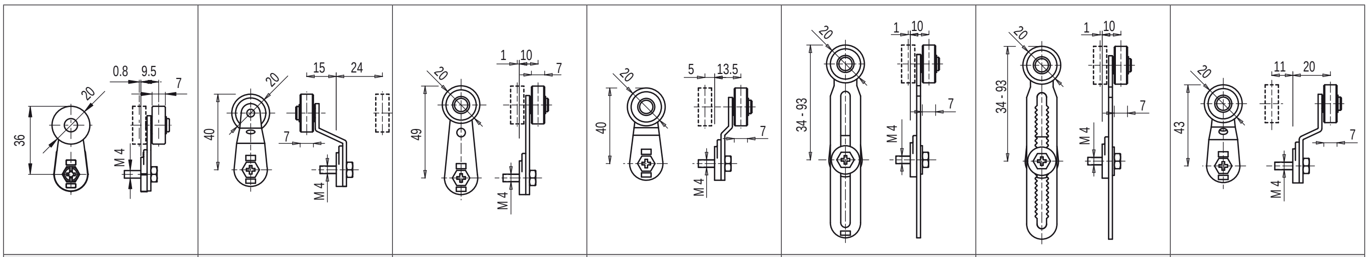
➔ The 2D/3D files are available at **www.pizzato.com**

Special loose actuators

All measures in the drawings are in mm

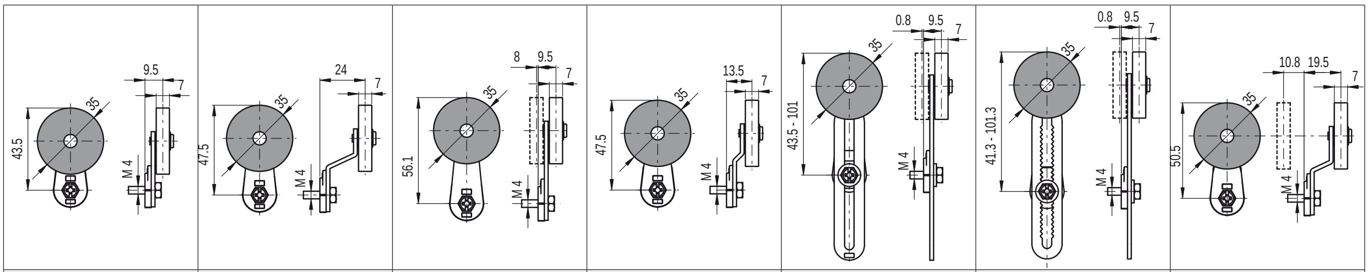
IMPORTANT: These loose actuators can be used with items of series FR, FM, FX, FZ and FK only.

Stainless steel rollers, Ø 20 mm



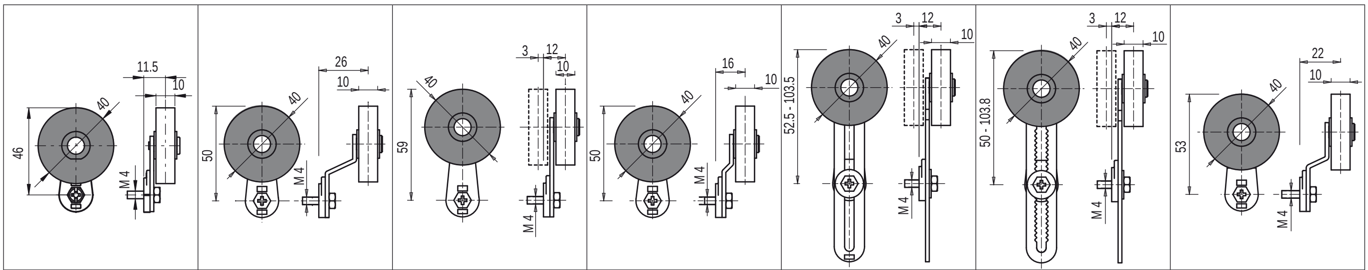
VF LE31-R24	VF LE51-R24	VF LE52-R24	VF LE54-R24	VF LE55-R24 [1]	VF LE56-R24	VF LE57-R24

Technopolymer rollers, Ø 35 mm



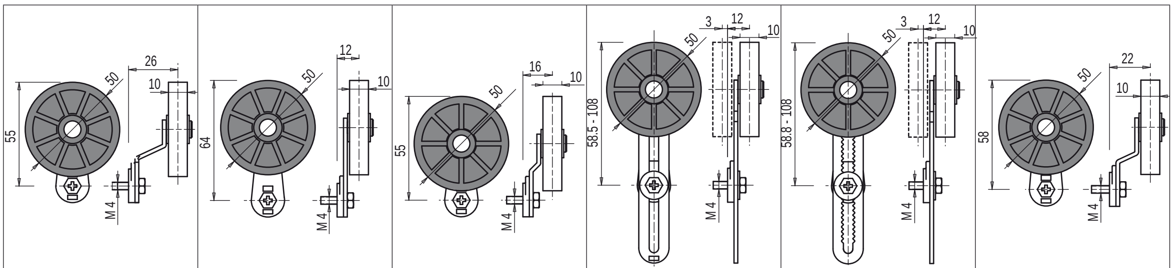
VF LE31-R25 [4]	VF LE51-R25 [4]	VF LE52-R25	VF LE54-R25 [4]	VF LE55-R25 [1]	VF LE56-R25	VF LE57-R25

Rubber rollers, Ø 40 mm



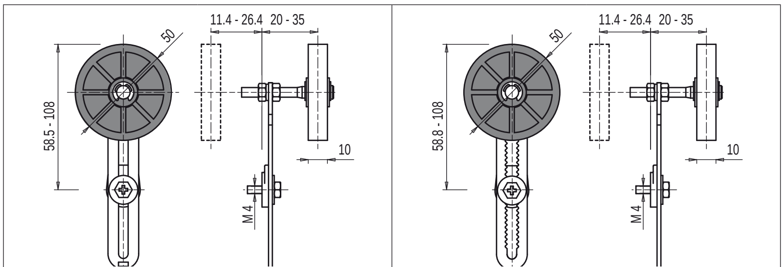
VF LE31-R5 [4]	VF LE51-R5 [4]	VF LE52-R5	VF LE54-R5 [4]	VF LE55-R5 [1]	VF LE56-R5	VF LE57-R5 [4]

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

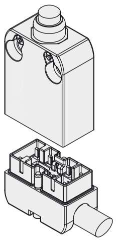
Accessories See page 225

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

Description

In line with the objectives of design and innovation, Pizzato Elettrica has developed the three modular NA-NB-NF series of prewired switches that are characterized by innovative and unique features. This product range implements new solutions required by the market and contains decades of company experience in the position switch sector.

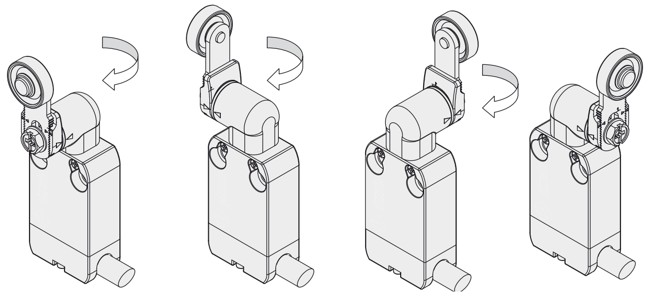
Switches with connectors



The new fundamental characteristic of these prewired switch series is the separation between the switch body and the wired connector.
The connector allows the user to change a product in the field without having to completely remove the wires.
Moreover this way it's easier to assemble products with different cable types and lengths.

Orientable heads

All heads can be turned in 90° steps. The new head for revolving lever has been designed with dimensions contained inside the switch profile. This way it's possible to install switches by the wall.

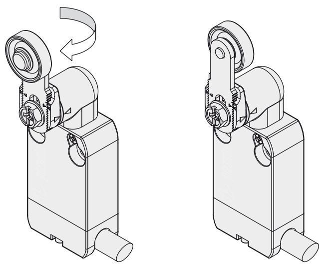


Protection degrees IP67 and IP69K

IP69K
IP67

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

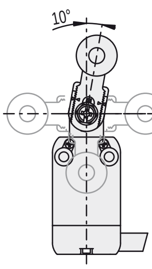
Overturning levers



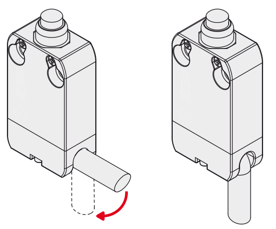
For switches with swivelling lever the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.

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.

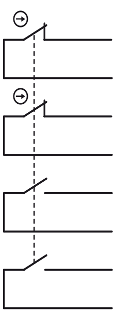


Orientable cable output



The wired connector is provided with a notch to allow the cable bending up to 90°.
Therefore it's possible to install it at the wall and it's easier to adjust the cable to the supporting flange.

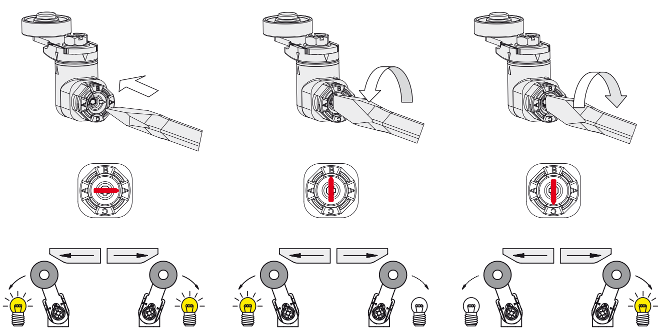
Positive opening contact blocks with 1-2-3-4 poles



These series contact blocks are versatile and compact. In the same space of the previous versions now it's possible to have up to 4 different contacts, 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.
Contact blocks have been studied so that they maintain the same connections position in the connector independently of the type of action (slow, snap) and the number of contacts. This allows use of the same cable with connector both for slow action and snap action units.

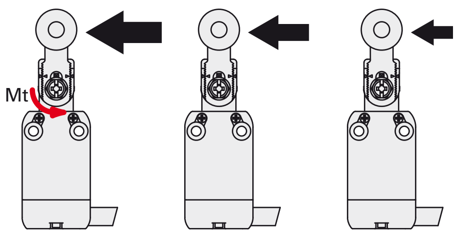
Unidirectional heads

All switches with swivelling lever are supplied with a selector which allows to choose the lever operating direction.
The following operations are possible: right-left (industrial standard set up), only from right or only from left. You can select the operating direction by revolving a special ring nut inside this type of heads.



Increased or reduced actuating force

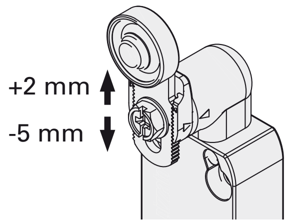
For actuators with swivelling levers, versions with increased or reduced actuating force are available on request. This feature allows selection of a switch perfectly tailored for the application. For further information contact the Technical Department.



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)

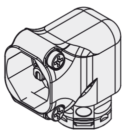
Adjustable levers with anti-unscrewing washer

Some applications present a problem due to fixing variations and carpentry laps.
In other cases small final adjustments are needed owing to the application. The majority of revolving levers for NA, NB, NF series can be adjusted for extension at 1mm intervals.

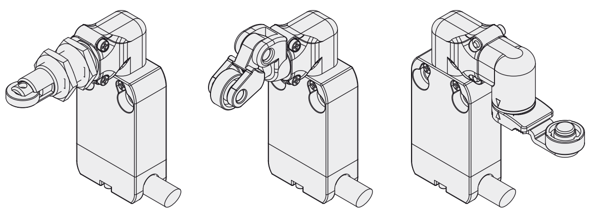


This feature, in conjunction with the radial adjusting actuator provides unique flexibility of alignment whilst still maintaining the geometrical coupling between the lever and the revolving shaft as prescribed for safety applications.

90° transmission block for actuators



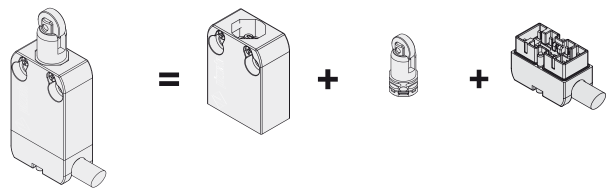
This component largely increases the application possibilities of this product range.
Actuators that can be attached directly to the switch body can also be fitted via the Transmission Block, increasing the positioning options and therefore the application possibilities.
The transmission block can be used also with swivelling lever heads. Even though it is possible with some actuators, it is not advisable to connect more than one transmission block to the same switch.



Switch components available separately

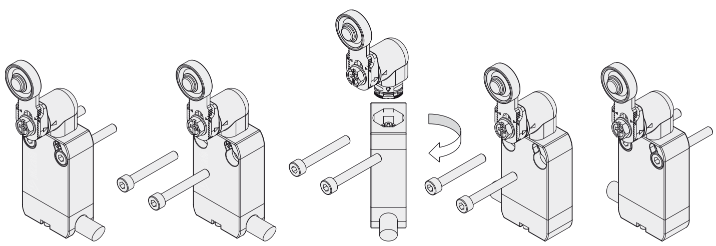
This product series is designed in a modular format, so that its single pieces can be purchased separately. This is advantageous to distributors of electrical material for stock flexibility and final customers for spare parts or new combinations.

NA B110BB-DN2 **NA B11000** **VN AA0BB** **VN CM11DN2**



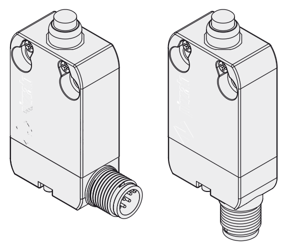
Reversible housing

The fixing holes and switch body shapes, added to the possibility of rotating the head, make this switch perfectly symmetrical.
If it's necessary to have the switch with cable output from left (the connector cannot be rotated), then it's possible to rotate completely the device maintaining the final actuator position unchanged.



M12 connectors

The long experience of Pizzato Elettrica has lead to the realization of the first 4-5-pin M12 connector integrated in a safety switch complying with the requirements of EN 60947-5-1. Its high insulation voltage Ui 250 Vac allows to mark it as suitable for safety applications ⊖.



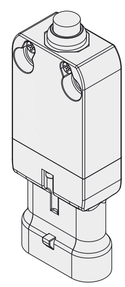
Extended temperature range

-40°C

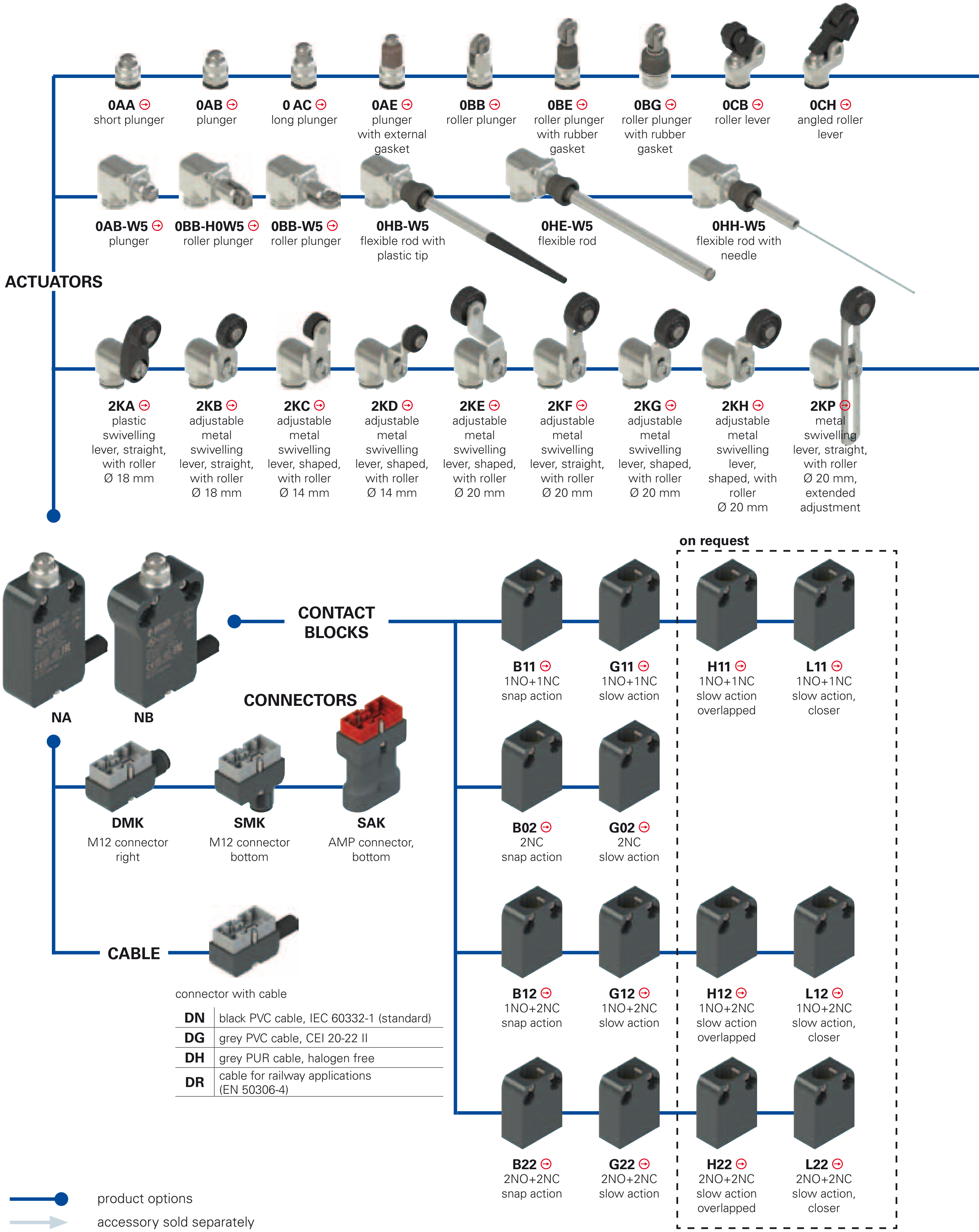
This range of switches is also available in a special version with an ambient operating temperature range of -40°C to +80°C.
They can be used for applications in cold stores, sterilisers and other devices with low temperature environments. Special materials that have been used to realize these versions,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

AMP connectors

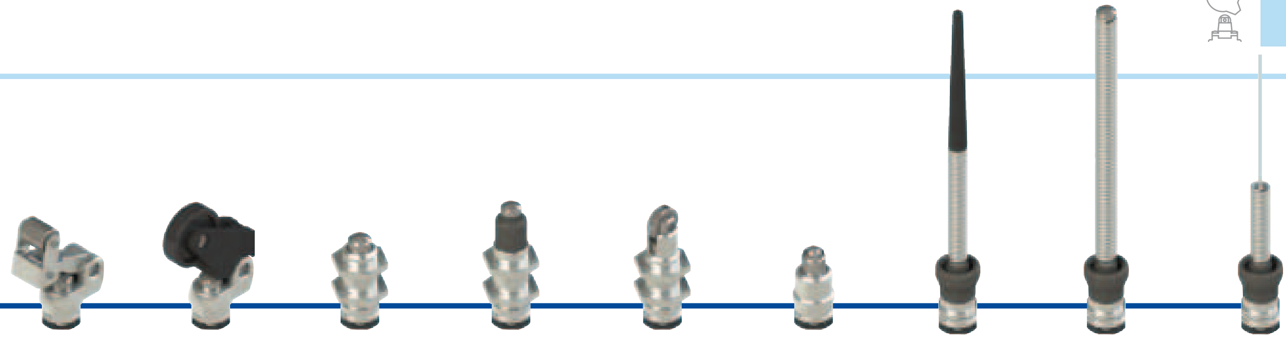
The AMP connectors for 2-contact versions are also available. These connectors, especially developed for the automotive sector, are exempt from vibrations thanks to rapid coupling.



Selection diagram for NA-NB series items sold assembled



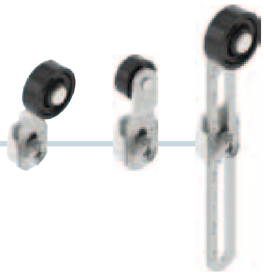
DN	black PVC cable, IEC 60332-1 (standard)
DG	grey PVC cable, CEI 20-22 II
DH	grey PUR cable, halogen free
DR	cable for railway applications (EN 50306-4)



0CP ⊝	**0CV** ⊝	**0EB** ⊝	**0EE** ⊝	**0FB** ⊝	**0 GB** ⊝	**0HB**	**0HE**	**0HH**
unidirectional roller lever	adjustable angled roller lever	plunger with M12 threaded head	plunger with M12 threaded head with external gasket	roller plunger with M12 threaded head	plunger with Ø 6 mm ball	flexible rod with plastic tip	flexible rod	flexible rod with needle

2LB	**2LE**	**2LH**	**2LL**	**2LP** ⊝	**200** ⊝
adjustable metal swivelling lever with stainless steel rod 3x3x125 mm	adjustable metal swivelling lever with stainless steel rod Ø3x125 mm	adjustable metal swivelling lever with fiber glass rod Ø6x200 mm	metal swivelling lever with adjustable flexible rod	metal swivelling lever with porcelain roll	metal head for swivelling lever actuators

LOOSE ACTUATORS
See page 139



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
NB	metal, hole spacing 25 mm

Contact blocks	
B11	1NO+1NC, snap action
B02	2NC, snap action
B12	1NO+2NC, snap action
B22	2NO+2NC, snap action
BA1	1NO+1NC, snap action in deviation (available only with M connector)
G11	1NO+1NC, slow action
G02	2NC, slow action
G12	1NO+2NC, slow action
G22	2NO+2NC, slow action
H11	1NO+1NC, slow action, overlapped
H12	1NO+2NC, slow action, overlapped
H22	2NO+2NC, slow action, overlapped
L11	1NO+1NC, slow action closer
L12	1NO+2NC, slow action closer
L22	2NO+2NC, slow action closer

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 to the right
S	connector at bottom

Transmission block	
	without transmission block
W5	90° transmission block

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 with 1 µm gold coating

Connection type	
2	cable, length 2 m (standard)
5	cable, length 5 m
K	connector

Other cable lengths on request.

Cable or connector type	
N	black PVC cable, IEC 60332-1 (standard)
G	grey PVC cable, CEI 20-22 II
H	grey PUR cable, halogen free
R	cable for railway applications (EN 50306-4)
M	M12 connector
A	AMP superseal 1.5 connector

Check feasibility using table on page 122.

Metal modular prewired switches **NA-NB** series

Main features

- Metal housing, right or bottom cable output
- Protection degrees IP67 and IP69K
- 4 types of integrated cable available
- Versions with M12 connector for safety applications ⊖
- Versions with AMP connector
- 14 contact blocks available
- 36 actuators available

Markings and quality marks:

IMQ approval:	CA02.04562
UL approval:	E131787
CCC approval:	2013010305653520
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing

Metal housing, baked powder coating, UV resistant
Version with integrated cable, standard length 2 m. Other lengths and special cables on request.
Versions with integrated M12 connector, 5 or 8 poles

Protection degree:	IP67 according to EN 60529 IP69K according to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Corrosion resistance in saline mist:	≥300 hours in NSS according to ISO 9227

General data

Ambient temperature:	See table on page 122
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Vibration resistance (actuators 0BB, 2KB, 2KC, 2KD):	5 … 150 Hz (7.9 m/s²) according to EN 61373 cl.9
Tightening torques for installation:	see pages 235-246

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

Electrical data

Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A according to EN 60947-5-1
Pollution degree:	3

In conformity 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.

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

⚠ **Installation for safety applications:**
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: see "internal connections" on page 122) as stated in **EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 244. Operate the switch **at least with the positive opening force**, indicated between brackets below each article, aside the minimum force value. All applicable standards must be respected.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.**

⚠ **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, 2NO+2NC versions with 8-pin M12 and AMP connector can be used only in PELV circuits.**

Characteristics approved by IMQ

Rated insulation voltage (Ui):	250 Vac
Conventional free air thermal current (Ith):	10 A (1-2 contacts) / 6 A (2-3 contacts) 4 A (4 contacts or 5-pin M12 connector)
Protection against short circuits (fuse):	10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 5-pin M12 connector), gG type
Rated impulse withstand voltage (U_{imp}):	4 kV
Protection degree of the housing:	IP67
MA terminals (saddle clamps)	
Pollution degree:	3
Utilization category:	AC15 / DC13 (with connector)
Operating voltage (Ue):	250 Vac (50 Hz) / 24 Vdc (with connector)
Operating current (Ie):	3 A / 2 A (with connector)

Forms of the contact element: X, Y, X+Y, X+X, Y+Y, Y+Y+X, X+X+Y, X+X+Y+Y, 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 conformity with standards: EN 60947-1, EN 60947-5-1 + A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

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

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

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

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

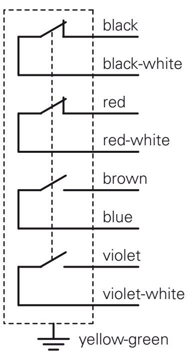
Utilization temperatures and electrical data

Output with cable								Output with M12 connector		Output with AMP connector
Versions with 2 contacts				Versions with 3 contacts		Versions with 4 contacts		Versions with 2 contacts	Versions with 3/4 contacts	Versions with 2 contacts
Cable type N 5x0.75 mm²,	Cable type G 5x0.75 mm²,	Cable type H 5x0.75 mm²,	Cable type R 5x0.5 mm²	Cable type N 7x0.5 mm²	Cable type H 7x0.5 mm²,	Cable type N 9x0.34 mm²	Cable type R 9x0.5 mm²	M12 connector 5 poles	M12 connector 8 poles	AMP superseal 1.5 connector
		Max. speed 100 m/min Max. acceleration 2 m/s²	Cable for railway applications EN50306-4 1E-300V-5x0.5 mm² MM-90 Cable in conformity with standards: EN 50306-4 EN 45555 Self-extinguishing: IEC 60332-1 EN 50305 EN 50306-1		Max. speed 300 m/min Max. acceleration 25 m/s²		Cable for railway applications EN50306-4 1P-300V-9x0.5 mm² MM-90 Cable in conformity with standards: EN 50306-4 EN 45555 Self-extinguishing: IEC 60332-1 EN 50305 EN 50306-1			
Sheath PVC 05VV-F, Self-extinguishing: IEC 60332-1-2 IEC 60332-1-3	Sheath PVC S05VV-F, Self-extinguishing: IEC 60332-1-2 IEC 60332-1-3 IEC 60332-3 CEI 20-22 II	PUR sheath HALOGEN FREE self-extinguishing: IEC 60332-1-2 IEC 60332-1-3		Sheath PVC 03VV-F, self-extinguishing IEC 60332-1-2 IEC 60332-1-3	PUR sheath HALOGEN FREE self-extinguishing: IEC 60332-1-2 IEC 60332-1-3	Sheath PVC 03VV-F, self-extinguishing IEC 60332-1-2 IEC 60332-1-3				
Minimum bending radius: 72 mm	Minimum bending radius: 72 mm	Minimum bending radius: 70 mm Without halogen Oil resistant IEC 60811-2-1	Minimum bending radius: 60 mm	Minimum bending radius: 108 mm	Minimum bending radius:108 mm Without halogen Oil resistant IEC 60811-2-1	Minimum bending radius: 94 mm	Minimum bending radius: 60 mm			
External diameter: 8 mm	External diameter: 8 mm	External diameter: 8 mm	External diameter: 6 mm	External diameter: 7 mm	External diameter: 7 mm	External diameter: 7 mm	External diameter: 6,5 mm			
Stripped end: 80 mm	Stripped end: 80 mm	Stripped end: 80 mm	Stripped end: 80 mm	Stripped end: 80 mm	Stripped end: 80 mm	Stripped end: 80 mm	Stripped end: 80 mm			
Class 5 copper IEC 60228	Class 5 copper IEC 60228	IEC 60228 class 6 copper	Class 5 copper IEC 60228	Class 5 copper IEC 60228	Class 6 copper IEC 60228	Class 5 copper IEC 60228	Class 5 copper IEC 60228			

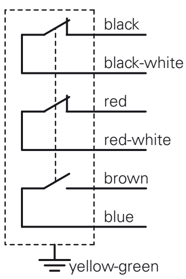
		Cable type N (2 contacts)	Cable type G	Cable type H	Cable type R	Cable type N (3 contacts)	Cable type H (3 contacts)	Cable type N (4 contacts)	Cable type R (4 contacts)	M12 2 contacts	M12 3/4 contacts	AMP 2 contacts
Ambient temperature standard	Cable fixed installation	-25 °C ... +70 °C	-25 °C ... +70 °C	-25°C … +80°C	-25 °C +80 °C	-25°C … +80°C	-25°C … +80°C	-25°C … +80°C	-25 °C +80 °C			
	Cable flexible installation	+5 °C ... +70 °C	+5 °C ... +70 °C	-25°C … +80°C	-25 °C +80 °C	-5 °C ... +80 °C	-25°C … +80°C	-5 °C ... +80 °C	-25 °C +80 °C	-25°C … +80°C		
	Cable mobile installation	/	/	-25°C … +80°C	/	/	-25°C … +80°C	/	/			
Ambient temperature extended (-T6)	Cable fixed installation	/	/	-40°C … +80°C	-40°C … +80°C	/	-40°C … +80°C	/	-40 °C +80 °C			
	Cable flexible installation	/	/	-40°C … +80°C	-40°C … +80°C	/	-30 °C ... +80 °C	/	-40 °C +80 °C	-40°C … +80°C		
	Cable mobile installation	/	/	-40°C … +80°C	/	/	-30 °C ... +80 °C	/	/			
Electrical data	Thermal current Ith	10 A	10 A	10 A	6 A	6 A	6 A	3 A	4 A	4 A	2 A	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 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	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 connections of the cable

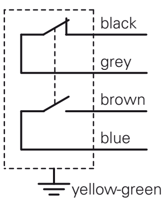
2NO+2NC



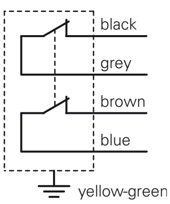
1NO+2NC



1NO+1NC

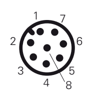


2NC



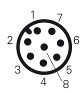
Internal connections of the connector

2NO+2NC



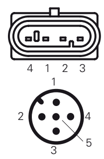
1-2 NC
3-4 NC
5-6 NO
7-8 NO

1NO+2NC



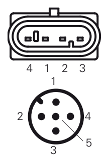
3-4 NC
5-6 NC
7-8 NO
1 ⏚

1NO+1NC



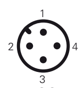
1-2 NC
3-4 NO
5 ⏚

2NC



1-2 NC
3-4 NC
5 ⏚

1NO+1NC in deviation

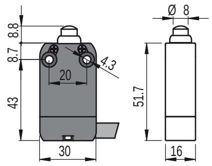


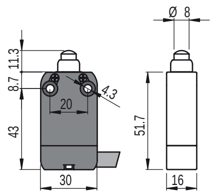
1 COMMON
2 NC
3 ⏚
4 NO

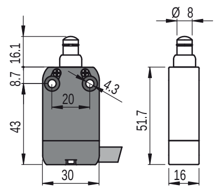
Female connectors See page 226

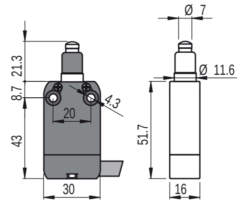
Contact type:

R = snap action
L = slow action

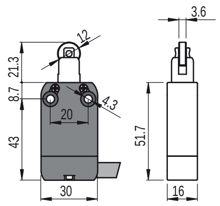


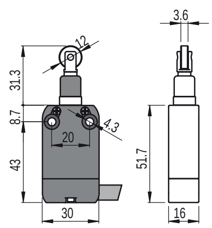


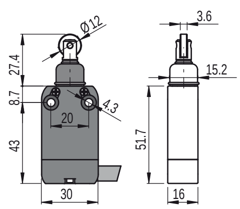


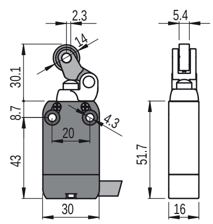


Contact blocks								With external rubber gasket	
B11	R	NA B110AA-DN2	1NO+1NC	NA B110AB-DN2	1NO+1NC	NA B110AC-DN2	1NO+1NC	NA B110AE-DN2	1NO+1NC
B02	R	NA B020AA-DN2	2NC	NA B020AB-DN2	2NC	NA B020AC-DN2	2NC	NA B020AE-DN2	2NC
B12	R	NA B120AA-DN2	1NO+2NC	NA B120AB-DN2	1NO+2NC	NA B120AC-DN2	1NO+2NC	NA B120AE-DN2	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 243 - type 4		page 243 - type 4		page 243 - type 4		page 243 - type 4	
Min. force		7 N (25 N)		7 N (25 N)		7 N (25 N)		7 N (25 N)	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1		page 244 - group 1	



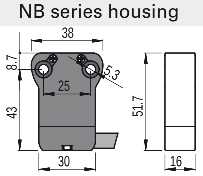






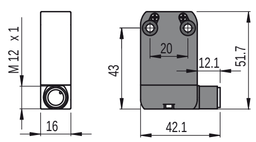
Contact blocks				With external rubber gasket		With external rubber gasket		With stainless steel roller on request	
B11	R	NA B110BB-DN2	1NO+1NC	NA B110BE-DN2	1NO+1NC	NA B110BG-DN2	1NO+1NC	NA B110CB-DN2	1NO+1NC
B02	R	NA B020BB-DN2	2NC	NA B020BE-DN2	2NC	NA B020BG-DN2	2NC	NA B020CB-DN2	2NC
B12	R	NA B120BB-DN2	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 243 - type 2		page 243 - type 5		page 243 - type 5		page 243 - type 3	
Min. force		7 N (25 N)		7 N (25 N)		7 N (25 N)		5 N (25 N)	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1		page 244 - group 2	

NB series housing



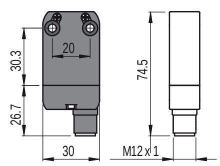
To purchase a NB series product: replace NA with NB in the codes shown above. Example:
NA B110AA-DN2 → **NB** B110AA-DN2

M12 connector, right



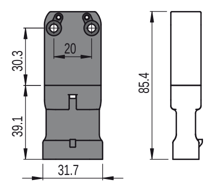
To purchase a product with M12 connector from the right replace DN2 with DMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DMK**

M12 connector, bottom



To purchase a product with M12 connector from below replace DN2 with SMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SMK**

AMP superseal 1.5 connector



To purchase a product with AMP connector replace DN2 with SAK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SAK**

All measures in the drawings are in mm

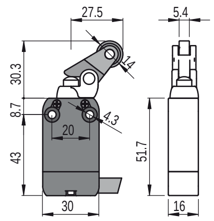
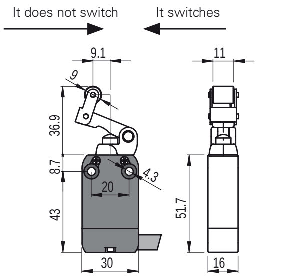
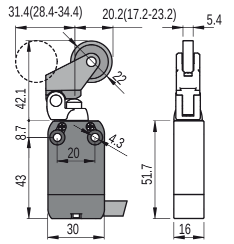
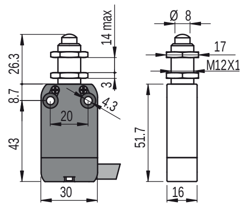
Items with code on **green** background are stock items

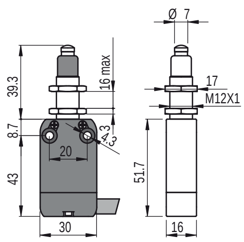
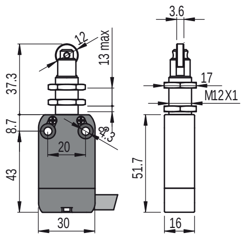
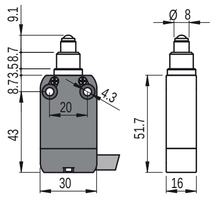
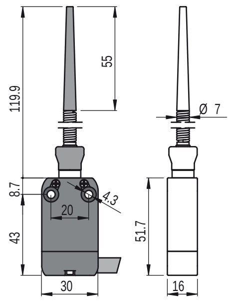
Accessories See page 225

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

Contact type:

R = snap action
L = slow action

		With stainless steel roller on request		Operation in one direction				Fixed only by threaded head	
Contact blocks									
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 243 - type 3		page 243 - type 3		page 243 - type 3		page 243 - type 4	
Min. force		5 N (25 N →)		3 N (25 N →)		3 N (25 N →)		7 N (25 N →)	
Travel diagrams		page 244 - group 2		page 244 - group 6		page 244 - group 3		page 244 - group 1	

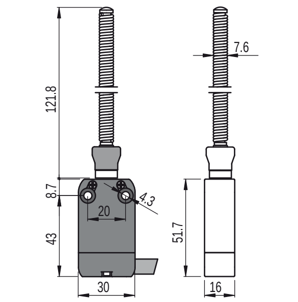
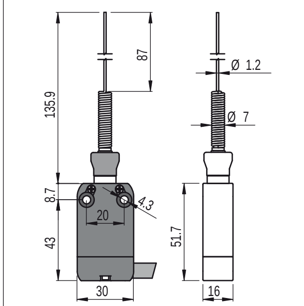
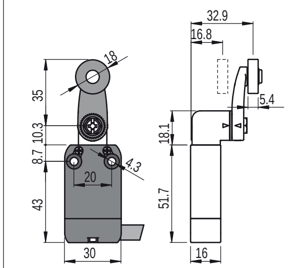
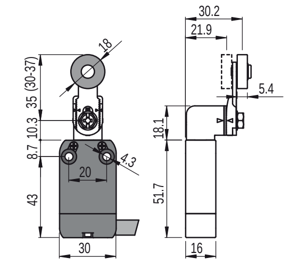
		Fixed only by threaded head With external rubber gasket		Fixed only by threaded head		Plunger with Ø 6 mm ball		With external rubber gasket	
Contact blocks									
B11	R	NA B110EE-DN2	→ 1NO+1NC	NA B110FB-DN2	→ 1NO+1NC	NA B110GB-DN2	→ 1NO+1NC	NA B110HB-DN2	1NO+1NC
B02	R	NA B020EE-DN2	→ 2NC	NA B020FB-DN2	→ 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 243 - type 4		page 243 - type 2		page 243 - type 2		1 m/s	
Min. force		7 N (25 N →)		7 N (25 N →)		7 N (25 N →)		0.03 Nm	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1		page 244 - group 4	

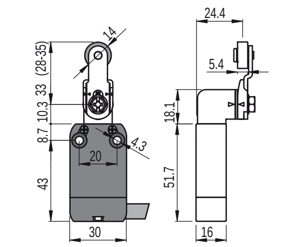
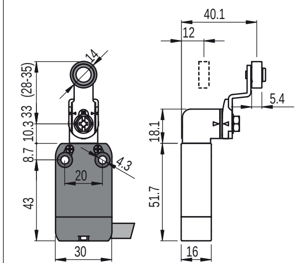
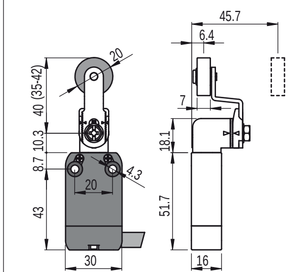
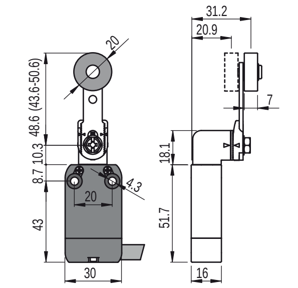
All measures in the drawings are in mm

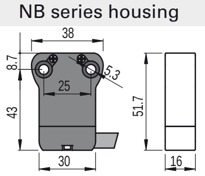
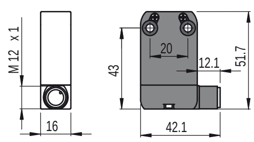
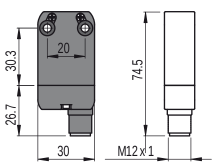
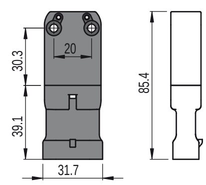
Metal modular prewired switches **NA-NB** series

Contact type:

R = snap action
L = slow action

		With external rubber gasket		With external rubber gasket		With stainless steel roller on request		With stainless steel roller on request	
									
Contact blocks									
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 243 - type 1		page 243 - type 1	
Min. force		0.07 Nm		0.03 Nm		0.07 Nm (0.25 Nm)		0.07 Nm (0.25 Nm)	
Travel diagrams		page 244 - group 4		page 244 - group 4		page 244 - group 5		page 244 - group 5	

		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request	
									
Contact blocks									
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 243 - type 1		page 243 - type 1		page 243 - type 1		page 243 - type 1	
Min. 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 244 - group 5		page 244 - group 5		page 244 - group 5		page 244 - group 5	

NB series housing	M12 connector, right	M12 connector, bottom	AMP superseal 1.5 connector
			
To purchase a NB series product: replace NA with NB in the codes shown above. Example: **NA** B110AA-DN2 → **NB** B110AA-DN2	**To purchase a product with M12 connector from the right** replace DN2 with DMK in the codes shown above. Example: NA B110AA-**DN2** → NA B110AA-**DMK**	**To purchase a product with M12 connector from below** replace DN2 with SMK in the codes shown above. Example: NA B110AA-**DN2** → NA B110AA-**SMK**	**To purchase a product with AMP connector** replace DN2 with SAK in the codes shown above. Example: NA B110AA-**DN2** → NA B110AA-**SAK**

All measures in the drawings are in mm

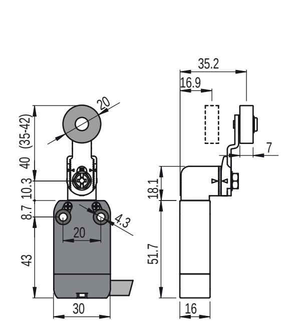
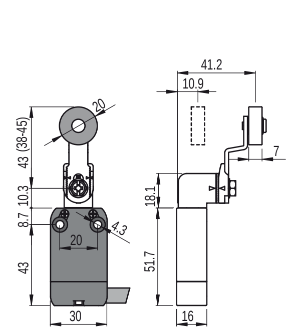
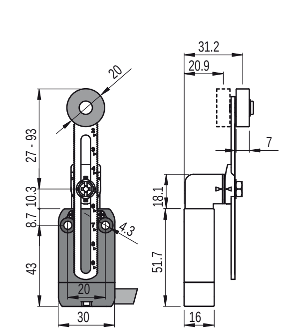
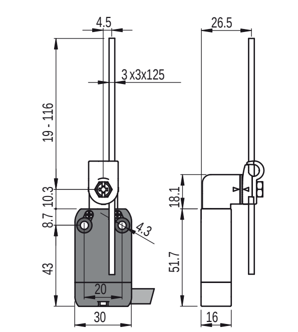
Items with code on **green** background are stock items

Accessories See page 225

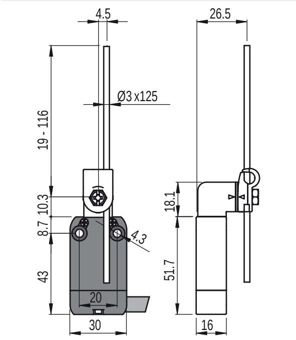
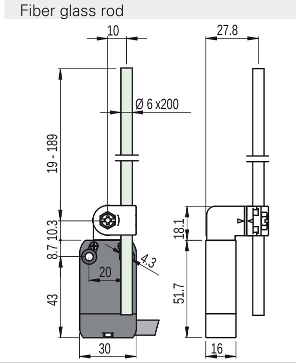
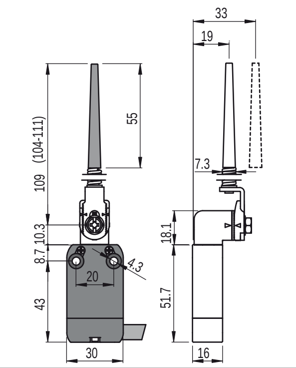
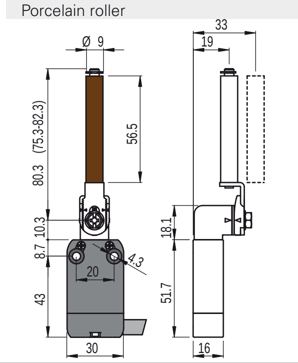
→ The 2D/3D files are available at **www.pizzato.com**

Contact type:

R = snap action
L = slow action

	With stainless steel roller on request	With stainless steel roller on request	With stainless steel roller on request	Square rod, 3x3 mm, stainless steel
Contact blocks				

Contact blocks									
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 243 - type 1		page 243 - type 1		page 243 - type 1		1.5 m/s	
Min. 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 244 - group 5		page 244 - group 5		page 244 - group 5		page 244 - group 5	

	Round rod, Ø 3 mm, stainless steel	Fiber glass rod		Porcelain roller
Contact blocks				

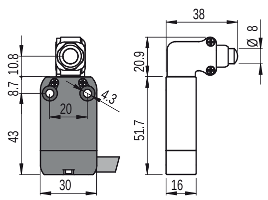
Contact blocks									
B11	R	NA B112LE-DN2	1NO+1NC	NA B112LH-DN2	1NO+1NC	NA B112LL-DN2	1NO+1NC	NA B112LP-DN2E24	1NO+1NC
B02	R	NA B022LE-DN2	2NC	NA B022LH-DN2	2NC	NA B022LL-DN2	2NC	NA B022LP-DN2E24	2NC
B12	R	NA B122LE-DN2	1NO+2NC	NA B122LH-DN2	1NO+2NC	NA B122LL-DN2	1NO+2NC	NA B122LP-DN2E24	1NO+2NC
B22	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	
Min. force		0.07 Nm		0.07 Nm		0.07 Nm		0.04 Nm	
Travel diagrams		page 244 - group 5		page 244 - group 5		page 244 - group 5		page 244 - group 5	

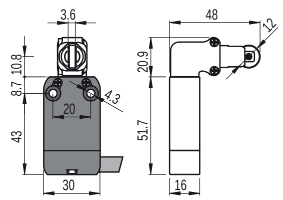
All measures in the drawings are in mm

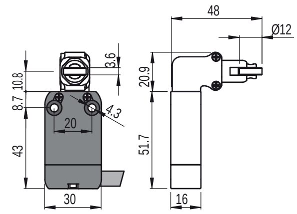
Metal modular prewired switches **NA-NB** series

Contact type:

R = snap action
L = slow action



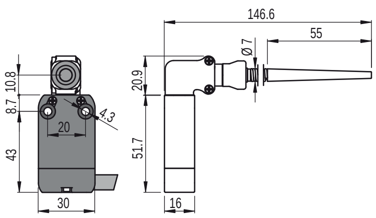




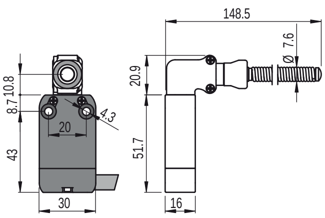
Contact blocks

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 243 - type 4		page 243 - type 2		page 243 - type 2	
Min. force		9.5 N (25 N →)		9.5 N (25 N →)		9.5 N (25 N →)	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1	

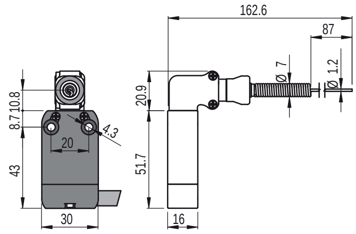
With external gasket



With external gasket



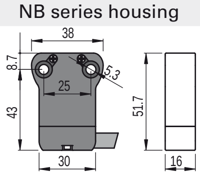
With external gasket



Contact blocks

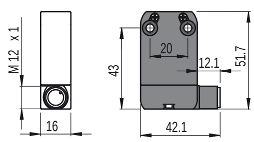
B11	R	NA B110HB-DN2W5	1NO+1NC	NA B110HE-DN2W5	1NO+1NC	NA B110HH-DN2W5	1NO+1NC
B02	R	NA B020HB-DN2W5	2NC	NA B020HE-DN2W5	2NC	NA B020HH-DN2W5	2NC
B12	R	NA B120HB-DN2W5	1NO+2NC	NA B120HE-DN2W5	1NO+2NC	NA B120HH-DN2W5	1NO+2NC
B22	R	NA B220HB-DN2W5	2NO+2NC	NA B220HE-DN2W5	2NO+2NC	NA B220HH-DN2W5	2NO+2NC
G11	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	
Min. force		0.08 Nm		0.12 Nm		0.08 Nm	
Travel diagrams		page 244 - group 4		page 244 - group 4		page 244 - group 4	

NB series housing



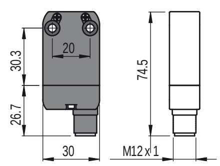
To purchase a NB series product: replace NA with NB in the codes shown above. Example:
NA B110AA-DN2 → **NB** B110AA-DN2

M12 connector, right



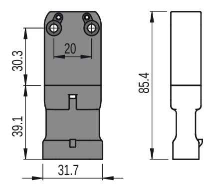
To purchase a product with M12 connector from the right replace DN2 with DMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**DMK**

M12 connector, bottom



To purchase a product with M12 connector from below replace DN2 with SMK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SMK**

AMP superseal 1.5 connector

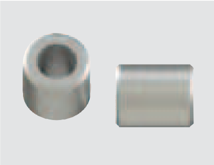


To purchase a product with AMP connector replace DN2 with SAK in the codes shown above. Example:
NA B110AA-**DN2** → NA B110AA-**SAK**

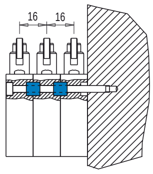
All measures in the drawings are in mm

Accessories

Article	Description
VN DT1F	Spacer for NA-NF series
VF D16B	Spacer for NB series



By interposing the spacers between one switch and the next, it is possible to have 2 or more prewired switches, preventing them from moving in relation to one another. **10 pcs.** packs



M12 connectors with cable

for details see page 225

Technical data:
- Polyurethane connector body (4/5/8 poles)
- Polypropylene connector body (12 poles)
- Class 6 rated copper of the wires according to IEC 60228 for mobile installation (4/5/8 poles)
- Class 5 rated copper of the wires according to IEC 60228 for fixed installation (12 poles)
- Gold-plated contacts (resistance < 5 mΩ)
- Self locking ring nut
- High flexibility wire suitable to be used in movable chains, with PVC sheath conforming to IEC 60332-3 and CEI 20-22II standards. With polyurethane sheath on request (4/5/8 poles)
- PVC cable, fixed installation (12 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 CA4PD3M

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Sheath coating	
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 item, minimum order quantity 100 pcs.

M12 sockets, field wireable

General data

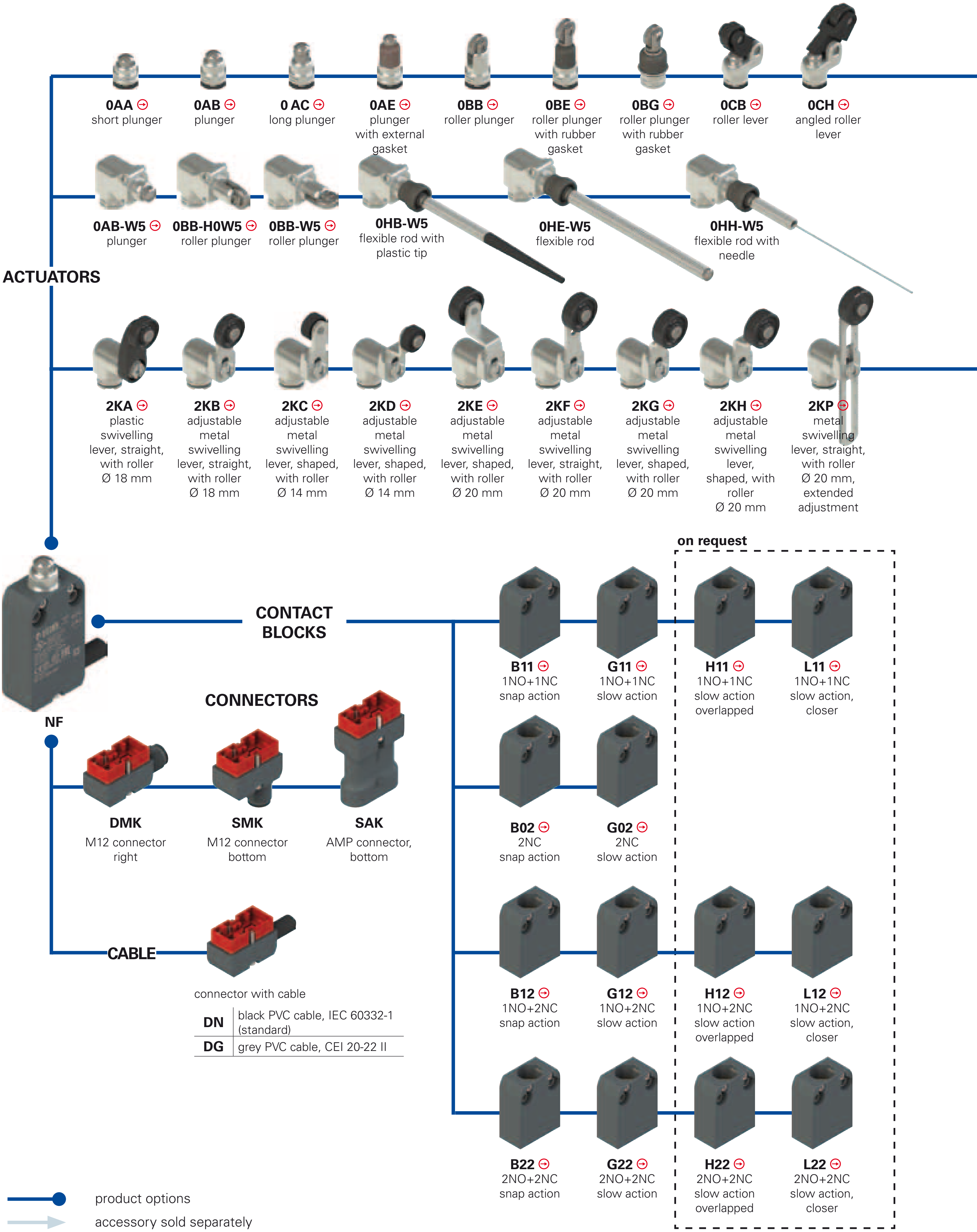
Technopolymer connector body	
Gold-plated contacts	
Screw terminals for wiring	
Max. operating voltages	250 Vac/dc (4 and 5 poles) 30 Vac/dc (8 poles)
Maximum current	4 A
Protection degree	IP67 according to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	from 0.25 mm² (24 AWG) to 0.5 mm² (20 AWG)

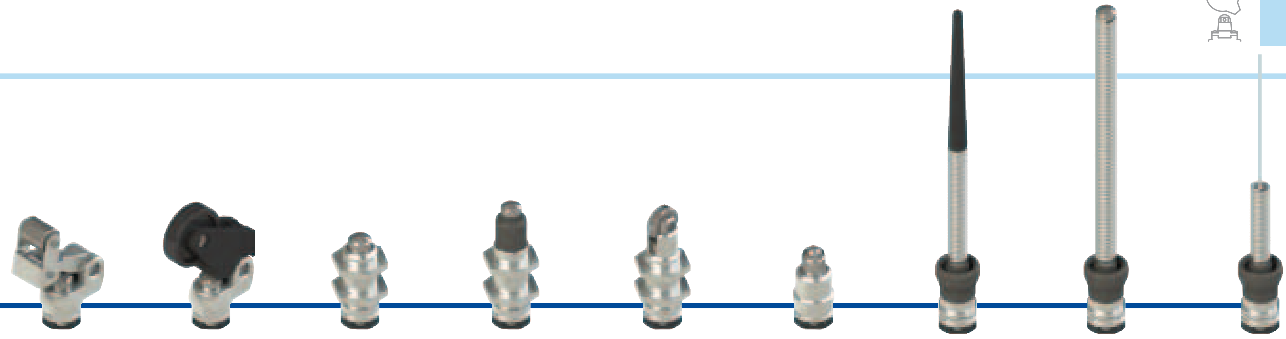
Article	Description	no. of poles
VF CBMP4DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	4
VF CBMP5DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	5
VF CBMP8DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 7 mm	8

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

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

Selection diagram for NF series items sold assembled

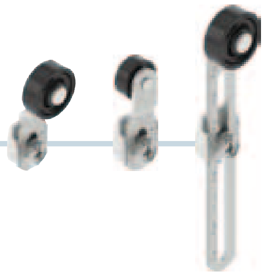




0CP ⊖	0CV ⊖	0EB ⊖	0EE ⊖	0FB ⊖	0 GB ⊖	0HB	0HE	0HH
unidirectional roller lever	adjustable angled roller lever	plunger with M12 threaded head	plunger with M12 threaded head with external gasket	roller plunger with M12 threaded head	plunger with Ø 6 mm ball	flexible rod with plastic tip	flexible rod	flexible rod with needle

2LB	2LE	2LH	2LL	2LP ⊖	200 ⊖
adjustable metal swivelling lever with stainless steel rod 3x3x125 mm	adjustable metal swivelling lever with stainless steel rod Ø3x125 mm	adjustable metal swivelling lever with fiber glass rod Ø6x200 mm	metal swivelling lever with adjustable flexible rod	metal swivelling lever with porcelain roll	metal head for swivelling lever actuators

LOOSE ACTUATORS
See page 139



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 blocks	
B11	1NO+1NC, snap action
B02	2NC, snap action
B12	1NO+2NC, snap action
B22	2NO+2NC, snap action
G11	1NO+1NC, slow action
G02	2NC, slow action
G12	1NO+2NC, slow action
G22	2NO+2NC, slow action
H11	1NO+1NC, slow action, overlapped
H12	1NO+2NC, slow action, overlapped
H22	2NO+2NC, slow action, overlapped
L11	1NO+1NC, slow action closer
L12	1NO+2NC, slow action closer
L22	2NO+2NC, slow action closer

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 to the right
S	connector at bottom

Transmission block	
	without transmission block
W5	90° transmission block

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 with 1 μm gold coating

Connection type	
2	cable, length 2 m (standard)
5	cable, length 5 m
K	connector

Other cable lengths on request.

Cable or connector type	
N	black PVC cable, IEC 60332-1 (standard)
G	grey PVC cable, CEI 20-22 II
M	M12 connector
A	AMP superseal 1.5 connector

Check feasibility using table on page 132.

Main features

- Technopolymer housing, right or bottom cable output
- Protection degrees IP67 and IP69K
- 2 types of integrated cable available
- Versions with M12 connector for safety applications ⊖
- Versions with AMP connector
- 14 contact blocks available
- 37 actuators available

Markings and quality marks:

IMQ approval:	CA02.04562
UL approval:	E131787
CCC approval:	2013010305653520
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing
Housing made of fiber glass reinforced technopolymer, self-extinguishing, shock-proof and with double insulation ⧈.
Version with integrated cable, standard length 2 m. Other lengths and special cables on request.
Versions with integrated M12 connector, 4 or 8 poles

Protection degree:	IP67 according to EN 60529 IP69K according to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Corrosion resistance in saline mist:	≥ 300 hours in NSS according to ISO 9227

General data

Ambient temperature:	See table on page 132
Max actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	40,000,00 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Electrical data

Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A according to EN 60947-5-1
Pollution degree:	3

In conformity 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.

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

⚠ **Installation for safety applications:**
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: see "internal connections" on page 132) as stated in **EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 244. Operate the switch **at least with the positive opening force**, indicated between brackets below each article, aside the minimum force value. All applicable standards must be respected.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.**

⚠ **Important: Switch off the circuit voltage before disconnecting the connector from the switch. The connector is not suitable for separation of electrical loads.**

Characteristics approved by IMQ

Rated insulation voltage (Ui): 250 Vac
Conventional free air thermal current (Ith): 10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 4-pin M12 connector)
Protection against short circuits (fuse): 10 A (1-2 contacts) / 6 A (2-3 contacts) / 4 A (4 contacts or 4-pin M12 connector), gG type
Rated impulse withstand voltage (U_{imp}): 4 kV
Protection degree of the housing: IP67
MA terminals (saddle clamps)
Pollution degree: 3
Utilization category: AC15 / DC13 (with connector)
Operating voltage (Ue): 250 Vac (50 Hz) / 24 Vdc (with connector)
Operating current (Ie): 3 A / 2 A (with connector)
Forms of the contact element: X, Y, X+Y, X+X, Y+Y, Y+Y+X, X+X+Y, X+X+Y+Y, 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 conformity with standards: EN 60947-1, EN 60947-5-1 + A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

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

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

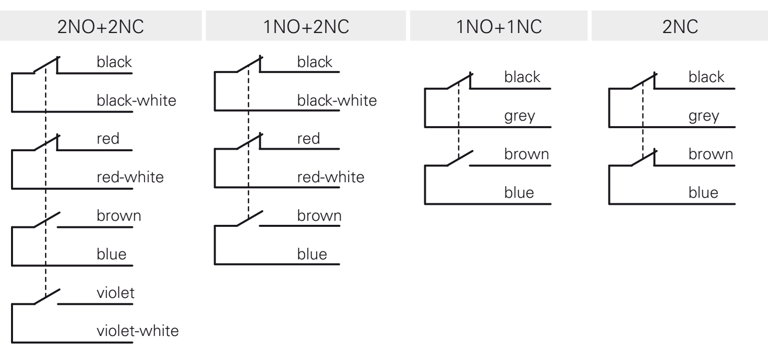
In conformity with standard: UL 508, CSA 22.2 No.14

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

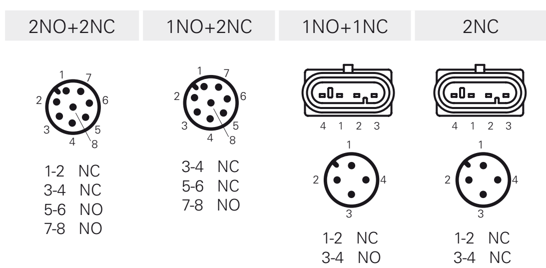
Utilization temperatures and electrical data

		Output with cable				Output with M12 connector		Output with AMP connector
		Versions with 2 contacts		Versions with 3 contacts	Versions with 4 contacts	Versions with 2 contacts	Versions with 3/4 contacts	Versions with 2 contacts
		Cable type N 5x0.75 mm², Sheath PVC 05VV-F, Self-extinguishing: IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 72 mm External diameter: 8 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type G 5x0.75 mm², Sheath PVC S05VV-F, Self-extinguishing: IEC 60332-1-2 IEC 60332-1-3 IEC 60332-3 CEI 20-22 II Minimum bending radius: 72 mm External diameter: 8 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type N 7x0.5 mm² Sheath PVC 03VV-F, Self-extinguishing IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 108 mm External diameter: 7 mm Stripped end: 80 mm Class 5 copper IEC 60228	Cable type N 9x0.34 mm² Sheath PVC 03VV-F, Self-extinguishing: IEC 60332-1-2 IEC 60332-1-3 Minimum bending radius: 94 mm External diameter: 7 mm Stripped end: 80 mm Class 5 copper IEC 60228	M12 connector 5 poles	M12 connector 8 poles	AMP superseal 1.5 connector
Ambient temperature standard	Cable fixed installation	-25 °C ... +70 °C	-25 °C ... +70 °C	-25°C … +80°C	-25°C … +80°C			
	Cable flexible installation	+5 °C ... +70 °C	+5 °C ... +70 °C	-5 °C ... +80 °C	-5 °C ... +80 °C		-25°C … +80°C	
	Cable mobile installation	/	/	/	/			
Ambient temperature extended (-T6)	Cable fixed installation	/	/	/	/			
	Cable flexible installation	/	/	/	/		-40°C … +80°C	
	Cable mobile installation	/	/	/	/			
Electrical data	Thermal current Ith	10 A	10 A	6 A	3 A	4 A	2 A	10 A
	Rated insulation voltage Ui	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	6 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
	Utilization category DC13 125 V	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
	Utilization category AC15 24 V	4 A	4 A	4 A	3 A	4 A	2 A	4 A
	Utilization category AC15 120 V	4 A	4 A	4 A	3 A	4 A	/	4 A
	Utilization category AC15 250 V	4 A	4 A	4 A	3 A	4 A	/	4 A
Approvals		CE cULus IMQ EAC CCC	CE EAC CCC	CE cULus IMQ EAC CCC	CE cULus IMQ EAC CCC	CE cULus IMQ EAC CCC	CE cULus EAC CCC	CE cULus EAC CCC

Internal connections of the cable



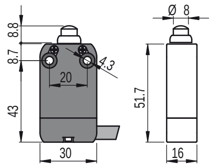
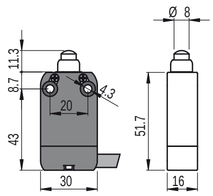
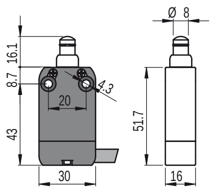
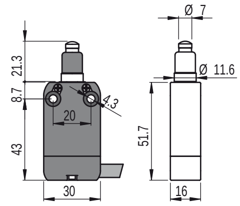
Internal connections of the connector



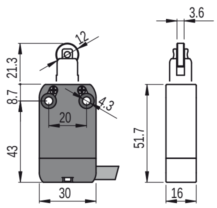
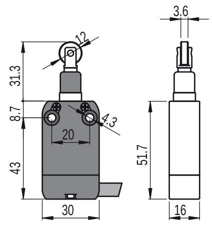
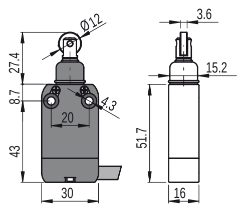
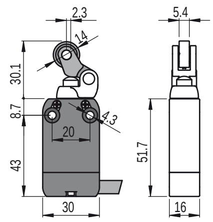
Female connectors See page 226

Contact type:

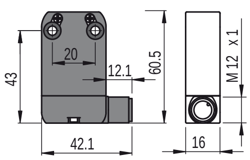
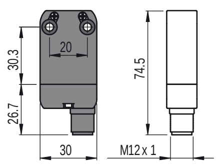
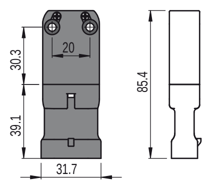
R = snap action
L = slow action

					With external rubber gasket
					

Contact blocks									
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 243 - type 4		page 243 - type 4		page 243 - type 4		page 243 - type 4	
Min. force		7 N (25 N)		7 N (25 N)		7 N (25 N)		7 N (25 N)	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1		page 244 - group 1	

			With external rubber gasket	With external rubber gasket	With stainless steel roller on request
					

Contact blocks									
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 243 - type 2		page 243 - type 5		page 243 - type 5		page 243 - type 3	
Min. force		7 N (25 N)		7 N (25 N)		7 N (25 N)		5 N (25 N)	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1		page 244 - group 2	

M12 connector, right	M12 connector, bottom	AMP superseal 1.5 connector
		

To purchase a product with M12 connector from the right replace DN2 with DMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**DMK**

To purchase a product with M12 connector from below replace DN2 with SMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SMK**

To purchase a product with AMP connector replace DN2 with SAK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SAK**

All measures in the drawings are in mm

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

Accessories See page 225

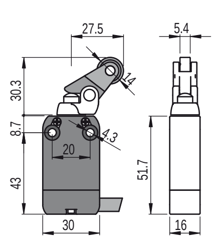
➔ The 2D/3D files are available at **www.pizzato.com**

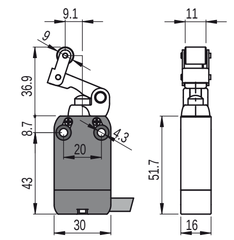
Contact type:

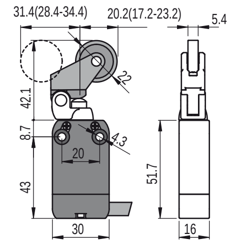
R = snap action
L = slow action

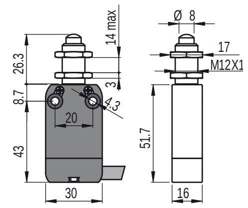
	With stainless steel roller on request	Operation in one direction		Fixed only by threaded head

It does not switch → ← It switches



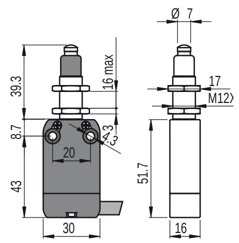


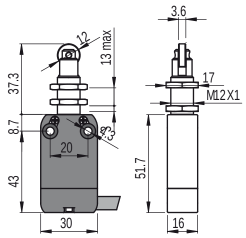


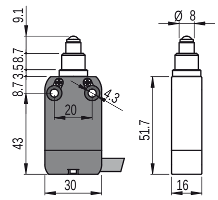


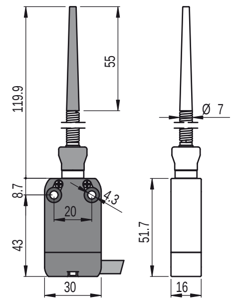
Contact blocks									
B11	R	NF B110CH-DN2	→ 1NO+1NC	NF B110CP-DN2	→ 1NO+1NC	NF B110CV-DN2	→ 1NO+1NC	NF B110EB-DN2	→ 1NO+1NC
B02	R	NF B020CH-DN2	→ 2NC	NF B020CP-DN2	→ 2NC	NF B020CV-DN2	→ 2NC	NF B020EB-DN2	→ 2NC
B12	R	NF B120CH-DN2	→ 1NO+2NC	NF B120CP-DN2	→ 1NO+2NC	NF B120CV-DN2	→ 1NO+2NC	NF B120EB-DN2	→ 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 243 - type 3		page 243 - type 3		page 243 - type 3		page 243 - type 4	
Min. force		5 N (25 N →)		3 N (25 N →)		3 N (25 N →)		7 N (25 N →)	
Travel diagrams		page 244 - group 2		page 244 - group 6		page 244 - group 3		page 244 - group 1	

	Fixed only by threaded head With external rubber gasket	Fixed only by threaded head	Plunger with Ø 6 mm ball	With external rubber gasket







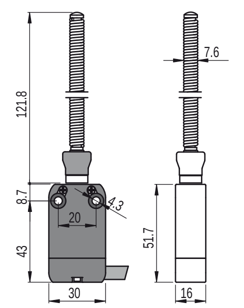
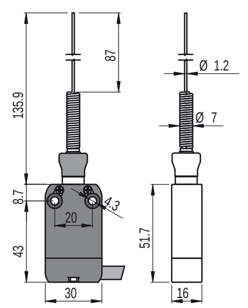
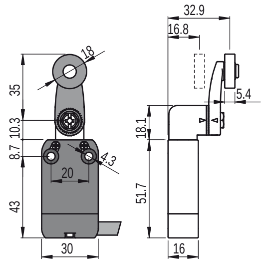
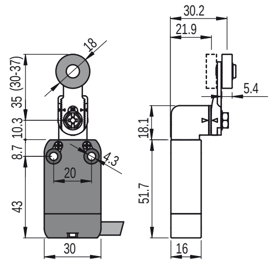


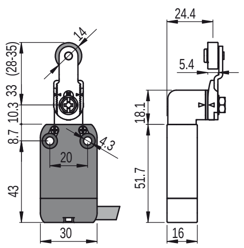
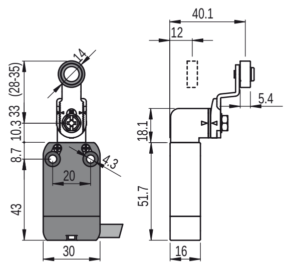
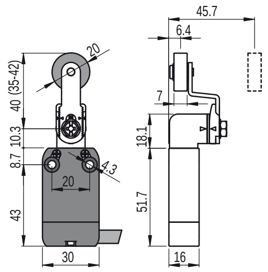
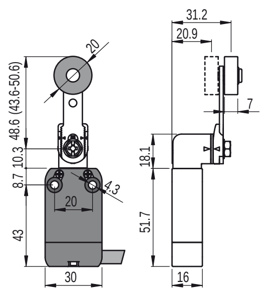
Contact blocks									
B11	R	NF B110EE-DN2	→ 1NO+1NC	NF B110FB-DN2	→ 1NO+1NC	NF B110GB-DN2	→ 1NO+1NC	NF B110HB-DN2	1NO+1NC
B02	R	NF B020EE-DN2	→ 2NC	NF B020FB-DN2	→ 2NC	NF B020GB-DN2	→ 2NC	NF B020HB-DN2	2NC
B12	R	NF B120EE-DN2	→ 1NO+2NC	NF B120FB-DN2	→ 1NO+2NC	NF B120GB-DN2	→ 1NO+2NC	NF B120HB-DN2	1NO+2NC
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 243 - type 4		page 243 - type 2		page 243 - type 2		1 m/s	
Min. force		7 N (25 N →)		7 N (25 N →)		7 N (25 N →)		0.03 Nm	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1		page 244 - group 4	

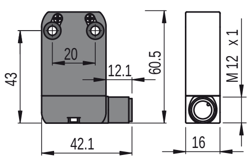
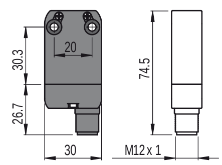
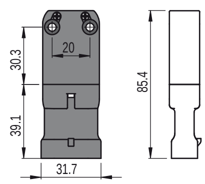
All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

Contact blocks		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 243 - type 1	page 243 - type 1
Min. force		0.07 Nm	0.03 Nm	0.07 Nm (0.25 Nm)	0.07 Nm (0.25 Nm)
Travel diagrams		page 244 - group 4	page 244 - group 4	page 244 - group 5	page 244 - group 5

Contact blocks		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 243 - type 1	page 243 - type 1	page 243 - type 1	page 243 - type 1
Min. 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 244 - group 5	page 244 - group 5	page 244 - group 5	page 244 - group 5

M12 connector, right	M12 connector, bottom	AMP superseal 1.5 connector
		

To purchase a product with M12 connector from the right replace DN2 with DMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**DMK**

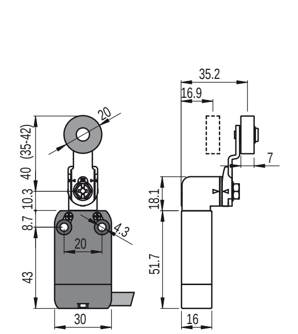
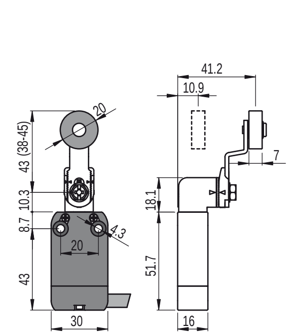
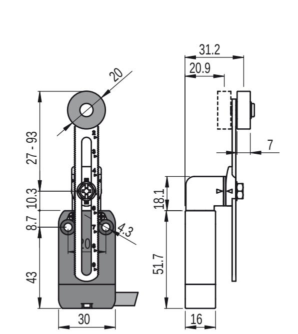
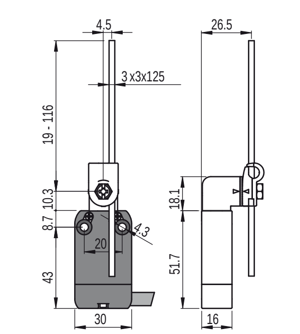
To purchase a product with M12 connector from below replace DN2 with SMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SMK**

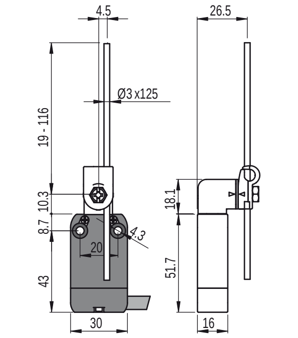
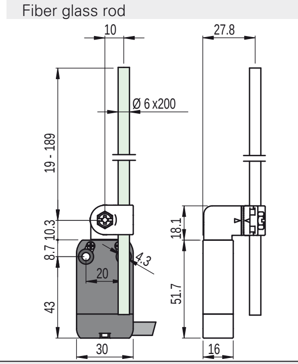
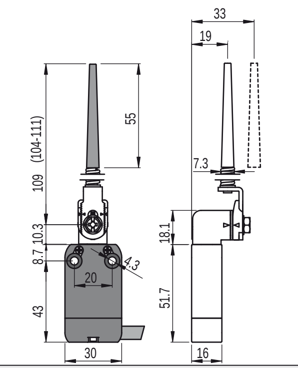
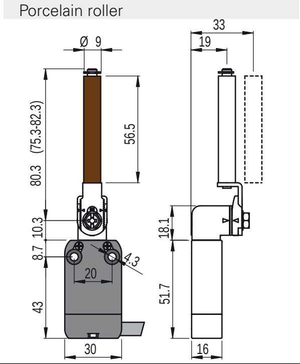
To purchase a product with AMP connector replace DN2 with SAK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SAK**

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

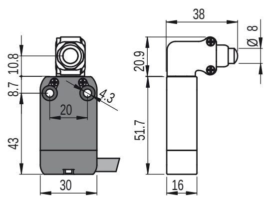
Contact blocks		With stainless steel roller on request		With stainless steel roller on request		With stainless steel roller on request		Square rod, 3x3 mm, stainless steel	
									
B11	R	NF B112KG-DN2	→ 1NO+1NC	NF B112KH-DN2	→ 1NO+1NC	NF B112KP-DN2	→ 1NO+1NC	NF B112LB-DN2	1NO+1NC
B02	R	NF B022KG-DN2	→ 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 243 - type 1		page 243 - type 1		page 243 - type 1		1.5 m/s	
Min. 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 244 - group 5		page 244 - group 5		page 244 - group 5		page 244 - group 5	

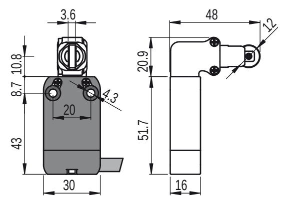
Contact blocks		Round rod, Ø 3 mm, stainless steel		Fiber glass rod				Porcelain roller	
									
B11	R	NF B112LE-DN2	1NO+1NC	NF B112LH-DN2	1NO+1NC	NF B112LL-DN2	1NO+1NC	NF B112LP-DN2E24	→ 1NO+1NC
B02	R	NF B022LE-DN2	2NC	NF B022LH-DN2	2NC	NF B022LL-DN2	2NC	NF B022LP-DN2E24	→ 2NC
B12	R	NF B122LE-DN2	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	
Min. force		0.07 Nm		0.07 Nm		0.07 Nm		0.04 Nm	
Travel diagrams		page 244 - group 5		page 244 - group 5		page 244 - group 5		page 244 - group 5	

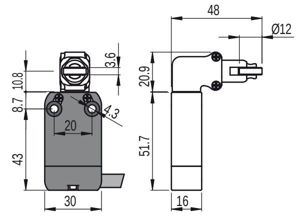
All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

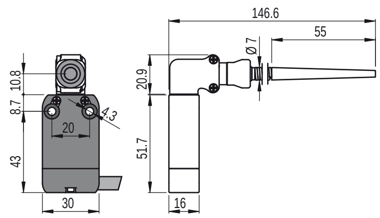




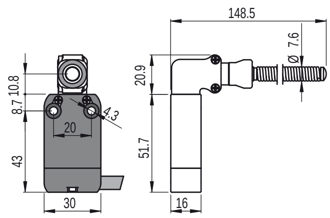


Contact blocks							
B11	R	NF B110AB-DN2W5	1NO+1NC	NF B110BB-DN2H0W5	1NO+1NC	NF B110BB-DN2W5	1NO+1NC
B02	R	NF B020AB-DN2W5	2NC	NF B020BB-DN2H0W5	2NC	NF B020BB-DN2W5	2NC
B12	R	NF B120AB-DN2W5	1NO+2NC	NF B120BB-DN2H0W5	1NO+2NC	NF B120BB-DN2W5	1NO+2NC
B22	R	NF B220AB-DN2W5	2NO+2NC	NF B220BB-DN2H0W5	2NO+2NC	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 243 - type 4		page 243 - type 2		page 243 - type 2	
Min. force		9.5 N (25 N)		9.5 N (25 N)		9.5 N (25 N)	
Travel diagrams		page 244 - group 1		page 244 - group 1		page 244 - group 1	

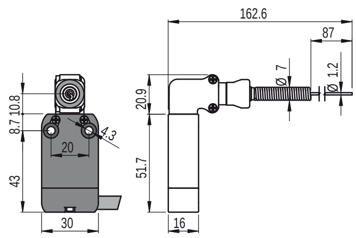
With external gasket



With external gasket

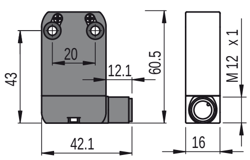


With external gasket

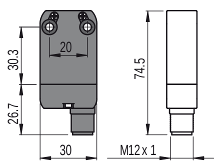


Contact blocks							
B11	R	NF B110HB-DN2W5	1NO+1NC	NF B110HE-DN2W5	1NO+1NC	NF B110HH-DN2W5	1NO+1NC
B02	R	NF B020HB-DN2W5	2NC	NF B020HE-DN2W5	2NC	NF B020HH-DN2W5	2NC
B12	R	NF B120HB-DN2W5	1NO+2NC	NF B120HE-DN2W5	1NO+2NC	NF B120HH-DN2W5	1NO+2NC
B22	R	NF B220HB-DN2W5	2NO+2NC	NF B220HE-DN2W5	2NO+2NC	NF 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	
Min. force		0.08 Nm		0.12 Nm		0.08 Nm	
Travel diagrams		page 244 - group 4		page 244 - group 4		page 244 - group 4	

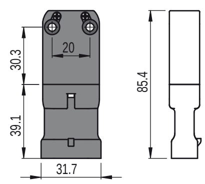
M12 connector, right



M12 connector, bottom



AMP superseal 1.5 connector



To purchase a product with M12 connector from the right replace DN2 with DMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**DMK**

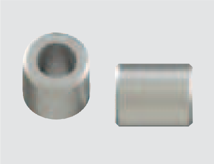
To purchase a product with M12 connector from below replace DN2 with SMK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SMK**

To purchase a product with AMP connector replace DN2 with SAK in the codes shown above. Example:
NF B110AA-**DN2** → NF B110AA-**SAK**

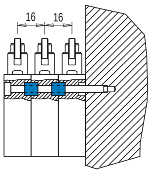
All measures in the drawings are in mm

Accessories

Article	Description
VN DT1F	Spacer for NA-NF series
VF D16B	Spacer for NB series



By interposing the spacers between one switch and the next, it is possible to have 2 or more prewired switches, preventing them from moving in relation to one another. **10 pcs.** packs



M12 connectors with cable

for details see page 225

Technical data:
- Polyurethane connector body (4/5/8 poles)
- Polypropylene connector body (12 poles)
- Class 6 rated copper of the wires according to IEC 60228 for mobile installation (4/5/8 poles)
- Class 5 rated copper of the wires according to IEC 60228 for fixed installation (12 poles)
- Gold-plated contacts (resistance < 5 mΩ)
- Self locking ring nut
- High flexibility wire suitable to be used in movable chains, with PVC sheath conforming to IEC 60332-3 and CEI 20-22II standards. With polyurethane sheath on request (4/5/8 poles)
- PVC cable, fixed installation (12 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 CA4PD3M

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Sheath coating	
P	PVC (standard)
U	PUR

Connector type	
D	straight (standard)
G	angled

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

Connection type	
M	M12x1

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 item, minimum order quantity 100 pcs.

M12 sockets, field wireable

General data

Technopolymer connector body
Gold-plated contacts
Screw terminals for wiring

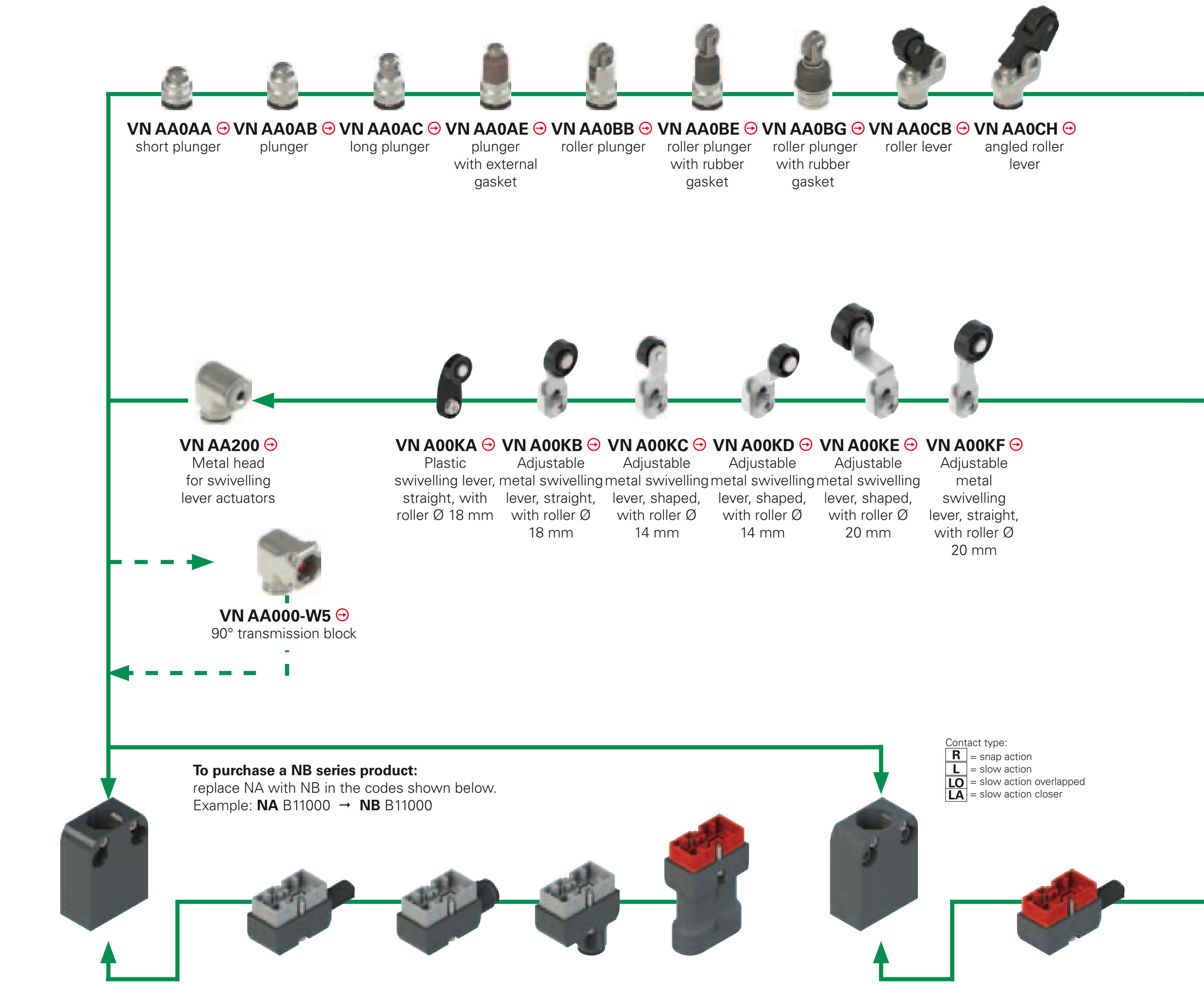
Max. operating voltages	250 Vac/dc (4 and 5 poles) 30 Vac/dc (8 poles)
Maximum current	4 A
Protection degree	IP67 according to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	from 0.25 mm^2 (24 AWG) to 0.5 mm^2 (20 AWG)

Article	Description	no. of poles
VF CBMP4DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	4
VF CBMP5DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	5
VF CBMP8DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 7 mm	8

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

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

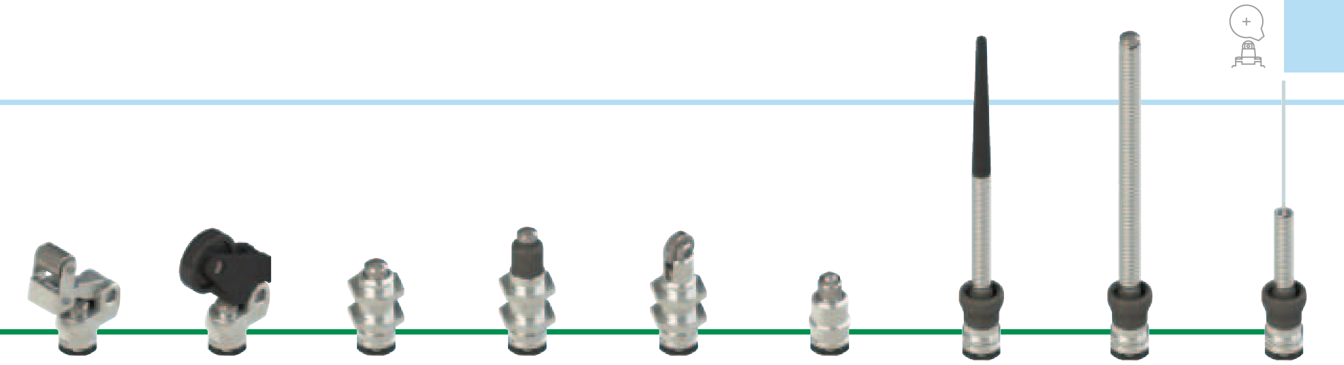
Selection diagram for NA - NB - NF series components sold separately



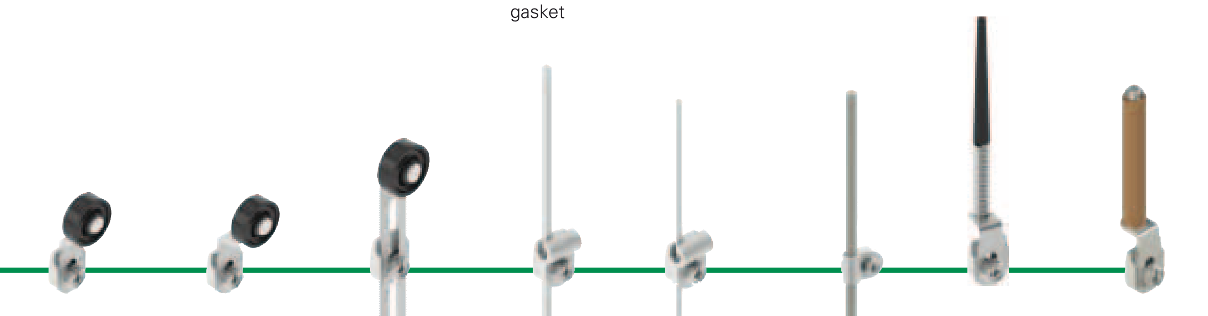
NA METAL housing hole spacing 20 mm		Metal connector with cable	cable length (m)		M12 metal connector, right		M12 metal connector, bottom		AMP technopolymer connector, bottom	NF TECHNOPOLYMER housing, 20 mm hole spacing		Technopolymer connector with cable	cable length (m)	
NA B11000 ⊝ 1NO+1NC R	↔	VN CM11DN2	2	↔	VN CM11DMK	↔	VN CM11SMK	↔	VN CM11SAK	NF B11000 ⊝ 1NO+1NC R	↔	VN CP11DN2	2	↔
NA G11000 ⊝ 1NO+1NC L										NF G11000 ⊝ 1NO+1NC L				
NA L11000 ⊝ 1NO+1NC LA		VN CM11DN5	5							NF L11000 ⊝ 1NO+1NC LA		VN CP11DN5	5	
NA H11000 ⊝ 1NO+1NC LO										NF H11000 ⊝ 1NO+1NC LO				
NA B02000 ⊝ 2NC R	↔	VN CM02DN2	2	↔	VN CM02DMK	↔	VN CM02SMK	↔	VN CM02SAK	NF B02000 ⊝ 2NC R	↔	VN CP02DN2	2	↔
NA G02000 ⊝ 2NC L		VN CM02DN5	5							NF G02000 ⊝ 2NC L		VN CP02DN5	5	
NA B20000 ⊝ 2NO R	↔	/		↔	VN CM20DMK	↔	VN CM20SMK	↔	VN CM20SAK	NF B20000 ⊝ 2NO R	↔	/		↔
NA G20000 ⊝ 2NO L		/								NF G20000 ⊝ 2NO L		/		
NA B12000 ⊝ 1NO+2NC R	↔	VN CM12DN2	2	↔	VN CM12DMK	↔	VN CM12SMK			NF B12000 ⊝ 1NO+2NC R	↔	VN CP12DN2	2	↔
NA G12000 ⊝ 1NO+2NC L										NF G12000 ⊝ 1NO+2NC L				
NA L12000 ⊝ 1NO+2NC LA		VN CM12DN5	5							NF L12000 ⊝ 1NO+2NC LA		VN CP12DN5	5	
NA H12000 ⊝ 1NO+2NC LO										NF H12000 ⊝ 1NO+2NC LO				
NA B22000 ⊝ 2NO+2NC R	↔	VN CM22DN2	2	↔	VN CM22DMK	↔	VN CM22SMK			NF B22000 ⊝ 2NO+2NC R	↔	VN CP22DN2	2	↔
NA G22000 ⊝ 2NO+2NC L										NF G22000 ⊝ 2NO+2NC L				
NA L22000 ⊝ 2NO+2NC LA		VN CM22DN5	5							NF L22000 ⊝ 2NO+2NC LA		VN CP22DN5	5	
NA H22000 ⊝ 2NO+2NC LO										NF H22000 ⊝ 2NO+2NC LO				

⚠ **It is forbidden to install VN CM••••• connectors on technopolymer housings**

⚠ **It is forbidden to install VN CP••••• connectors on metal housings**



VN AA0CP ⊖	VN AA0CV ⊖	VN AA0EB ⊖	VN AA0EE ⊖	VN AA0FB ⊖	VN AA0GB ⊖	VN AA0HB	VN AA0HE	VN AA0HH
Unidirectional roller lever	Adjustable angled roller lever	Plunger with M12 threaded head	Plunger with M12 threaded head with external gasket	Roller plunger with M12 threaded head	Plunger with Ø 6 mm ball	Flexible rod with plastic tip	Flexible rod	Flexible rod with needle



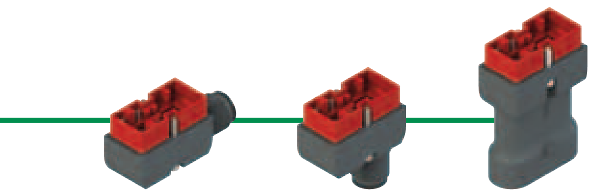
VN A00KG ⊖	VN A00KH ⊖	VN A00KP ⊖	VN A00LB	VN A00LE	VN A00LH	VN A00LL	VN A00LP ⊖
Adjustable metal swivelling lever, shaped, with roller Ø 20 mm	Adjustable metal swivelling lever, shaped, with roller Ø 20 mm	Metal swivelling lever, straight, with roller Ø 20 mm, extended adjustment	Adjustable metal swivelling lever with stainless steel rod 3x3x125	Adjustable metal swivelling lever with stainless steel rod Ø3x125	Adjustable metal swivelling lever with fiber glass rod Ø6x200	Metal swivelling lever with adjustable flexible rod	Metal swivelling lever with porcelain roll

Article code composition examples

NF B220AA-DN2

NF B220AA-DN2

NF B22000 + VN AA0AA + VN CP22DN2

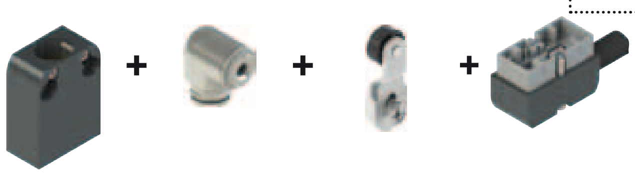


	M12 technopolymer connector, right		M12 technopolymer connector, bottom		AMP technopolymer connector, bottom
⇔	VN CP11DMK	⇔	VN CP11SMK	⇔	VN CP11SAK
⇔	VN CP02DMK	⇔	VN CP02SMK	⇔	VN CP02SAK
⇔	VN CP20DMK	⇔	VN CP20SMK	⇔	VN CP20SAK
⇔ ⇔	VN CP22DMK	⇔ ⇔	VN CP22SMK		

NA B112KC-DN2

NA B112KC-DN2

NA B11000 + VN AA200 + VN A00KC + VN CM11DN2



⚠ **Installation for safety applications:**

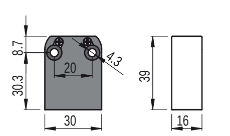
To obtain a safety switch with positive opening ⊖, only join housings bearing the positive opening symbol next to the code ⊖ to actuators bearing the positive opening symbol next to the code ⊖.

Example: **VN A00KB ⊖ + VN AA200 ⊖ + NA B11000 ⊖**

Housings

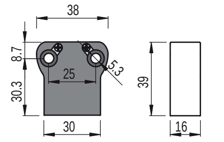
All measures in the drawings are in mm

NA metal housing



NA B11000	1NO+1NC	R
NA G11000	1NO+1NC	L
NA B12000	1NO+2NC	R
NA G12000	1NO+2NC	L
NA L12000	1NO+2NC	LA
NA B22000	2NO+2NC	R
NA G22000	2NO+2NC	L
NA L22000	2NO+2NC	LA
NA H22000	2NO+2NC	LO

metal housing NB

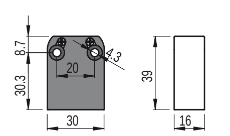


NB B11000	1NO+1NC	R
NB G11000	1NO+1NC	L
NB B12000	1NO+2NC	R
NB G12000	1NO+2NC	L
NB L12000	1NO+2NC	LA
NB B22000	2NO+2NC	R
NB G22000	2NO+2NC	L
NB L22000	2NO+2NC	LA
NB H22000	2NO+2NC	LO

Contact type:
- **R** = snap action
- **L** = slow action
- **LO** = slow action overlapped
- **LA** = slow action closer

Markings and quality marks:

NF technopolymer housing



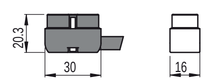
NF B11000	1NO+1NC	R
NF G11000	1NO+1NC	L
NF B12000	1NO+2NC	R
NF G12000	1NO+2NC	L
NF L12000	1NO+2NC	LA
NF B22000	2NO+2NC	R
NF G22000	2NO+2NC	L
NF L22000	2NO+2NC	LA
NF H22000	2NO+2NC	LO

Connectors with cable

All measures in the drawings are in mm

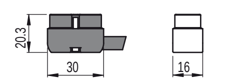
Other cable lengths on request

metal connector for NA and NB housing



Article	Contacts	Cable length (m)	Cable type N = PVC H = PUR HALOGEN FREE
VN CM11DN2	1NO+1NC	2	N
VN CM11DN5	1NO+1NC	5	N
VN CM12DN2	1NO+2NC	2	N
VN CM12DN5	1NO+2NC	5	N
VN CM22DN2	2NO+2NC	2	N
VN CM22DN5	2NO+2NC	5	N
VN CM11DH2	1NO+1NC	2	H
VN CM11DH5	1NO+1NC	5	H
VN CM12DH2	1NO+2NC	2	H
VN CM12DH5	1NO+2NC	5	H

technopolymer connector for NF housing



Article	Contacts	Cable length (m)	Cable type N = PVC
VN CP11DN2	1NO+1NC	2	N
VN CP11DN5	1NO+1NC	5	N
VN CP12DN2	1NO+2NC	2	N
VN CP12DN5	1NO+2NC	5	N
VN CP22DN2	2NO+2NC	2	N
VN CP22DN5	2NO+2NC	5	N

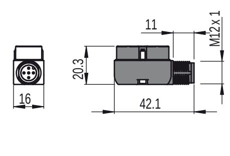
M12 or AMP connectors

All measures in the drawings are in mm

⚠ **Important: Always check that the electric load used respects the voltage and current limits for the connectors. See tables on page 122 and 132**

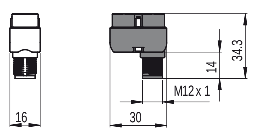
metal connectors for NA and NB housing

M12 connector, right



VN CM11DMK	1NO+1NC
VN CM02DMK	2NC
VN CM22DMK	2NO+2NC

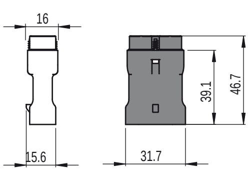
M12 connector, bottom



VN CM11SMK	1NO+1NC
VN CM02SMK	2NC
VN CM22SMK	2NO+2NC

technopolymer connectors for NA and NB housing

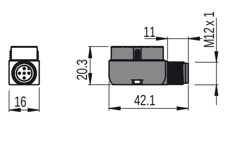
AMP superseal 1.5



VN CM11SAK	1NO+1NC
VN CM02SAK	2NC
VN CM20SAK	2NO

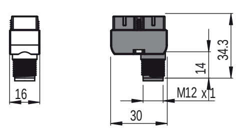
technopolymer connectors for NF housings

M12 connector, right



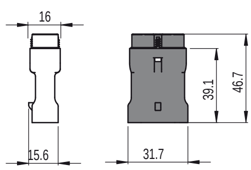
VN CP11DMK	1NO+1NC
VN CP02DMK	2NC
VN CP22DMK	2NO+2NC

M12 connector, bottom



VN CP11SMK	1NO+1NC
VN CP02SMK	2NC
VN CP22SMK	2NO+2NC

AMP superseal 1.5



VN CP11SAK	1NO+1NC
VN CP02SAK	2NC
VN CP20SAK	2NO

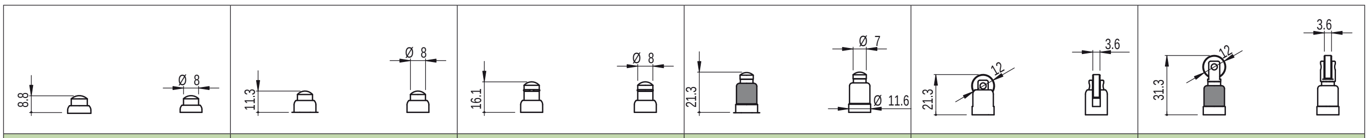
Items with code on **green** background are stock items

Accessories See page 225

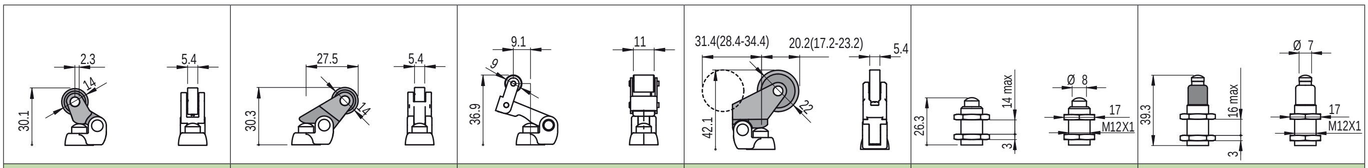
→ The 2D/3D files are available at **www.pizzato.com**

Actuators

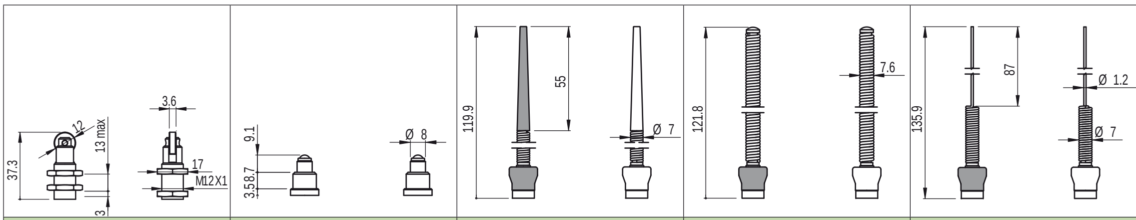
All measures in the drawings are in mm



VN AA0AA	VN AA0AB	VN AA0AC	VN AA0AE	VN AA0BB	VN AA0BE



VN AA0CB	VN AA0CH	VN AA0CP	VN AA0CV	VN AA0EB	VN AA0EE

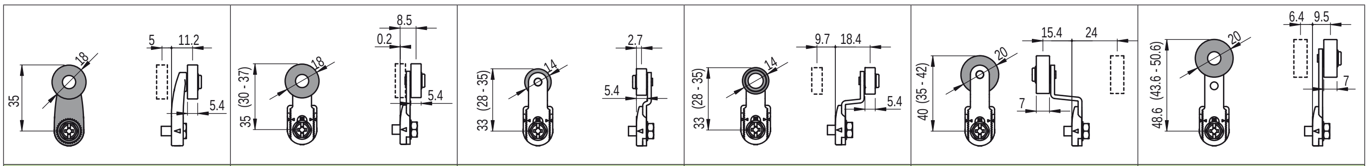


VN AA0FB	VN AA0GB	VN AA0HB	VN AA0HE	VN AA0HH	

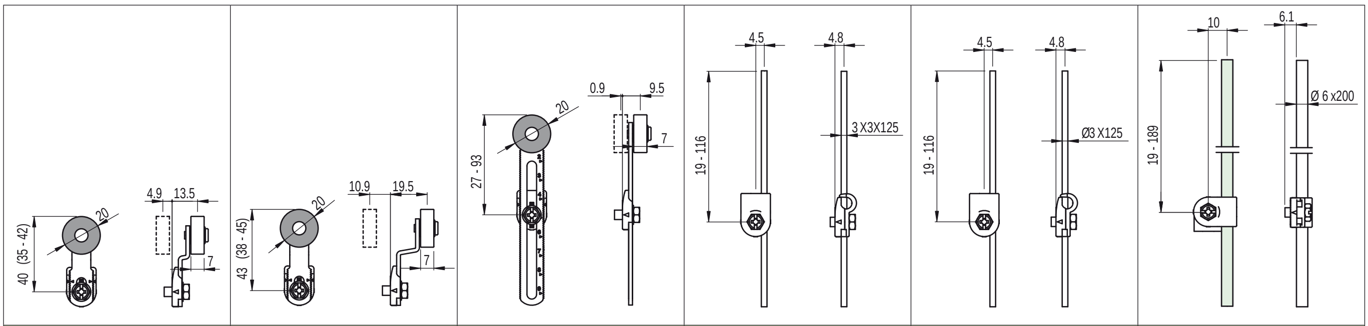
Levers

All measures in the drawings are in mm

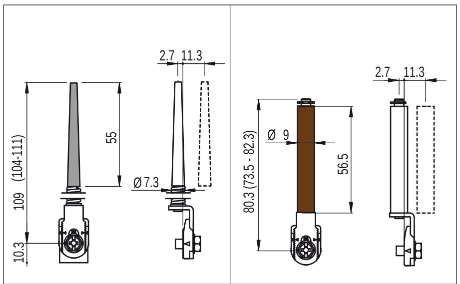
ATTENTION: These loose actuators can be used with products of series NA, NB and NF only.



VN A00KA	VN A00KB	VN A00KC	VN A00KD	VN A00KE	VN A00KF

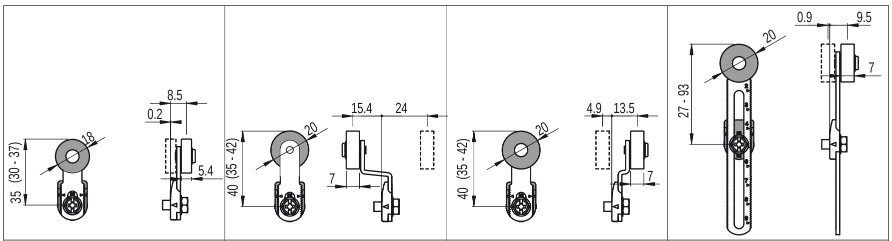


VN A00KG	VN A00KH	VN A00KP	VN A00LB	VN A00LE	VN A00LH



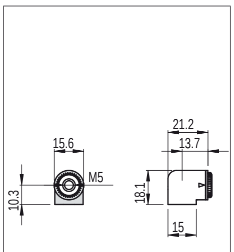
VN A00LL	VN A00LP

Levers with stainless steel external metallic parts



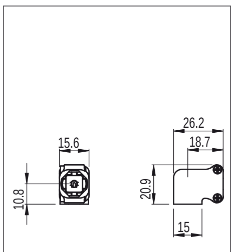
VN A00KB-V38	VN A00KE-V38	VN A00KG-V38	VN A00KP-V38

Heads



VN AA200

90° transmission block



VN AA000-W5

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

Accessories See page 225

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

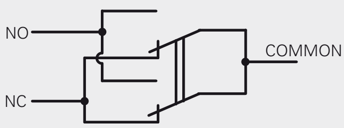
Description

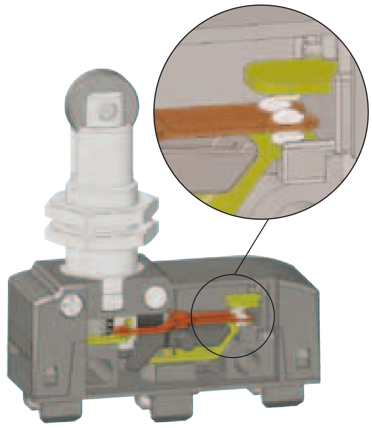
Microswitches of MK series have been developed in order to add new features to traditional and tested microswitches of Pizzato Elettrica.
These products have been designed with shapes and fixing perfectly interchangeable with the previous ones and with various additional functions useful to extend the application field.

The main innovation of this series is the tripping device modern and evolved, with qualitative features higher than solutions present on the market.
The electrical contact on new microswitch has been realized with higher reliability technology, thanks to the double and redundant shape, and has the possibility to carry out operations with positive opening. The housing of the new microswitch provides the possibility to seat gaskets in order to seal the device against fine dusts or liquids up to IP65 degree. Fastening terminals of conductors are more practical and allow the fixing of different diameter cables or the possibility to choose different bends of faston contacts. For high quantity it's possible to supply the microswitch only with the contact NO or NC, in order to minimize purchase costs.

Contact block reliability

In the following table we refer to the typical microswitch contact structure (type A) normally used in the industry, compared with the innovative solution that Pizzato Elettrica uses in new MK series microswitches: movable contact with single interruption and double contacts (type B). As you can see from the table below, this last structure (type B) offers half of the contact resistance (R) than the simple mobile contact (type A) and a lower probability of failure (fe).
In fact, defined x the probability of a commutation failure of a single interruption, it results that in the type A the failure probability fe=x, in the type B the probability fe $\cong x^2$. This means that if in a certain situation the probability of a single interruption failure x is equal, for instance, to 1×10^{-4} (1 failed interruption every 10,000) we will have:
- 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	Failure probability fe
A Customary microswitch		mobile contact, single interruption	R=Rc	fe=x
B Pizzato MK series microswitch		contacts with single interruption and double contacts	R=Rc/2	fe $\cong x^2$

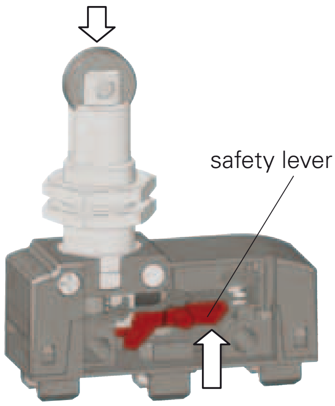


Extended temperature range

-40°C

For the new MK series versions with extended temperature range are available on request. Differently from standard MK microswitches with temperature range from +85 C° to -25 C°, these special versions can be used in places where the ambient temperature changes from +85 C° to -40 °C. They can be installed inside cold stores, sterilizers or other equipment with very low ambient temperature. Special materials that have been used to realize these versions, maintain unchanged their features also in these conditions, widening the installation possibilities.

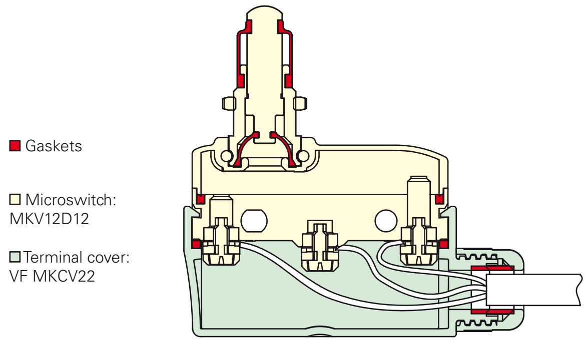
Microswitches for safety applications



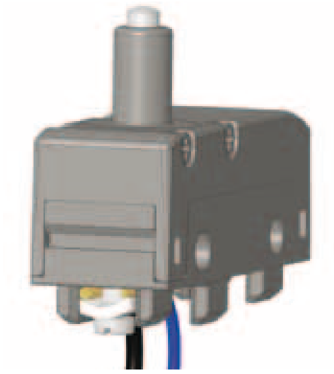
All microswitches that have the symbol ⊖ beside the code are with positive opening, therefore suitable for safety applications. These microswitches are provided with a rigid connection between button and NC contacts, which are opened by force through a strong/sturdy internal safety lever.
The positive opening has been realised in conformity with the standard EN 60947 5 1, enclosure K, therefore these microswitches are suitable for the installation for people's protection.

Protection degree IP65

By installing microswitches MK ••2••• with terminal covers VF MKC•22 or terminal covers VF MKC•23, it's possible to obtain a microswitch fully dust proof and waterproof. Thanks to special rubber gaskets anti-oil, we achieve the protection degree IP65. For application with high presence of dirtiness, are available also versions with double gasket in the button (internal + external). ex. MK ••2•12 or MK ••2•13.



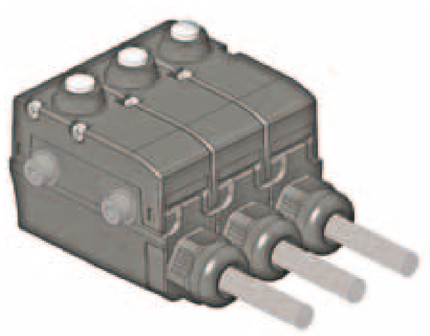
Clamping screw plates for different diameter cables (MK V•)

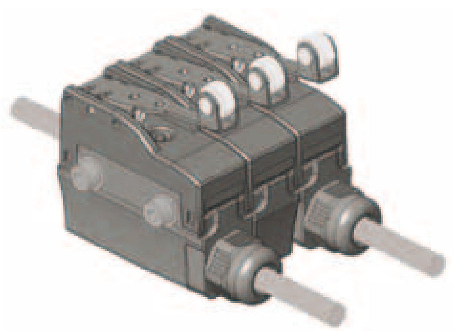


These clamping screw plates have a particular "roofing tile" structure and are connected loosely to the clamping screw. In this way, during the wires fixing, the clamping screw plate is able to suit to cables of different diameter (see picture) and tends to tighten the wires toward the screw instead of permitting them to escape towards the outside.

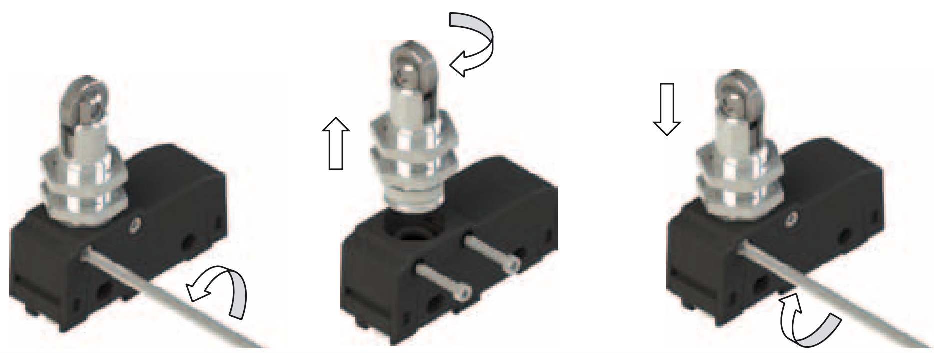
Stackable terminal covers with wiretrap cable gland

New terminal covers supplied with wiretrap cable gland are provided for the protection degree up to IP65. These terminal covers are snap-in assembled and they have small dimensions in the microswitch profile, it's possible to install them also on microswitches fixed side by side.
See page 154.

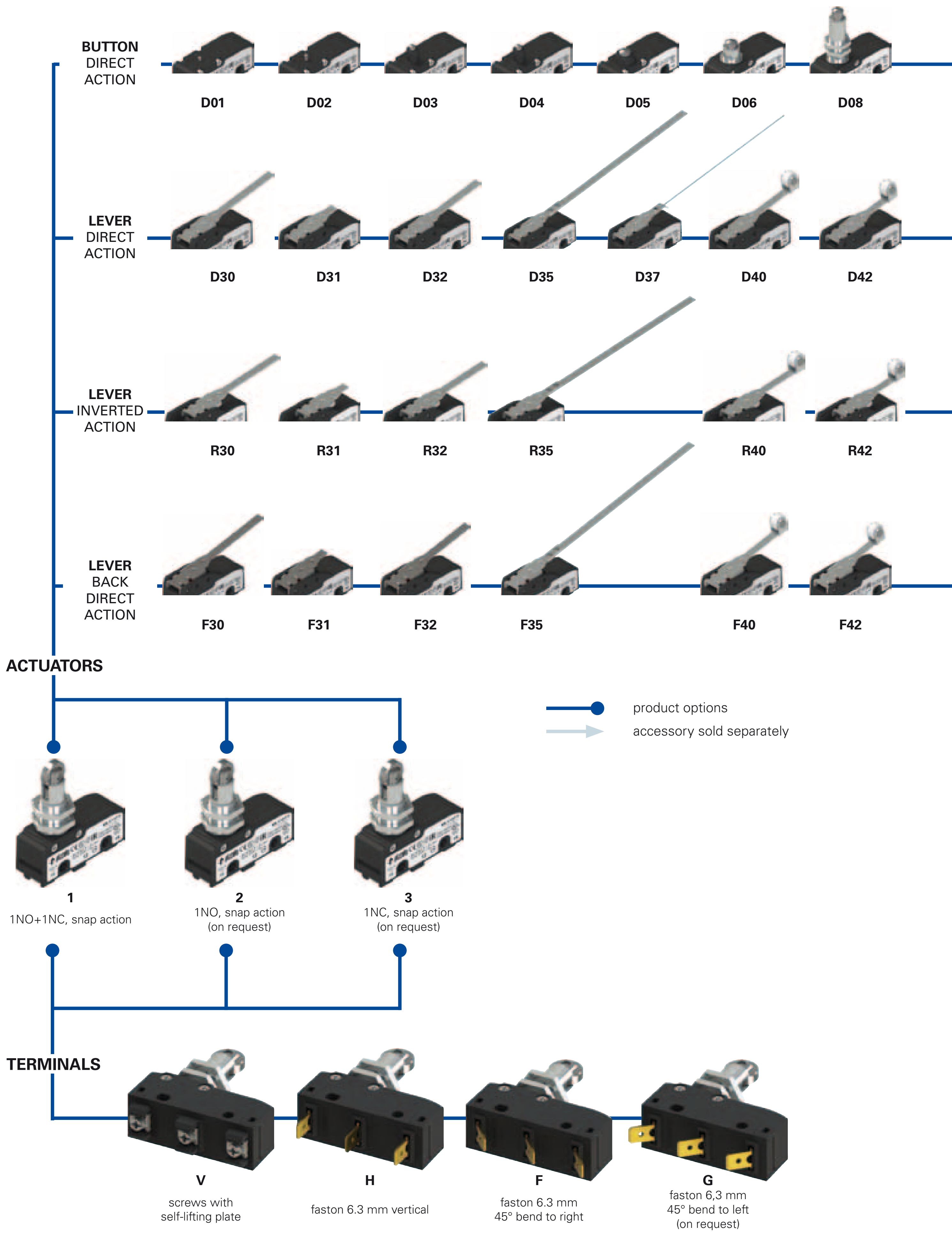




Orientable actuators



Thanks to the new patented lateral fixing system, it's possible to rotate the roller of microswitches MK •••15 and MK •••17 in 90° steps.
The lateral fixing allows to disconnect the actuator from the body also when the actuator is already fixed to the racket. The flexibility of the product allows also to unify items on stock for applications that require roller both longitudinal or transversal.


BUTTON
DIRECT
ACTION
D01
D02
D03
D04
D05
D06
D08
LEVER
DIRECT
ACTION
D30
D31
D32
D35
D37
D40
D42
LEVER
INVERTED
ACTION
R30
R31
R32
R35
R40
R42
LEVER
BACK
DIRECT
ACTION
F30
F31
F32
F35
F40
F42
ACTUATORS
product options
accessory sold separately
1
1NO+1NC, snap action
2
1NO, snap action
(on request)
3
1NC, snap action
(on request)
TERMINALS
V
screws with
self-lifting plate
H
faston 6.3 mm vertical
F
faston 6.3 mm
45° bend to right
G
faston 6,3 mm
45° bend to left
(on request)

D09	D10	D12	D13	D15	D17	D18	D19
		external rubber gasket	external rubber gasket				

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	screws with self-lifting plate
H	vertical faston
F	faston, bent 45° to right
G	faston, bent 45° to left (on request)

Contact blocks	
1	1NO+1NC, snap action in deviation
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)

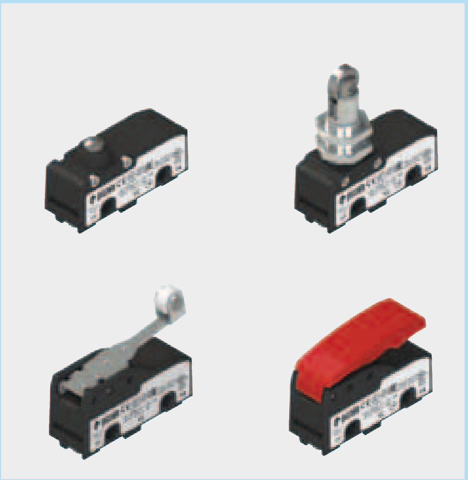
Actuation type	
D	direct action
R	inverted action
F	back direct action

Actuator	
01	pin
02	pin
03	narrow button
..	....

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

Rollers	
	standard roller
R16	metal roller Ø 9.5x4 mm (only for actuators 40, 42,45, 47, 53, 59)
R10	large plastic roller Ø 9.8x8.4 mm (only for actuators 40, 42, 45, 53)

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 wiretrap cable gland

Markings and quality marks:

IMQ approval:	CA02.05772
UL approval:	E131787
CCC approval:	2013010305604291
EAC approval:	RU C-IT ДМ94.В.01024

Technical data

Housing

Housing made of glass fiber reinforced technopolymer, self-extinguishing and shock-proof.

Protection degree acc. to EN 60529:	IP00 without terminal cover
	IP20 (with terminal cover VF C01, VF C03)
	IP40 (with terminal cover VF MKC•1•, VF C02)
	IP65 (with terminal cover 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[1]/hour
Mechanical endurance:	10 million operating cycles[1]
Safety parameters:	
B_{10d}:	20,000,000 for NC contacts
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

MK series:	min.	1 x 0.34 mm^2	(1 x AWG 22)
	max.	2 x 1.5 mm^2	(2 x AWG 16)

In conformity 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.

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

Installation for safety applications:
Use only microswitches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel (CAP)** stated aside the article code. Actuate the switch **at least with the positive opening force (FAP)** stated aside the article code.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.**

Electrical data

Thermal current (Ith):	16 A
Rated insulation voltage (Ui):	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)	250	120
Ie (A)	6	6

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	5	0.6	0.3

Characteristics approved by IMQ and CCC

Rated insulation voltage (Ui): 250 Vac
Conventional free air thermal current (Ith): 16 A
Protection against short circuits: type gG fuse 16 A 250 V
Rated impulse withstand voltage (Uimp): 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 conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

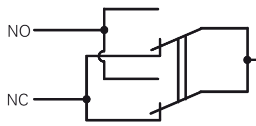
Characteristics approved by UL

Utilization categories	Q300 (69 VA, 125-250 Vdc) A300 (720 VA, 120 … 300 Vac)

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

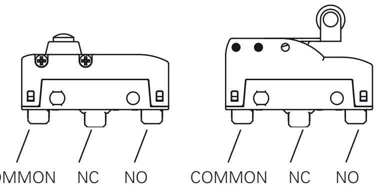
Please contact our technical service for the list of approved products.

Circuit diagram

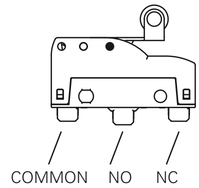


Contacts with single interruption and double contacts

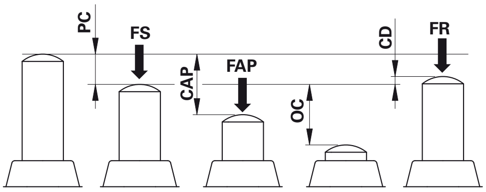
With direct and back direct action (F, D)

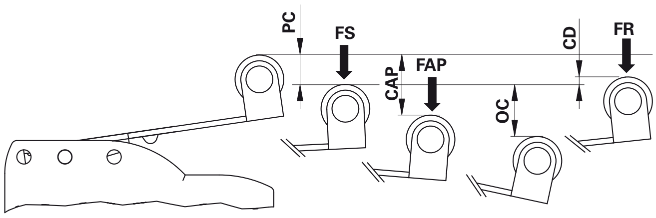


With inverted action (R)



Actuation forces and travels

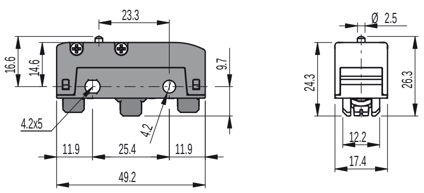




PC pre-travel
CAP positive opening travel
OC over-travel
CD differential travel
FS operating force
FR releasing force
FAP positive opening force

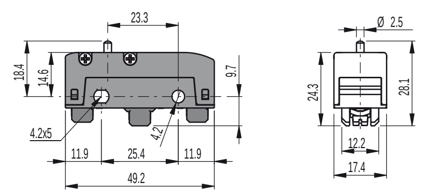
Microswitches with direct action

All measures in the drawings are in mm



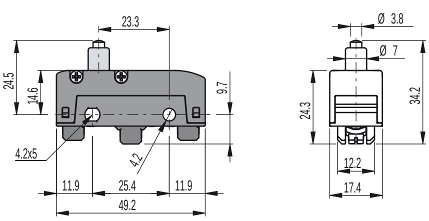
MK V11D01	1NO+1NC	PC OC CD	0,5 mm 1,5 mm 0,05 mm	FS FR	4 N 3 N

Maximum and Minimum speed page 245 - type 1



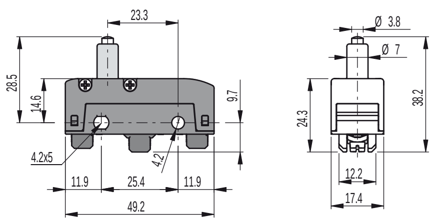
MK V11D02	1NO+1NC	PC OC CD	0,5 mm 2 mm 0,05 mm	FS FR	4 N 3 N

Maximum and Minimum speed page 245 - type 1



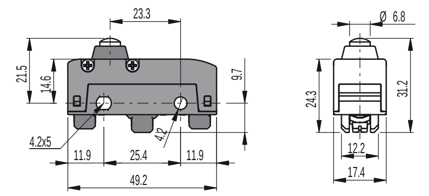
MK V11D03	1NO+1NC	PC OC CD	0,5 mm 2 mm 0,05 mm	FS FR	4 N 3 N

Maximum and Minimum speed page 245 - type 1



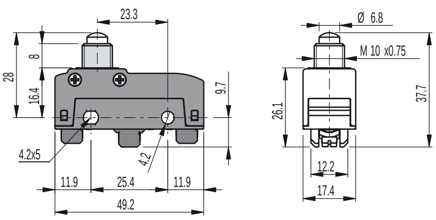
MK V11D04	1NO+1NC	PC OC CD	0,5 mm 2 mm 0,05 mm	FS FR	4 N 3 N

Maximum and Minimum speed page 245 - type 1



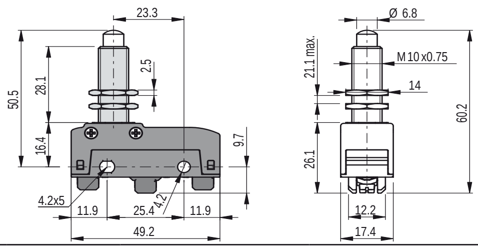
MK V11D05 → 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	2 mm	FR	3 N
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



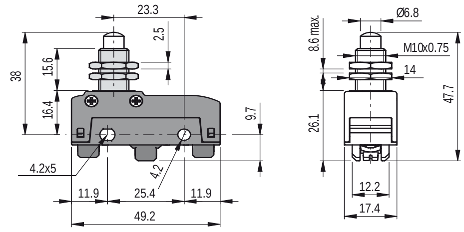
MK V11D06 → 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	3 mm	FR	3 N
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



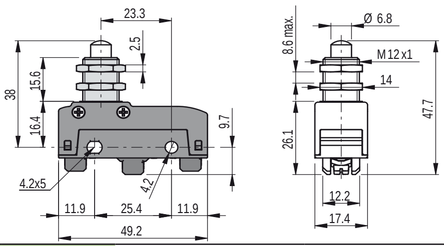
MK V11D08 → 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	5,5 mm	FR	3 N
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



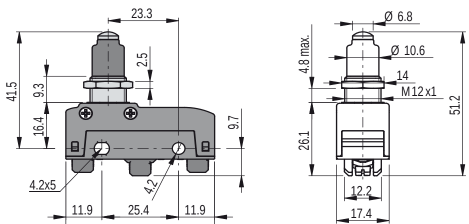
MK V11D09 → 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	5,5 mm	FR	3 N
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



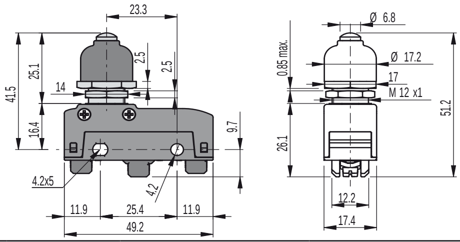
MK V11D10 → 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	5,5 mm	FR	3 N
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - 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		

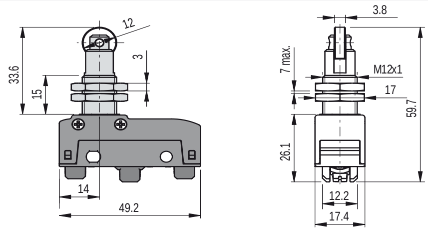
Maximum and Minimum speed page 245 - type 1



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 page 245 - type 1

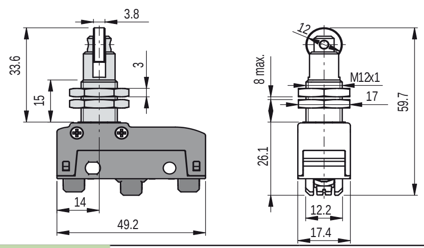
Fixed only by threaded head



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		

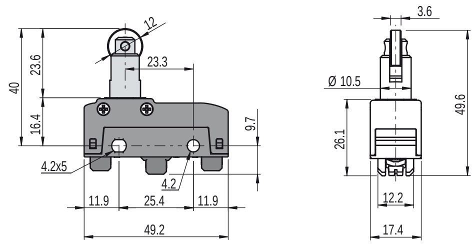
Maximum and Minimum speed page 245 - type 2

Fixed only by threaded head



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 page 245 - type 2



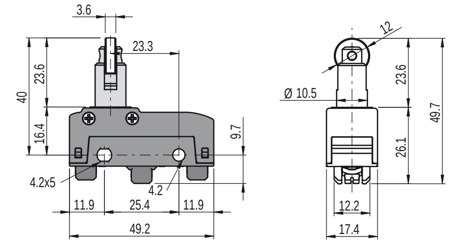
MK V11D18 → 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	5,5 mm	FR	3 N .
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 2

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

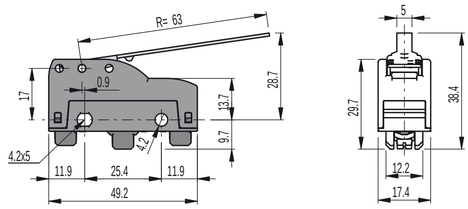
Accessories See page 225

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



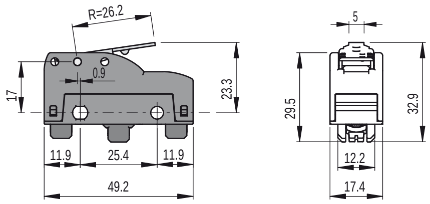
MK V11D19 1NO+1NC	PC	0,5 mm	FS	4 N
	OC	5,5 mm	FR	3 N .
	CD	0,05 mm	FAP	20 N
	CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 2



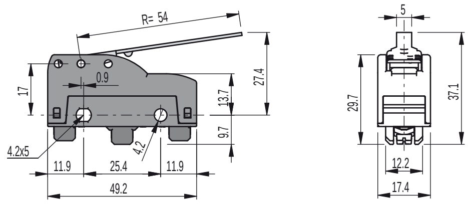
MK V11D30 1NO+1NC	PC	9 mm	FS	0,65 N
	OC	10 mm	FR	0,5 N
	CD	1,1 mm		

Maximum and Minimum speed page 245 - type 3



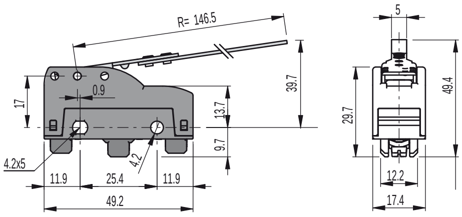
MK V11D31 1NO+1NC	PC	4,54 mm	FS	1,66 N
	OC	3,86 mm	FR	1,32 N
	CD	0,42 mm		

Maximum and Minimum speed page 245 - type 3



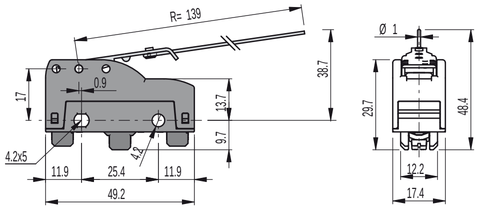
MK V11D32 1NO+1NC	PC	7,7 mm	FS	0,76 N
	OC	8,3 mm	FR	0,58 N
	CD	0,9 mm		

Maximum and Minimum speed page 245 - type 3



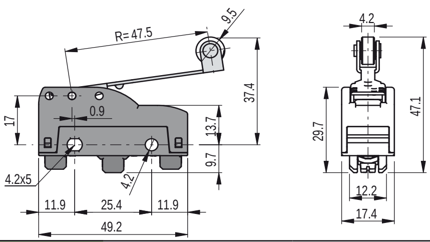
MK V11D35 1NO+1NC	PC	19 mm	FS	0,28 N
	OC	16,7 mm	FR	0,22 N
	CD	2,5 mm		

Maximum and Minimum speed page 245 - type 3



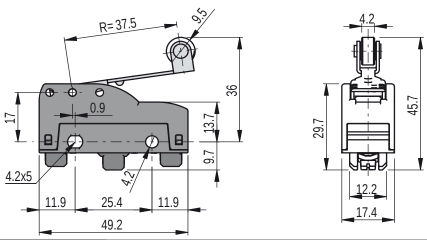
MK V11D37 1NO+1NC	PC	19 mm	FS	0,08 N
	OC	9,5 mm	FR	0,04 N
	CD	2,3 mm		

Maximum and Minimum speed page 245 - type 3



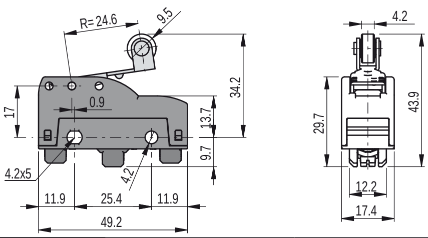
MK V11D40 1NO+1NC	PC	6,7 mm	FS	0,86 N
	OC	7,8 mm	FR	0,66 N
	CD	0,8 mm		

Maximum and Minimum speed page 245 - type 6



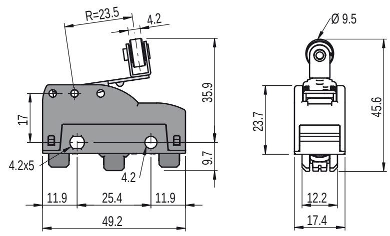
MK V11D42 1NO+1NC	PC	5,3 mm	FS	1,09 N
	OC	5,7 mm	FR	0,84 N
	CD	0,6 mm		

Maximum and Minimum speed page 245 - type 6



MK V11D45 1NO+1NC	PC	3,5 mm	FS	1,66 N
	OC	4,5 mm	FR	1,28 N
	CD	0,4 mm		

Maximum and Minimum speed page 245 - type 6



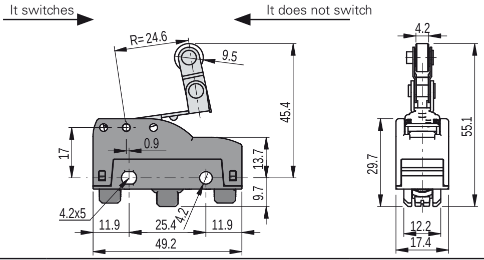
MK V11D46 1NO+1NC	PC	3,5 mm	FS	1,66 N
	OC	4,5 mm	FR	1,28 N
	CD	0,4 mm		

Maximum and Minimum speed page 245 - type 6

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

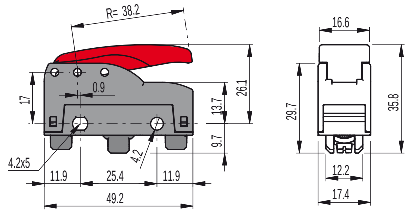
Accessories See page 225

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



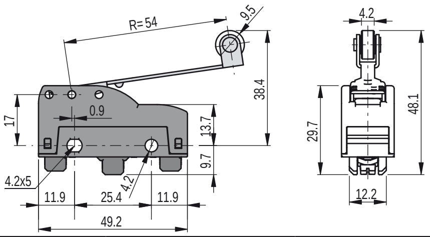
MK V11D47	1NO+1NC	PC	3,5 mm	FS	1,66 N
		OC	4 mm	FR	1,28 N
		CD	0,4 mm		

Maximum and Minimum speed page 245 - type 6



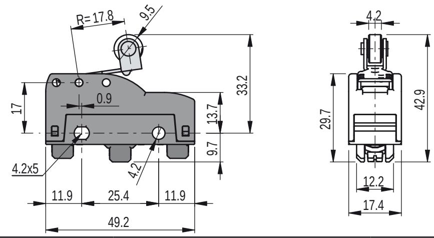
MK V11D49 1NO+1NC Hand operated

Maximum and Minimum speed page 245 - type 3



MK V11D53	1NO+1NC	PC	7,7 mm	FS	0,76 N
		OC	8,9 mm	FR	0,58 N
		CD	0,9 mm		

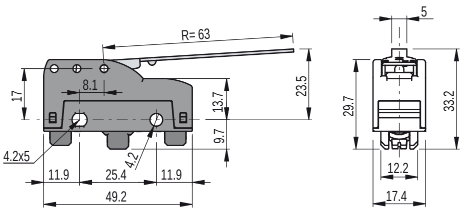
Maximum and Minimum speed page 245 - type 6



MK V11D59	1NO+1NC	PC	2,5 mm	FS	2,3 N
		OC	4,5 mm	FR	1,77 N
		CD	0,2 mm		

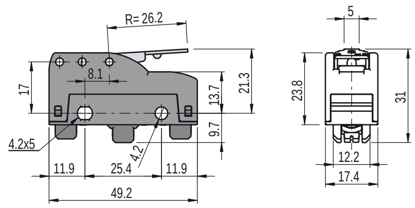
Maximum and Minimum speed page 245 - type 6

Microswitches with inverted action



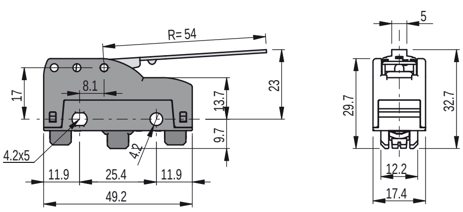
MK V11R30	1NO+1NC	PC	4,4 mm	FS	0,6 N
		OC	14 mm	FR	0,4 N
		CD	1 mm		

Maximum and Minimum speed page 245 - type 4



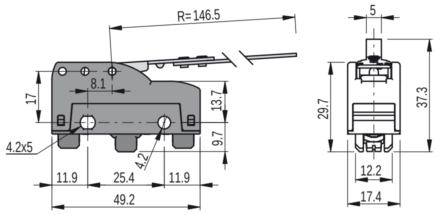
MK V11R31	1NO+1NC	PC	0,7 mm	FS	1,47 N
		OC	6,01 mm	FR	0,72 N
		CD	0,23 mm		

Maximum and Minimum speed page 245 - type 4



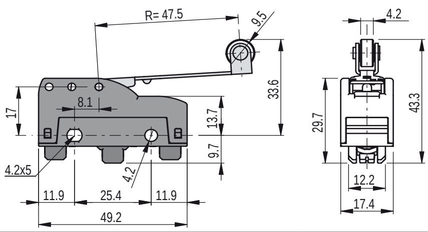
MK V11R32	1NO+1NC	PC	3,7 mm	FS	0,7 N
		OC	11,8 mm	FR	0,5 N
		CD	0,8 mm		

Maximum and Minimum speed page 245 - type 4



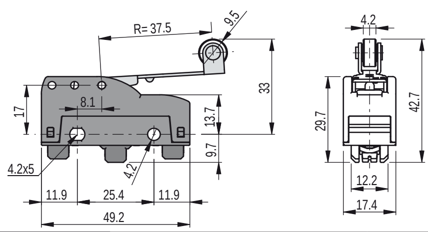
MK V11R35	1NO+1NC	PC	14,3 mm	FS	0,3 N
		OC	25,7 mm	FR	0,2 N
		CD	3,2 mm		

Maximum and Minimum speed page 245 - type 7



MK V11R40	1NO+1NC	PC	3,4 mm	FS	0,8 N
		OC	10,3 mm	FR	0,5 N
		CD	0,7 mm		

Maximum and Minimum speed page 245 - type 7



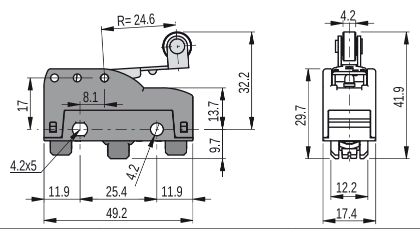
MK V11R42	1NO+1NC	PC	2,7 mm	FS	1,2 N
		OC	7,9 mm	FR	1,7 N
		CD	0,5 mm		

Maximum and Minimum speed page 245 - type 7

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

Accessories See page 225

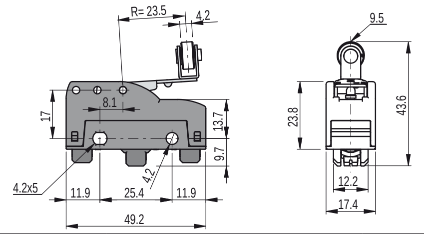
→ The 2D/3D files are available at **www.pizzato.com**



MK V11R45 1NO+1NC

PC	1,5 mm	FS	1,7 N
OC	5,5 mm	FR	1 N
CD	0,3 mm		

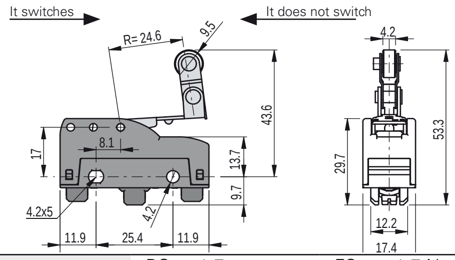
Maximum and Minimum speed page 245 - type 7



MK V11R46 1NO+1NC

PC	3,5 mm	FS	1,5 N
OC	5,4 mm	FR	1,45 N
CD	0,2 mm		

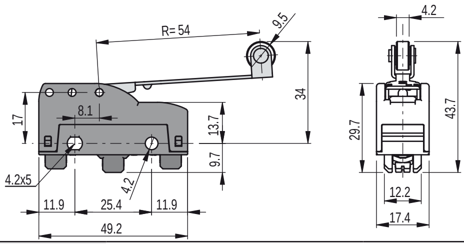
Maximum and Minimum speed page 245 - type 7



MK V11R47 1NO+1NC

PC	1,7 mm	FS	1,7 N
OC	5,3 mm	FR	1 N
CD	0,3 mm		

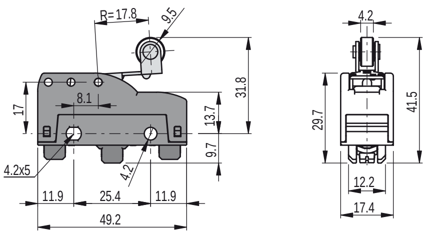
Maximum and Minimum speed page 245 - type 7



MK V11R53 1NO+1NC

PC	4,3 mm	FS	0,8 N
OC	11,6 mm	FR	0,4 N
CD	0,8 mm		

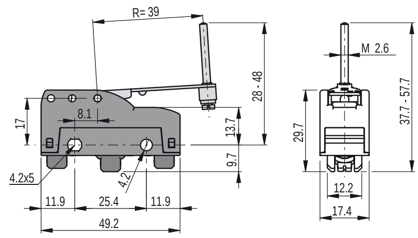
Maximum and Minimum speed page 245 - type 7



MK V11R59 1NO+1NC

PC	1,5 mm	FS	2,4 N
OC	3,9 mm	FR	1,3 N
CD	0,3 mm		

Maximum and Minimum speed page 245 - type 7

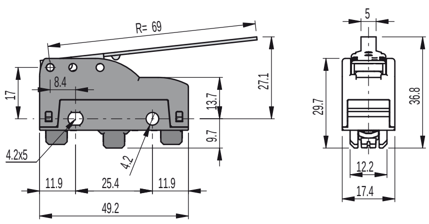


MK V11R60 1NO+1NC

PC	2,7 mm	FS	1,2 N
OC	9,2 mm	FR	0,6 N
CD	0,5 mm		

Maximum and Minimum speed page 245 - type 4

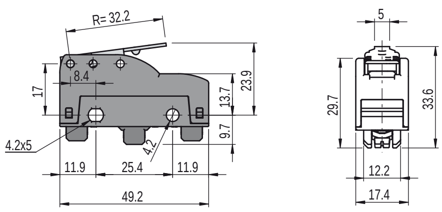
Microswitches with back direct action



MK V11F30 1NO+1NC

PC	2,7 mm	FS	0,6 N
OC	12,9 mm	FR	0,5 N
CD	0,35 mm		

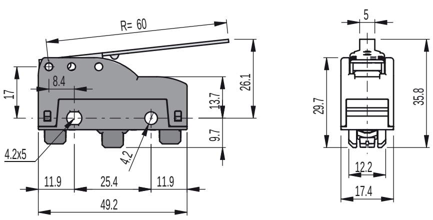
Maximum and Minimum speed page 245 - type 5



MK V11F31 ⊖ 1NO+1NC

PC	1,63 mm	FS	1,76 N
OC	4,64 mm	FR	1,08 N
CD	0,17 mm	FAP	5,78 N
CAP	5,72 mm		

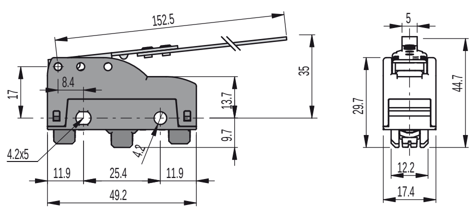
Maximum and Minimum speed page 245 - type 5



MK V11F32 1NO+1NC

PC	2,5 mm	FS	0,7 N
OC	11,5 mm	FR	0,6 N
CD	0,3 mm		

Maximum and Minimum speed page 245 - type 5



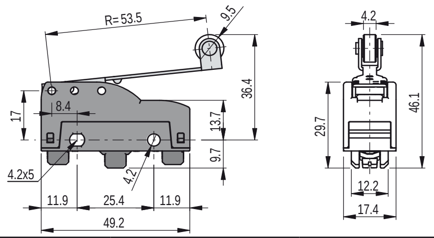
MK V11F35 1NO+1NC

PC	7,5 mm	FS	0,25 N
OC	25,9 mm	FR	0,2 N
CD	1,3 mm		

Maximum and Minimum speed page 245 - type 5

Accessories See page 225

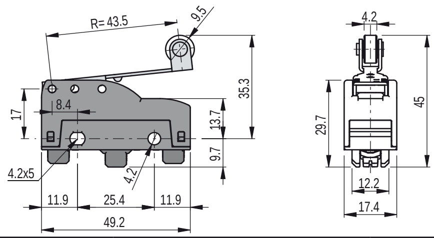
➔ The 2D/3D files are available at **www.pizzato.com**



MK V11F40 1NO+1NC

PC	2,4 mm	FS	0,85 N
OC	10,4 mm	FR	0,65 N
CD	0,25 mm		

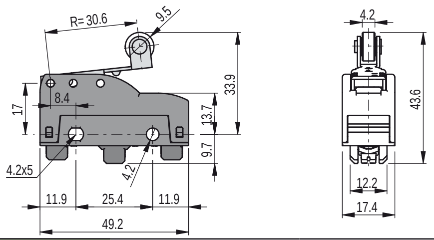
Maximum and Minimum speed page 245 - type 8



MK V11F42 1NO+1NC

PC	1,6 mm	FS	1 N
OC	8,4 mm	FR	0,7 N
CD	0,2 mm	FAP	4,9 N
CAP	9 mm		

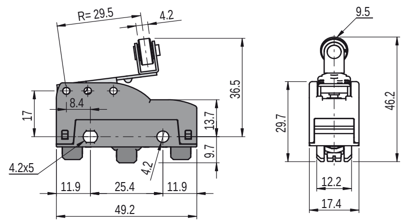
Maximum and Minimum speed page 245 - type 8



MK V11F45 1NO+1NC

PC	1,1 mm	FS	1,3 N
OC	6,6 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

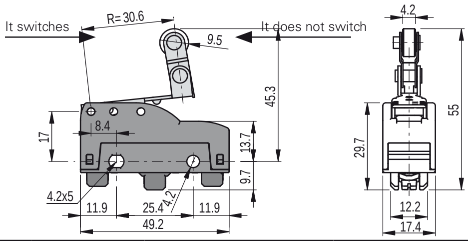
Maximum and Minimum speed page 245 - type 8



MK V11F46 1NO+1NC

PC	1,1 mm	FS	1,3 N
OC	6,6 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

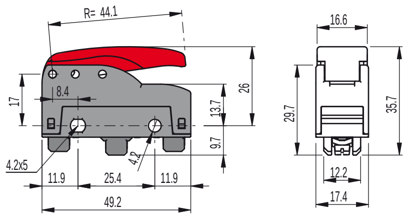
Maximum and Minimum speed page 245 - type 8



MK V11F47 1NO+1NC

PC	1,1 mm	FS	1,3 N
OC	5,6 mm	FR	0,9 N
CD	0,1 mm	FAP	6,9 N
CAP	6,3 mm		

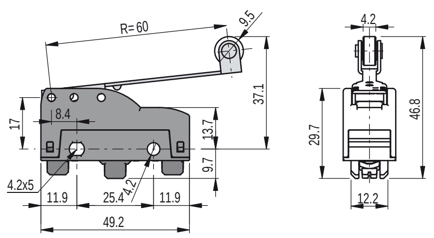
Maximum and Minimum speed page 245 - type 8



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		

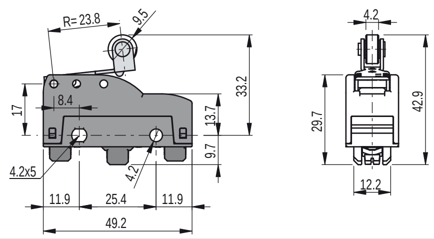
Maximum and Minimum speed page 245 - type 5



MK V11F53 1NO+1NC

PC	2,5 mm	FS	0,7 N
OC	11,5 mm	FR	0,6 N
CD	0,3 mm		

Maximum and Minimum speed page 245 - type 8



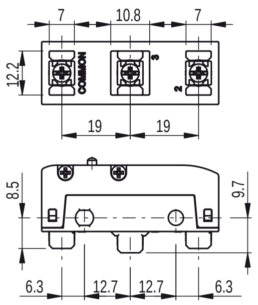
MK V11F59 1NO+1NC

PC	0,8 mm	FS	1,7 N
OC	5,2 mm	FR	1,3 N
CD	0,08 mm	FAP	8,9 N
CAP	4,9 mm		

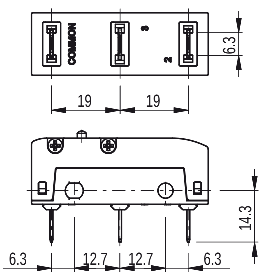
Maximum and Minimum speed page 245 - type 8

Terminals outline dimensions

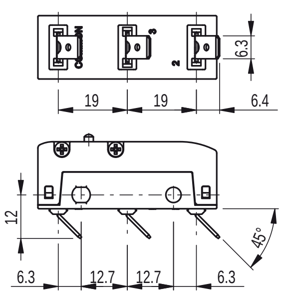
All measures in the drawings are in mm



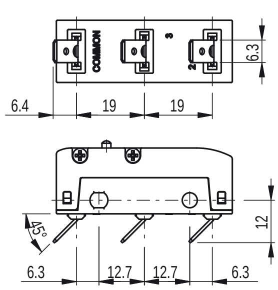
Screw terminals **V** with plate



Vertical faston **H** terminals



Faston terminals **F**, right bending

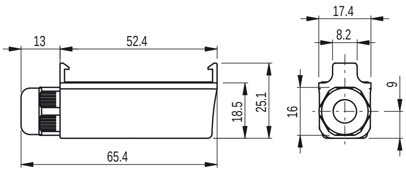


Faston terminals **G**, left bending (on request)

Note: H vertical faston terminals can be bent according to one's 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.

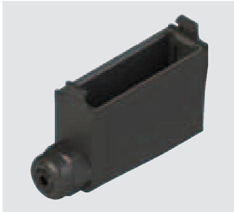
Protections (terminal covers)

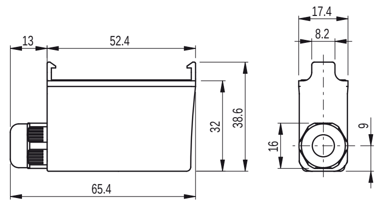
10 pcs. packs



Protective terminal cover for screw terminals snap-in assembled and with wiretrap cable gland. Allows the stacked installation of switches.

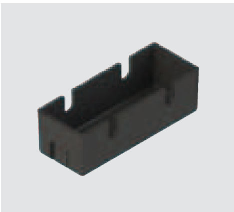
Article	Description	Protection degree
VF MKCV11	Protective terminal cover without gasket for multipolar cables from Ø 5 to Ø 7.5 mm	IP40
VF MKCV12	Protective terminal cover without gasket for multipolar cables from Ø 4 to Ø 7.5 mm	IP40
VF MKCV13	Protective terminal cover without gasket for multipolar cables from Ø 2 to Ø 5.5 mm	IP40
VF MKCV22	Protective terminal cover with gasket for multipolar cables from Ø 4 to Ø 7.5 mm	IP65
VF MKCV23	Protective terminal cover with gasket for multipolar cables from Ø 2 to Ø 5.5 mm	IP65

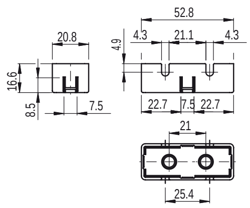




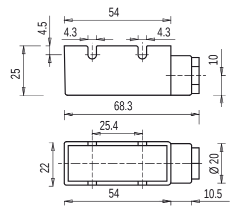
Protective terminal cover for vertical faston terminals with wiretrap cable gland, snap-in attachment. Allows the stacked installation of switches.

Article	Description	Protection degree
VF MKCH11	Protective terminal cover without gasket for multipolar cables from Ø 5 to Ø 7.5 mm	IP40
VF MKCH12	Protective terminal cover without gasket for multipolar cables from Ø 4 to Ø 7.5 mm	IP40
VF MKCH13	Protective terminal cover without gasket for multipolar cables from Ø 2 to Ø 5.5 mm	IP40
VF MKCH22	Protective terminal cover with gasket for multipolar cables from Ø 4 to Ø 7.5 mm	IP65
VF MKCH23	Protective terminal cover with gasket for multipolar cables from Ø 2 to Ø 5.5 mm	IP65

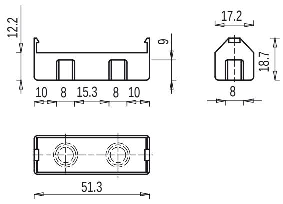




Article	Description	Protection degree
VF C01	Protective terminal cover for screw terminals	IP20



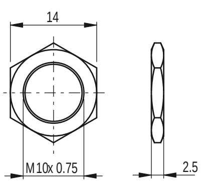
Article	Description	Protection degree
VF C02	Protective terminal cover for screw terminals with cable gland PG9 for multipolar cables from Ø 5 to Ø 7 mm	IP40



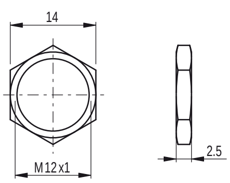
Article	Description	Protection degree
VF C03	Protective terminal cover for screw terminals, snap-in attachment. Allows the stacked installation of switches	IP20

Accessories

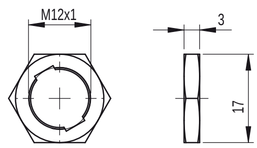
10 pcs. packs



Article	Description
VF AC83	Hexagonal threaded nut for microswitches with actuators D06, D08, D09



Article	Description
VF AC72	Hexagonal threaded nut for microswitches with actuators D10, D12, D13



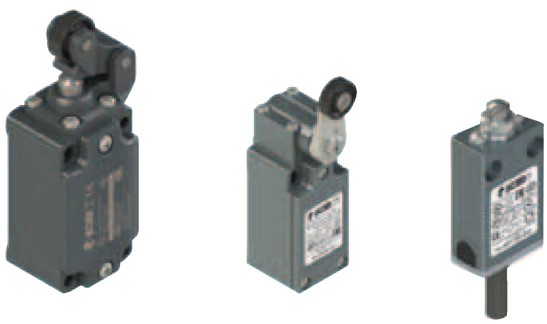
Article	Description
AC35	Hexagonal threaded nut notched for microswitches with actuators D15, D16

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

Accessories See page 225

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

ATEX



ATEX Directive

The ATEX mark (**At**mospheres **Ex**plosives) refers to two European directives concerning the risk of deflagration in potentially explosive atmospheres:
- ATEX 94/9/EC: concerns the requirements for electrical and non-electrical equipment used in potentially explosive environments. According to this directive the manufacturer has to comply with the provided requirements and mark the articles in conformity with particular categories
- ATEX 99/92/EC: regards the minimum safety and sanitary requirements that the user has to satisfy during the activity in potentially explosive environments.

These directives determine the requirements for the safety and health protection of people, animals and property and carry several procedures for the conformity demonstration of equipment to the directive requirements.

Classification of potentially explosive atmospheres.

A potentially explosive atmosphere is an atmosphere that could become explosive according to the local conditions of work. Usually it consists in environments where it is present a mixture of air and flammable substances in the form of gas, smog, steams and dusts.
The ATEX 99/92/EC directive defines for two types of explosive atmosphere, depending on the presence in the zone of gases or combustible dusts. Each area exposed to these types of explosive atmospheres is classified in three zones, according to the frequency and duration of the explosive atmosphere. For atmospheres with explosive gas, areas are classified in zones 0, 1 and 2; for atmosphere with explosive dusts in zones 20, 21 and 22:
- **Zone 0/20** : a place where gas or combustible dust is present permanently. Constant danger. Equipment of minimum category 1 is required.
- **Zone 1/21** : a place where gas or combustible dust is likely to occur during normal operation. Potential danger. Equipment of minimum category 2 is required.
- **Zone 2/22** : a place where gas or combustible dust is unlikely to occur or only for a short period. Lower danger. Equipment of minimum category 3 is required.

It's under the responsibility of the final user to choose and classify the different zones and to use suitable equipments.

Device categories acc. to ATEX directive and IEC standards

ATEX 94/9/CE directive distinguishes equipment between 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 degree:
- **Category M1**: Equipment designed to assure a very high protection level
- **Category M2**: Equipment designed to assure a high protection level

Equipment of the group II is divided in three further categories according to the required protection degree:
- **Category 1**: Equipment designed to assure a very high protection level (use in zones 0 and 20, 1 and 21, 2 and 22)
- **Category 2**: Equipment designed to assure a high protection level (use in zones 1 and 21, 2 and 22)
- **Category 3**: Equipment designed to assure a normal protection level (use in zones 2 and 22)

The relation between the EPL (Equipment Protection Levels) of the IEC 60079-0 standard, and the categories and applications of the ATEX directive are shown in the table below.

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

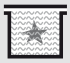
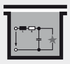
Environment characteristics				Equipment characteristics			
				acc. to ATEX 94/9/EC		acc. to IEC 60079-0	
Environment of application	**Flammable material**	**Potentially explosive atmosphere**	**Classification of potentially explosive atmospheres: ZONE**	**Required marking of the device: CATEGORY**	**Required marking of the device: GROUP**	**EPL**	**Required protection level**
Mining				**M1**	**I**	**Ma**	very high
				M2		**Mb**	high
Above ground	**Gas**	It is present continuously, for long periods or frequently	**0**	**1G**	**II**	**Ga**	very high
		It is likely to occur	**1**	**2G**		**Gb**	high
		It is unlikely to occur or, if it does, is likely to do infrequently and for a short period only	**2**	**3G**		**Gc**	normal
	Dusts	It is present continuously, for long periods or frequently	**20**	**1D**		**Da**	very high
		It is likely to occur	**21**	**2D**		**Db**	high
		It is unlikely to occur or, if it does, is likely to do infrequently and for a short period only	**22**	**3D**		**Dc**	normal

Protection modes

In order to avoid an explosion caused by the electrical ignition of an explosive atmosphere, it is possible to take different type of precautions:
- Isolate the dangerous parts into housing in order to limit the explosion inside itself.
- Avoid contact between ignition sources and the potentially explosive atmosphere interposing solid, liquid or gaseous materials.
- Take measures in order to limit the generation of dangerous ignition sources, eliminating the possibility of faults or limiting the energy so it's not sufficient to cause the ignition.

For each modality several methods of protection have been developed and standardized, as listed in the following table.

Table 2 - Protection methods and reference standards

Protection method	Symbol	Engraving	Zone of utilization GAS	Zone of utilization DUSTS	IEC / EN standards
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
Pressurization		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		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

Ex II 2G Ex ia IIC T6 Gb

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Community 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 Protection mode (see table 2)
⑥ Classification of gases (see table 4)
⑦ Temperature class (see table 3)
⑧ EPL according to IEC 60079-0 standard (see table 1)

Devices for places with presence of dusts

Ex II 3D Ex tc IIIC T80°C Dc

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Community 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 Protection mode (see table 2)
⑥ Classification of dusts (see table 5)
⑦ Maximum surface temperature of the equipment
⑧ EPL according to IEC 60079-0 standard (see table 1)

Temperature classes

Table 3

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

Classification of gases

Table 4

excerpt 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		naphtha, benzene, hexane	hydrogen sulfide	
T4		acetaldehyde	ethyl ether	
T5				
T6				carbon bisulphide

Classification of dust

Table 5

IIIA	IIIB	IIIC
combustible particles	non-conductive powder	conductive powder

Main features

- Approvals:

  Category **2G** and **M2**
- Metal housing, one conduit entry
- Protection degree IP66
- Versions with gold-plated silver contacts

ATEX markings and quality labels:

CE

Ⓔx **II 2G Ex ia IIC T6 Gb**

Ⓔx **I M2 Ex ia I Mb**

Technical data

Housing

Metal housing, baked powder coating	
One threaded conduit entry:	M20x1.5
Protection degree:	IP66 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +60°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••93-EX•, F• ••78-EX•, F• ••8•-EX•, F• ••95-EX•	500.000 operating cycles[1]
F• ••99-EX•, F• ••R2-EX•	250.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
F• ••93-EX•,F• ••78-EX•, F• ••8•-EX	1,000,000
F• ••99-EX•, F• ••R2-EX•	500,000
F• ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20,28:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, 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.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
2G **M2**	**1** **M2**	**Gb** **Mb**	Ⓔx **II 2G Ex ia IIC T6 Gb** Ⓔx **I M2 Ex ia I Mb**	**-EX7**

Electrical data

Maximum current (Ii):	2.1 A
Maximum voltage (Ui):	30 Vdc
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	fuse 4 A 250 V type gG
Pollution degree:	3

⚠ **This type of switches must be used only in intrinsic safety circuits in conformity with standard IEC 60079-11, EN 60079-11**
⚠ **For the correct utilization of the switch please use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval: E131787
EAC approval: RU C-IT ДМ94.B.01024

Characteristics approved by UL

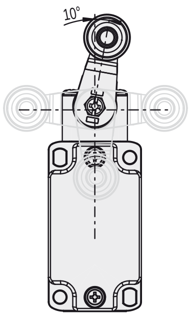
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

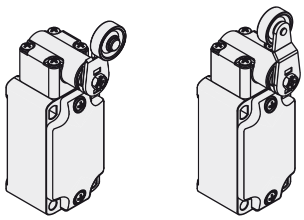
Adjustable levers

In the switches it is possible to adjust the lever with 10° steps for the whole 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.



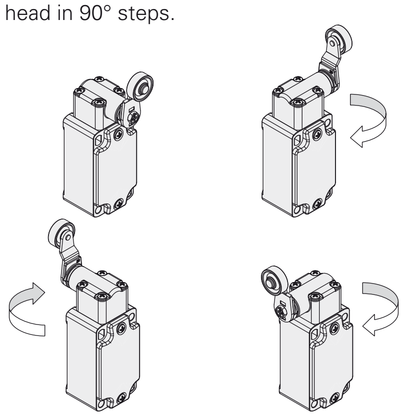
Overturning levers

In the switches, the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



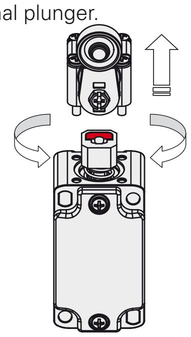
Orientable heads

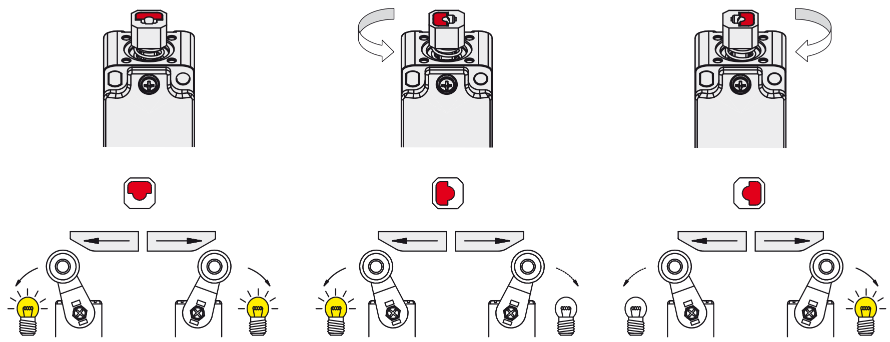
In all switches, it is possible to rotate the head in 90° steps.



Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving 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 / article

FD 502-GM2-EX7

Housing	
FD	metal, one conduit entry

Contact blocks	
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
...	....

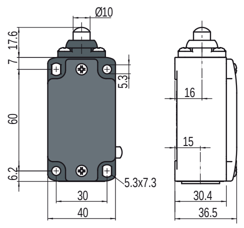
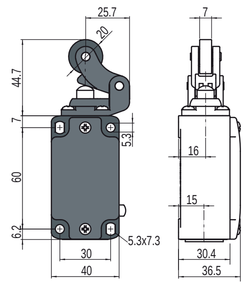
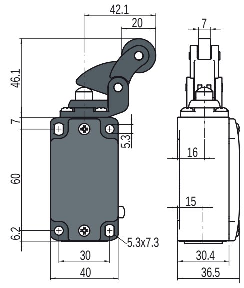
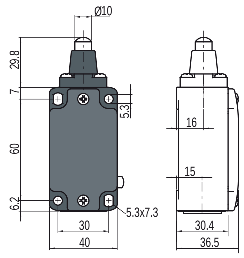
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

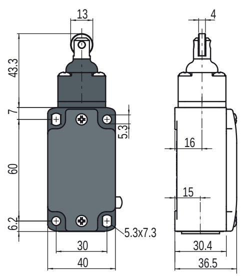
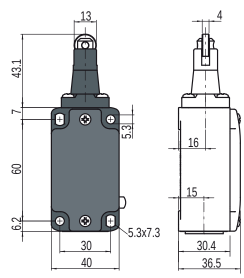
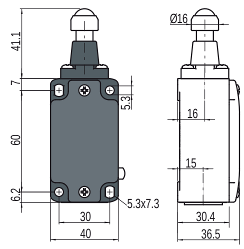
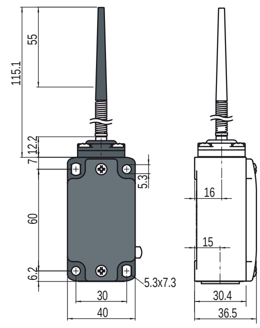
Threaded conduit entry	
M2	M20x1.5

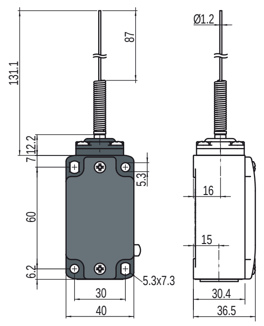
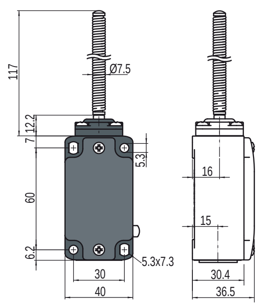
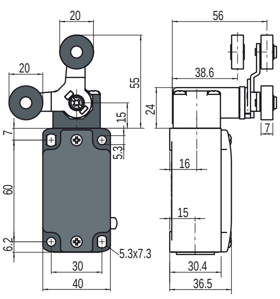
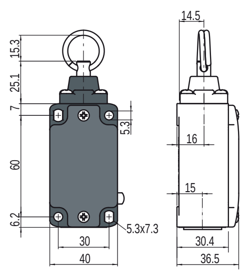
ATEX approval	
-EX7	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb

Contact type:

R = snap action
L = slow action

				With stainless steel roller on request	With stainless steel roller on request	
						
Contact blocks						
5	R		FD 501-M2-EX7 ➔ 1NO+1NC	FD 502-M2-EX7 ➔ 1NO+1NC	FD 505-M2-EX7 ➔ 1NO+1NC	FD 511-M2-EX7 ➔ 1NO+1NC
20	L		FD 2001-M2-EX7 ➔ 1NO+2NC	FD 2002-M2-EX7 ➔ 1NO+2NC	FD 2005-M2-EX7 ➔ 1NO+2NC	FD 2011-M2-EX7 ➔ 1NO+2NC
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
Min. force			8 N (25 N ➔)	6 N (25 N ➔)	6 N (25 N ➔)	8 N (25 N ➔)
Travel diagrams			page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

			With external rubber gasket		Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
						
Contact blocks						
5	R		FD 515-M2-EX7 ➔ 1NO+1NC	FD 516-M2-EX7 ➔ 1NO+1NC	FD 519-M2-EX7 ➔ 1NO+1NC	FD 520-M2-EX7 1NO+1NC
20	L		FD 2015-M2-EX7 ➔ 1NO+2NC	FD 2016-M2-EX7 ➔ 1NO+2NC	FD 2019-M2-EX7 ➔ 1NO+2NC	FD 2020-M2-EX7 1NO+2NC
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
Min. force			11 N (25 N ➔)	8 N (25 N ➔)	8 N (25 N ➔)	0.09 Nm
Travel diagrams			page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

			With external rubber gasket	With external rubber gasket	Bistable	Rope switch for signalling
						
Contact blocks						
5	R		FD 521-M2-EX7 1NO+1NC	FD 525-M2-EX7 1NO+1NC	FD 541-M2-EX7 ➔ 1NO+1NC	FD 576-M2-EX7 1NO+1NC
20	L		FD 2021-M2-EX7 1NO+2NC	FD 2025-M2-EX7 1NO+2NC		FD 2076-M2-EX7 2NO+1NC
Max. speed			1 m/s	1 m/s	0.5 m/s with cam at 30°	0.5 m/s
Min. force			0.08 Nm	0.14 Nm	0.21 Nm (0.36 Nm ➔)	initial 20 N - final 40 N
Travel diagrams			page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 6

All measures in the drawings are in mm

Code	Approvals	Category	Zone	EPL
-EX7	Ex II 2G Ex ia IIC T6 Gb	2G	1	Gb
	Ex I M2 Ex ia I Mb	M2	M2	Mb

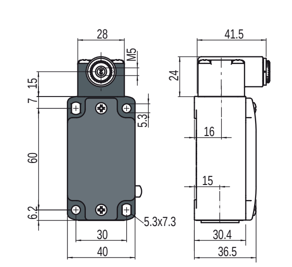
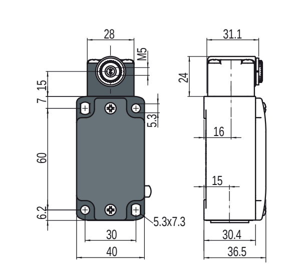
Accessories See page 225

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

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:
R = snap action
L = slow action

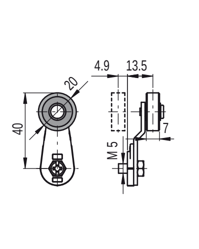
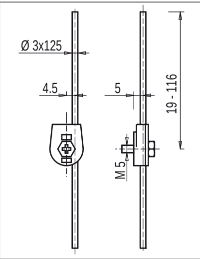
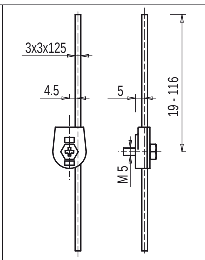
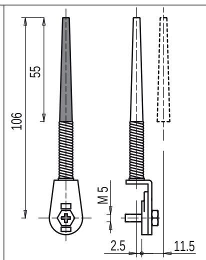
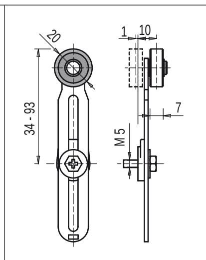
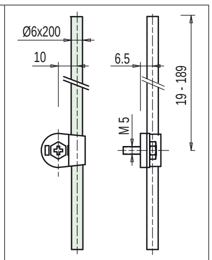
Contact blocks		Regular head	Compact head
			
5	R	FD 538-M2-EX7 ➲ 1NO+1NC	FD 558-M2-EX7 ➲ 1NO+1NC
20	L	FD 2038-M2-EX7 ➲ 1NO+2NC	FD 2058-M2-EX7 ➲ 1NO+2NC
Min. force		0,1 Nm (0,25 Nm ➲)	0,06 Nm (0,25 Nm ➲)
Travel diagrams		page 238 - group 4	page 238 - group 4

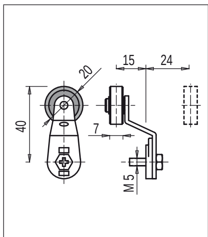
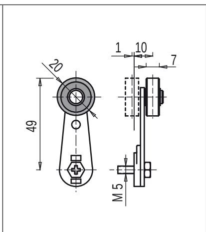
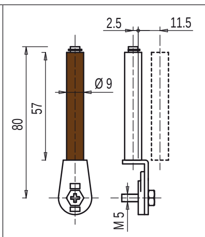
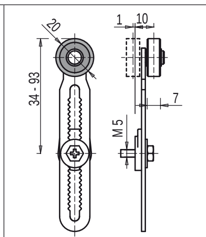
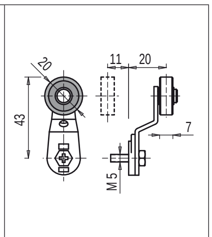
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ➲ aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

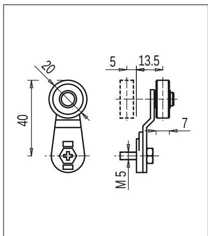
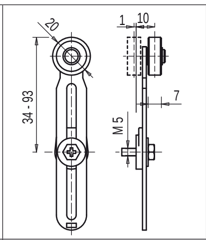
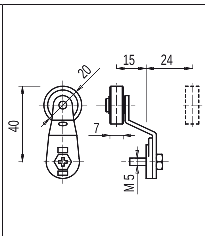
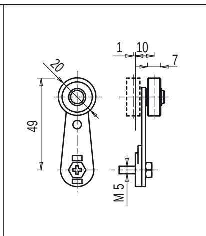
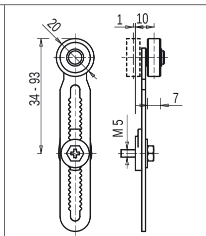
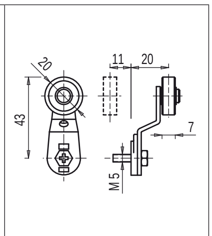
All measures in the drawings are in mm

IMPORTANT: These loose actuators can be used with items of the FD series only.

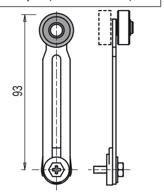
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable fiber glass rod
						
Article	VF L31 ➲	VF L32 (2)	VF L33 (2)	VF L34	VF L35 ➲ (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (cam 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 figure beside.
If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (2) If installed with switch FD •58-M2-EX7 (e.g. FD 558-M2-EX7, FD 658-M2-EX7…) the actuator could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.



Code	Approvals	Category	Zone	EPL
-EX7	Ⓔx **II 2G Ex ia IIC T6 Gb** Ⓔx **I M2 Ex ia I Mb**	**2G** **M2**	**1** **M2**	**Gb** **Mb**

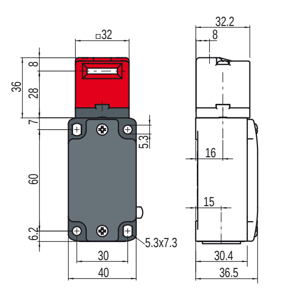
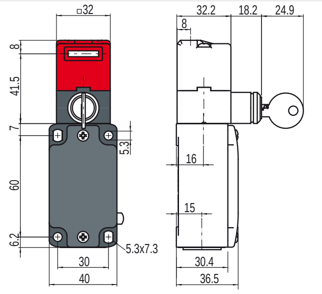
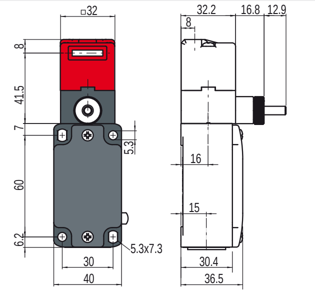
Items with code on **green** background are stock items

Accessories See page 225

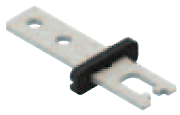
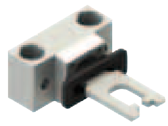
➔ The 2D/3D files are available at **www.pizzato.com**

Safety switches with separate actuator

All measures in the drawings are in mm

Contact type: L = slow action	Switches with separate actuator	Switches with separate actuator and key release	Switches with manual mechanical delay
	Switches without actuator	Switches without actuator	Switches without actuator
Contact blocks			
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	
Min. force	10 N (18 N ➜)	30 N (40 N ➜)	10 N (18 N ➜)
Travel diagrams Gen. Cat. Safety	page 21	page 140	page 132

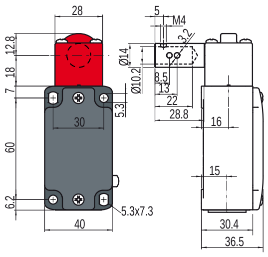
Actuators

					
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 with items of the FD series only (e.g. FD 2093-M2-EX7).
Low level coded actuators according to EN ISO 14119.

Safety switches for hinges

All measures in the drawings are in mm

Contact type: L = slow action	
Contact blocks	
20 L	FD 2095-M2-EX7 ➜ 1NO+2NC
Min. force	0,15 Nm (0,4 Nm ➜)
Travel diagrams Gen. Cat. Safety	page 75

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX7	Ex II 2G Ex ia IIC T6 Gb	2G	1	Gb
	Ex I M2 Ex ia I Mb	M2	M2	Mb

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

Accessories See page 225

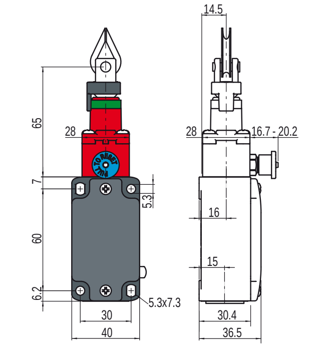
➔ The 2D/3D files are available at **www.pizzato.com**

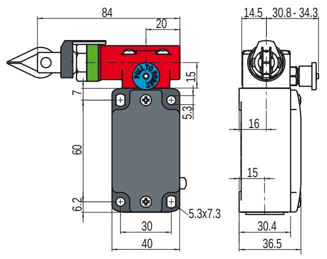
Safety rope switch with reset for emergency stops

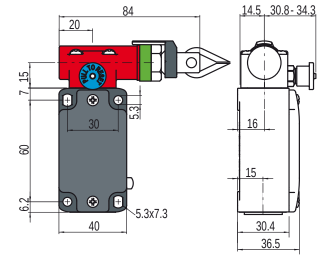
All measures in the drawings are in mm

Contact type:

L = slow action

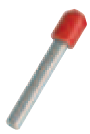
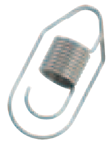
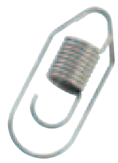






Contact blocks			
20 L	FD 2078-M2-EX7 → 1NO+2NC	FD 2083-M2-EX7 → 1NO+2NC	FD 2084-M2-EX7 → 1NO+2NC
Min. force	initial 63 N...final 83 N (90 N →)	initial 147 N…final 235 N (250 N →)	initial 147 N…final 235 N (250 N →)
Travel diagrams Gen. Cat. Safety	page 171 - group 1	page 171 - group 2	page 171 - group 2

Accessories for rope installation

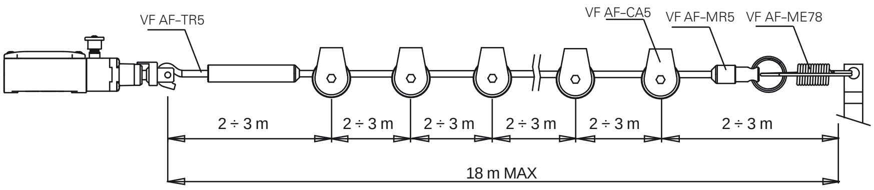
      

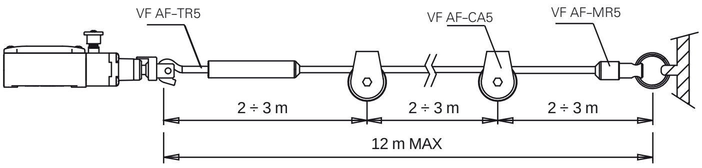
 

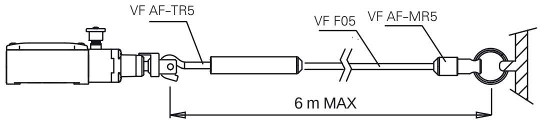
VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR03	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal head	Safety spring for transversal head	Rope, Ø 5 mm. 100 m rolls	Function indicator for ropes. Text “STOP”	Stainless steel pulley	Angular pulley, stainless steel

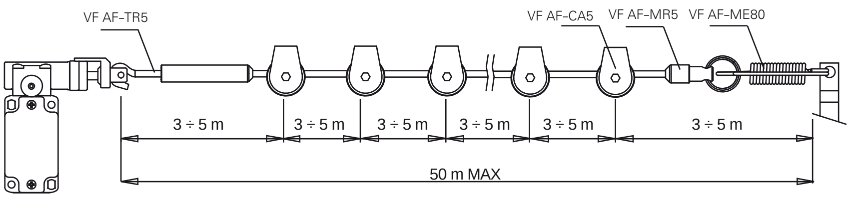
Application examples and max. rope length

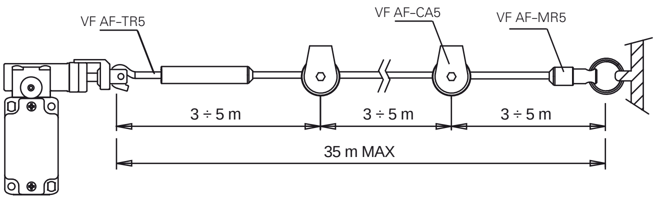
All measures in the drawings are in mm

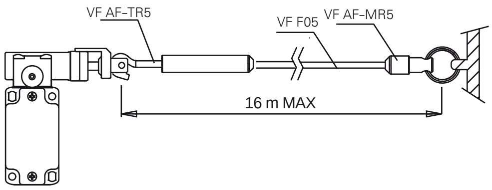












⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX7	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb	2G M2	1 M2	Gb Mb

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

Accessories See page 225

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

Main features

- Approvals:
  Category **2G** and **M2**
- Metal housing, three conduit entries
- Protection degree IP66
- Versions with gold-plated silver contacts

ATEX markings and quality labels:

CE

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

Technical data

Housing

Metal housing, baked powder coating	
Three threaded conduit entries:	M20x1.5
Protection degree:	IP66 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +60°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••93-EX•, F• ••78-EX•, F• ••8•-EX•, F• ••95-EX•	500.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
F• ••93-EX•,F• ••78-EX•, F• ••8•-EX	1,000,000
F• ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact block 20:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, 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.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
2G **M2**	**1** **M2**	**Gb** **Mb**	**Ex II 2G Ex ia IIC T6 Gb** **Ex I M2 Ex ia I Mb**	**-EX7**

Electrical data

Maximum current (Ii):	2.1 A
Maximum voltage (Ui):	30 Vdc
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	fuse 4 A 250 V type gG
Pollution degree:	3

⚠ **This type of switches must be used only in intrinsic safety circuits in conformity with standard IEC 60079-11, EN 60079-11**
⚠ **For the correct utilization of the switch please use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval:	E131787
EAC approval:	RU C-IT ДМ94.B.01024

Characteristics approved by UL

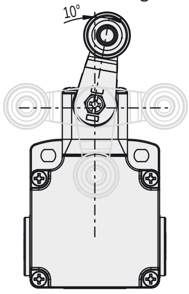
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

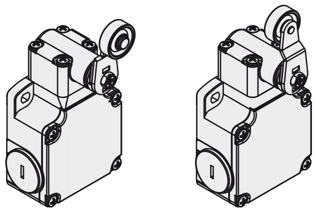
Adjustable levers

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.



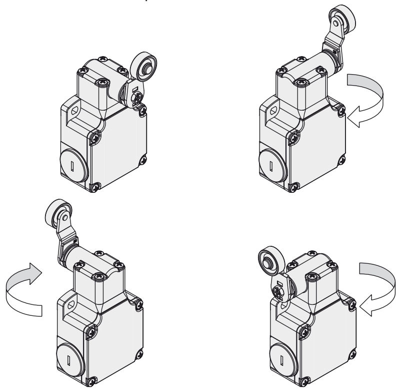
Overturning levers

For switches with swivelling lever the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



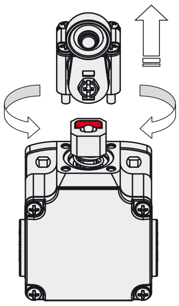
Orientable heads

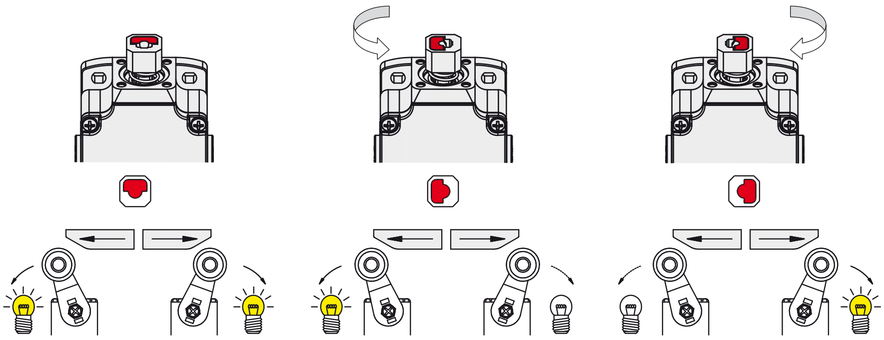
In all switches, it is possible to rotate the head in 90° steps.



Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving the internal plunger (contact block 16 excluded).





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 — article

FL 502-GM2-EX7

Housing	
FL	metal, three conduit entries

Contact blocks	
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
...	....

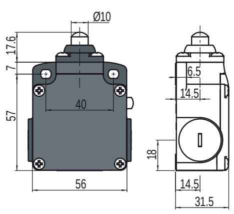
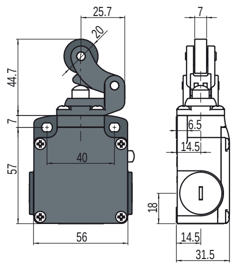
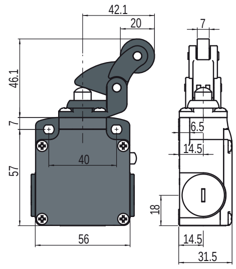
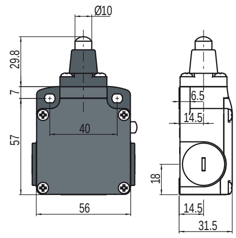
ATEX approval	
-EX7	II 2G Ex ia IIC T6 Gb I M2 Ex ia I Mb

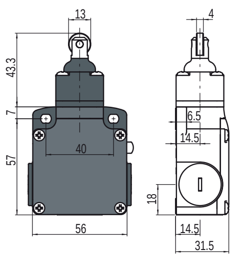
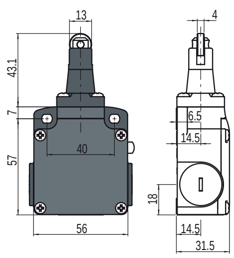
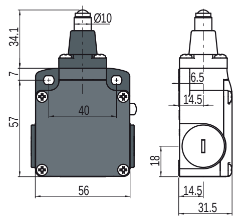
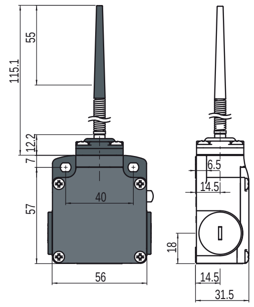
Threaded conduit entry	
M2	M20x1.5

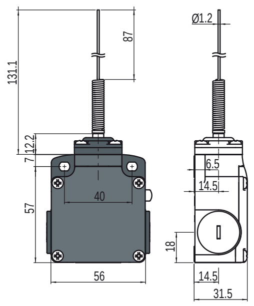
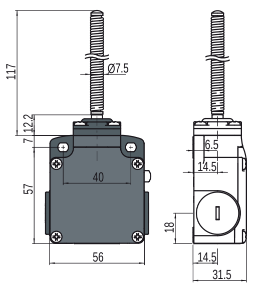
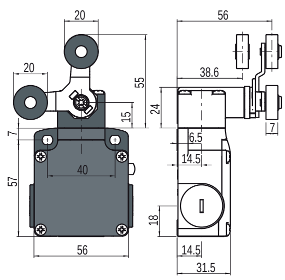
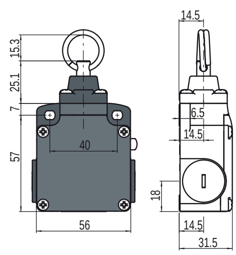
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

Contact type:

R = snap action
L = slow action

			With stainless steel roller on request	With stainless steel roller on request	
Contact blocks					
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
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
Min. force		8 N (25 N)	6 N (25 N)	6 N (25 N)	8 N (25 N)
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

		With external rubber gasket		Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
Contact blocks					
5	R	FL 515-M2-EX7 1NO+1NC	FL 516-M2-EX7 1NO+1NC	FL 519-M2-EX7 1NO+1NC	FD 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	FD 2020-M2-EX7 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
Min. force		11 N (25 N)	8 N (25 N)	8 N (25 N)	0.09 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

		With external rubber gasket	With external rubber gasket	Bistable	Rope switch for signalling
Contact blocks					
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
Max. speed		1 m/s	1 m/s	0.5 m/s with cam at 30°	0.5 m/s
Min. force		0.08 Nm	0.14 Nm	0.21 Nm (0.36 Nm)	initial 20 N - final 40 N
Travel diagrams		page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 6

All measures in the drawings are in mm

Code	Approvals	Category	Zone	EPL
-EX7	II 2G Ex ia IIC T6 Gb I M2 Ex ia I Mb	2G M2	1 M2	Gb Mb

Accessories See page 225

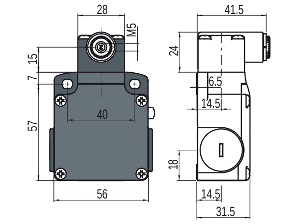
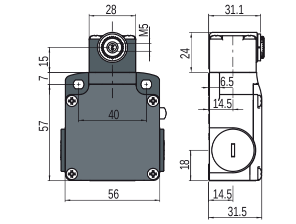
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

Contact blocks		Regular head	Compact head
			
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
Min. force		0,1 Nm (0,25 Nm ➔)	0,06 Nm (0,25 Nm ➔)
Travel diagrams		page 238 - group 4	page 238 - group 4

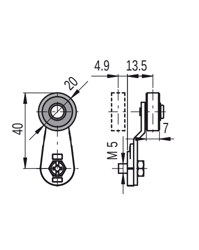
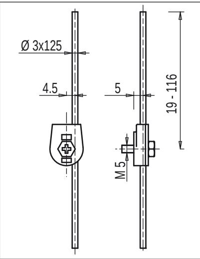
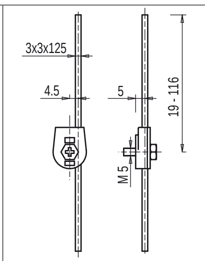
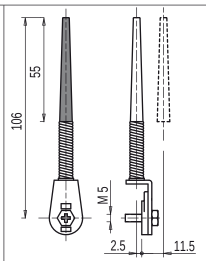
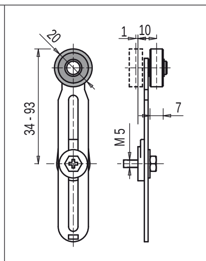
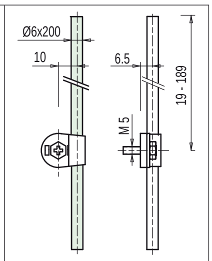
IMPORTANT

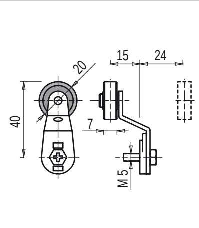
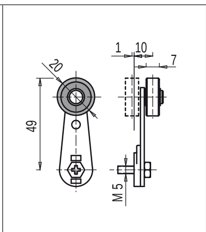
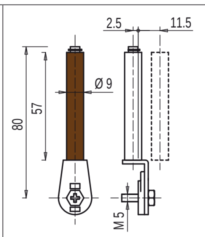
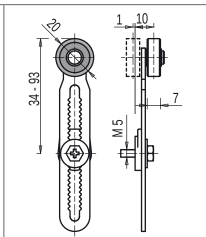
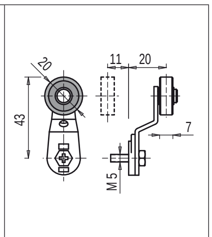
For safety applications: join only switches and actuators marked with symbol ➔ aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

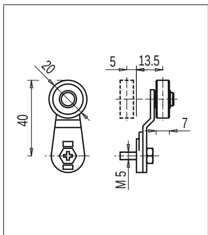
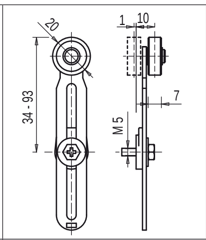
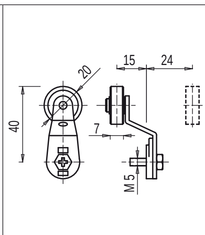
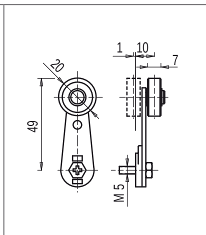
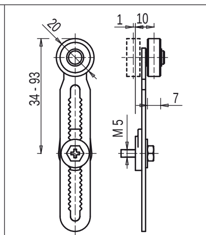
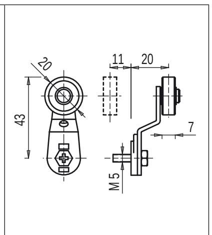
All measures in the drawings are in mm

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

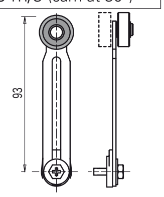
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable fiber glass rod
						
Article	VF L31 ➔	VF L32 (2)	VF L33 (2)	VF L34	VF L35 ➔ (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (cam 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 figure beside.
If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (2) If installed with switch FL •58-M2-EX7 (e.g. FL 558-M2-EX7, FL 658-M2-EX7…) the actuator could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.



Code	Approvals	Category	Zone	EPL
-EX7	Ex II 2G Ex ia IIC T6 Gb	2G	1	Gb
	Ex I M2 Ex ia I Mb	M2	M2	Mb

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

Accessories See page 225

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

Safety switches with separate actuator

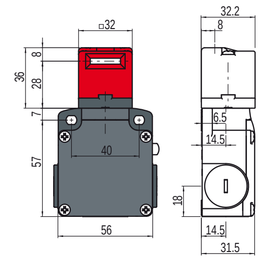
All measures in the drawings are in mm

Contact type:

L = slow action

Switches with separate actuator

Switches without actuator

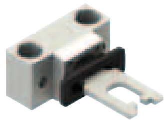


Contact blocks			
20	L	FL 2093-M2-EX7	1NO+2NC
Min. force		10 N (18 N ⊖)	
Travel diagrams Gen. Cat. Safety		page 21	

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

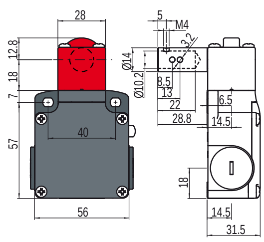
IMPORTANT: These actuators can be used with items of the FL series only (e.g. FL 2093-M2-EX7).
Low level coded actuators according to EN ISO 14119.

Safety switches for hinges

All measures in the drawings are in mm

Contact type:

L = slow action



Contact blocks			
20	L	FL 2095-M2-EX7	⊖ 1NO+2NC
Min. force		0,15 Nm (0,4 Nm ⊖)	
Travel diagrams Gen. Cat. Safety		page 75	

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX7	⟨Ex⟩ II 2G Ex ia IIC T6 Gb	2G	1	Gb
	⟨Ex⟩ I M2 Ex ia I Mb	M2	M2	Mb

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

Accessories See page 225

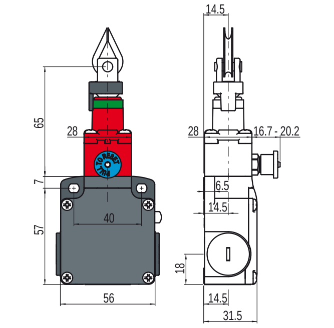
➔ The 2D/3D files are available at **www.pizzato.com**

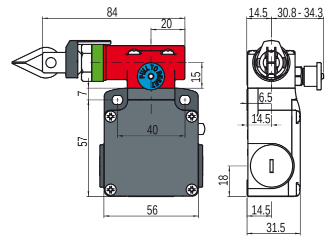
Safety rope switch with reset for emergency stops

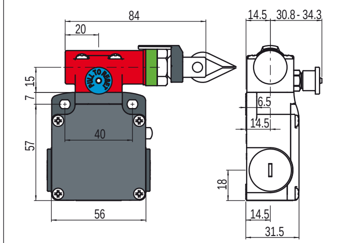
All measures in the drawings are in mm

Contact type:

L = slow action







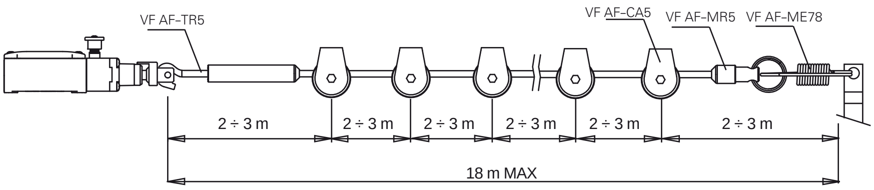
Contact blocks			
20 L	FL 2078-M2-EX7 → 1NO+2NC	FL 2083-M2-EX7 → 1NO+2NC	FL 2084-M2-EX7 → 1NO+2NC
Min. force	initial 63 N...final 83 N (90 N →)	initial 147 N…final 235 N (250 N →)	initial 147 N…final 235 N (250 N →)
Travel diagrams Gen. Cat. Safety	page 171 - group 1	page 171 - group 2	page 171 - group 2

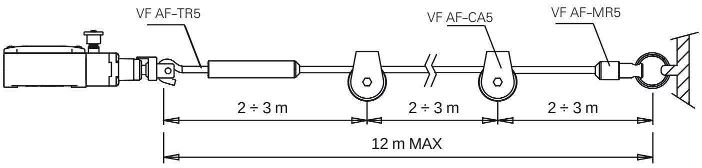
Accessories for rope installation

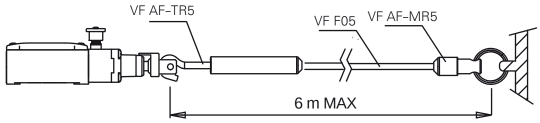
VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR03	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal head	Safety spring for transversal head	Rope, Ø 5 mm. 100 m rolls	Function indicator for ropes. Text "STOP"	Stainless steel pulley	Angular pulley, stainless steel

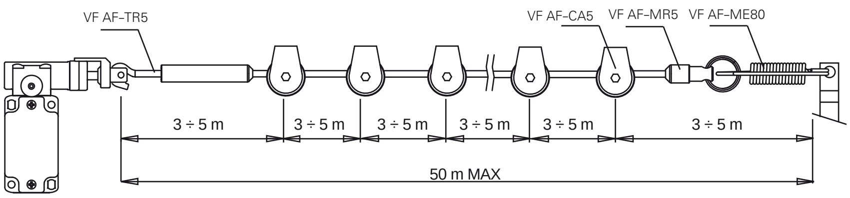
Application examples and max. rope length

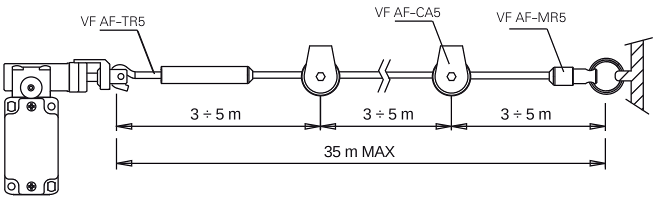
All measures in the drawings are in mm

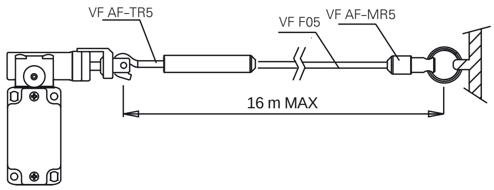












⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX7	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb	2G M2	1 M2	Gb Mb

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

Accessories See page 225

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

Main features
- Approvals:
  Category **2G** and **M2**
- Metal housing, one conduit entry
- Protection degree IP67
- Versions with gold-plated silver contacts

ATEX markings and quality labels:

CE

Ⓔx **II 2G Ex ia IIC T6 Gb**

Ⓔx **I M2 Ex ia I Mb**

Technical data

Housing

Metal housing, baked powder coating	
One threaded conduit entry:	M20x1.5
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +60°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••C•-EX•, F• ••96-EX•	500.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d} (NC contacts):	
F• ••••-EX•	20,000,000
F• ••C•-EX•	1,000,000
F• ••96-EX•	2,500,000
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact block 20:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, 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.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 240. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
2G **M2**	**1** **M2**	**Gb** **Mb**	Ⓔx **II 2G Ex ia IIC T6 Gb** Ⓔx **I M2 Ex ia I Mb**	**-EX7**

Electrical data

Maximum current (Ii):	2.1 A
Maximum voltage (Ui):	30 Vdc
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	fuse 4 A 250 V type gG
Pollution degree:	3

⚠ **This type of switches must be used only in intrinsic safety circuits in conformity with standard IEC 60079-11, EN 60079-11**
⚠ **For the correct utilization of the switch use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval: E131787
EAC approval: RU C-IT ДМ94.В.01024

Characteristics approved by UL

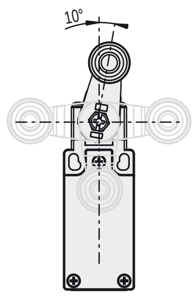
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

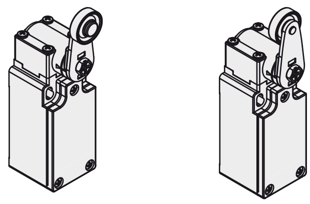
Adjustable levers

In the switches it is possible to adjust the lever with 10° steps for the whole 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.



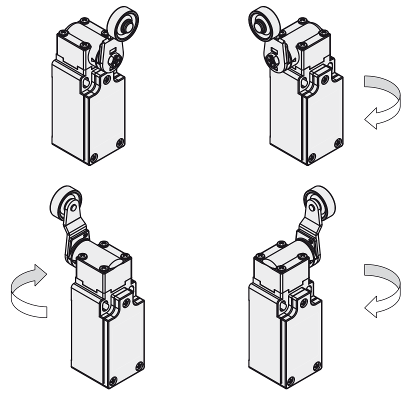
Overturning levers

In the switches, the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



Orientable heads

In all switches, it is possible to rotate the head 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 / article

FM 502-GM2-EX7

Housing	
FM	metal, one conduit entry

Contact blocks	
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
...	....

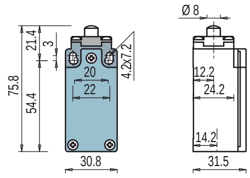
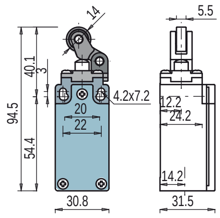
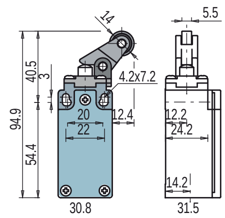
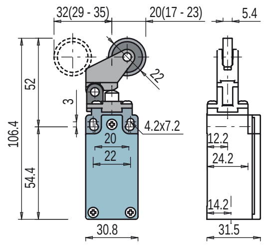
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

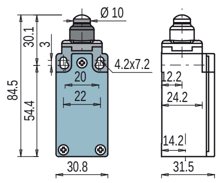
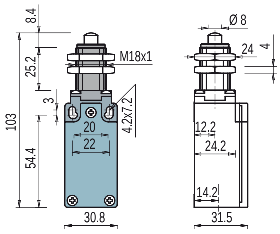
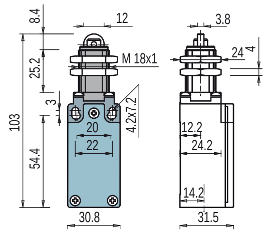
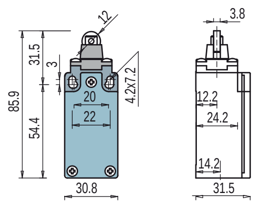
Threaded conduit entry	
M2	M20x1.5

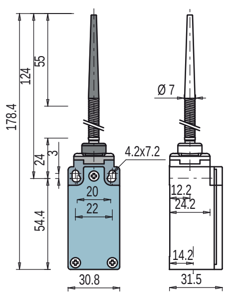
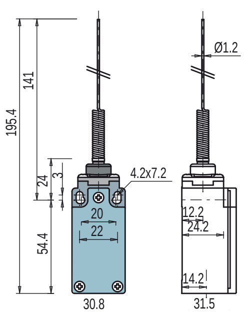
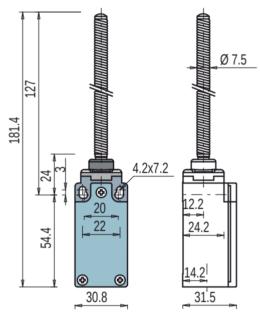
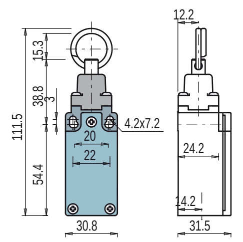
ATEX approval	
-EX7	Ex II 2G Ex ia IIC T6 Gb Ex I M2 Ex ia I Mb

Contact type:

R = snap action
L = slow action

			With stainless steel roller on request	With stainless steel roller on request	
					
Contact blocks					
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°
Min. force		8 N (25 N)	6 N (25 N)	6 N (25 N)	4 N (25 N)
Travel diagrams		page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 3

		With external rubber gasket			
					
Contact blocks					
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°
Min. force		8 N (25 N)	8 N (25 N)	8 N (25 N)	8 N (25 N)
Travel diagrams		page 240 - group 1	page 240 - group 1	page 240 - group 1	page 240 - group 1

		With external rubber gasket	With external rubber gasket	With external rubber gasket	Rope switch for signalling
					
Contact blocks					
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
Min. force		0.06 Nm	0.04 Nm	0.11 Nm	initial 20 N - final 40 N
Travel diagrams		page 240 - group 4	page 240 - group 4	page 240 - group 4	page 240 - group 7

All measures in the drawings are in mm

Code	Approvals	Category	Zone	EPL
-EX7	II 2G Ex ia IICT6 Gb I M2 Ex ia I Mb	2G M2	1 M2	Gb Mb

Accessories See page 225

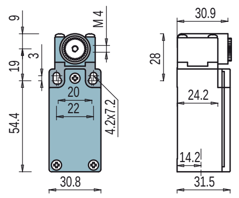
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action



Contact blocks

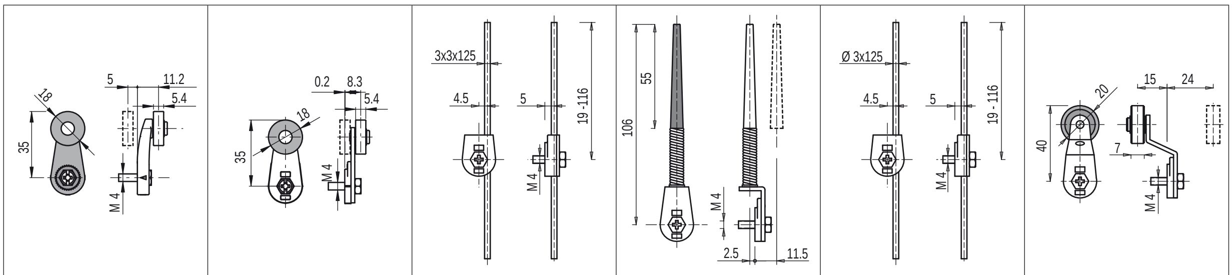
5	R	FM 538-M2-EX7	1NO+1NC
20	L	FM 2038-M2-EX7	1NO+2NC
Min. force		0,06 Nm (0,25 Nm)	
Travel diagrams		page 240 - group 5	

IMPORTANT
For safety applications: join only switches and actuators marked with symbol aside the product code.
For more information about safety applications see details on page 235.

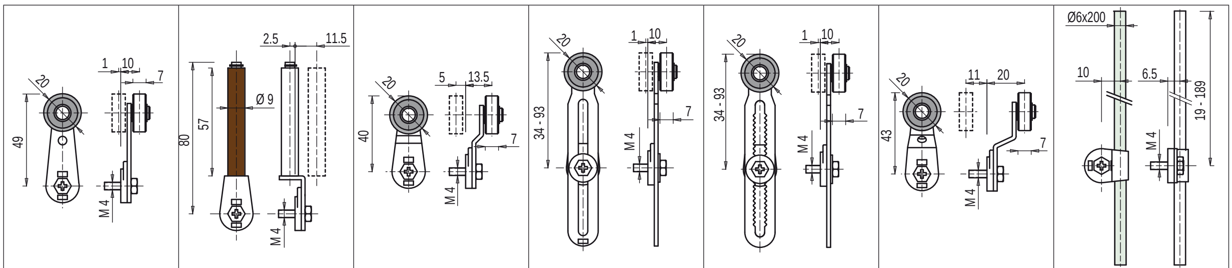
Loose actuators

All measures in the drawings are in mm

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

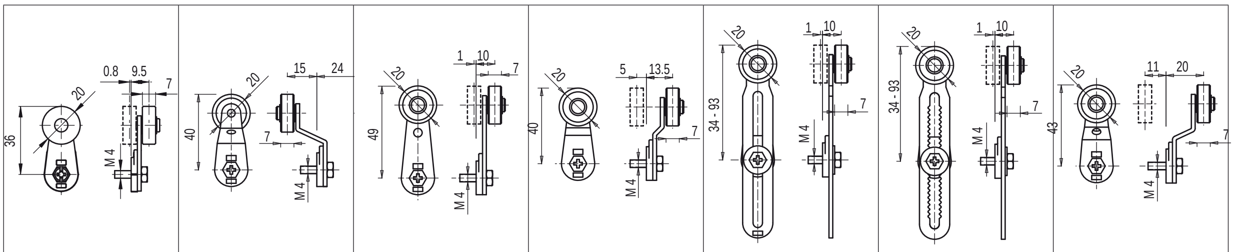


	Roller, Ø 18 mm	Roller, Ø 18 mm	Adjustable square rod, 3x3x125 mm	Flexible rod with pointed end	Adjustable round rod Ø 3x125 mm	Technopolymer roller Ø 20 mm
Article	VF LE30	VF LE31	VF LE33	VF LE34	VF LE50	VF LE51
Max. speed	1.5 m/s (cam at 30°)	1.5 m/s (cam at 30°)	1.5 m/s	1.5 m/s	1.5 m/s	1.5 m/s (cam at 30°)

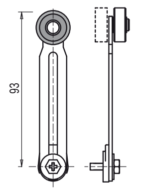


	Technopolymer roller Ø 20 mm	Porcelain roller	Technopolymer roller Ø 20 mm	Adjustable actuator with technopolymer roller	Adjustable safety actuator with techno-polymer roller	Technopolymer roller Ø 20 mm	Adjustable fiber glass rod
Article	VF LE52	VF LE53	VF LE54	VF LE55 (1)	VF LE56	VF LE57	VF LE69
Max. 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 figure beside.
If you need an adjustable lever for safety applications, use the adjustable safety lever VF LE56.

Code	Approvals	Category	Zone	EPL
-EX7	II 2G Ex ia IIC T6 Gb I M2 Ex ia I Mb	2G M2	1 M2	Gb Mb

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

Accessories See page 225

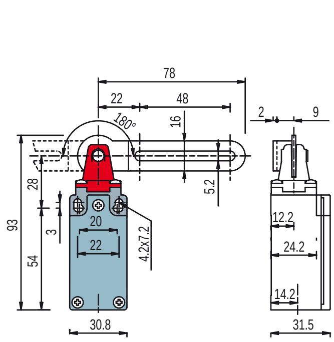
The 2D/3D files are available at **www.pizzato.com**

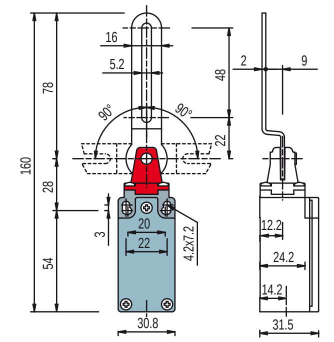
Safety switches with slotted hole lever

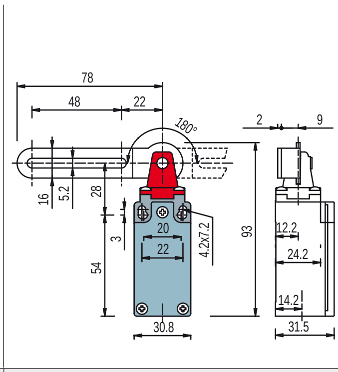
All measures in the drawings are in mm

Contact type:

L = slow action

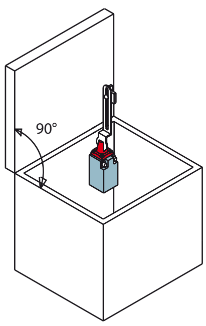


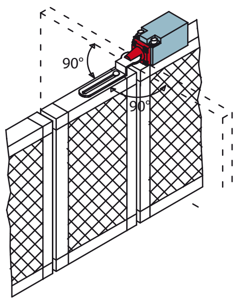




Contact blocks			
20 L	FM 20C1-M2-EX7 ⊖ 1NO+2NC	FM 20C2-M2-EX7 ⊖ 1NO+2NC	FM 20C3-M2-EX7 ⊖ 1NO+2NC
Min. force	11 N (15 N ⊖)	11 N (15 N ⊖)	11 N (15 N ⊖)
Travel diagrams	page 242 - group 10	page 242 - group 11	page 242 - group 10

Application examples

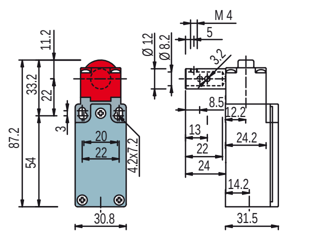




Safety switches for hinges

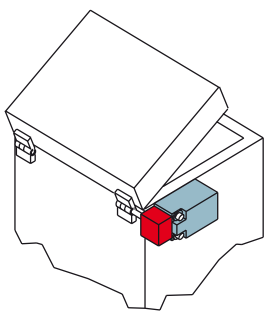
Contact type:

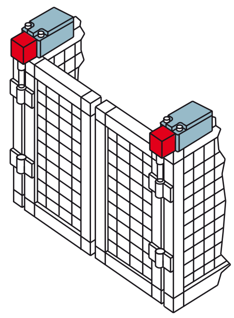
L = slow action



Contact blocks	
20 L	FM 2096-M2-EX7 ⊖ 1NO+2NC
Min. force	0,15 Nm (0,4 Nm ⊖)
Travel diagrams	page 242 - group 9

Application examples





⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX7	Ex II 2G Ex ia IICT6 Gb	2G	1	Gb
	Ex I M2 Ex ia I Mb	M2	M2	Mb

Accessories See page 225

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

Notes

Main features

- Approvals:

  2D category
- Metal housing, one conduit entry
- Protection degree IP66
- Versions with gold-plated silver contacts

ATEX markings and quality labels:

CE

Ex **II 2D Ex tb IIIC T80°C Db**

Technical data

Housing

Metal housing, baked powder coating	
One threaded conduit entry:	M20x1.5
Protection degree:	IP66 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +70°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••93-EX•, F• ••78-EX•, F• ••8•-EX•, F• ••95-EX•	500.000 operating cycles[1]
F• ••99-EX•, F• ••R2-EX•	250.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
F• ••93-EX•,F• ••78-EX•, F• ••8•-EX	1,000,000
F• ••99-EX•, F• ••R2-EX•	500,000
F• ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20,28:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, 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 60079-31, EN 60079-31.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
2D	**21**	**Db**	Ex **II 2D Ex tb IIIC T80°C Db**	**-EX8**

Electrical data

Thermal current (Ith):	6 A
Rated insulation voltage (Ui):	250 Vac/Vdc
Conditional short circuit current:	1000 A according 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

⚠ **For the correct utilization of the switch please use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval: E131787
EAC approval: RU C-IT ДМ94.B.01024

Characteristics approved by UL

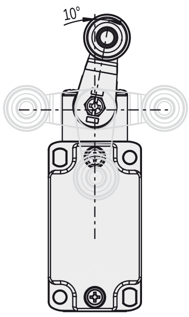
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

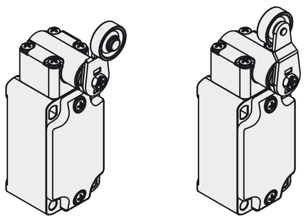
Adjustable levers

In the switches it is possible to adjust the lever with 10° steps for the whole 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.



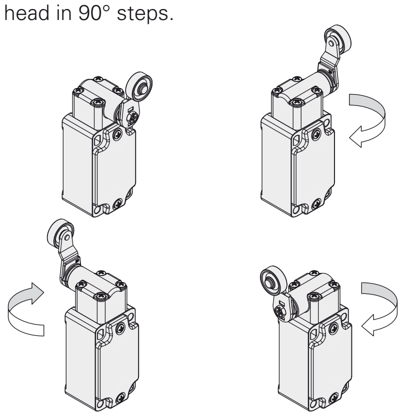
Overturning levers

In the switches, the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



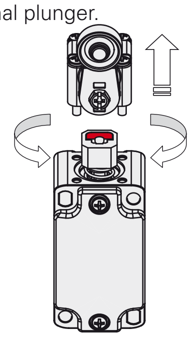
Orientable heads

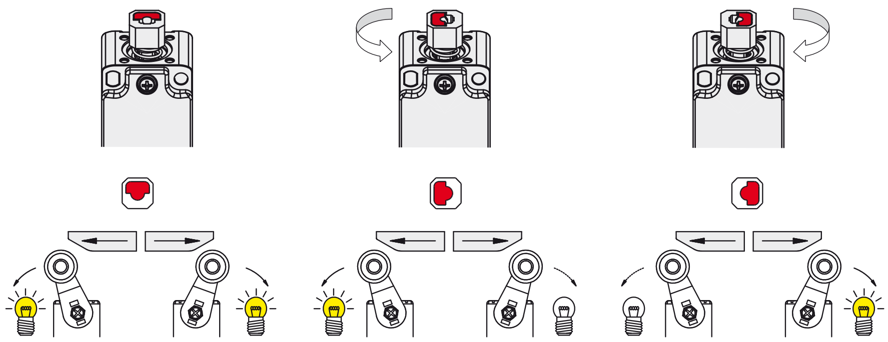
In all switches, it is possible to rotate the head in 90° steps.



Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving 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 — article

FD 502-GM2-EX8

Housing	
FD	metal, one conduit entry

Contact blocks	
5	1NO+1NC, snap action
10	2NO, slow action
11	2NC, snap action
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action

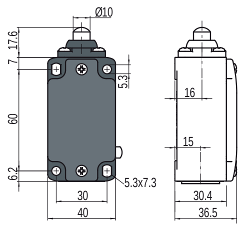
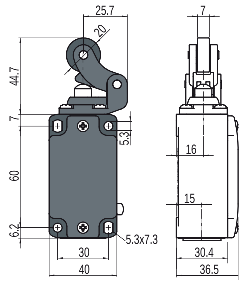
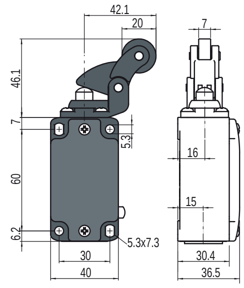
Actuators	
01	short plunger
02	roller lever
...	....

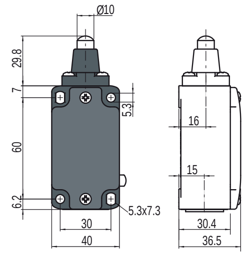
ATEX approval	
-EX8	Ex II 2D Ex tb IIIC T80°C Db

Threaded conduit entry	
M2	M20x1.5

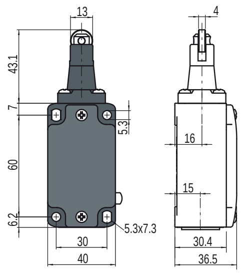
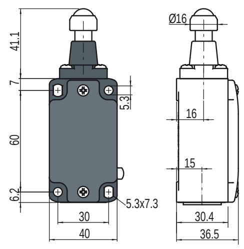
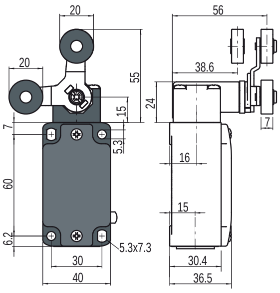
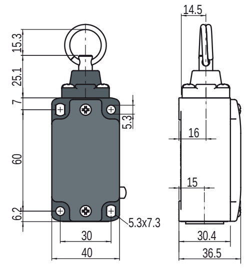
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

Switches compliant with **ATEX** directive / **FD** series

Contact type: R = snap action, L = slow action	With stainless steel roller on request	With stainless steel roller on request	
			



Contact blocks				
5 R	FD 501-M2-EX8 1NO+1NC	FD 502-M2-EX8 1NO+1NC	FD 505-M2-EX8 1NO+1NC	FD 511-M2-EX8 1NO+1NC
20 L	FD 2001-M2-EX8 1NO+2NC	FD 2002-M2-EX8 1NO+2NC	FD 2005-M2-EX8 1NO+2NC	FD 2011-M2-EX8 1NO+2NC
Max. speed	0.5 m/s	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Min. force	8 N (25 N)	6 N (25 N)	6 N (25 N)	8 N (25 N)
Travel diagrams	page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

		Ball, Ø 12.7 mm, stainless steel	Bistable	Rope switch for signalling
				

Contact blocks				
5 R	FD 516-M2-EX8 1NO+1NC	FD 519-M2-EX8 1NO+1NC	FD 541-M2-EX8 1NO+1NC	FD 576-M2-EX8 1NO+1NC
20 L	FD 2016-M2-EX8 1NO+2NC	FD 2019-M2-EX8 1NO+2NC		FD 2076-M2-EX8 1NO+2NC
Max. speed	0.5 m/s with cam at 30°	0.5 m/s	0.5 m/s with cam at 30°	0.5 m/s
Min. force	8 N (25 N)	8 N (25 N)	0.21 Nm (0.36 Nm)	initial 20 N - final 40 N
Travel diagrams	page 238 - group 1	page 238 - group 1	page 238 - group 4	page 238 - group 6

All measures in the drawings are in mm

Code	Approvals	Category	Zone	EPL
-EX8	II 2D Ex tb IIIC T80°C Db	2D	21	Db

Accessories See page 225

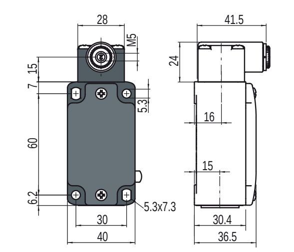
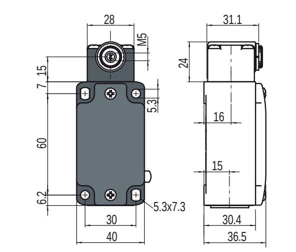
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

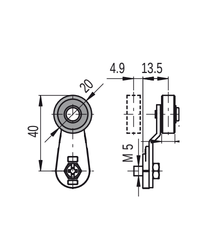
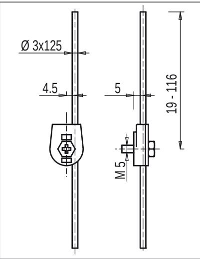
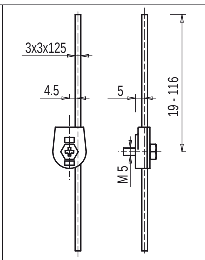
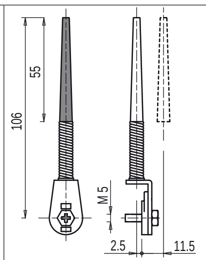
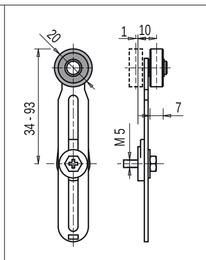
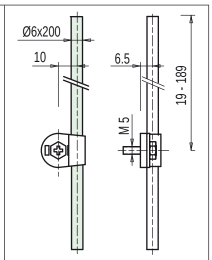
Contact blocks		Regular head	Compact head
			
5	R	FD 538-M2-EX8 ⊕ 1NO+1NC	FD 558-M2-EX8 ⊕ 1NO+1NC
20	L	FD 2038-M2-EX8 ⊕ 1NO+2NC	FD 2058-M2-EX8 ⊕ 1NO+2NC
Min. force		0,1 Nm (0,25 Nm ⊕)	0,06 Nm (0,25 Nm ⊕)
Travel diagrams		page 238 - group 4	page 238 - group 4

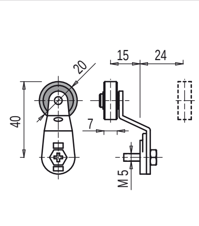
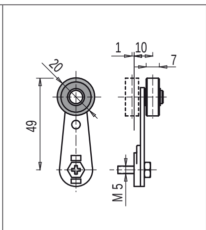
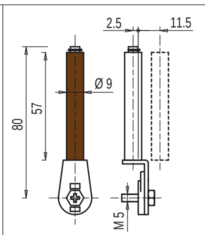
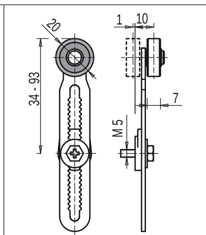
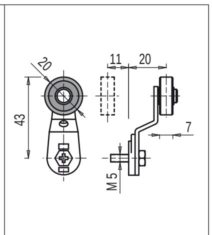
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊕ aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

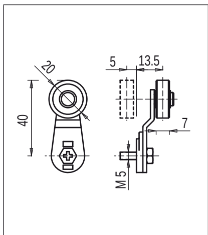
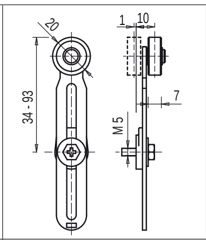
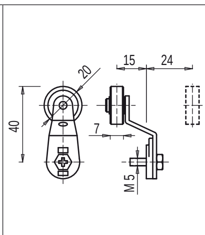
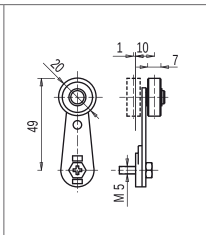
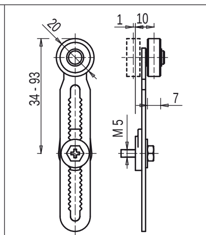
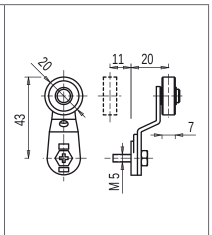
All measures in the drawings are in mm

IMPORTANT: These loose actuators can be used with items of the FD series only.

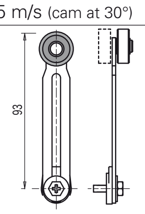
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable fiber glass rod
						
Article	VF L31 ⊕	VF L32 (2)	VF L33 (2)	VF L34	VF L35 ⊕ (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (cam 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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- [2] If installed with switch FD •58-M2-EX8 (e.g. FD 558-M2-EX8, FD 658-M2-EX8…) the actuator could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.



Code	Approvals	Category	Zone	EPL
-EX8	**Ⓔx II 2D Ex tb IIIC T80°C Db**	**2D**	**21**	**Db**

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

Accessories See page 225

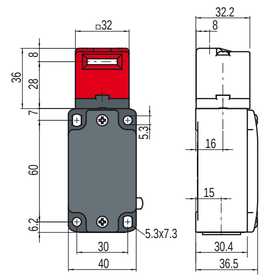
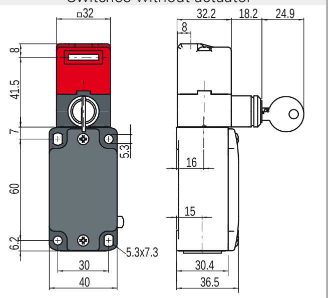
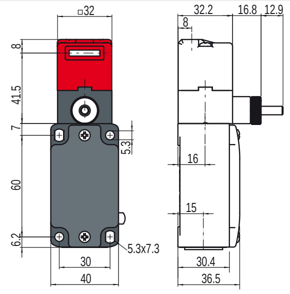
➔ The 2D/3D files are available at **www.pizzato.com**

Safety switches with separate actuator

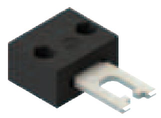
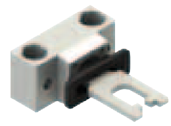
All measures in the drawings are in mm

Contact type:

L = slow action

Contact blocks		Switches with separate actuator	Switches with separate actuator and key release	Switches with manual mechanical delay
		Switches without actuator	Switches without actuator	Switches without actuator
				
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	
Min. force		10 N (18 N ⊖)	30 N (40 N ⊖)	10 N (18 N ⊖)
Travel diagrams Gen. Cat. Safety		page 21	page 140	page 132

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

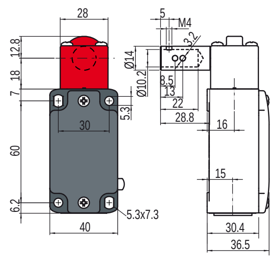
IMPORTANT: These actuators can be used with items of the FD series only (e.g. FD 2093-M2-EX8).
Low level coded actuators according to EN ISO 14119.

Safety switches for hinges

All measures in the drawings are in mm

Contact type:

L = slow action

Contact blocks		
		
20	L	FD 2095-M2-EX8 ⊖ 1NO+2NC
Min. force		0,15 Nm (0,4 Nm ⊖)
Travel diagrams Gen. Cat. Safety		page 75

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX8	**⟨Ex⟩ II 2D Ex tb IIIC T80°C Db**	**2D**	**21**	**Db**

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

Accessories See page 225

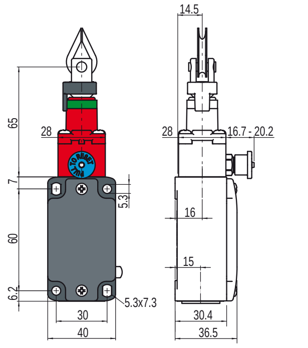
→ The 2D/3D files are available at **www.pizzato.com**

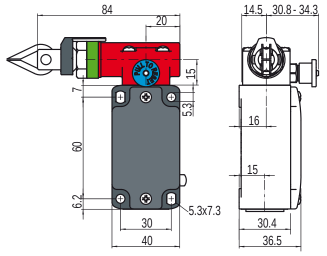
Safety rope switch with reset for emergency stops

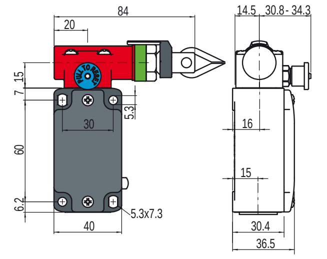
All measures in the drawings are in mm

Contact type:

L = slow action

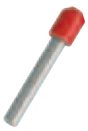
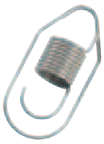
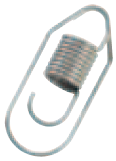






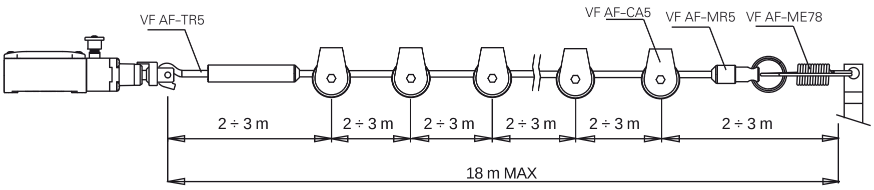
Contact blocks			
18 L	FD 1878-M2-EX8 ⊖ 1NO+1NC	FD 1883-M2-EX8 ⊖ 1NO+1NC	FD 1884-M2-EX8 ⊖ 1NO+1NC
20 L	FD 2078-M2-EX8 ⊖ 1NO+2NC	FD 2083-M2-EX8 ⊖ 1NO+2NC	FD 2084-M2-EX8 ⊖ 1NO+2NC
Min. force	initial 63 N…final 83 N (90 N ⊖)	initial 147 N…final 235 N (250 N ⊖)	initial 147 N…final 235 N (250 N ⊖)
Travel diagrams Gen. Cat. Safety	page 171 - group 1	page 171 - group 2	page 171 - group 2

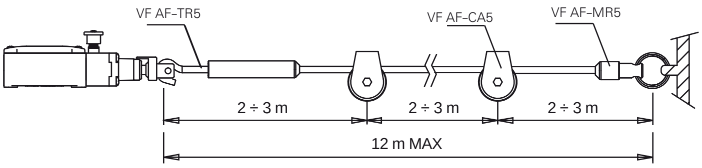
Accessories for rope installation

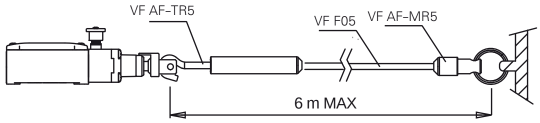
								
VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR03	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal head	Safety spring for transversal head	Rope, Ø 5 mm. 100 m rolls	Function indicator for ropes. Text “STOP”	Stainless steel pulley	Angular pulley, stainless steel

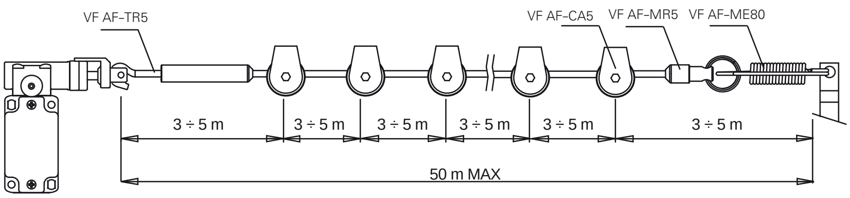
Application examples and max. rope length

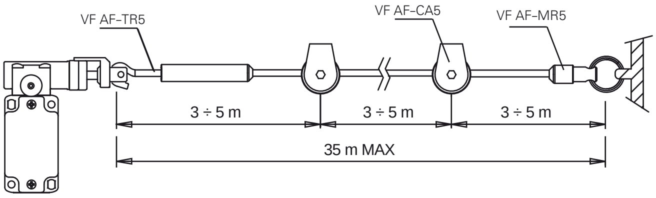
All measures in the drawings are in mm

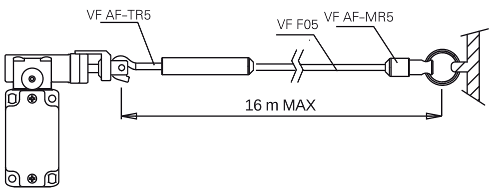












⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX8	Ex II 2D Ex tb IIIC T80°C Db	2D	21	Db

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

Accessories See page 225

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

Main features

- Approvals:
  2D category
- Metal housing, three conduit entries
- Protection degree IP66
- Versions with gold-plated silver contacts

ATEX markings and quality labels:

CE

Ex II 2D Ex tb IIIC T80°C Db

certification in progress

Technical data

Housing

Metal housing, baked powder coating	
Three threaded conduit entries:	M20x1.5
Protection degree:	IP66 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +70°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••93-EX•, F• ••78-EX•, F• ••8•-EX•, F• ••95-EX•	500.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
F• ••93-EX•,F• ••78-EX•, F• ••8•-EX	1,000,000
F• ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact block 20:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

In conformity with standards:

IEC 60947-5-1, EN 60947-5-1, 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 60079-31, EN 60079-31.

In conformity with the requirements of:

ATEX Directive 94/9/EC

Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.

Positive contact opening in conformity with standards:

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

Installation for safety applications:

Use only switches marked with the symbol ⊝ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
2D	**21**	**Db**	**Ex II 2D Ex tb IIIC T80°C Db**	**-EX8**

Electrical data

Thermal current (Ith):	6 A
Rated insulation voltage (Ui):	250 Vac/Vdc
Conditional short circuit current:	1000 A according 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

⚠ **For the correct utilization of the switch please use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval: E131787
EAC approval: RU C-IT ДМ94.В.01024

Characteristics approved by UL

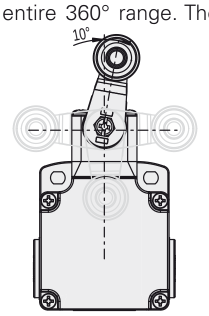
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

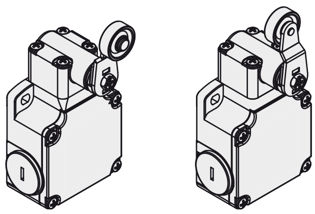
Adjustable levers

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.



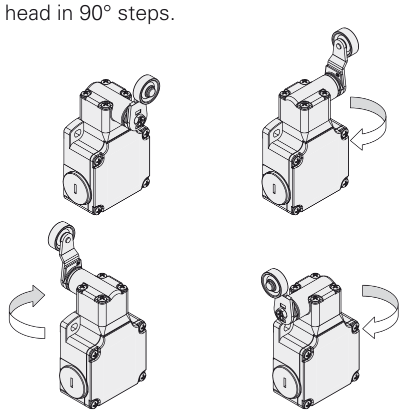
Overturning levers

For switches with swivelling lever the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



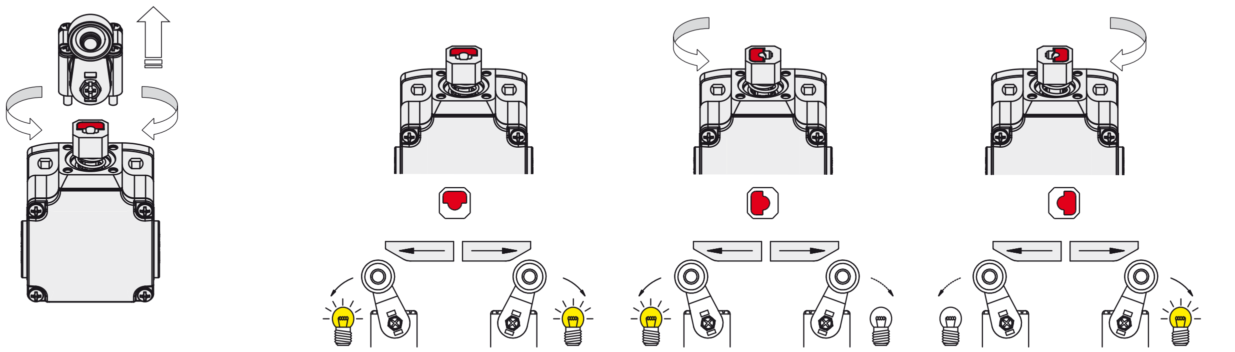
Orientable heads

In all switches, it is possible to rotate the head in 90° steps.



Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving the internal plunger (contact block 16 excluded).



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 | article

FL 502-GM2-EX8

Housing	
FL	metal, three conduit entries

Contact blocks	
5	1NO+1NC, snap action
10	2NO, slow action
11	2NC, snap action
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action

Actuators	
01	short plunger
02	roller lever
...	....

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

Threaded conduit entry	
M2	M20x1.5

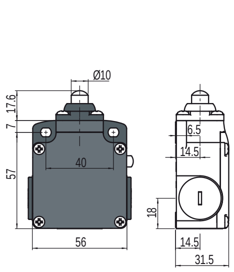
ATEX approval	
-EX8	Ⓔx II 2D Ex tb IIIC T80°C Db

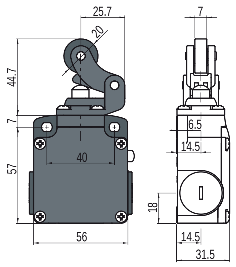
Switches compliant with ATEX directive ⟨Ex⟩ / FL series

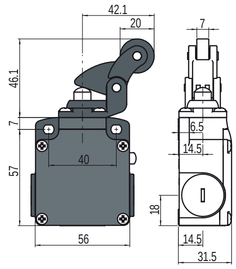
Contact type:

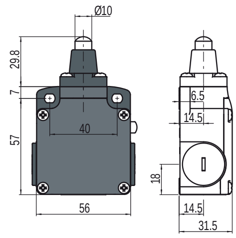
R = snap action
L = slow action

With stainless steel roller on request | With stainless steel roller on request



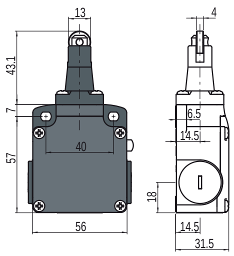


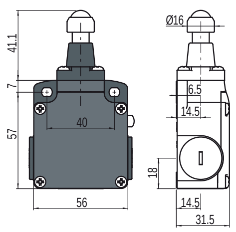


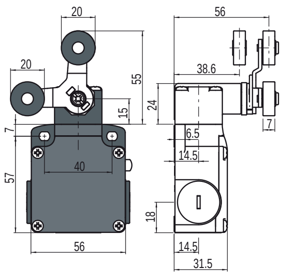


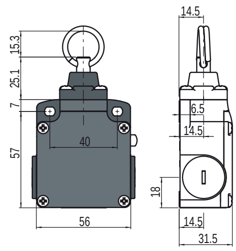
Contact blocks					
5	R	FL 501-M2-EX8 ⊖ 1NO+1NC	FL 502-M2-EX8 ⊖ 1NO+1NC	FL 505-M2-EX8 ⊖ 1NO+1NC	FL 511-M2-EX8 ⊖ 1NO+1NC
20	L	FL 2001-M2-EX8 ⊖ 1NO+2NC	FL 2002-M2-EX8 ⊖ 1NO+2NC	FL 2005-M2-EX8 ⊖ 1NO+2NC	FL 2011-M2-EX8 ⊖ 1NO+2NC
Max. speed		0.5 m/s	0.5 m/s with cam at 30°	0.5 m/s with cam at 30°	0.5 m/s
Min. force		8 N (25 N ⊖)	6 N (25 N ⊖)	6 N (25 N ⊖)	8 N (25 N ⊖)
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

Ball, Ø 12.7 mm, stainless steel | Bistable | Rope switch for signalling









Contact blocks					
5	R	FL 516-M2-EX8 ⊖ 1NO+1NC	FL 519-M2-EX8 ⊖ 1NO+1NC	FL 541-M2-EX8 ⊖ 1NO+1NC	FL 576-M2-EX8 1NO+1NC
20	L	FL 2016-M2-EX8 ⊖ 1NO+2NC	FL 2019-M2-EX8 ⊖ 1NO+2NC		FL 2076-M2-EX8 1NO+2NC
Max. speed		0.5 m/s with cam at 30°	0.5 m/s	0.5 m/s with cam at 30°	0.5 m/s
Min. force		8 N (25 N ⊖)	8 N (25 N ⊖)	0.21 Nm (0.36 Nm ⊖)	initial 20 N - final 40 N
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 4	page 238 - group 6

All measures in the drawings are in mm

Code	Approvals	Category	Zone	EPL
-EX8	⟨Ex⟩ II 2D Ex tb IIIC T80°C Db	2D	21	Db

Accessories See page 225

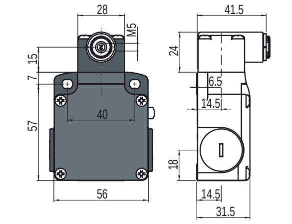
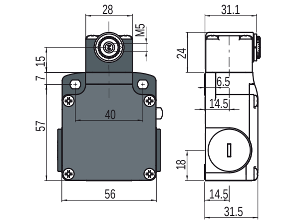
➔ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

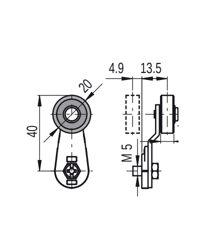
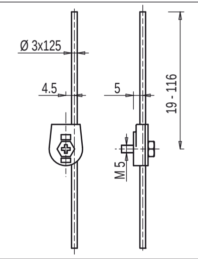
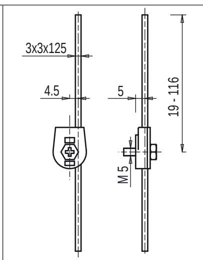
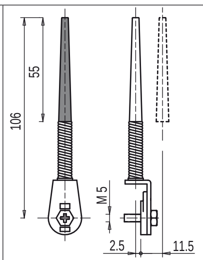
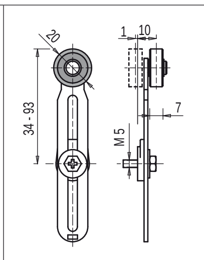
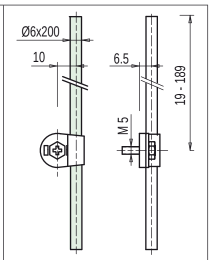
Contact blocks		Regular head	Compact head
			
5	R	FL 538-M2-EX8 ➜ 1NO+1NC	FL 558-M2-EX8 ➜ 1NO+1NC
20	L	FL 2038-M2-EX8 ➜ 1NO+2NC	FL 2058-M2-EX8 ➜ 1NO+2NC
Min. force		0,1 Nm (0,25 Nm ➜)	0,06 Nm (0,25 Nm ➜)
Travel diagrams		page 238 - group 4	page 238 - group 4

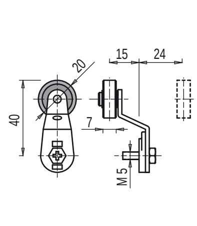
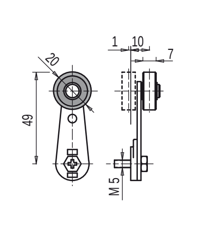
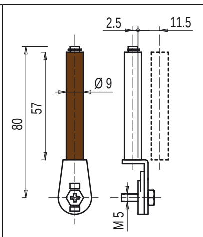
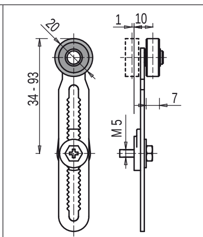
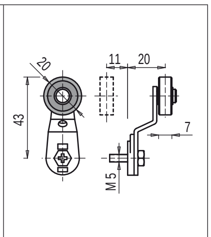
IMPORTANT
For safety applications: join only switches and actuators marked with symbol ➜ aside the product code.
For more information about safety applications see details on page 235.

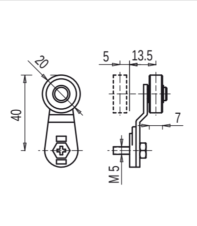
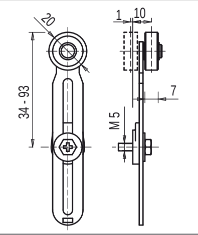
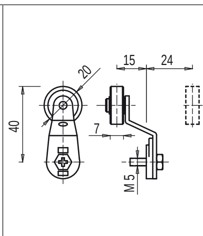
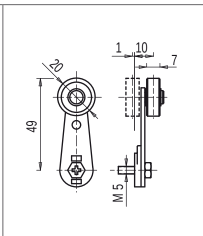
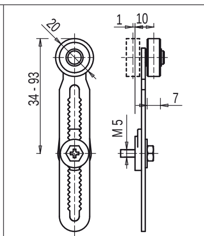
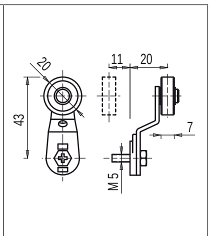
Loose actuators

All measures in the drawings are in mm

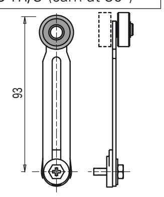
IMPORTANT: These loose actuators can be used with items of the FL series only.

	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 fiber glass 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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (2) If installed with switch FL •58-M2-EX8 (e.g. FL 558-M2-EX8, FL 658-M2-EX8...) the actuator could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.



Code	Approvals	Category	Zone	EPL
-EX8	Ex II 2D Ex tb IIIC T80°C Db	2D	21	Db

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

Accessories See page 225

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

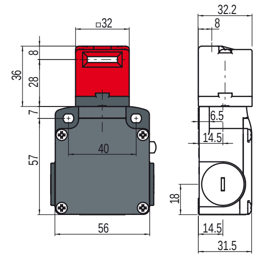
Safety switches with separate actuator

All measures in the drawings are in mm

Contact type:

L = slow action

	Switches with separate actuator
	Switches without actuator



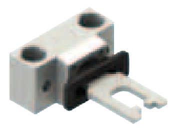
Contact blocks

Contact blocks	
20 L	FL 2093-M2-EX8 ⊖ 1NO+2NC
Min. force	10 N (18 N ⊖)
Travel diagrams Gen. Cat. Safety	page 21

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

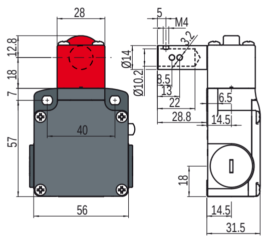
IMPORTANT: These actuators can be used with items of the FL series only (e.g. FL 2093-M2-EX8).
Low level coded actuators according to EN ISO 14119.

Safety switches for hinges

All measures in the drawings are in mm

Contact type:

L = slow action



Contact blocks	
20 L	FL 2095-M2-EX8 ⊖ 1NO+2NC
Min. force	0,15 Nm (0,4 Nm ⊖)
Travel diagrams Gen. Cat. Safety	page 75

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX8	**Ex II 2D Ex tb IIIC T80°C Db**	**2D**	**21**	**Db**

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

Accessories See page 225

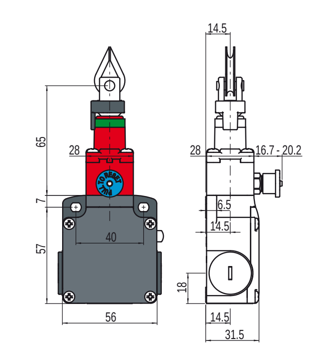
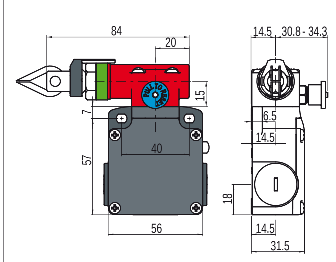
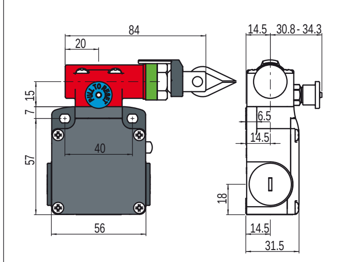
➔ The 2D/3D files are available at **www.pizzato.com**

Safety rope switch with reset for emergency stops

All measures in the drawings are in mm

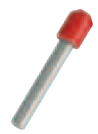
Contact type:

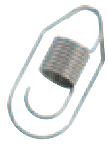
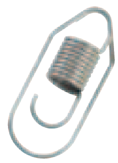
L = slow action

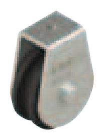




Contact blocks			
18 L	FL 1878-M2-EX8 ⊖ 1NO+1NC	FL 1883-M2-EX8 ⊖ 1NO+1NC	FL 1884-M2-EX8 ⊖ 1NO+1NC
20 L	FL 2078-M2-EX8 ⊖ 1NO+2NC	FL 2083-M2-EX8 ⊖ 1NO+2NC	FL 2084-M2-EX8 ⊖ 1NO+2NC
Min. force	initial 63 N…final 83 N (90 N ⊖)	initial 147 N…final 235 N (250 N ⊖)	initial 147 N…final 235 N (250 N ⊖)
Travel diagrams Gen. Cat. Safety	page 171 - group 1	page 171 - group 2	page 171 - group 2

Accessories for rope installation

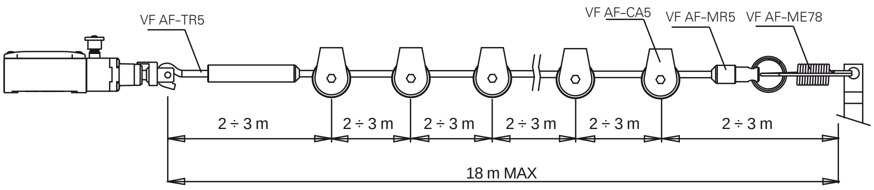



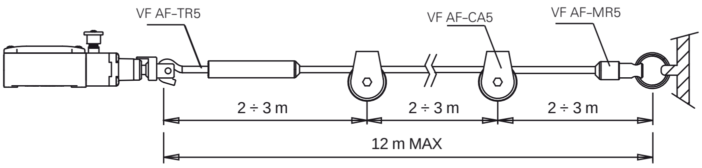


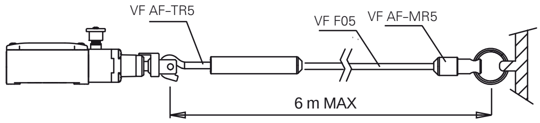

VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR03	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal head	Safety spring for transversal head	Rope, Ø 5 mm. 100 m rolls	Function indicator for ropes. Text "STOP"	Stainless steel pulley	Angular pulley, stainless steel

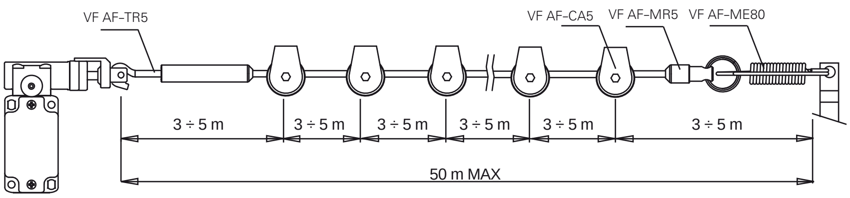
Application examples and max. rope length

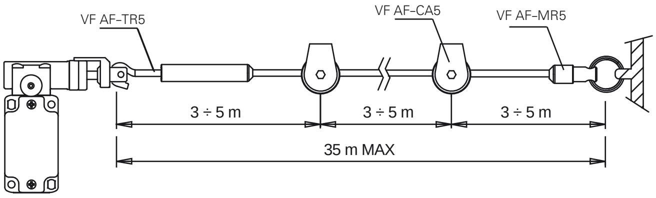
All measures in the drawings are in mm

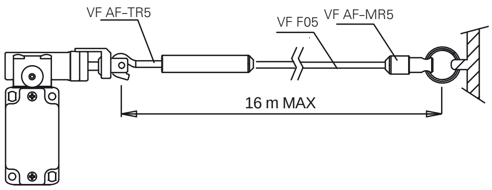












⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX8	Ex II 2D Ex tb IIIC T80°C Db	2D	21	Db

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

Accessories See page 225

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

Technical data

Housing

Metal housing, baked powder coating
2 m connection cable in polyurethane without halogens, other lengths on request

Protection degree:	IP67 according to EN 60529

General data

Ambient temperature:	-20°C … +60°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	10 million operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, 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.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Main features

- Approvals:
  3D and **3G** category
- Metal housing
- Protection degree IP67
- Polyurethane cable without halogens

ATEX markings and quality labels:

CE
II 3D Ex tc IIIC T80°C Dc
II 3G Ex nC IIC T6 Gc

Installation for safety applications:
Use only switches marked with the symbol aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: see "internal connections") as stated in **EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 241. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
3D	**22**	**Dc**	**II 3D Ex tc IIIC T80°C Dc**	**-EX5**
3G	**2**	**Gc**	**II 3G Ex nC IIC T6 Gc**	

Electrical data

Thermal current (Ith):	10 A
Rated insulation voltage (Ui):	400 Vac/dc
Conditional short circuit current:	1000 A according 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)

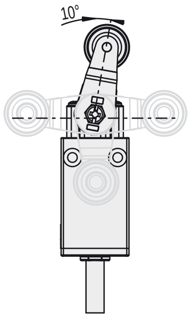
Ue (V)	120	250	400
Ie (A)	6	4	3

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	2.5	0.55	0.27

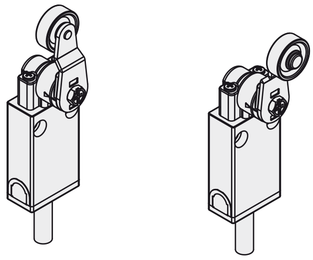
Adjustable levers

In the switches it is possible to adjust the lever with 10° steps for the whole 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.



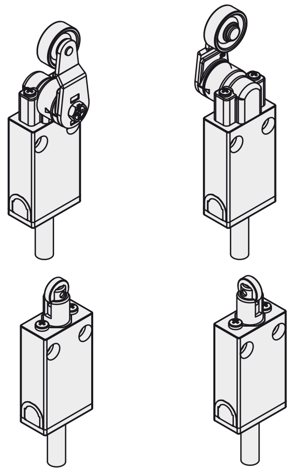
Overturning levers

In the switches, the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.

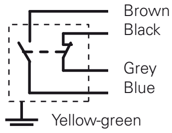


Orientable heads

With some models it is possible to rotate the head in 90° or 180°degree steps.



Internal connections



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 / article

FA 4501-2SH-GEX5

Housing	
FA	metal

Contact blocks	
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

Output direction	
S	output at bottom

Cable type	
H	halogen free polyurethane cable

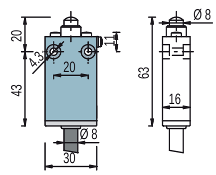
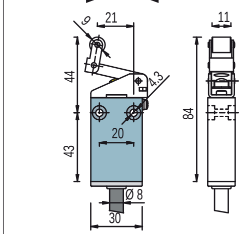
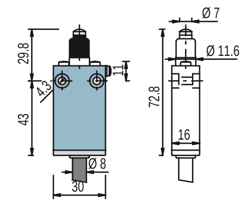
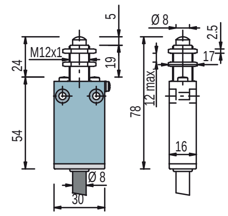
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

ATEX approval	
-EX5	II 3D Ex tc IIIC T80°C Dc II 3G Ex nC IIC T6 Gc

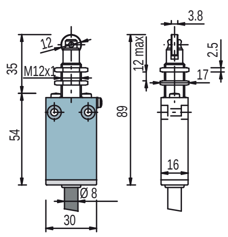
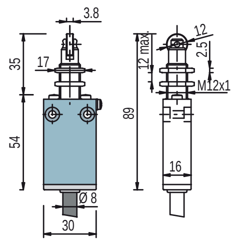
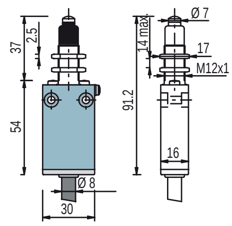
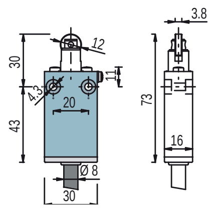
Contact type:

R = snap action
L = slow action

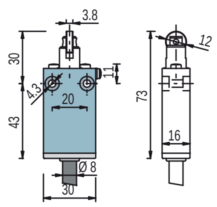
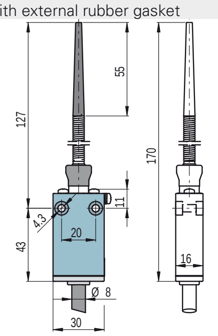
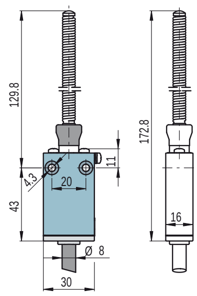
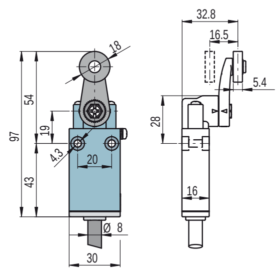
It does not switch → ← It switches

Contact blocks			Operation in one direction	With external rubber gasket	Fixed only by threaded head
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
Min. force		10 N (25 N ⊖)	5 N (25 N ⊖)	10 N (25 N ⊖)	10 N (25 N ⊖)
Travel diagrams		page 241 - group 1	page 241 - group 2	page 241 - group 1	page 241 - group 1

Contact blocks		Fixed only by threaded head	Fixed only by threaded head	With external rubber gasket	Roller, Ø 12 mm, stainless steel
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°
Min. force		10 N (25 N ⊖)	10 N (25 N ⊖)	10 N (25 N ⊖)	10 N (25 N ⊖)
Travel diagrams		page 241 - group 1	page 241 - group 1	page 241 - group 1	page 241 - group 1

Contact blocks		Roller, Ø 12 mm, stainless steel	With external rubber gasket	With external rubber gasket	With Ø 20 mm stainless steel roller on request
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°
Min. force		10 N (25 N ⊖)	0.03 Nm	0.06 Nm	0.03 Nm (0.25 Nm ⊖)
Travel diagrams		page 241 - group 1	page 241 - group 3	page 241 - group 3	page 241 - group 4

Code	Approvals	Category	Zone	EPL
-EX5	II 3D Ex tc IIIC T80°C Dc	3D	22	Dc
	II 3G Ex nC IIC T6 Gc	3G	2	Gc

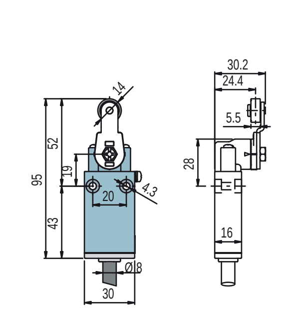
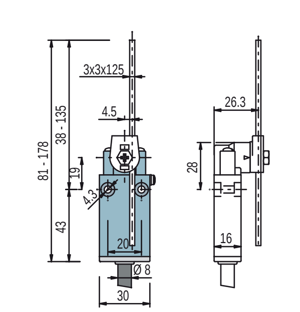
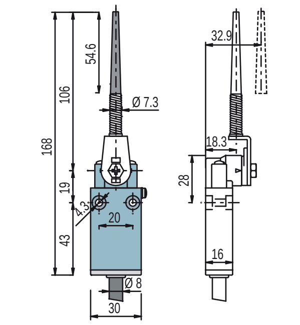
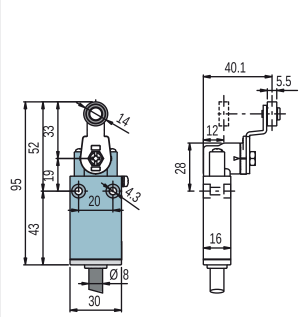
Accessories See page 225

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

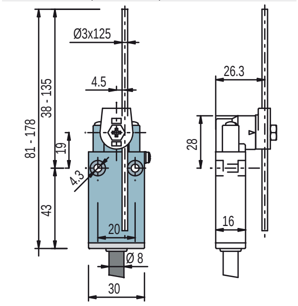
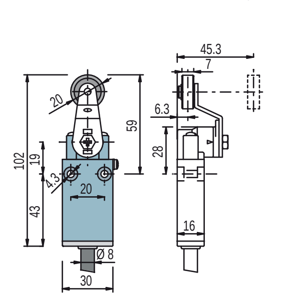
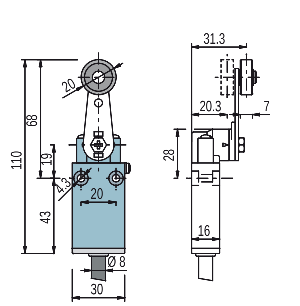
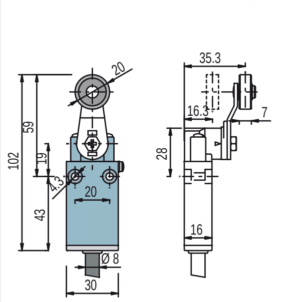
All measures in the drawings are in mm

Contact type:

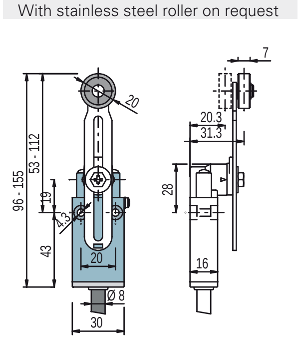
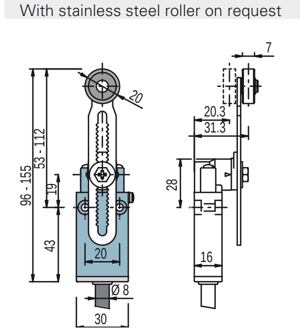
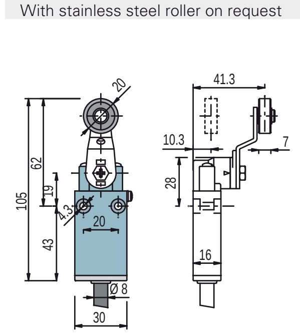
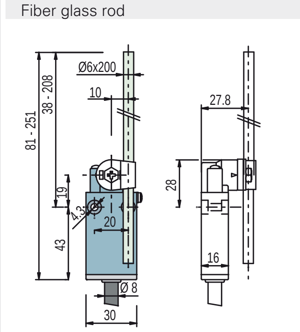
R = snap action
L = slow action

With stainless steel roller on request	Square rod, 3x3 mm		With stainless steel roller on request
			

Contact blocks				
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°
Min. force	0.03 Nm (0.25 Nm ➔)	0.03 Nm	0.03 Nm	0.03 Nm (0.25 Nm ➔)
Travel diagrams	page 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

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
			

Contact blocks				
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°
Min. 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 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

With stainless steel roller on request	With stainless steel roller on request	With stainless steel roller on request	Fiber glass rod
			

Contact blocks				
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
Min. 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 241 - group 4	page 241 - group 4	page 241 - group 4	page 241 - group 4

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

Code	Approvals	Category	Zone	EPL
-EX5	Ex II 3D Ex tc IIIC T80°C Dc	3D	22	Dc
	Ex II 3G Ex nC IIC T6 Gc	3G	2	Gc

Accessories See page 225

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

All measures in the drawings are in mm

Main features

- Approvals:

3D category

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

ATEX markings and quality labels:

CE

Ⓔx II 3D Ex tc IIIC T80°C Dc

Technical data

Housing

Metal housing, baked powder coating	
One threaded conduit entry:	M20x1.5
Protection degree:	IP66 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +70°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••93-EX•, F• ••78-EX•, F• ••8•-EX•, F• ••95-EX•	500.000 operating cycles[1]
F• ••99-EX•, F• ••R2-EX•	250.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
F• ••93-EX•,F• ••78-EX•, F• ••8•-EX	1,000,000
F• ••99-EX•, F• ••R2-EX•	500,000
F• ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact blocks 20, 28:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5, 6, 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 conformity 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 60079-31, EN 60079-31.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
3D	**22**	**Dc**	**Ⓔx II 3D Ex tc IIIC T80°C Dc**	**-EX4**

Electrical data

Thermal current (Ith):	10 A
Rated insulation voltage (Ui):	500 Vac 600 Vdc 400 Vac for contact blocks 20, 28
Conditional short circuit current:	1000 A according 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

⚠ **For the correct utilization of the switch please use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval: E131787
EAC approval: RU C-IT ДМ94.B.01024

Characteristics approved by UL

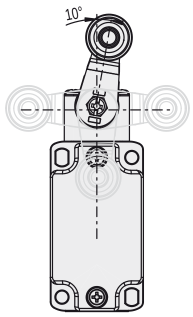
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

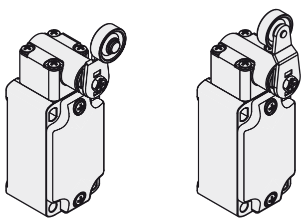
Adjustable levers

In the switches it is possible to adjust the lever with 10° steps for the whole 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.



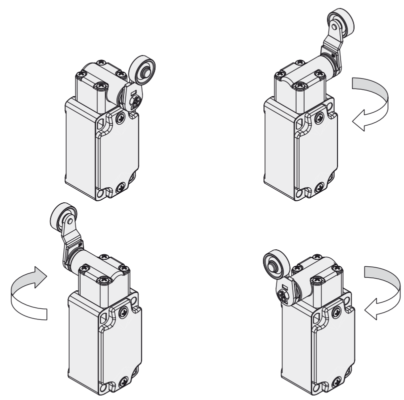
Overturning levers

In the switches, the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



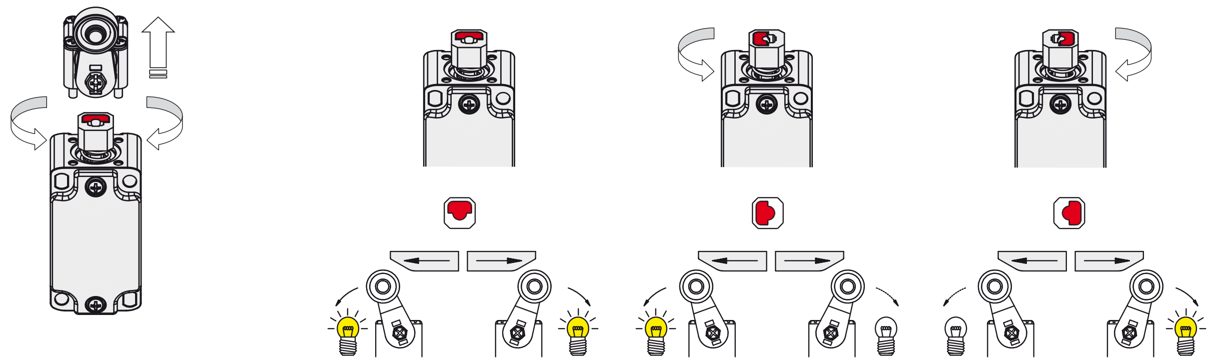
Orientable heads

In all switches, it is possible to rotate the head in 90° steps.



Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving 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 / article

FD 502-GM2-EX4

Housing	
FD	metal, one conduit entry

Contact blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
18	1NO+1NC, slow action
20	1NO+2NC, slow action
2	2x(1NO-1NC), snap action

Actuators	
01	short plunger
02	roller lever
...	....

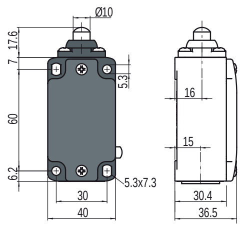
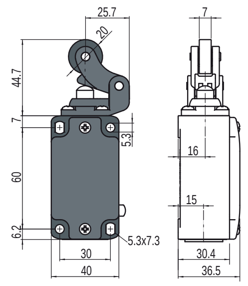
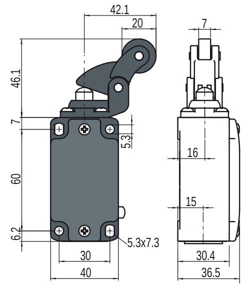
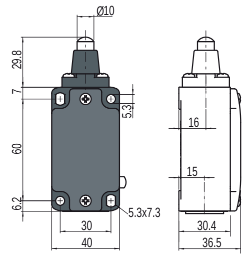
ATEX approval	
-EX4	II 3D Ex tc IIIC T80°C Dc

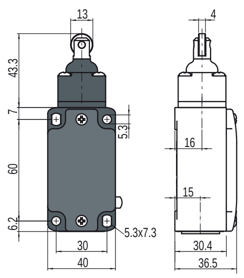
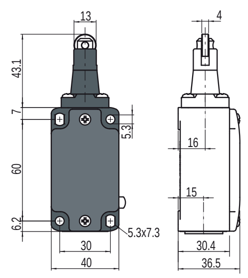
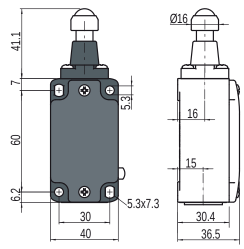
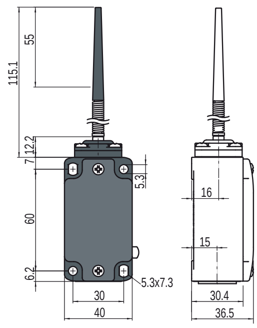
Threaded conduit entry	
M2	M20x1.5

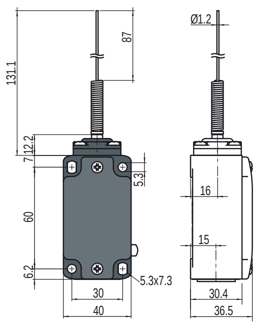
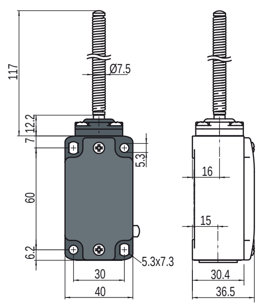
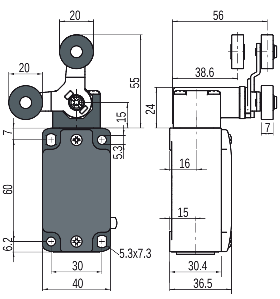
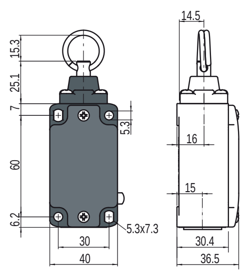
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

Contact type:

R = snap action
L = slow action

			With stainless steel roller on request	With stainless steel roller on request	
					
Contact blocks					
5	R	FD 501-M2-EX4 (→) 1NO+1NC	FD 502-M2-EX4 (→) 1NO+1NC	FD 505-M2-EX4 (→) 1NO+1NC	FD 511-M2-EX4 (→) 1NO+1NC
6	L	FD 601-M2-EX4 (→) 1NO+1NC	FD 602-M2-EX4 (→) 1NO+1NC	FD 605-M2-EX4 (→) 1NO+1NC	FD 611-M2-EX4 (→) 1NO+1NC
20	L	FD 2001-M2-EX4 (→) 1NO+2NC	FD 2002-M2-EX4 (→) 1NO+2NC	FD 2005-M2-EX4 (→) 1NO+2NC	FD 2011-M2-EX4 (→) 1NO+2NC
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)
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
Min. force		8 N (25 N (→))	6 N (25 N (→))	6 N (25 N (→))	8 N (25 N (→))
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

		With external rubber gasket		Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
					
Contact blocks					
5	R	FD 515-M2-EX4 (→) 1NO+1NC	FD 516-M2-EX4 (→) 1NO+1NC	FD 519-M2-EX4 (→) 1NO+1NC	FD 520-M2-EX4 1NO+1NC
6	L	FD 615-M2-EX4 (→) 1NO+1NC	FD 616-M2-EX4 (→) 1NO+1NC	FD 619-M2-EX4 (→) 1NO+1NC	
20	L	FD 2015-M2-EX4 (→) 1NO+2NC	FD 2016-M2-EX4 (→) 1NO+2NC	FD 2019-M2-EX4 (→) 1NO+2NC	FD 2020-M2-EX4 1NO+2NC
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)
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
Min. force		11 N (25 N (→))	8 N (25 N (→))	8 N (25 N (→))	0.09 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3

		With external rubber gasket	With external rubber gasket	Bistable	Rope switch for signalling
					
Contact blocks					
5	R	FD 521-M2-EX4 1NO+1NC	FD 525-M2-EX4 1NO+1NC	FD 541-M2-EX4 (→) 1NO+1NC	FD 576-M2-EX4 1NO+1NC
6	L				FD 676-M2-EX4 1NO+1NC
20	L	FD 2021-M2-EX4 1NO+2NC	FD 2025-M2-EX4 1NO+2NC		FD 2076-M2-EX4 2NO+1NC
2	R	FD 221-M2-EX4 2x(1NO-1NC)	FD 225-M2-EX4 2x(1NO-1NC)		FD 276-M2-EX4 2x(1NO-1NC)
Max. speed		1 m/s	1 m/s	0.5 m/s with cam at 30°	0.5 m/s
Min. force		0.08 Nm	0.14 Nm	0.21 Nm (0.36 Nm (→))	initial 20 N - final 40 N
Travel diagrams		page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 6

Code	Approvals	Category	Zone	EPL
-EX4	**Ⓔx II 3D Ex tc IIIC T80°C Dc**	**3D**	**22**	**Dc**

Accessories See page 225

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

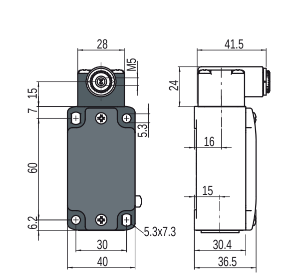
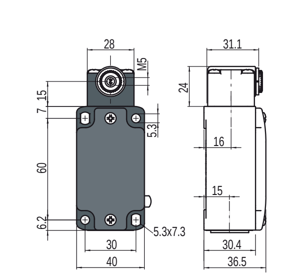
All measures in the drawings are in mm

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

		Regular head	Compact head
			
Contact blocks			
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)
Min. force		0,1 Nm (0,25 Nm (→))	0,06 Nm (0,25 Nm (→))
Travel diagrams		page 238 - group 1	page 238 - group 1

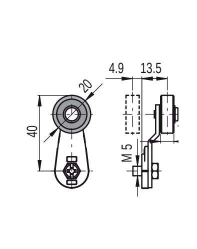
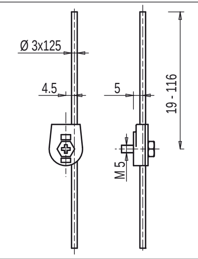
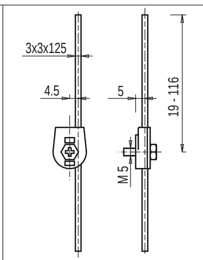
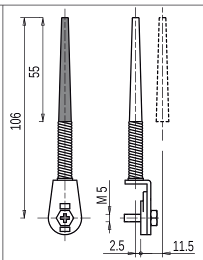
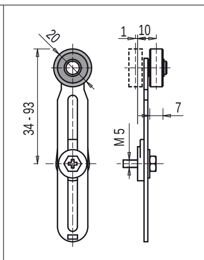
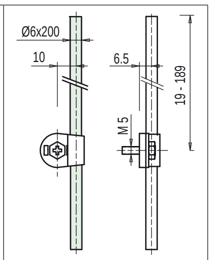
IMPORTANT

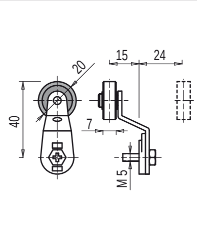
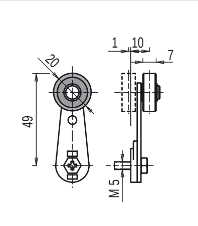
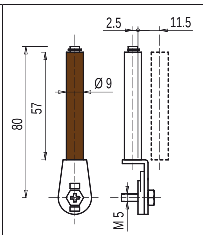
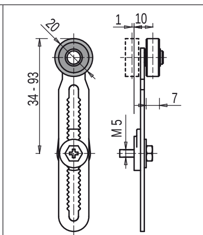
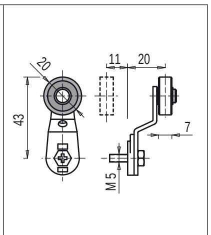
For safety applications: join only switches and actuators marked with symbol (→) aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

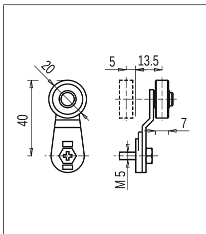
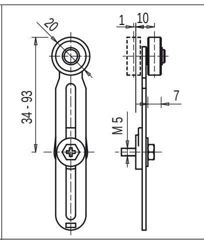
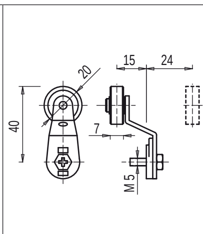
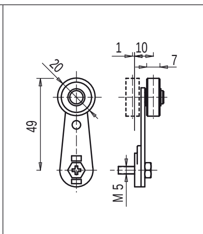
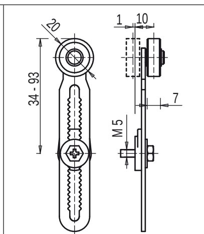
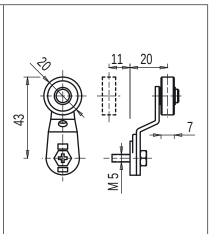
All measures in the drawings are in mm

IMPORTANT: These loose actuators can be used with items of the FD series only.

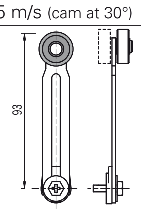
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable fiber glass rod
						
Article	VF L31 (→)	VF L32 (2)	VF L33 (2)	VF L34	VF L35 (→) (1) (2)	VF L36 (2)
Max. speed	1.5 m/s (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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- (2) If installed with switch FD •58-M2-EX4 (e.g. FD 558-M2-EX4, FD 658-M2-EX4…) the actuator could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.



Code	Approvals	Category	Zone	EPL
-EX4	**Ⓔx II 3D Ex tc IIIC T80°C Dc**	**3D**	**22**	**Dc**

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

Accessories See page 225

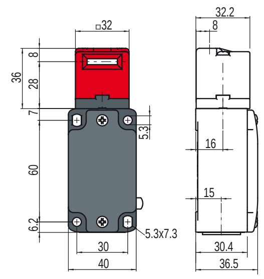
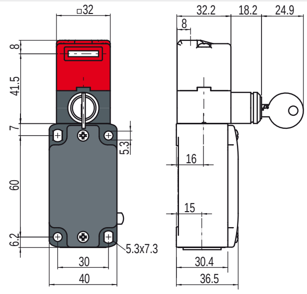
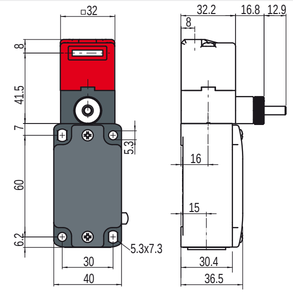
➔ The 2D/3D files are available at **www.pizzato.com**

Safety switches with separate actuator

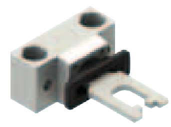
All measures in the drawings are in mm

Contact type:

L = slow action

Contact blocks		Switches with separate actuator	Switches with separate actuator and key release	Switches with manual mechanical delay
		Switches without actuator	Switches without actuator	Switches without actuator
				
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	
Min. force		10 N (18 N)	30 N (40 N)	10 N (18 N)
Travel diagrams Gen. Cat. Safety		page 21	page 140	page 132

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

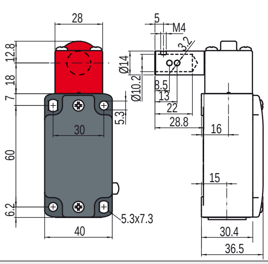
IMPORTANT: These actuators can be used with items of the FD series only (e.g. FD 693-M2-EX4).
Low level coded actuators according to EN ISO 14119.

Safety switches for hinges

All measures in the drawings are in mm

Contact type:

L = slow action

Contact blocks		
		
18	L	FD 1895-M2-EX4 1NO+1NC
20	L	FD 2095-M2-EX4 1NO+2NC
Min. force		0,15 Nm (0,4 Nm)
Travel diagrams Gen. Cat. Safety		page 75

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX4	II 3D Ex tc IIIC T80°C Dc	3D	22	Dc

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

Accessories See page 225

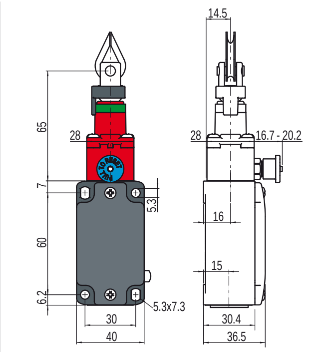
➔ The 2D/3D files are available at **www.pizzato.com**

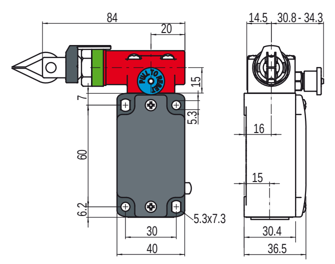
Safety rope switch with reset for emergency stops

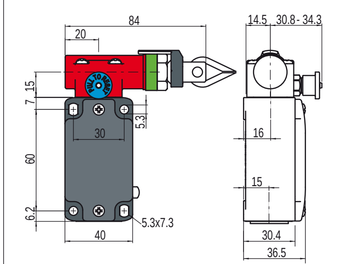
All measures in the drawings are in mm

Contact type:

L = slow action







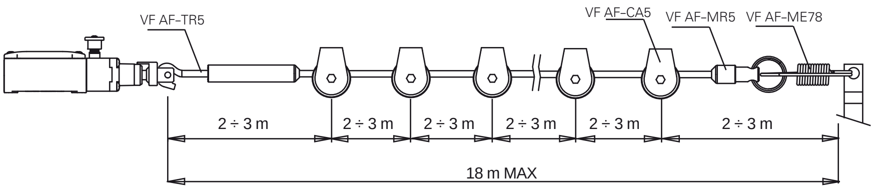
Contact blocks				
18	L	FD 1878-M2-EX4 1NO+1NC	FD 1883-M2-EX4 1NO+1NC	FD 1884-M2-EX4 1NO+1NC
20	L	FD 2078-M2-EX4 1NO+2NC	FD 2083-M2-EX4 1NO+2NC	FD 2084-M2-EX4 1NO+2NC
Min. force		initial 63 N...final 83 N (90 N)	initial 147 N...final 235 N (250 N)	initial 147 N...final 235 N (250 N)
Travel diagrams Gen. Cat. Safety		page 171 - group 1	page 171 - group 2	page 171 - group 2

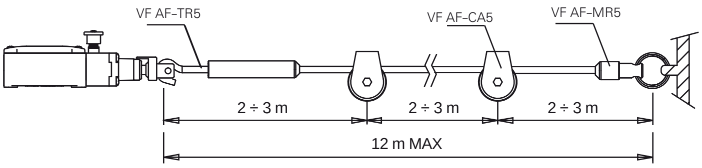
Accessories for rope installation

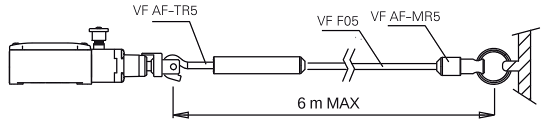
VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR03	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal head	Safety spring for transversal head	Rope, Ø 5 mm. 100 m rolls	Function indicator for ropes. Text "STOP"	Stainless steel pulley	Angular pulley, stainless steel

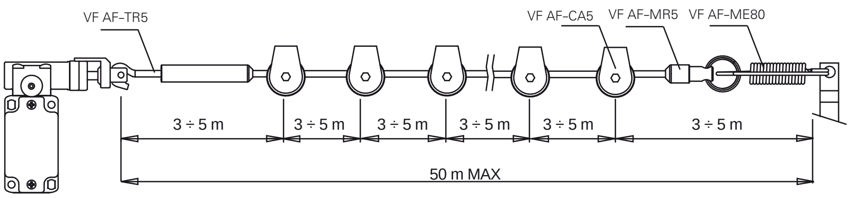
Application examples and max. rope length

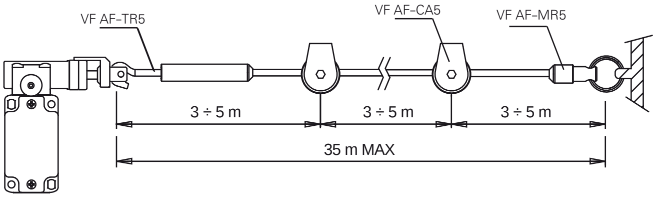
All measures in the drawings are in mm

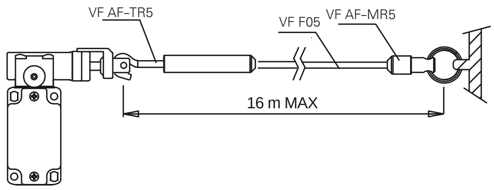












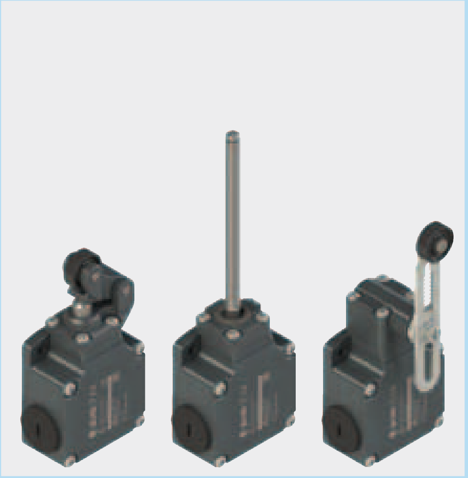
⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX4	Ex II 3D Ex tc IIIC T80°C Dc	3D	22	Dc

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

Accessories See page 225

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



Main features

- Approvals:

3D category

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

ATEX markings and quality labels:

CE

⟨Ex⟩ **II 3D Ex tc IIIC T80°C Dc**

Technical data

Housing

Metal housing, baked powder coating	
Three threaded conduit entries:	M20x1.5
Protection degree:	IP66 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-20°C … +70°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	
F• ••••-EX•	10 million operating cycles[1]
F• ••93-EX•, F• ••78-EX•, F• ••8•-EX•, F• ••95-EX•	500.000 operating cycles[1]
Mounting position:	any
Safety parameters B_{10d}(NC contacts):	
F• ••••-EX•	20,000,000
F• ••93-EX•,F• ••78-EX•, F• ••8•-EX	1,000,000
F• ••95-EX•	2,500,00
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact block 20:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact block 5, 6, 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 conformity 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 60079-31, EN 60079-31.

In conformity with the requirements of:
ATEX Directive 94/9/EC
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Category	Zone	EPL	Approvals	Product code extension
3D	**22**	**Dc**	⟨Ex⟩ **II 3D Ex tc IIIC T80°C Dc**	**-EX4**

Electrical data

Thermal current (Ith):	10 A
Rated insulation voltage (Ui):	500 Vac 600 Vdc 400 Vac for contact blocks 20, 28
Conditional short circuit current:	1000 A according 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

⚠ **For the correct utilization of the switch please use cable glands suitable for the zone according to the ATEX directive**

Quality marks of the product:

UL approval: E131787
EAC approval: RU C-IT ДМ94.B.01024

Characteristics approved by UL

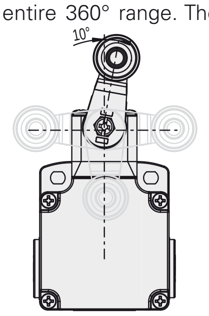
Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Data of housing type 1, 4X "indoor use only", 12, 13
For all contact blocks except 2 and 3 use 60 or 75°C copper (Cu) conductor, rigid or flexible, wire size AWG 12/14. Terminal tightening torque of 7.1 lb in (0.8 Nm).
For contact blocks 2 and 3 use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 14. Terminal tightening torque of 12 lb in (1.4 Nm).

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

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

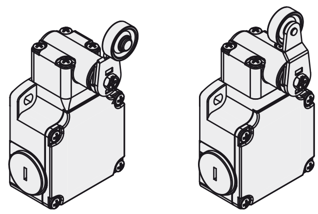
Adjustable levers

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.



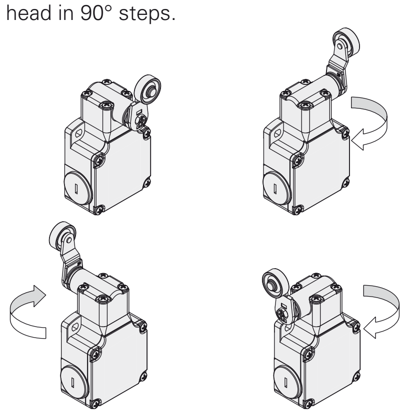
Overturning levers

For switches with swivelling lever the lever can be fastened straight or reversed, maintaining the positive coupling.
This makes it possible to have two different work plans of the lever.



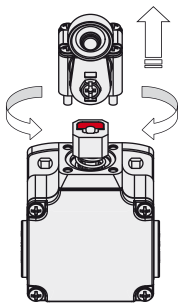
Orientable heads

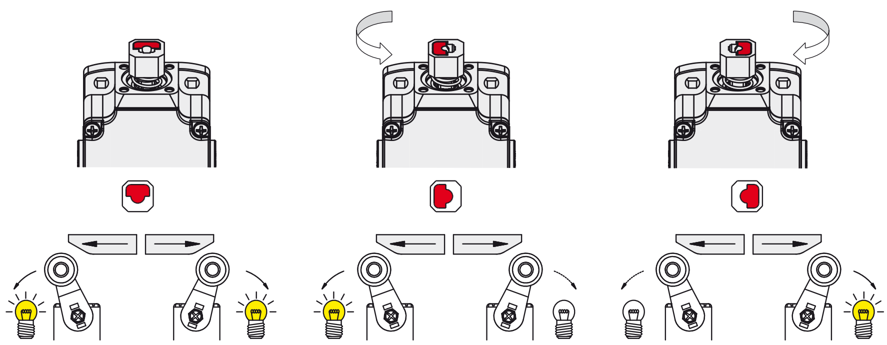
In all switches, it is possible to rotate the head in 90° steps.



Unidirectional heads

For switches with swivelling lever, it is possible to select the unidirectional operation by removing the four screws of the head and revolving the internal plunger (contact block 16 excluded).





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 — article

FL 502-GM2-EX4

Housing	
FL	metal, three conduit entries

Contact blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
18	1NO+1NC, slow action
20	1NO+2NC, slow action
2	2x(1NO-1NC), snap action

Actuators	
01	short plunger
02	roller lever
...	....

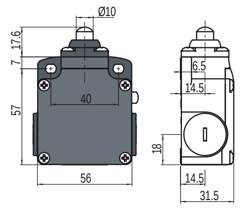
ATEX approval	
-EX4	Ex II 3D Ex tc IIIC T80°C Dc

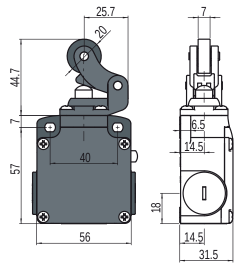
Threaded conduit entry	
M2	M20x1.5

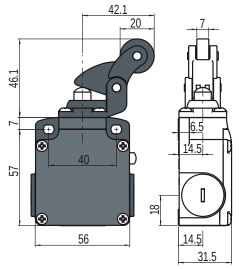
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

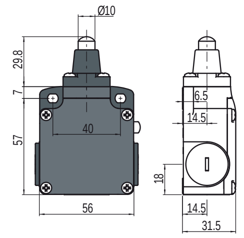
Contact type:

R = snap action
L = slow action

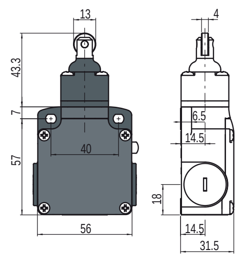


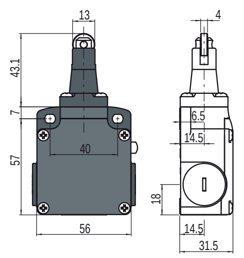


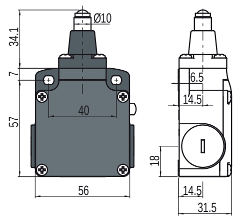


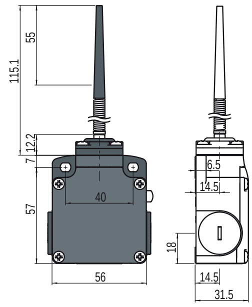


Contact blocks			With stainless steel roller on request	With stainless steel roller on request	
5	R	FL 501-M2-EX4 → 1NO+1NC	FL 502-M2-EX4 → 1NO+1NC	FL 505-M2-EX4 → 1NO+1NC	FL 511-M2-EX4 → 1NO+1NC
6	L	FL 601-M2-EX4 → 1NO+1NC	FL 602-M2-EX4 → 1NO+1NC	FL 605-M2-EX4 → 1NO+1NC	FL 611-M2-EX4 → 1NO+1NC
20	L	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)
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
Min. force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	8 N (25 N →)
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

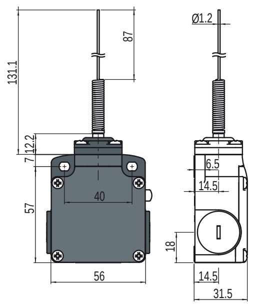


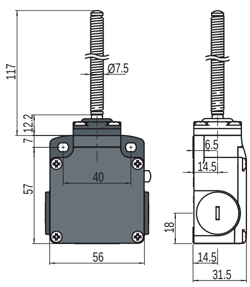


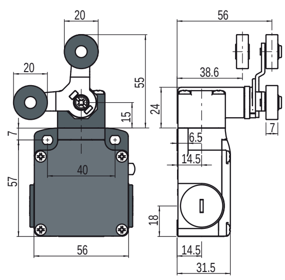


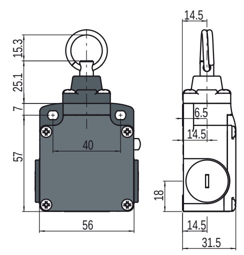


Contact blocks		With external rubber gasket		Ball, Ø 12.7 mm, stainless steel	With external rubber gasket
5	R	FL 515-M2-EX4 → 1NO+1NC	FL 516-M2-EX4 → 1NO+1NC	FL 519-M2-EX4 → 1NO+1NC	FL 520-M2-EX4 1NO+1NC
6	L	FL 615-M2-EX4 → 1NO+1NC	FL 616-M2-EX4 → 1NO+1NC	FL 619-M2-EX4 → 1NO+1NC	
20	L	FL 2015-M2-EX4 → 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)
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
Min. force		11 N (25 N →)	8 N (25 N →)	8 N (25 N →)	0.09 Nm
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	page 238 - group 3









Contact blocks		With external rubber gasket	With external rubber gasket	Bistable	Rope switch for signalling
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)
Max. speed		1 m/s	1 m/s	0.5 m/s with cam at 30°	0.5 m/s
Min. force		0.08 Nm	0.14 Nm	0.21 Nm (0.36 Nm →)	initial 20 N - final 40 N
Travel diagrams		page 238 - group 3	page 238 - group 3	page 238 - group 4	page 238 - group 6

Code	Approvals	Category	Zone	EPL
-EX4	**Ex II 3D Ex tc IIIC T80°C Dc**	**3D**	**22**	**Dc**

All measures in the drawings are in mm

Accessories See page 225

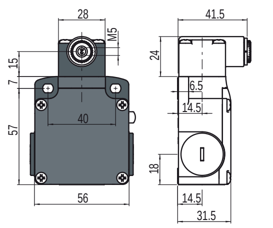
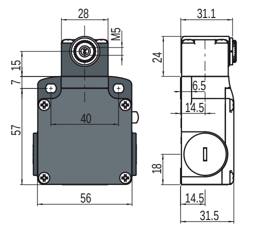
→ The 2D/3D files are available at **www.pizzato.com**

Position switches with revolving lever without actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

Contact blocks		Regular head	Compact head
			
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)
Min. force		0,1 Nm (0,25 Nm ➔)	0,06 Nm (0,25 Nm ➔)
Travel diagrams		page 238 - group 1	page 238 - group 1

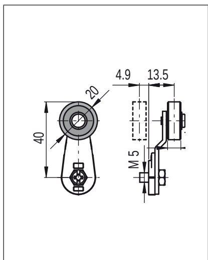
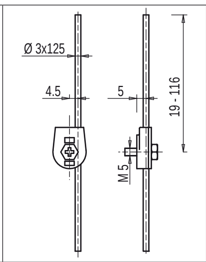
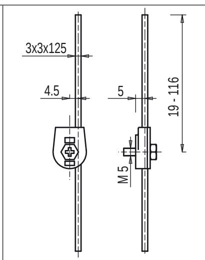
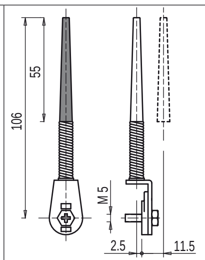
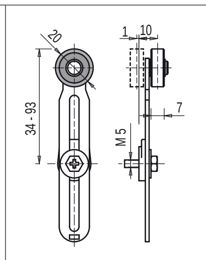
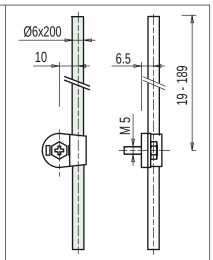
IMPORTANT

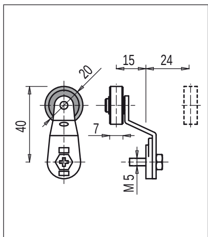
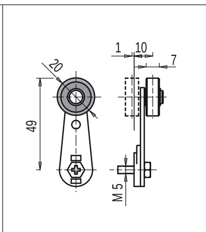
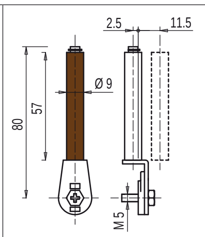
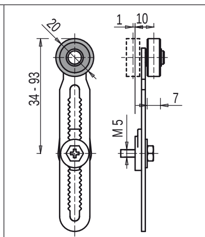
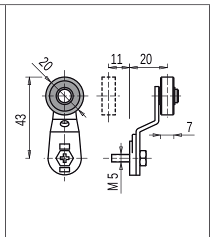
For safety applications: join only switches and actuators marked with symbol ➔ aside the product code.
For more information about safety applications see details on page 235.

Loose actuators

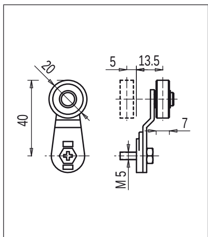
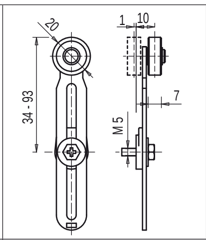
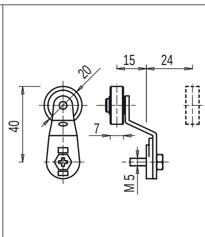
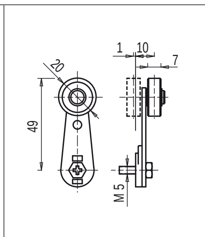
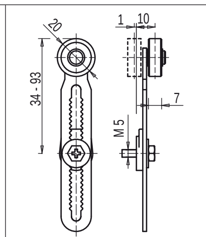
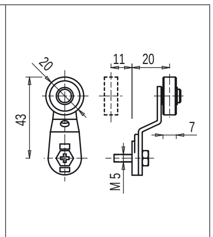
All measures in the drawings are in mm

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

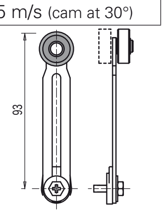
	Technopolymer roller Ø 20 mm	Adjustable round rod Ø 3x125 mm	Adjustable square rod 3x3x125 mm	Flexible rod with pointed end	Adjustable actuator with technopolymer roller	Adjustable fiber glass rod
						
Article	VF L31 ➔	VF L32 [2]	VF L33 [2]	VF L34	VF L35 ➔ [1] [2]	VF L36 [2]
Max. speed	1.5 m/s (cam 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 figure beside. If you need an adjustable lever for safety applications, use the adjustable safety lever VF L56.
- [2] If installed with switch FL •58-M2-EX4 (e.g. FL 558-M2-EX4, FL 658-M2-EX4…) the actuator could mechanically interfere with the housing of the switch. The interference could happen or not according to the actuator and the head fixing position.



Code	Approvals	Category	Zone	EPL
-EX4	**Ⓔx II 3D Ex tc IIIC T80°C Dc**	**3D**	**22**	**Dc**

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

Accessories See page 225

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

Safety switches with separate actuator

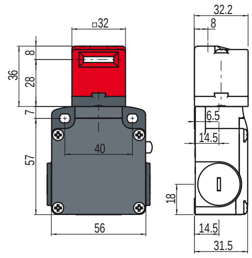
All measures in the drawings are in mm

Contact type:

L = slow action

Switches with separate actuator

Switches without actuator



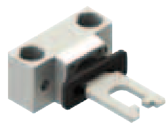
Contact blocks

6	L	FL 693-M2-EX4	⊕ 1NO+1NC
20	L	FL 2093-M2-EX4	⊕ 1NO+2NC
Min. force		10 N (18 N ⊕)	
Travel diagrams Gen. Cat. Safety		page 21	

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

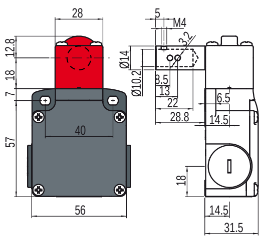
IMPORTANT: These actuators can be used with items of the FL series only (e.g. FL 693-M2-EX4).
Low level coded actuators according to EN ISO 14119.

Safety switches for hinges

All measures in the drawings are in mm

Contact type:

L = slow action



Contact blocks

18	L	FL 1895-M2-EX4	⊕ 1NO+1NC
20	L	FL 2095-M2-EX4	⊕ 1NO+2NC
Min. force		0,15 Nm (0,4 Nm ⊕)	
Travel diagrams Gen. Cat. Safety		page 75	

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX4	**⟨Ex⟩ II 3D Ex tc IIIC T80°C Dc**	**3D**	**22**	**Dc**

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

Accessories See page 225

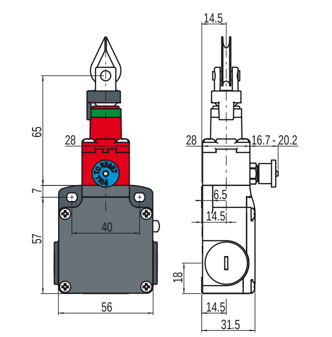
➔ The 2D/3D files are available at **www.pizzato.com**

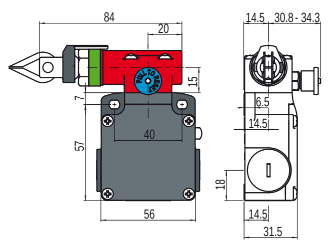
Safety rope switch with reset for emergency stops

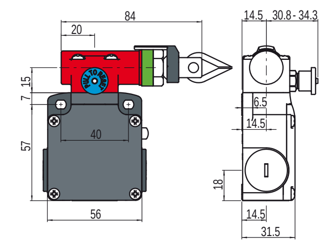
All measures in the drawings are in mm

Contact type:

L = slow action

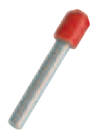


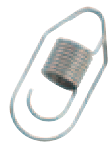
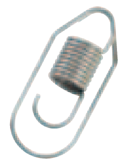


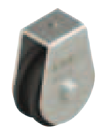


Contact blocks				
18	L	FL 1878-M2-EX4 ⊖ 1NO+1NC	FL 1883-M2-EX4 ⊖ 1NO+1NC	FL 1884-M2-EX4 ⊖ 1NO+1NC
20	L	FL 2078-M2-EX4 ⊖ 1NO+2NC	FL 2083-M2-EX4 ⊖ 1NO+2NC	FL 2084-M2-EX4 ⊖ 1NO+2NC
Min. force		initial 63 N...final 83 N (90 N ⊖)	initial 147 N...final 235 N (250 N ⊖)	initial 147 N...final 235 N (250 N ⊖)
Travel diagrams Gen. Cat. Safety		page 171 - group 1	page 171 - group 2	page 171 - group 2

Accessories for rope installation

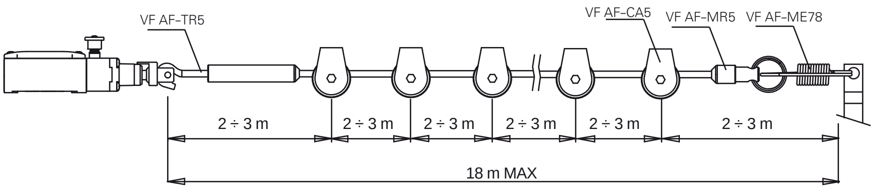



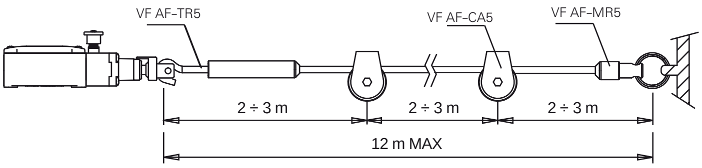


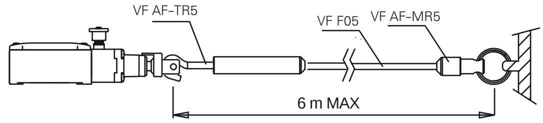

VF AF-TR5	VF AF-TR8	VF AF-MR5	VF AF-ME78	VF AF-ME80	VF F05-100	VF AF-IF1GR03	VF AF-CA5	VF AF-CA10
Adjustable stay bolt	Stay bolt	End clamp	Safety spring for longitudinal head	Safety spring for transversal head	Rope, Ø 5 mm. 100 m rolls	Function indicator for ropes. Text "STOP"	Stainless steel pulley	Angular pulley, stainless steel

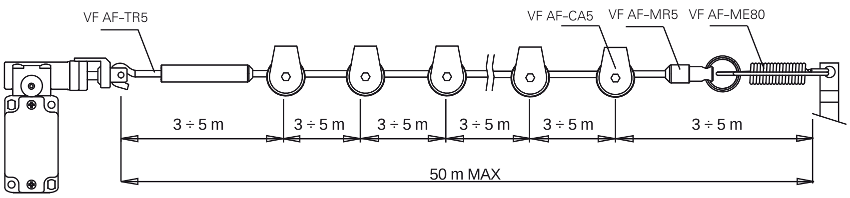
Application examples and max. rope length

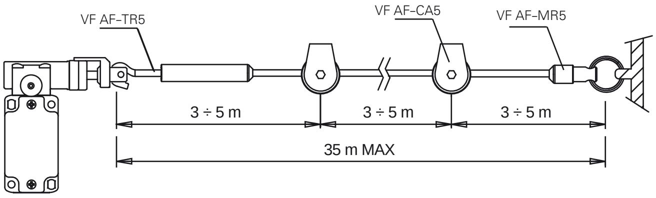
All measures in the drawings are in mm

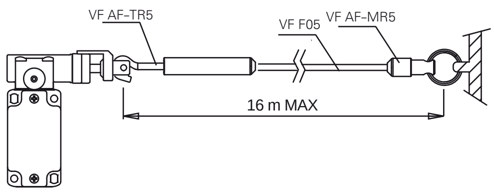












⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Code	Approvals	Category	Zone	EPL
-EX4	Ⓔx II 3D Ex tc IIIC T80°C Dc	3D	22	Dc

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

Accessories See page 225

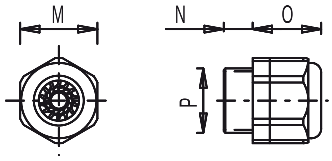
➔ The 2D/3D files are available at **www.pizzato.com**

Accessories

ATEX cable gland, technopolymer

Technical data:

ATEX marking:	Ex II 2G 1D Ex and II tD A20 IP68
Body and ring material:	plastic PA V0 according to UL 94
Ambient temperature:	-20 … +95°C
Protection degree:	IP68 (≤ 10 bar)
Tightening torque:	3 … 4 Nm

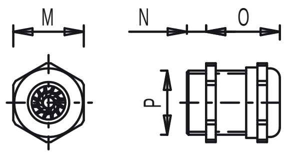


Article	Description	ATEX certificate number	M	N	O	P
VF PBM20C6P-2GD	M20x1.5 cable gland, technopolymer, for multipolar cables from Ø 6.5 to Ø 12 mm	DMT 02 ATEX E 047 X	24	9	24	M20x1.5

ATEX cable gland, metal

Technical data:

ATEX marking:	Ex II 2G Ex and II Ex II 1D Ex tD A20 IP68
Body and ring material:	brass, nickel-plated
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 cable gland, brass, for multipolar cables from Ø 6 to Ø 12 mm	KEMA 99ATEX6971 X	24	9	24	M20x1.5

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

Accessories See page 225

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

Notes

Technical data

Housing
Metal housing with anticorrosive surface treatment

One threaded conduit entry:	M20 x 1.5
Protection degree:	IP67 according to EN 60529 with cable gland having equal or higher protection degree

General data

Ambient temperature:	-15°C … +180°C for articles FD 2011-M2T2 and FD 2016-M2T2 -25°C … +180°C for article FD 2038-M2T2
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	1 million operating cycles[1]
Mounting position:	any
Safety parameters:	
B_{10d}:	2,000,000 for NC contacts
Mechanical interlock, not coded:	type 1 according to EN ISO 14119
Tightening torques for installation:	see pages 235-246

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

Cable cross section (flexible copper strands)

Contact block 20:	min.	1 x 0.34 mm^2	(1 x AWG 22)
	max.	2 x 1.5 mm^2	(2 x AWG 16)

In conformity 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.

Main features

- Operating temperature up to +180°C
- Metal housing, one conduit entry
- Protection degree IP67

Markings and quality marks:

EAC approval: RU C-IT ДМ94.B.01024

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams on page 238. Operate the switch **at least with the positive opening force**, indicated between 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 chapter utilization requirements from page 235 to page 246.**

Electrical data | **Utilization category**

Ambient temperature +20 °C

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A according to EN 60947-5-1
Protection against short circuits:	fuse 4 A 250 V type gG
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24	125	250
Ie (A)	4	1.1	0.4

Ambient temperature +180 °C

Thermal current (Ith):	4 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Protection against short circuits:	fuse 4 A 250 V type gG
Pollution degree:	3

Alternating current: AC15 (50÷60 Hz)

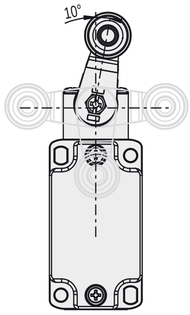
Ue (V)	24	120	250
Ie (A)	4	4	4

Direct current: DC13

Ue (V)	24
Ie (A)	1

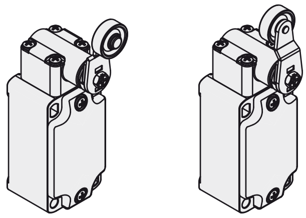
Adjustable levers

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.



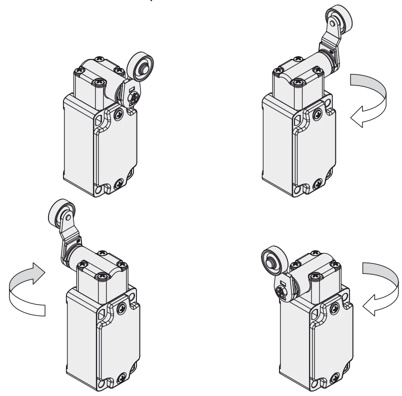
Overturning levers

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.



Orientable heads

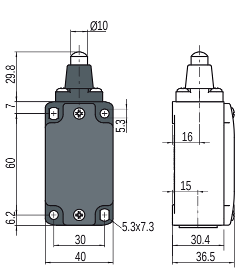
In all switches, it is possible to rotate the head in 90° steps.

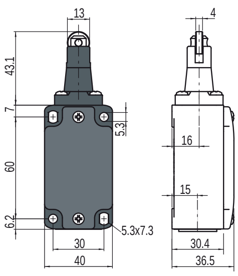


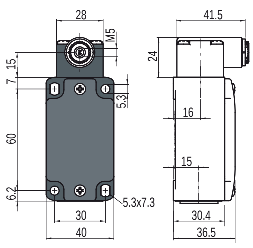
Dimensional drawings

Contact type:

L = slow action





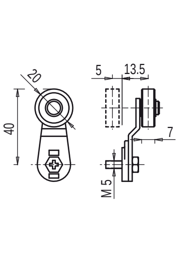
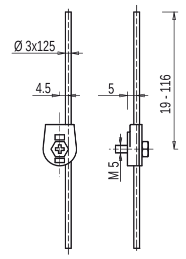
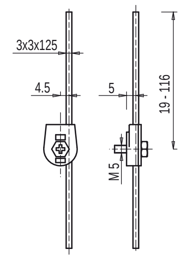
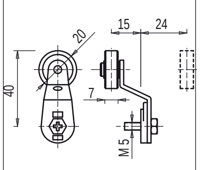
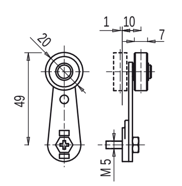
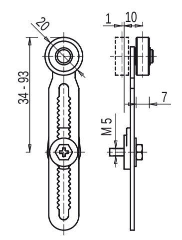
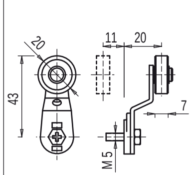


Contact blocks			
20 L	FD 2011-M2T2 ⊖ 1NO+2NC	FD 2016-M2T2 ⊖ 1NO+2NC	FD 2038-M2T2 ⊖ 1NO+2NC
Max. speed	page 7/3 - type 4	page 7/3 - type 2	
Min. force	8 N (25 N ⊖)	8 N (25 N ⊖)	0.1 Nm (0.25 Nm ⊖)
Travel diagrams	page 238 - group 1	page 238 - group 1	page 238 - group 4

IMPORTANT
For safety applications: join only switches and actuators marked with symbol ⊖ aside the product code.
For more information about safety applications see details on page 235.

Special loose actuators

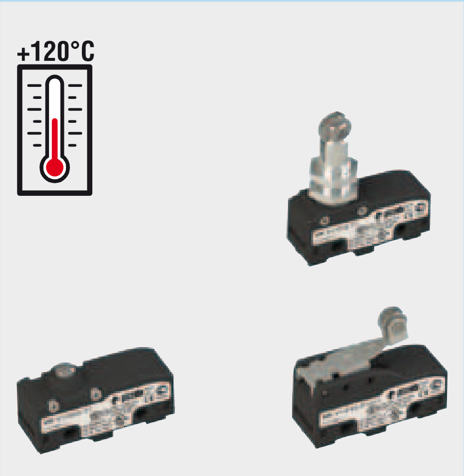
All measures in the drawings are in mm

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 ⊖

Accessories See page 225

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

Microswitch for high temperature **MK** series



Main features
- Operating temperature up to +120°C
- Technopolymer housing
- High reliability contacts
- 4 terminal types available
- 16 actuators available
- Versions with positive opening ⊖
- Versions with gold-plated silver contacts

Markings and quality marks:

CE EAC

EAC approval: RU C-IT ДМ94.В.01024

Technical data

Housing
Housing made of glass fiber reinforced technopolymer, self-extinguishing and shock-proof.

Protection degree:	IP00 (terminals) IP40 (electrical contacts) according to EN 60529

General data

Ambient temperature:	-25°C … +120°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	500.000 operating cycles[1]
Safety parameters:	
B_{10d}:	1,000,000 for NC contacts
Tightening torques for installation:	see page 212

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

Cable cross section (flexible copper strands)

MK series:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529, EN 60947-1, IEC 60947-1

In conformity with the requirements of:
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/CE and EMC Directive 2004/108/EC.
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 ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel (CAP)** stated aside the article code. Actuate the switch **at least with the positive opening force (FAP)** stated aside the article code.

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.**

Electrical data

Ambient temperature +20 °C

Thermal current (Ith):	16 A
Rated insulation voltage (Ui):	250 Vac 300 Vdc
Rated impulse withstand voltage (U_{imp}):	4 kV
Conditional short circuit current:	1000 A according 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)

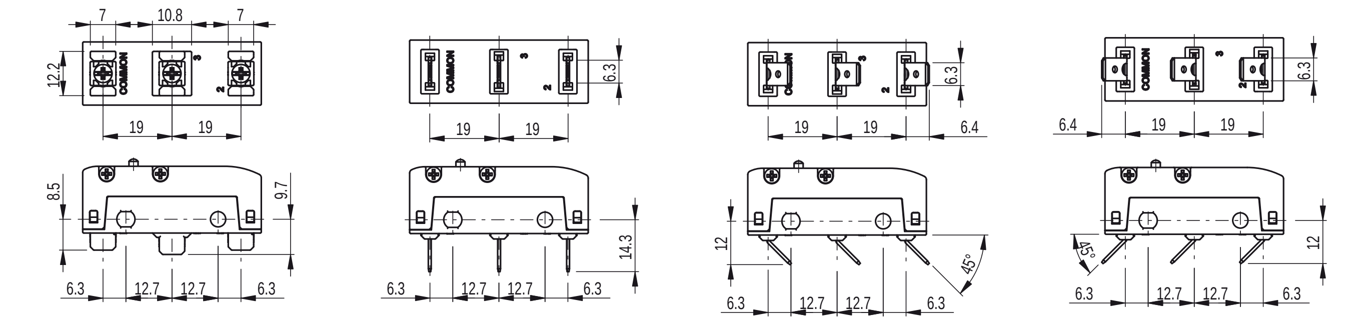
Ue (V)	120	250
Ie (A)	3	2

Direct current: DC13

Ue (V)	24	125
Ie (A)	2	0.5

Terminals outline dimensions

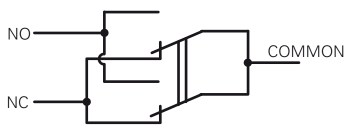
All measures in the drawings are in mm



Screw terminals **V** with plate — Vertical faston **H** terminals — Faston terminals **F**, right bending — Faston terminals **G**, left bending (on request)

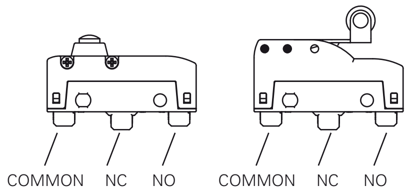
Note: H vertical faston terminals can be bent according to one's installation requirements.
We recommend to bend the faston with an angle not higher than 45° and to carry out this operation no more than 5 times.

Circuit diagram

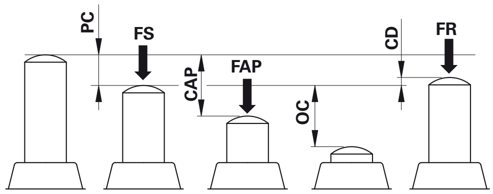


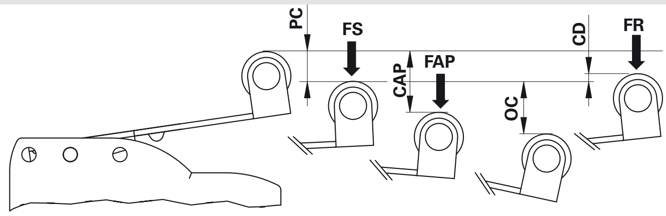
Contacts with single interruption and double contacts

With direct and back direct action (F, D)



Actuation forces and travels





PC pre-travel
CAP positive opening travel
OC over-travel
CD differential travel
FS operating force
FR releasing 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	screws with self-lifting plate
H	vertical faston
F	faston, bent 45° to right
G	faston, bent 45° to left (on request)

Contact blocks	
1	1NO+1NC, snap action in deviation

Actuation type	
D	direct action
F	back direct action

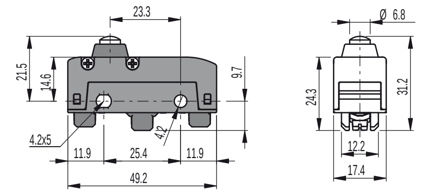
Ambient temperature	
T7	-25 °C ... +120 °C

Rollers	
	standard roller
R16	metal roller Ø 9.5x4 mm (only for actuators 40, 42 ,45, 59)

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

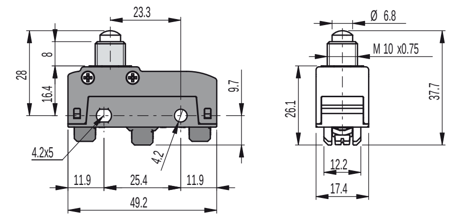
Actuator	
05	low button
06	threaded button
08	threaded button
..	....

Microswitch for high temperature **MK** series



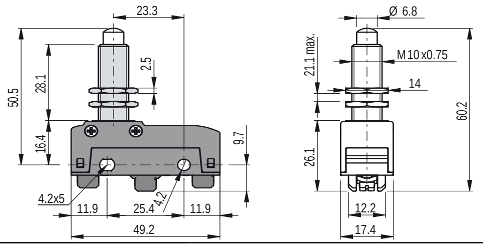
MK V11D05-T7	1NO+1NC	PC	0,5 mm	FS	4 N
		OC	2 mm	FR	3 N
		CD	0,05 mm	FAP	20 N
		CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



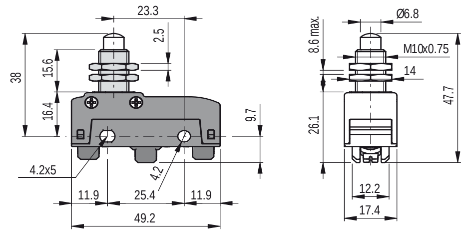
MK V11D06-T7	1NO+1NC	PC	0,5 mm	FS	4 N
		OC	3 mm	FR	3 N
		CD	0,05 mm	FAP	20 N
		CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



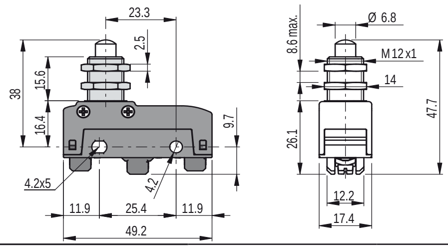
MK V11D08-T7	1NO+1NC	PC	0,5 mm	FS	4 N
		OC	5,5 mm	FR	3 N
		CD	0,05 mm	FAP	20 N
		CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 1



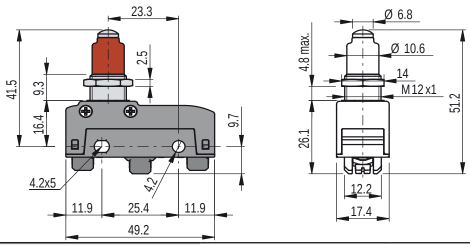
MK V11D09-T7	1NO+1NC	PC	0,5 mm	FS	4 N
		OC	5,5 mm	FR	3 N
		CD	0,05 mm	FAP	20 N
		CAP	2,2 mm		

Maximum and Minimum speed page 245 - 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		

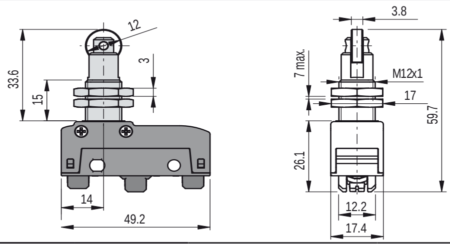
Maximum and Minimum speed page 245 - type 1



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 page 245 - type 1

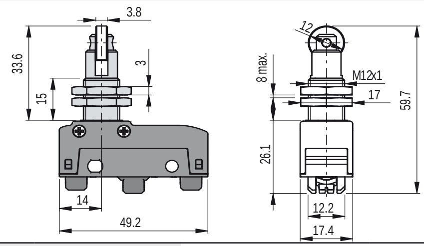
Fixed only by threaded head



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		

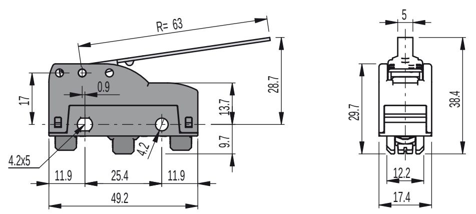
Maximum and Minimum speed page 245 - type 2

Fixed only by threaded head



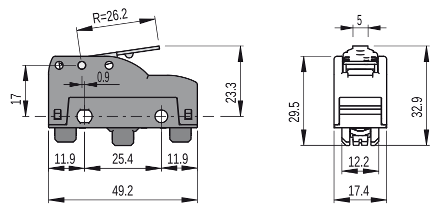
MK V11D17-T7	1NO+1NC	PC	0,5 mm	FS	4 N
		OC	5,5 mm	FR	3 N
		CD	0,05 mm	FAP	20 N
		CAP	2,2 mm		

Maximum and Minimum speed page 245 - type 2



MK V11D30-T7	1NO+1NC	PC	9 mm	FS	0,65 N
		OC	10 mm	FR	0,5 N
		CD	1,1 mm		

Maximum and Minimum speed page 245 - type 3



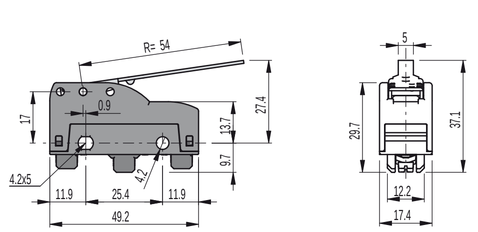
MK V11D31-T7	1NO+1NC	PC	4,54 mm	FS	1,66 N
		OC	3,86 mm	FR	1,32 N
		CD	0,42 mm		

Maximum and Minimum speed page 245 - type 3

Accessories See page 225

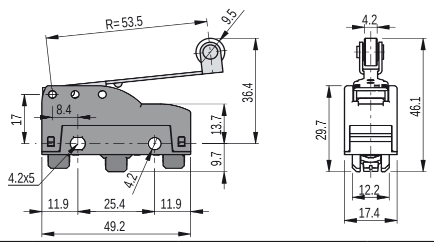
→ The 2D and 3D files are available at **www.pizzato.com**

All measures in the drawings are in mm



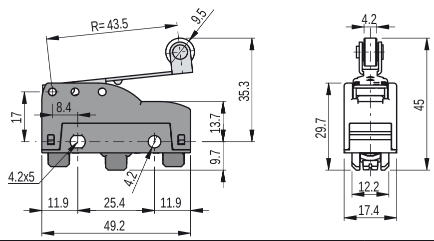
MK V11D32-T7	1NO+1NC	PC OC CD	7,7 mm 8,3 mm 0,9 mm	FS FR	0,76 N 0,58 N

Maximum and Minimum speed page 245 - type 3



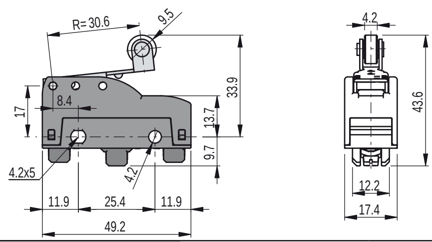
MK V11F40-R16T7	1NO+1NC	PC OC CD	2,4 mm 10,4 mm 0,25 mm	FS FR	0,85 N 0,65 N

Maximum and Minimum speed page 245 - type 8



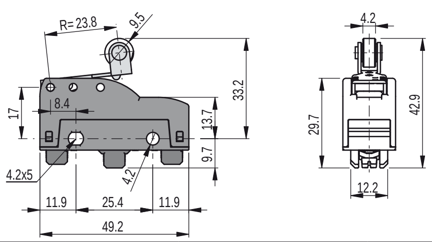
MK V11F42-R16T7	1NO+1NC	PC OC CD CAP	1,6 mm 8,4 mm 0,2 mm 9 mm	FS FR FAP	1 N 0,7 N 4,9 N

Maximum and Minimum speed page 245 - type 8



MK V11F45-R16T7	1NO+1NC	PC OC CD CAP	1,1 mm 6,6 mm 0,1 mm 6,3 mm	FS FR FAP	1,3 N 0,9 N 6,9 N

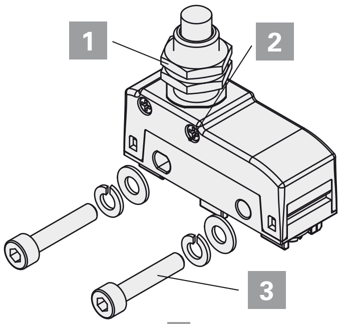
Maximum and Minimum speed page 245 - type 8



MK V11F59-R16T7	1NO+1NC	PC OC CD CAP	0,8 mm 5,2 mm 0,08 mm 4,9 mm	FS FR FAP	1,7 N 1,3 N 8,9 N

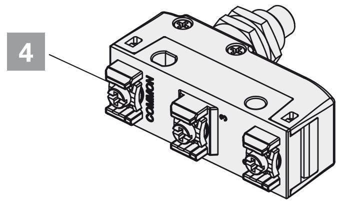
Maximum and Minimum speed page 245 - type 8

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 M4 screws 3 with a torque of **0.8** … **1.2** Nm, insert washer and spring washer.

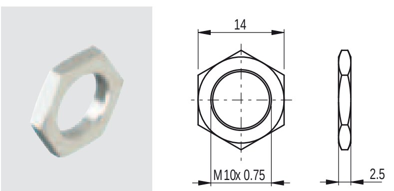
Attention: A tightening torque higher than 1.2 Nm can cause the breaking of the microswitch, only fix on even surfaces.



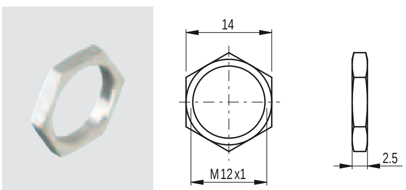
Tighten the terminal screws 4 with a torque of **0.6** … **0.8** Nm.

Accessories

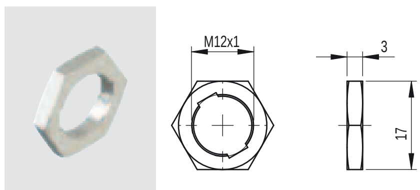
10 pcs. packs



Article	Description
VF AC83	Hexagonal threaded nut for microswitches with actuators D06, D08, D09

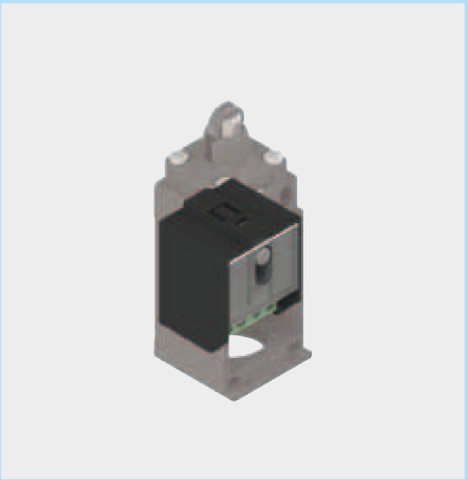


Article	Description
VF AC72	Hexagonal threaded nut for microswitches with actuators D10, D12, D13



Article	Description
AC35	Hexagonal threaded nut notched for microswitches with actuators D15, D16

Electronic contact blocks for position switches



Main features

- Adjustable intervention point
- Output signals without bounces
- Two static outputs 1NO and 1NC
- Reduced actuating force
- Signal LEDs for power supply and switching
- Minimum differential travel

Markings:

EAC approval:	RU C-IT ДМ94.B.01024

In conformity with the requirements of:
Low Voltage Directive 2006/95/EC,
Machinery Directive 2006/42/EC and
EMC Directive 2004/108/EC.

Description

The article E1 is an electronic contact block, designed to replace the traditional mechanical contact block placed inside the position switches of Pizzato Elettrica. The combination between the body and the head of a position switch with this electronic contact block makes a mechatronic device that increases the application range of position switches.

General data

Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Adjustable operating distance:	0.2 … 2 mm or 2° … 30°
Differential travel:	< 0.1 mm or < 1°
Tightening torques for installation:	see pages 235-246

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

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
Load short circuit protection:	yes
Inverse-polarity protection:	yes
Output type:	PNP
Supply LED:	yes
Switching LED:	yes
Protection fuse:	315 mA fast

Cable cross section (flexible copper strands)

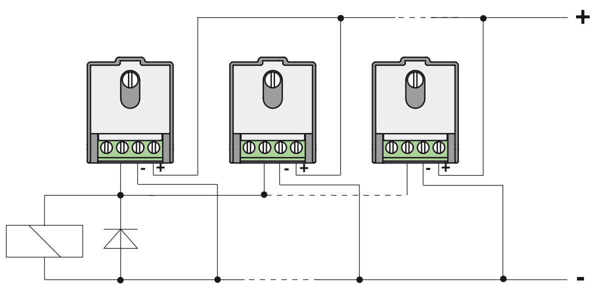
Contact block E1	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	1 x 2.5 mm²	(1 x AWG 14)

In conformity 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 chapter utilization requirements from page 235 to page 246.**

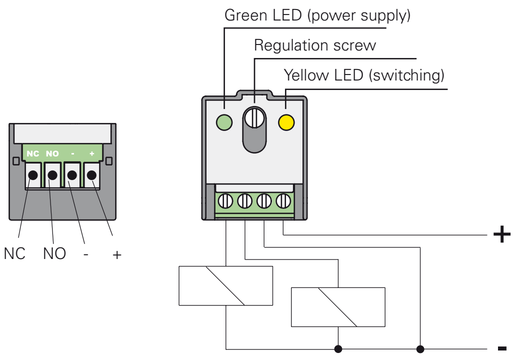
Parallel connection of several units E1 (OR)

The connection of many electronic contact blocks (OR) in parallel does not require any special precaution. With inductive loads (relay) it is advisable to install a protection diode.



Connection diagram

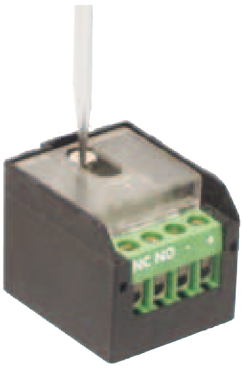
The wiring connection comes through a marked terminal block indicating the function of each pole. There are two signal LEDs: the first one shows power supply presence and the second shows the switching state.



Main features

The contact block E1 consists of a photoelectric sensor that checks the position of the mechanic actuator, with the following features:
1) Feasibility of adjusting the switching point by a screw directly applied on the contact block. The adjusting screw is positioned on the cap of the contact block, in order to offer an easy setting point, without extracting the contact block from the switch body.
2) Differential travel below 0.1 mm, guaranteed over the entire operating temperature range.
3) Reduced actuating force.
4) Two static PNP output, 1NO+1NC, short circuit protected.
5) Exit signal without bounce.
6) Wide range of operating temperatures.
7) Signal LEDs for power supply and switching.

These functionalities allow to resolve the following problems:
1) When interfacing the switches with PLC there are problems because of contacts bouncing or in case of very low voltages.
2) When it is necessary to sense light objects which require a contact block with high sensibility and reduced actuating forces.
3) When it is necessary to sense very small objects which require a very low differential travel.
4) When it is requested to adjust the operating point. The internal LED shows the switching point when you turn the adjusting screw.
5) In cases where the perfectly simultaneous commutation of the two outputs is required.
6) When it is necessary to detect transparent objects, or where the use of normal sensors is not feasible, keeping in mind that special sensors normally have a higher price than this solution.



Series connection of several units E1 (AND)

To connect the units in series (AND), it is necessary to comply with the following conditions:
The electric current of the first unit is the addition of the electric load and the max. load absorbed by the other switches. If we consider the connection of *n* units, the nominal current "*Ie*", results:

$Ie = (200\text{-}20 \times n)$ mA

With *Ie*: rated operating current
n: number of switches connected in series

Example: with 3 switches you can switch maximum 140 mA.

In connected-through state, each switch causes a voltage drop. The load should be suitable to work with a voltage of:

$Uc = Ua - 2 \times n$

With *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.

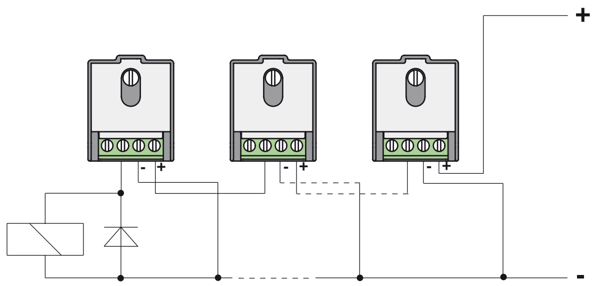
The maximum number of switches that can be connected in series depends on the supply voltage used. In any case, the number should be lower than:

$$n_{max} \leq \frac{Va - 10}{2} + 1$$

With $n_{max:}$ max. number of units connected in series
Va: supply voltage used

Example: with 24 Vdc it is possible to connect a maximum of 7 switches. With 30 Vdc it is possible to connect 11 switches.

With inductive loads (relay) it is advisable to install a protection diode.



Advice for 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:

- Exclude or limit the interference from the source.
- Filter the power supply with adequate capacitor
- Separate the power cables from the switch cables.
- Limit the cable length to max. 200 m.

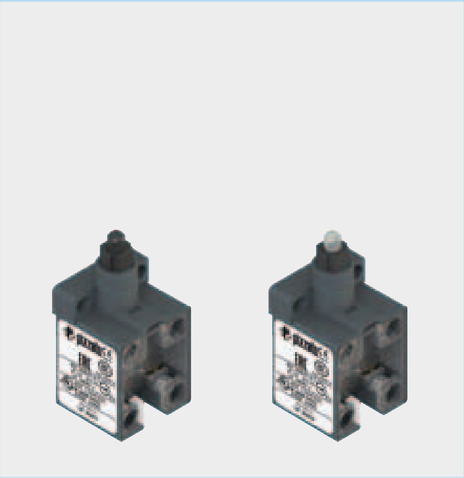
Check the voltage drop along the power supply lines.
When necessary, twist and shield the output wires of the switches or use a suitable twisted and shielded wire with a suitable cross section.

Special loads

The switch is protected against overload and short-circuit, so it is necessary to limit the inrush current of the electric load. Typical examples are capacitors, which require a high current impulse during their load, and incandescence lamps, the electric resistance of which is the tenth part of the hot electric resistance. For the capacitive loads, when necessary, connect a limit resistance in series, whereas for the lamps, when necessary, use a suitable electric resistance of pre-heating.

Utilization limits

- Not suitable for installations for safety applications
- Can only be applied with FD, FP, FL, FR, FM, FX and FZ series position switches.



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

Markings and quality marks:

UL approval:	E131787
CCC approval:	2013010305600704
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing
Housing made of glass fiber reinforced technopolymer, self-extinguishing and shock-proof

Protection degree:	IP20 (terminals), IP40 (contacts) according to EN 60529

General data

Ambient temperature:	-40°C … +80°C
Safety parameters:	
B_{10d}:	40,000,000 for NC contacts
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	20 million operating cycles[1]
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s (slow action) 0.01 mm/s (snap action)
Tightening torques screws contact blocks:	0.6 … 0.8 Nm

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

Cable cross section (flexible copper strands)
Contact blocks 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 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 conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, UL 508, CSA 22.2 No.14.
Approvals:
UL 508, CSA 22.2 No.14, EN 60947-1, EN 60947-5-1

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

Installation for safety applications:
Use only switches marked with the symbol ⊖ aside the product code. Always connect the safety circuit to the **NC contacts** (normally closed contacts: 11-12, 21-22 or 31-32) as stated in **standard EN 60947-5-1, encl. K, par. 2**. Actuate the switch **at least up to the positive opening travel** shown in the travel diagrams. Operate the switch **at least with the positive opening force**, indicated between brackets below each article, aside the minimum force value.

Electrical data

Thermal current (Ith):	10 A
Rated insulation voltage (Ui):	500 Vac 600 Vdc
Rated impulse withstand voltage (U_{imp}):	6 kV
Conditional short circuit current:	1000 A according 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

Characteristics approved by UL

Utilization categories Q300 (69 VA, 125 … 250 Vdc)
A600 (720 VA, 120 … 600 Vac)
Characteristics of the housing: open type
For all contact blocks use 60 or 75 °C copper (Cu) conductor, rigid or flexible, wire size AWG 12-14. Terminal tightening torque of 7.1 lb in (0.8 Nm).

In conformity with standard: UL 508, CSA 22.2 N.14

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

Description

Contact blocks with captive screws, finger protection and self-lifting clamping screw plates. With NC contacts with positive opening for safety applications. Fitted with twin bridge contacts, they are particularly suitale for high-reliability applications.
Suitable for the installation inside foot switches series PA, PX and PC.

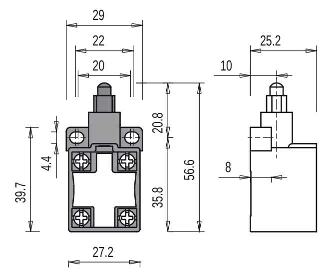
Dimensional drawings

All measures in the drawings are in mm

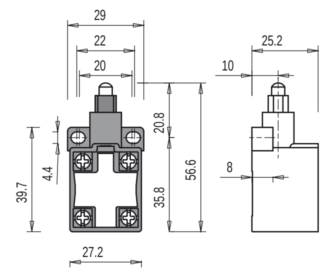
Contact type:

- R = snap action
- L = slow action
- LO = slow action overlapped
- LS = slow action shifted
- LV = slow action shifted and spaced
- LA = slow action closer

Technopolymer button

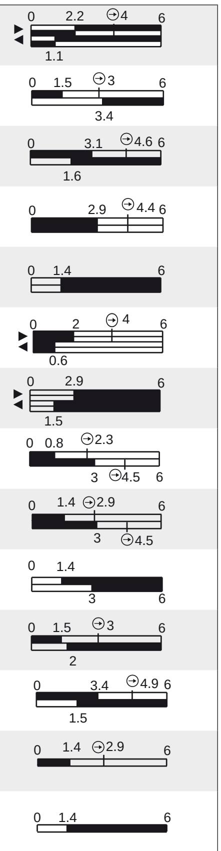


Metal button



Contact blocks		Technopolymer button		Metal button	
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	
Min. force		8 N (20 N ⊖)		8 N (20 N ⊖)	

Travel diagrams



Legend
Closed contact | Open contact | ⊖ Positive opening travel according to IEC 60947-5-1 | ► Pushing the switch / ◄ Releasing the switch

Code structure

article — options

VF B501-G

Contact blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
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

Actuators	
01	with technopolymer button
02	with metal button

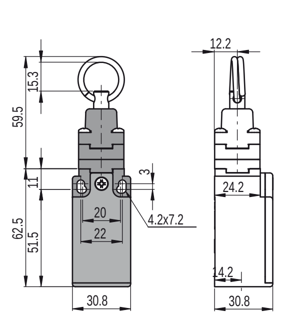
Items with code on **green** background are stock items

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

FR 573-M2 signalling switches with stable contact

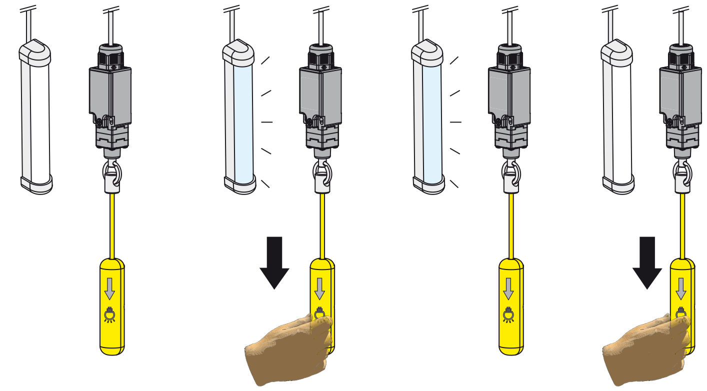
Contact type:

R = snap action



Contact blocks

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	
Min. force		initial 20 N - final 40 N	



The switch is activated by pulling the connected rope, operates in stable position mode.

This means that the first activation closes the contacts, the following activation opens them, and so on.

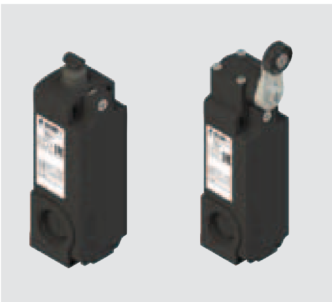
Such solution has been specifically studied to be applied in all those situations where a non-stable position switch is generally used to control a step-by-step relay, such as for example devices for switching on/off the inside lights or opening/closing the gates.

Thanks to this stable position function, for example, a first pull of the rope switches on a lighting system, which can later be switched off by means of a subsequent pulling action.

Therefore, the use of the switch on its own makes it unnecessary to have any combined solutions with step-by-step relays and respective wiring, thus remarkably simplifying all installation operations.

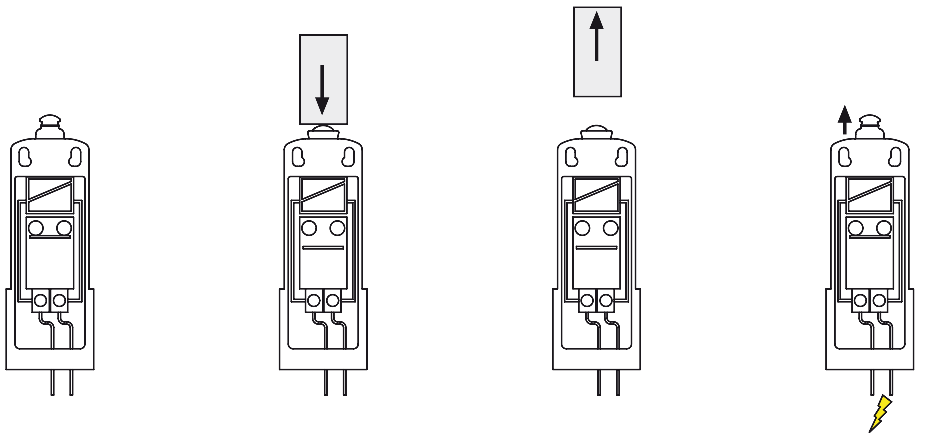
For more information, see the Pizzato Elettrica Lifts General Catalogue 2015-2016.

Switches with electrical reset FT series



When the FT series safety switches with reset are operated they remain switched and they reset electrically through the integrated solenoid. Thanks to this feature it's possible to remote reset the switch without being physically near it.
They are available with 3 supply voltages (24 Vdc, 48 Vdc, 230 Vac), with different actuators and they are adapt to many applications, particularly to the lift, the over-speed governor and generally to the safety field. Some items can also be supplied with the manual reset.
Furthermore Pizzato Elettrica has introduces a new adjustment system integrated in the switch: this system, purposely designed for over-speed devices, allows a very sensitive adjustment of the switch position along its vertical axis.
For more information, see the Pizzato Elettrica Lifts General Catalogue 2015-2016.

Working principle

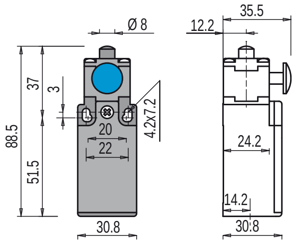


Switch in resting position — Switch activation. Contact opening — Switch release. The contacts remain open — Switch reset by means of electric impulse

Switches for switching cabinets FR 5F1-M2, FR 10F1-M2

Contact type:

R = snap action
L = slow action

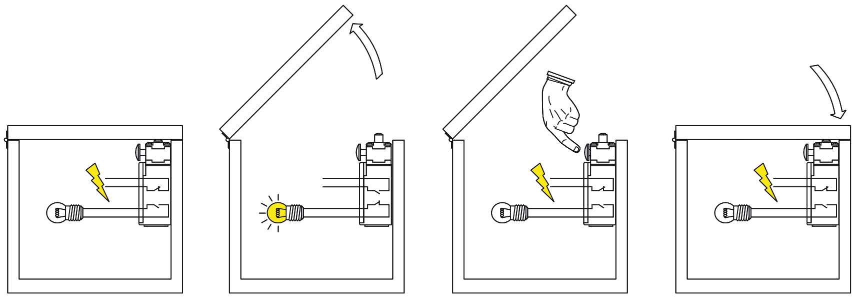


Contact blocks

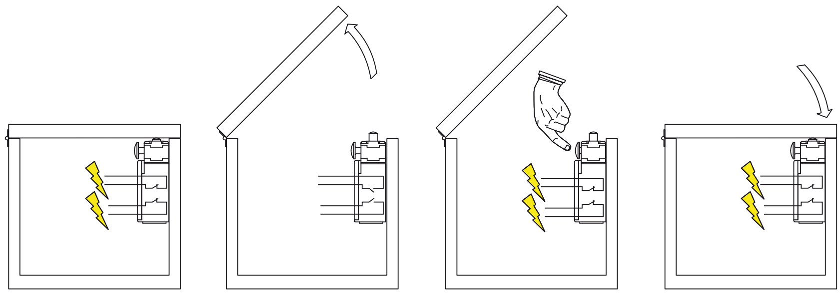
5	R	FR 5F1-M2	1NO+1NC
10	L	FR 10F1-M2	2NO
Max. speed		page 239 - type 4	
Min. force		8 N (25 N)	
Travel diagrams		page 241 - group 1	

Switches FR 5F1-M2 and FR 10F1-M2 can be installed on doors of switching cabinets. They are used to switch on possible signal devices, once the door is open (e.g. three-phase flashing devices, etc.). The operator assigned to the board maintenance may simulate the closing of the door by pushing the blue button. At the end of the maintenance the functionality of the switch will be automatically re-established easily by closing the door of the cabinet.

Working principle FR 5F1-M2



Working principle FR 10F1-M2

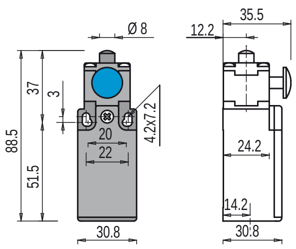


If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Switches for switching cabinets FR 37F1-M2

Contact type:

L = slow action

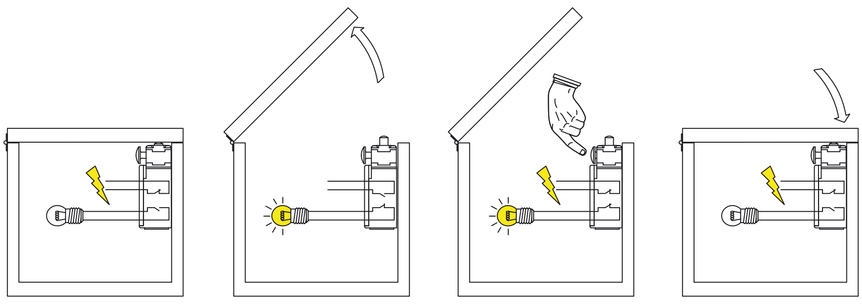


Contact blocks

37	L	FR 37F1-M2	1NO+1NC
Max. speed		page 239 - type 4	
Min. force		8 N (25 N)	
Travel diagrams		page 241 - group 1	

The operation of this switch is similar to that of the one described above.
When the button of the switch is pressed, it simulates the door closing operation, therefore the auxiliary circuit is newly supplied with power and the light remains on; it will only go off after the door has been closed.

Working principle FR 37F1-M2



If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.

Switches with **stainless steel** external parts

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 housing
- External metallic parts in stainless steel only
- 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 sulphate	■	■
Leaded petrol	■	■
Unleaded petrol	■	■
Benzol	■	□
Beer	■	■
Butane	■	■
Butanol	■	■
Quicklime	■	■
Calcium chloride	■	■
Calcium hydroxide	■	■
Chloroform	■	■
Aluminium chloride	■	■
Ferrous chloride	□	□
Chromium plate	▣	▣
Diesel	■	■
Ether	■	■
Formaldehyde 100%	■	□
Furfural	■	■
Gelatine	■	■
Glycerine	■	■
Glucose	■	■
Shellac (orange)	■	■
Hydrogen (gas)	■	■
Iodine	□	■
Milk	■	■
Magnesium chloride	□	■
Magnesium hydroxide	■	■
Magnesium sulphate (Epsom salts)	■	■
Mayonnaise	■	■

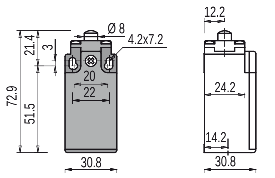
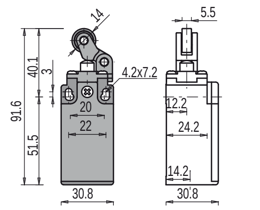
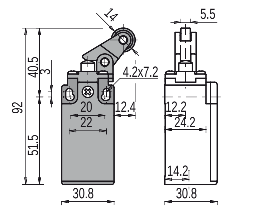
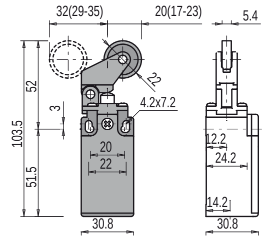
Substance	Stainless steel	Technopolymer
Whisky malt	■	■
Molasses	■	■
Nickel chloride	▣	▣
Aluminium nitrate	■	■
Combustible oils	■	■
Tanning oil	■	-
Linseed oil	■	■
Hydraulic oil (synthetic)	■	■
Hydraulic oil (synthetic)	■	■
Mineral Oil	■	■
Motor Oil	■	■
Transformer oil	■	■
Paraffin	■	■
Potassium chloride	■	■
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.

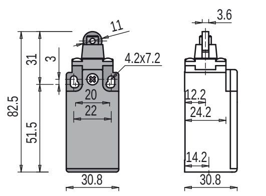
■ No corrosion
▣ Possible corrosion
□ Corrosion
\- Data not available

Contact type:

R = snap action
L = slow action

Contact blocks					
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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		8 N (25 N)	6 N (25 N)	6 N (25 N)	4 N (25 N)
Travel diagrams		page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 3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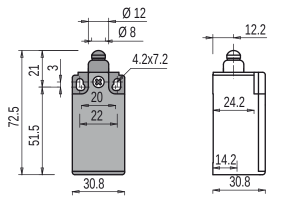
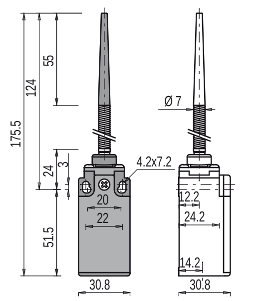
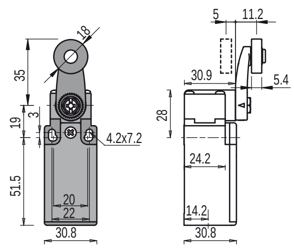
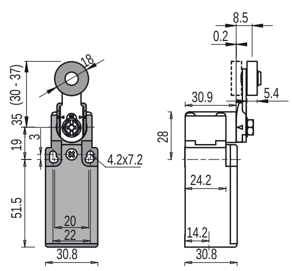
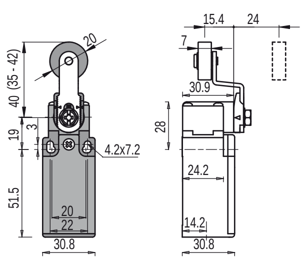
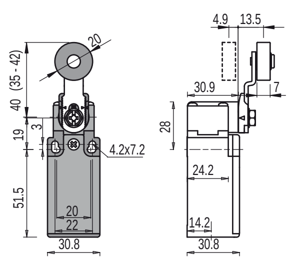
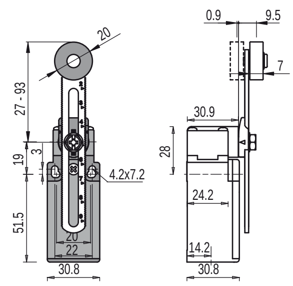

With external rubber gasket



Contact blocks					
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 2A1-XM2 2x(1NO-1NC)	FR 220-XM2 2x(1NO-1NC)	FR 230-XM2V38 2x(1NO-1NC)
Max. speed		page 239 - type 2	page 239 - type 4	1 m/s	page 239 - type 1
Min. force		8 N (25 N)	6 N (25 N)	0.07 Nm	0.06 Nm (0.25 Nm)
Travel diagrams		page 240 - group 1	page 240 - group 1	page 240 - group 4	page 240 - group 5

Contact blocks					
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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 240 - group 5	page 240 - group 5	page 240 - group 5	page 240 - group 5

All measures in the drawings are in mm

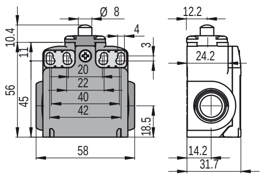
Accessories See page 225

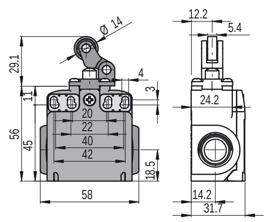
→ The 2D/3D files are available at **www.pizzato.com**

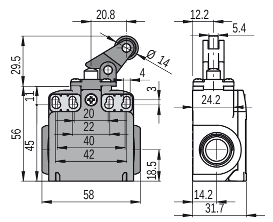
Switches with **stainless steel** external parts

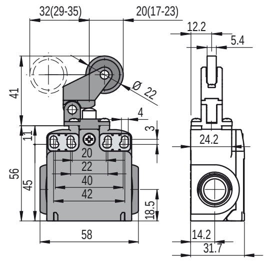
Contact type:

R = snap action
L = slow action

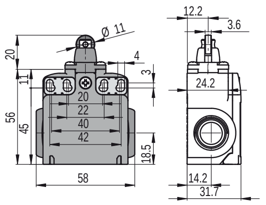




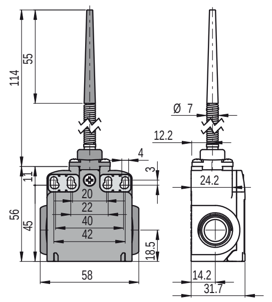




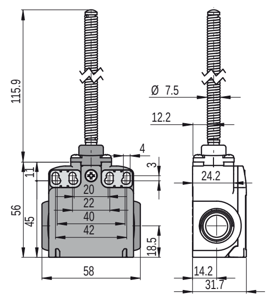
Contact blocks					
5	R	FX 501-XM2 (→) 1NO+1NC	FX 502-XM2 (→) 1NO+1NC	FX 505-XM2 (→) 1NO+1NC	FX 507-XM2 (→) 1NO+1NC
6	L	FX 601-XM2 (→) 1NO+1NC	FX 602-XM2 (→) 1NO+1NC	FX 605-XM2 (→) 1NO+1NC	FX 607-XM2 (→) 1NO+1NC
9	L	FX 901-XM2 (→) 2NC	FX 902-XM2 (→) 2NC	FX 905-XM2 (→) 2NC	FX 907-XM2 (→) 2NC
20	L	FX 2001-XM2 (→) 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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force		8 N (25 N (→))	6 N (25 N (→))	6 N (25 N (→))	4 N (25 N (→))
Travel diagrams		page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 3

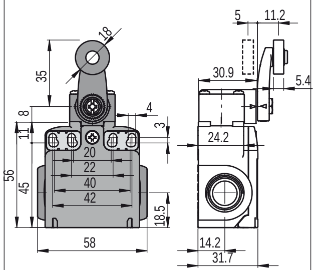


With external rubber gasket

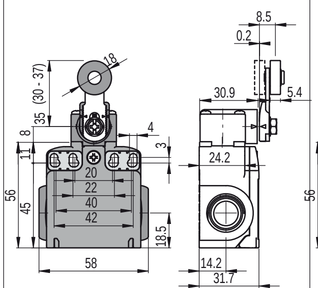


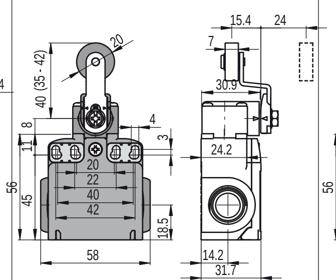
With external rubber gasket

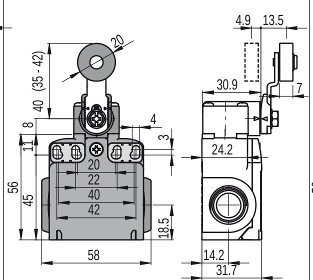


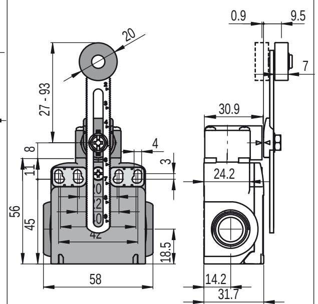


Contact blocks					
5	R	FX 515-XM2 (→) 1NO+1NC	FX 520-XM2 1NO+1NC	FX 525-XM2 1NO+1NC	FX 530-XM2V38 (→) 1NO+1NC
6	L	FX 615-XM2 (→) 1NO+1NC			FX 630-XM2V38 (→) 1NO+1NC
9	L	FX 915-XM2 (→) 2NC			FX 930-XM2V38 (→) 2NC
20	L	FX 2015-XM2 (→) 1NO+2NC	FX 2020-XM2 1NO+2NC	FX 2025-XM2 1NO+2NC	FX 2030-XM2V38 (→) 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 239 - type 2	1 m/s	1 m/s	page 239 - type 1
Min. force		8 N (25 N (→))	0.07 Nm	0.12 Nm	0.06 Nm (0.25 Nm (→))
Travel diagrams		page 240 - group 1	page 240 - group 4	page 240 - group 4	page 240 - group 5









Contact blocks					
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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 240 - group 5	page 240 - group 5	page 240 - group 5	page 240 - group 5

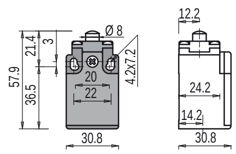
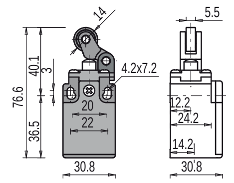
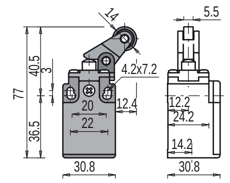
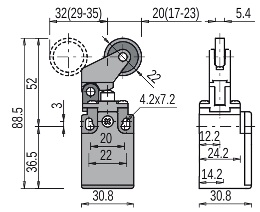
All measures in the drawings are in mm

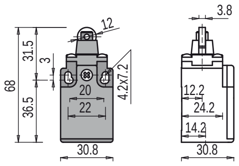
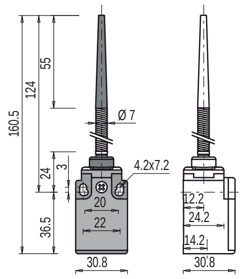
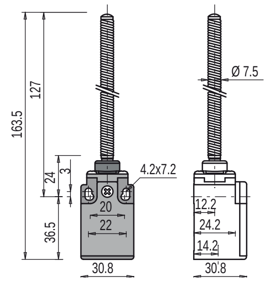
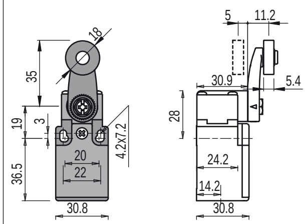
Accessories See page 225

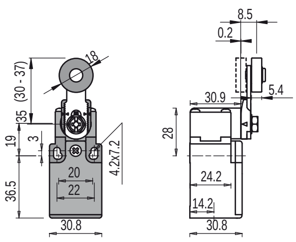
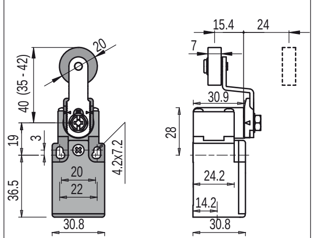
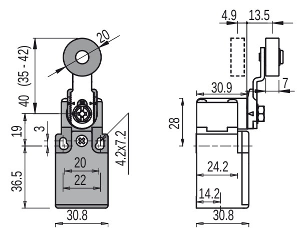
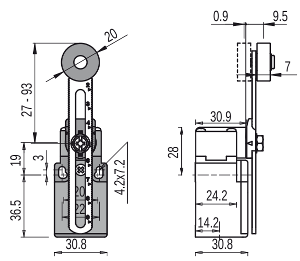
➔ The 2D/3D files are available at **www.pizzato.com**

Contact type:

R = snap action
L = slow action

				
Contact blocks				
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 239 - type 4	page 239 - type 3	page 239 - type 3	page 239 - type 3
Min. force	8 N (25 N)	6 N (25 N)	6 N (25 N)	4 N (25 N)
Travel diagrams	page 240 - group 1	page 240 - group 2	page 240 - group 2	page 240 - group 3

		With external rubber gasket	With external rubber gasket	
				
Contact blocks				
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 239 - type 2	1 m/s	1 m/s	page 239 - type 1
Min. force	8 N (25 N)	0.05 Nm	0.1 Nm	0.06 Nm (0.25 Nm)
Travel diagrams	page 240 - group 1	page 240 - group 4	page 240 - group 4	page 240 - group 5

				
Contact blocks				
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 239 - type 1	page 239 - type 1	page 239 - type 1	page 239 - type 1
Min. 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 240 - group 5	page 240 - group 5	page 240 - group 5	page 240 - group 5

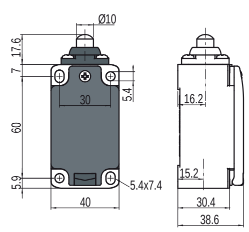
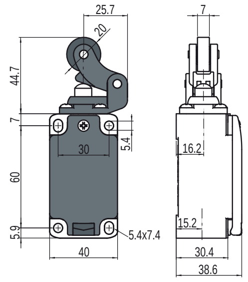
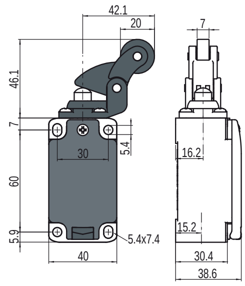
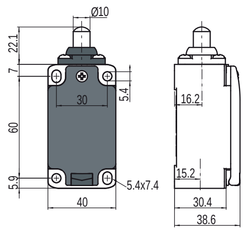
All measures in the drawings are in mm

Accessories See page 225

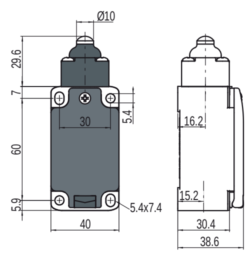
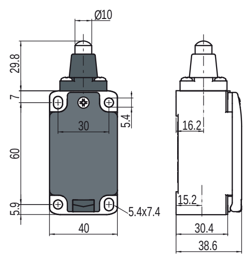
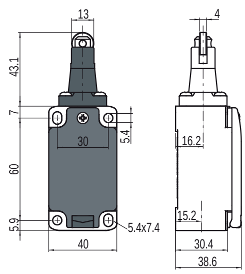
➔ The 2D/3D files are available at **www.pizzato.com**

Contact type:

R = snap action
L = slow action

Contact blocks					
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 237 - type 4	page 237 - type 3	page 237 - type 3	page 237 - type 4
Min. force		8 N (25 N →)	6 N (25 N →)	6 N (25 N →)	8 N (25 N →)
Travel diagrams		page 238 - group 1	page 238 - group 2	page 238 - group 2	page 238 - group 1

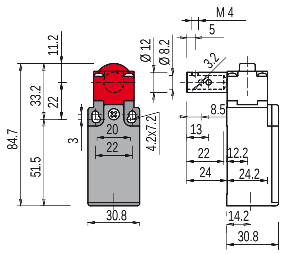
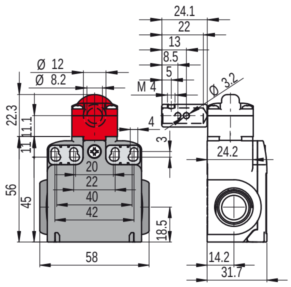
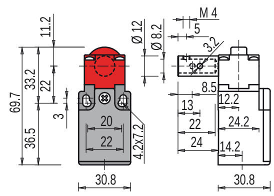
Contact blocks					
5	R	FP 510-XM2 → 1NO+1NC	FP 511-XM2 → 1NO+1NC	FP 516-XM2 → 1NO+1NC	
6	L	FP 610-XM2 → 1NO+1NC	FP 611-XM2 → 1NO+1NC	FP 616-XM2 → 1NO+1NC	
9	L	FP 910-XM2 → 2NC	FP 911-XM2 → 2NC	FP 916-XM2 → 2NC	
20	L	FP 2010-XM2 → 1NO+2NC	FP 2011-XM2 → 1NO+2NC	FP 2016-XM2 → 1NO+2NC	
2	R	FP 210-XM2 2x(1NO-1NC)	FP 211-XM2 2x(1NO-1NC)	FP 216-XM2 2x(1NO-1NC)	
Max. speed		page 237 - type 4	page 237 - type 4	page 237 - type 2	
Min. force		11 N (25 N →)	8 N (25 N →)	8 N (25 N →)	
Travel diagrams		page 238 - group 1	page 238 - group 1	page 238 - group 1	

Safety switches for hinges

All measures in the drawings are in mm

Contact type:

L = slow action

Contact blocks				
98	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
Min. force		0,15 Nm (0,4 Nm →)	0,15 Nm (0,4 Nm →)	0,15 Nm (0,4 Nm →)
Travel diagrams		page 242 - group 9	page 242 - group 9	page 242 - group 9

⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 235 to page 246.**

Accessories See page 225

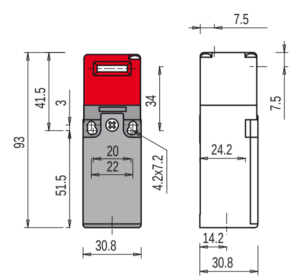
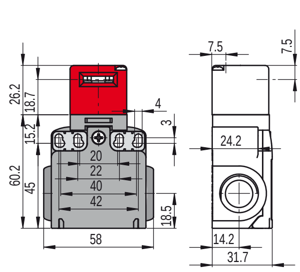
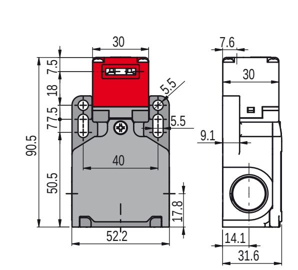
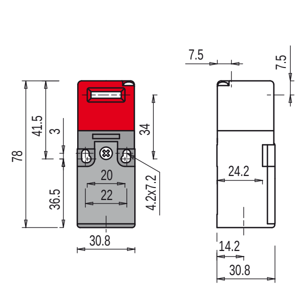
→ The 2D/3D files are available at **www.pizzato.com**

Safety switches with separate actuator

All measures in the drawings are in mm

Contact type:

R = snap action
L = slow action

without actuator	without actuator	without actuator	without actuator
			

Contact blocks

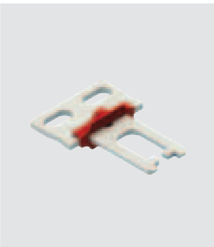
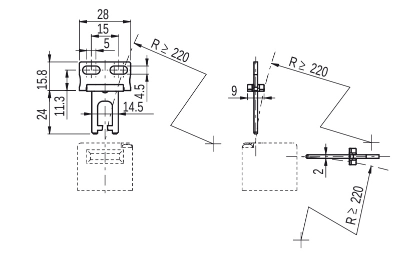
Contact blocks					
6	L	FR 693-XM2 ⊖ 1NO+1NC	FX 693-XM2 ⊖ 1NO+1NC	FW 692-XM2 ⊖ 1NO+1NC	
9	L	FR 993-XM2 ⊖ 2NC	FX 993-XM2 ⊖ 2NC	FW 992-XM2 ⊖ 2NC	
20	L	FR 2093-XM2 ⊖ 1NO+2NC	FX 2093-XM2 ⊖ 1NO+2NC	FW 2092-XM2 ⊖ 1NO+2NC	
33	L				FK 3393-XM1 ⊖ 1NO+1NC
34	L				FK 3493-XM1 ⊖ 2NC
Min. force		10 N (18 N ⊖)	10 N (18 N ⊖)	10 N (18 N ⊖)	10 N (18 N ⊖)
Travel diagrams		page 242 - group 8	page 242 - group 8	page 242 - group 8	page 242 - group 8

Stainless steel actuators

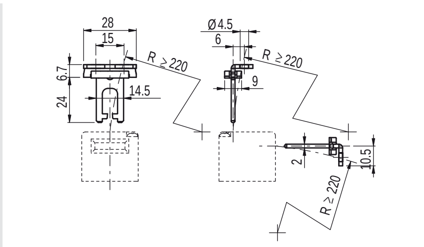
All measures in the drawings are in mm

IMPORTANT: These actuators can be used with items of the FR, FX, FK and FW series (e.g. FR 693-XM2).
Low level of coding acc. to EN ISO 14119.

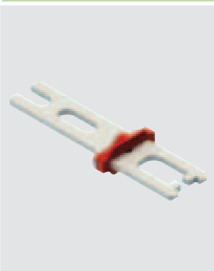
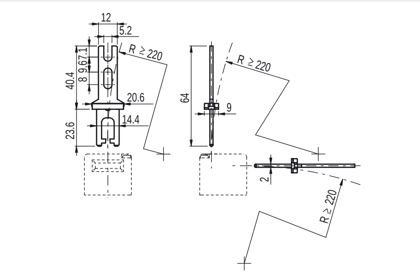
Article	Description
VF KEYD	Straight actuator

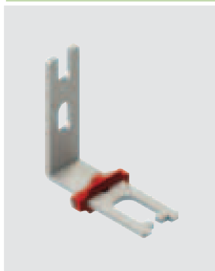
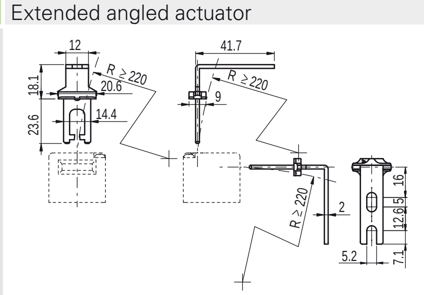
Article	Description
VF KEYD1	Angled actuator

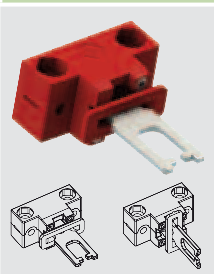
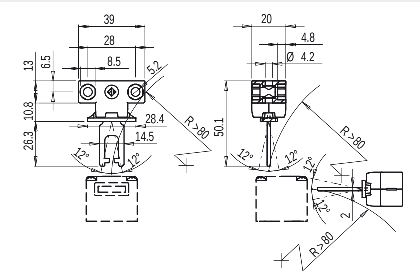
Article	Description
VF KEYD5	Extended actuator

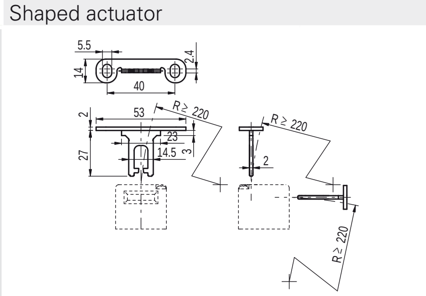
Article	Description
VF KEYD6	Extended angled actuator

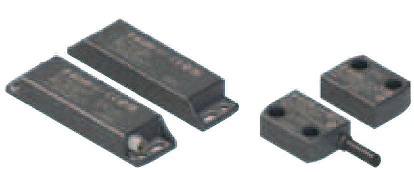
Article	Description
VF KEYD8	Universal actuator

Article	Description
VF KEYD10	Shaped actuator

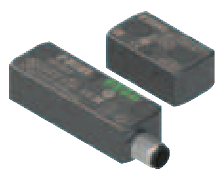



3 SR series magnetic safety sensors



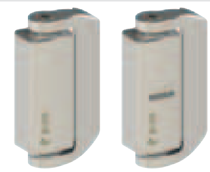
See General Safety Catalogue
Pizzato Elettrica 2015-2016 pages 29/35

4 ST series safety sensors with RFID technology



See General Safety Catalogue
Pizzato Elettrica 2015-2016 page 41

5 HX series stainless steel safety switches



See General Safety Catalogue
Pizzato Elettrica 2015-2016 page 61

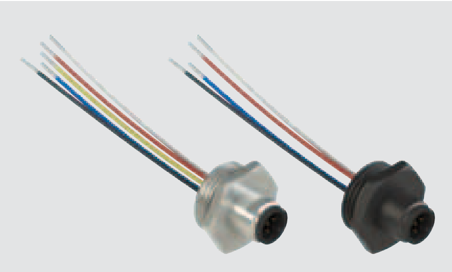
Items with code on **green** background are stock items

Accessories See page 225

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

M12 plugs

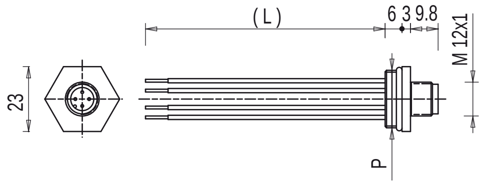
All measures in the drawings are in mm



These standard M12 plugs 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 switch with connector can be replaced with an identical one very quickly, avoiding the possibility of incorrect wiring.

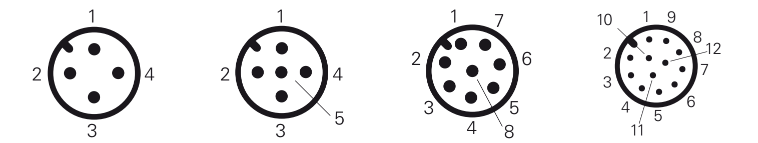
Technical data:

Max. operating voltage:	250 Vac / 300 Vdc (4/5 poles) 30 Vac / 36 Vdc (8/12 poles)
Max. operating current:	4 A (4/5 poles) 2 A (8 poles) 1.5 A (12 poles)
Protection degree:	IP67 acc. to EN 60529
Ambient temperature:	-25°C … +80°C
Tightening torque:	1 … 1.5 Nm
Wire cross-section:	0.5 mm² (20 AWG) for 4/5 poles 0.25 mm² (24 AWG) for 8 poles 0.14 mm² (26 AWG) for 12 poles
Contact type:	gold-plated



Conductor configuration

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 / options

VF CNM5MM-L100

Body material	
M	metal
P	plastic

No. of poles	
4	4 poles
5	5 poles
8	8 poles
12	12 poles

Connector thread (P)	
M	M20 x 1.5 (standard)
P	PG 13.5

Connection type	
M	M12x1

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

ATTENTION: always cut off the power supply before disconnecting the connector. The connector is not suitable for separation of electrical loads.
Note: the 12-pin 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**

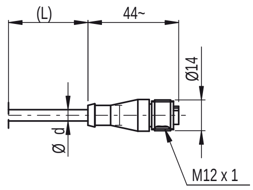
M12 sockets with cable

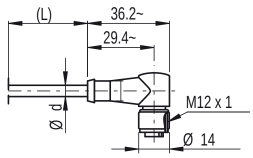
All measures in the drawings are in mm

Technical data:
- Polyurethane connector body (4/5/8 poles)
- Polypropylene connector body (12 poles)
- Class 6 rated copper of the wires acc. to IEC 60228 for mobile installation (4/5/8 poles)
- Class 5 rated copper of the wires acc. to IEC 60228 for fixed installation (12 poles)
- Gold-plated contacts (resistance < 5 mΩ)
- Self locking ring nut
- High flexibility wire suitable to be used in movable chains, with PVC sheath conforming to IEC 60332-3 and CEI 20-22II standards. With polyurethane sheath on request (4/5/8 poles)
- PVC cable, fixed installation (12 poles)

Technical data:

Max. operating voltage:	250 Vac / 300 Vdc (4/5 poles) 30 Vac / 36 Vdc (8/12 poles)
Max. operating current:	4 A (4-5 poles) 2 A (8 poles) 1.5 A (12 poles)
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 … +90°C for fixed installation (4/5/8 poles) -15°C … +90°C for mobile installation (4/5/8 poles) -25°C … +70°C for fixed installation (12 poles)
Wire cross-section:	0.34 mm² (22 AWG) for 4 poles 0.25 mm² (24 AWG) for 5/8 poles 0.14 mm² (26 AWG) for 12 poles
Minimum bending radius:	> cable diameter x 10

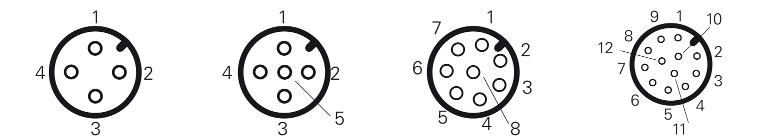




ø d: 5 mm for 4 and 5 poles
6 mm for 8 poles
6.5 mm for 12 poles

Conductor configuration

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

Sheath coating	
P	PVC (standard)
U	PUR

Connector type	
D	straight (standard)
G	angled

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

Connection type	
M	M12x1

Stock items

- VF CA4PD3M
- VF CA4PD5M
- VF CA4PD0M
- VF CA5PD3M
- VF CA5PD5M
- VF CA5PD0M
- VF CA8PD5M
- VF CA8PD0M
- VF CA12PD5M
- VF CA12PD0M

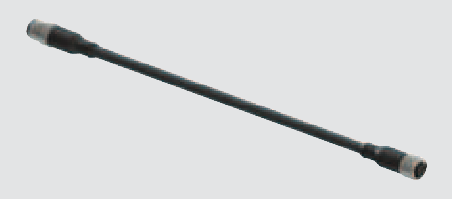
Attention! No stock item, minimum order quantity 100 pcs.

ATTENTION: always cut off the power supply before disconnecting 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**

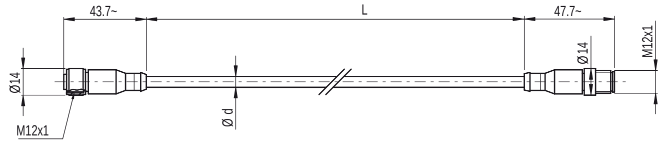
Extension cable with M12 connectors



Technical data:
Polyurethane connector body
Class 6 rated copper of the wires acc. to IEC 60228
Gold-plated contacts (resistance < 5 mΩ)
Self locking ring nut
High flexibility cable suitable to be used in drag chains, with PVC sheath conforming to IEC 60332-3 and CEI 20-22II standards.

Technical data:

Max. operating voltage:	250 Vac / 300 Vdc (5 poles) 30 Vac / 36 Vdc (8 poles)
Max. operating current:	4 A (5 poles) 2 A (8 poles)
Protection degree:	IP67 acc. to EN 60529
Ambient temperature:	-25°C … +90°C for fixed installation -15°C … +90°C for mobile installation
Wire cross-section:	0.5 mm² (20 AWG) (5 poles) 0.25 mm² (24 AWG) (8 poles)
Minimum bending radius:	> cable diameter x 10



ø d: 7 mm for 5 poles
6 mm for 8 poles

Code structure

VF CA5PD3M-MD

No. of poles	
5	5 poles
8	8 poles

Sheath coating	
P	PVC

Connector type	
D	straight

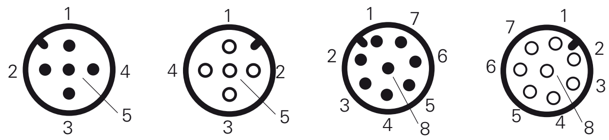
Connection type	
M	M12x1

Cable length (L)		No. of poles 5	8
3	3 metres (standard)	•	•
5	5 metres (standard)	•	•
0	10 metres (standard)	•	

Other lengths on request

Conductor configuration

5 poles plug	5 poles socket	8 poles plug	8 poles socket



Articles

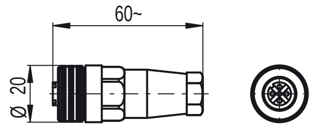
VF CA5PD3M-MD
VF CA5PD5M-MD
VF CA5PD0M-MD
VF CA8PD3M-MD
VF CA8PD5M-MD

M12 sockets, field wireable

All measures in the drawings are in mm

General data
Technopolymer connector body
Gold-plated contacts
Screw terminals for wiring

Max. operating voltages	250 Vac/dc (4 and 5 poles) 30 Vac/dc (8 poles)
Maximum current	4 A
Protection degree	IP67 acc. to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	from 0.25 mm² (24 AWG) to 0.5 mm² (20 AWG)



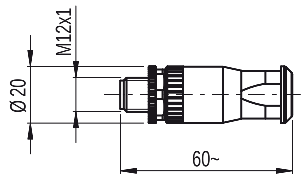
Article	Description	no. of poles
VF CBMP4DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	4
VF CBMP5DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	5
VF CBMP8DM04	Field wireable M12 socket, straight, for multipolar cables from Ø 4 to Ø 7 mm	8

M12 plugs, field wireable

All measures in the drawings are in mm

General data
Technopolymer connector body
Gold-plated contacts
Screw terminals for wiring

Max. operating voltages	250 Vac/dc (5 poles) 30 Vac/dc (8 poles)
Maximum current	4 A
Protection degree	IP67 acc. to EN 60529
Ambient temperature	-25°C … +85°C
Wire cross-section	from 0.25 mm² (24 AWG) to 0.5 mm² (20 AWG)

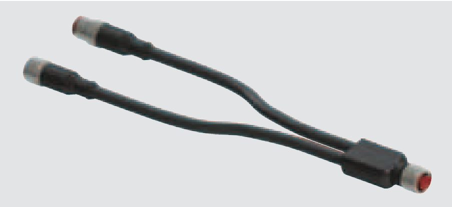


Article	Description	no. of poles
VF CCMP5DM04	Field wireable M12 plug, straight, for multipolar cables from Ø 4 to Ø 6.5 mm	5
VF CCMP8DM04	Field wireable M12 plug, straight, for multipolar cables from Ø 4 to Ø 7 mm	8

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

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

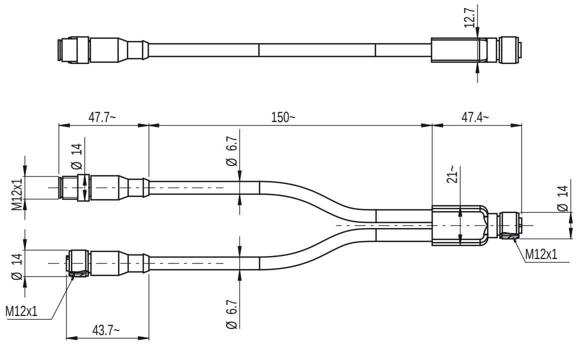
M12 connectors, Y-shaped, for series connections



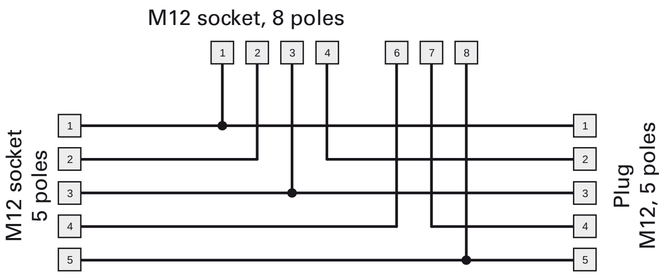
Technical data:
Polyurethane connector body
Class 6 rated copper of the wires acc. to IEC 60228
Gold-plated contacts (resistance < 5 mΩ)
Self locking ring nut
High flexibility cable suitable to be used in drag chains, with PVC sheath conforming to IEC 60332-3 and CEI 20-22II standards.

Technical data:

Max. operating voltage:	30 Vac / 36 Vdc
Max. operating current:	4 A (4-5 poles) 2 A (8 poles)
Protection degree:	IP67 acc. to EN 60529
Ambient temperature:	-25°C … +90°C for fixed installation -15°C … +90°C for mobile installation
Wire cross-section:	0.5 mm² (22 AWG)
Minimum bending radius:	> cable diameter x 10

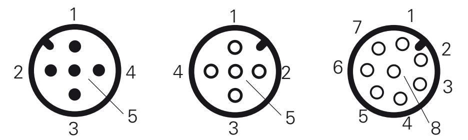


Internal wiring diagram, Y-shaped connector



Conductor configuration

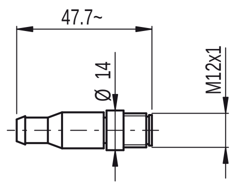
5 poles plug	5 poles socket	8 poles socket



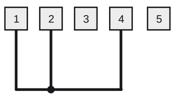
Article	Description
VF CY201P0	M12 connectors, Y-shaped, for series connections

M12 terminating plugs for series connections

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

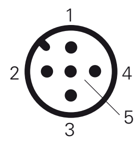


Internal wiring diagram of the terminating plug



Conductor configuration

5 poles plug



Article	Description
VF CY100P0	M12 terminating plugs for series connections, 5 poles

Series connection with Y-shaped M12 connectors

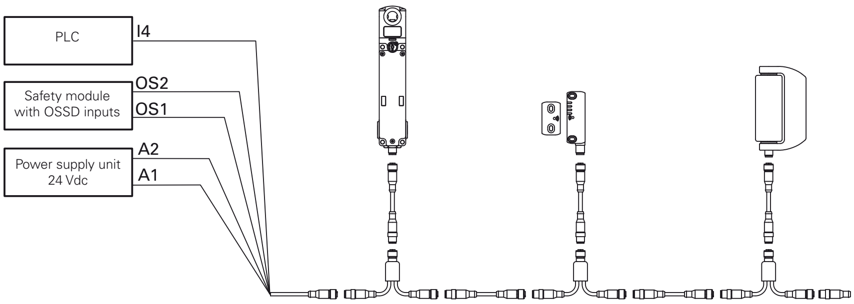
To facilitate and simplify the series wiring of the safety devices, a variety of accessories are available, designed specifically for this purpose. Based on the proven design of the M12 connector, which simply combines standard elements, category 4, PLe and SIL3 safety device chains are available, which can connect up to 32 devices in series. All of which is without the risk of connection errors and with a high IP67 protection degree. The safety chains are composed of a 24Vdc power supply unit, a series of extension cables to reach the various devices in the field, Y connectors to branch away from the chain towards each individual device, and a terminator to close the end of the line.
A suitable safety module is used alongside the power supply unit to assess the state of the safety chain safe outputs.

Items connected in series
The series may consist of both devices that are identical to one another (homogeneous series) or 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
HX series safety hinge switches: HX BEE1-••M

Electrical connection of the chain

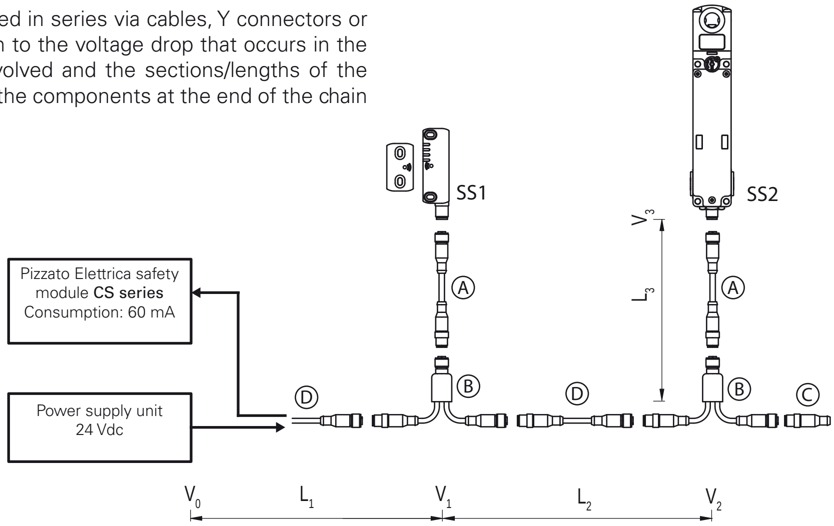
Pin	Colour	Connection	
1	Brown	A1	+24 Vdc supply input
2	White	OS1	Safety output
3	Blue	A2	0 V supply input
4	Black	OS2	Safety output
5	Grey	I4	Solenoid activation input

Note: By activating or deactivating the I4 input, all NG series switches in the chain will lock or unlock all the protections. Activation and deactivation of the I4 input has no effect on the ST sensors and HX hinges in the chain.



Connection example and voltage drop verification

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. In particular, we must evaluate the currents involved and the sections/lengths of the cables used, to ensure that under real usage conditions the components at the end of the chain are supplied within permissible limits.



Legend:
L_1 length 1st section (m)
L_2 length 2nd section (m)
L_3 length 3rd section (m)
V_0 Supply voltage (V)
V_1 voltage at point 1 (V)
V_2 voltage at point 2 (V)
V_3 voltage at point 3 (V)
I_1 transfer current 1st section (A)
I_2 transfer current 2nd section (A)
I_3 transfer current 3rd section (A)
ρ copper resistance = 0.018 (Ω x mm²/m)
S wire cross-section (mm²)
SS1 safety sensor, 45 mA consumption (ST series)
SS2 safety switch with lock, 505 mA consumption (NG series)
Ⓐ: Extension cable with M12 connectors, 0,25 mm² (VF CA8PD5M-MD)
Ⓑ: M12 connectors, Y-shaped (VF CY201P0)
Ⓒ: Terminating plugs for series connections (VF CY100P0)
Ⓓ: Extension cable with M12 connectors, 0,5 mm² (VF CA5PD0M-MD)

Data:
$I_1 = I_{CS}+I_{SS1}+I_{SS2}=60+45+505=610$ mA
$I_2 = I_{SS2}=505$ mA
$I_3 = I_{SS2}=505$ mA
$V_0 = 24$ V
$L_1 = 10$ m
$L_2 = 10$ m
$L_3 = 5$ m
$S_1 = 0{,}5$ mm²
$S_2 = 0{,}5$ mm²
$S_3 = 0{,}25$ mm²

Calculations:

$$V_1 = V_0 - \rho \times \frac{L_1}{S_1} \times I_1 = 24 - 0{,}018 \times \frac{10}{0{,}5} \times 0{,}61 = 23{,}7 \text{ V}$$

$$V_2 = V_1 - \rho \times \frac{L_2}{S_2} \times I_2 = 23{,}7 - 0{,}018 \times \frac{10}{0{,}5} \times 0{,}505 = 23{,}5 \text{ V}$$

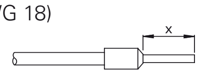
$$V_3 = V_2 - \rho \times \frac{L_3}{S_3} \times I_3 = 23{,}5 - 0{,}018 \times \frac{5}{0{,}25} \times 0{,}505 = 23{,}3 \text{ V}$$

Conclusions:
Given the minimum SS2 supply voltage which is equal to 24 V- 10% = 21.6 V, which is 23.3 V > 21.6 V, the device chain described above can be classed as properly dimensioned.

Junction box for series connection of up to 4 devices

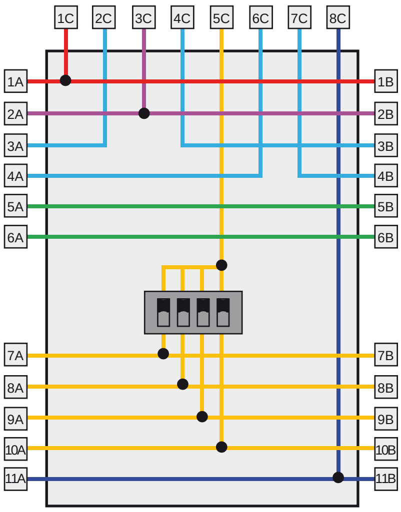
Technical data:

Material:	Self-extinguishing shock-proof polycarbonate with double insulation, UV resistant fibreglass reinforced, with increased shock resistance.
Screw material:	stainless steel
Protection degree:	IP67 acc. to IEC 60529 IP69K acc. to ISO 20653 with cable gland having equal or higher protection degree
Conduit entries:	• 2 upper and lower inputs with knock out M20 - 1/2 NPT • 2 side inputs with knock out M20 - 1/2 NPT - M25 • 2 base inputs with knock out M16
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 wires and flexible wires with 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

Conductor configuration



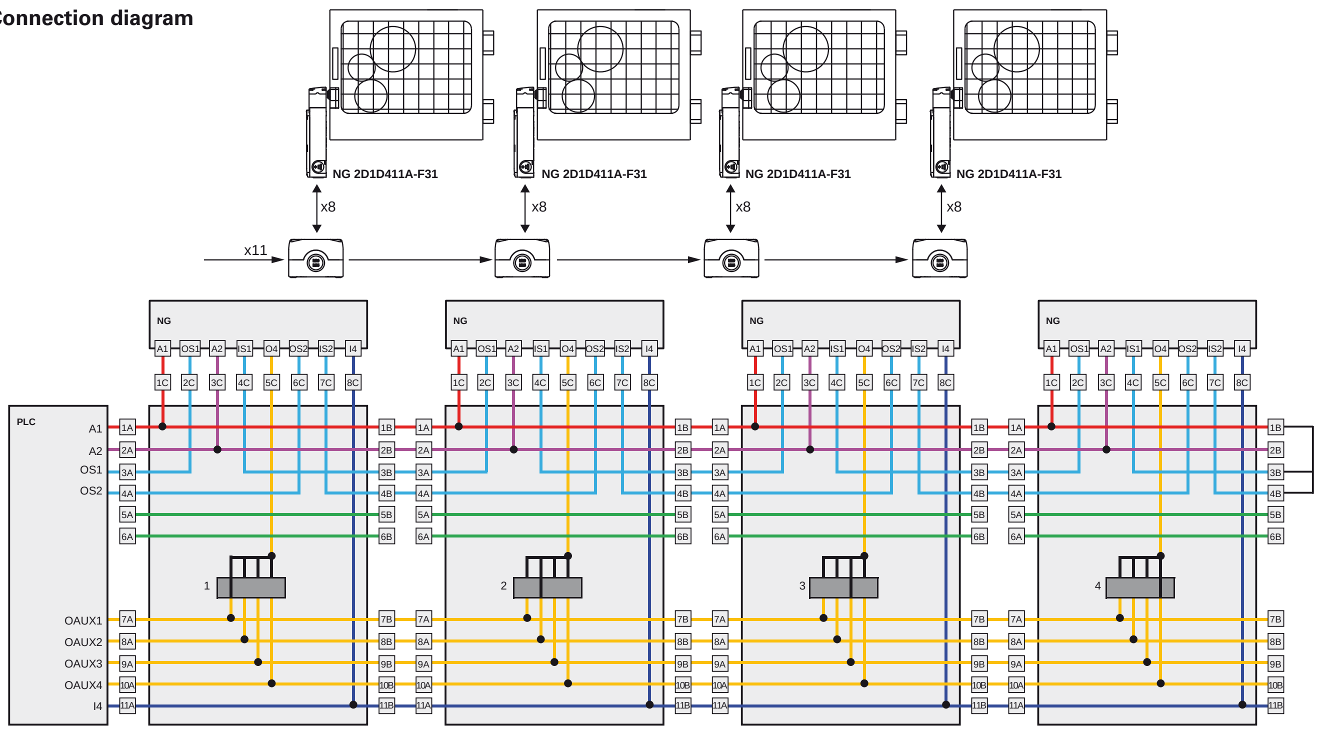
Example of series connection of 4 NG series switches

Terminal box	Connection	
1A	A1	+24 Vdc supply input
2A	A2	0 V supply input
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	+24 Vdc supply input
2B	A2	0 V supply input
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	+24 Vdc supply input
2C	OS1	Safety output
3C	A2	0 V supply input
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

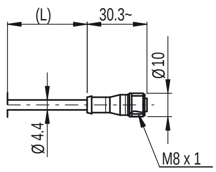
Connection diagram

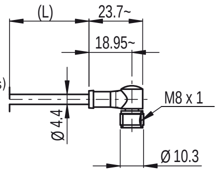


M8 sockets with cable

Technical data:
Polyurethane connector body
Class 6 rated copper of the wires acc. to IEC 60228
Gold-plated contacts (resistance < 5 mΩ)
Self locking ring nut
High flexibility cable suitable to be used in drag chains, with PVC sheath conforming to IEC 60332-3 and CEI 20-22II standards.
With polyurethane sheath on request.

All measures in the drawings are in mm

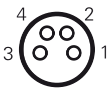




Max. operating voltage:	60 Vac / 75 Vdc
Max. operating current:	4 A
Protection degree:	IP67 acc. to EN 60529 IP69K acc. to ISO 20653 (Protect the cables from direct high-pressure and high-temperature jets)
Ambient temperature:	-25°C … +90°C for fixed installation -15°C … +90°C for mobile installation
Wire cross-section:	0.25 mm² (24 AWG)
Minimum bending radius:	> cable diameter x 10

Conductor configuration

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 (standard)
3	3 poles

Sheath coating	
P	PVC (standard)
U	PUR

Connector type	
D	straight (standard)
G	angled

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

Connection type	
K	M8x1

Stock items

VF CA4PD3K
VF CA4PD5K

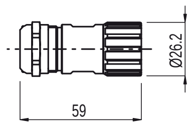
Attention! No stock item, minimum order quantity 100 pcs.

M23 sockets, 12 poles, without cable

All measures in the drawings are in mm

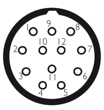
Technical data:

Body:	metal, nickel-plated
Max. operating voltage:	300 Vac
Dielectric strength:	2500 Vac for 1 minute
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
Mating cycles:	> 1000

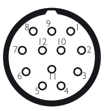


Pin configuration

12 poles



clockwise numbering



counterclockwise numbering

Article	Description
VF AC2205	Nut fastener

M23 connector nut fastener, article: VF CBSM12DS07. Required for opening and wiring the connector.

Code structure

VF CBSM12TS07

Connection type	
S	M23x1

Body material	
M	metal

No. of poles	
12	12 poles

Connector type	
T	clockwise numbering (standard)
D	counterclockwise numbering

Pin connection type	
S	solder 0.34 ... 1 mm²

Cable diameter	
07	from Ø 7 to Ø 12 mm

Stock items

VF CBSM12TS07

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

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

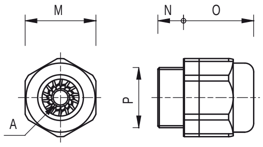
Wiretrap cable glands

10 pcs. packs

The design of this cable gland improves the retention forces of the wires. Each type of cable gland accepts a wide range of cable diameters.
Only fit for circular cables.

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	M25x1.5 cable gland for one cable from Ø 10 … 17 mm		30	10	28	M25x1.5
	VF PAM20C6N	M20x1.5 cable gland for one cable from Ø 6 … 12 mm		24	9	24	M20x1.5
	VF PAM20C5N	M20x1.5 cable gland for one cable from Ø 5 … 10 mm		24	9	24	M20x1.5
	VF PAM20C3N	M20x1.5 cable gland for one cable from Ø 3 … 7 mm		24	9	24	M20x1.5
	VF PAM16C5N	M16x1.5 cable gland for one cable from Ø 5 … 10 mm		22	7.5	23	M16x1.5
	VF PAM16C4N	M16x1.5 cable gland for one cable from Ø 4 … 8 mm		22	7.5	23	M16x1.5
	VF PAM16C3N	M16x1.5 cable gland for one cable from Ø 3 … 7 mm		22	7.5	23	M16x1.5
PG threads	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
Metric threads	VF PAM20CBN	M20x1.5 multi hole cable gland for 2 cables from Ø 3 … 5 mm		24	9	23	M20x1.5
	VF PAM20CDN	M20x1.5 multi hole cable gland for 3 cables from Ø 1 … 4 mm		24	9	23	M20x1.5
	VF PAM20CEN	M20x1.5 multi hole cable gland for 3 cables from Ø 3 … 5 mm		24	9	23	M20x1.5
	VF PAM20CFN	M20x1.5 multi hole cable gland for 4 cables from Ø 1 … 4 mm		24	9	23	M20x1.5

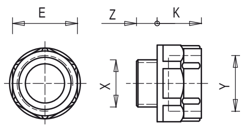
Thread adapters

100 pcs. packs

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:	reinforced technopolymer with glass fibre
Tightening torque:	3 … 4 Nm



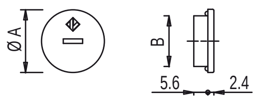
Article	Description	X	Y	Z	K	⬡E
VF ADPG13-PG11	Adapter from PG 13.5 to PG 11	PG 13.5	PG 11	9	12	22
VF ADPG13-M20	Adapter from PG 13.5 to M20x1.5	PG 13.5	M20x1.5	9	14	24
VF ADPG13-1/2NPT	Adapter from PG 13.5 to 1/2 NPT	PG 13.5	1/2 NPT	9	14	24
VF ADPG11-1/2NPT	Adapter from PG 11 to 1/2 NPT	PG 11	1/2 NPT	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

100 pcs. packs

Technical data:

Body material:	technopolymer
Protection degree:	IP67 acc. to EN 60529
Tightening torque:	from 1.2 to 1.6 Nm (PG13.5 / M20) 1 … 1.4 Nm (PG11 / M16)



Article	Description	A	B
VF PTM20	Protection cap M20x1,5	25	M20x1.5
VF PTM16	Protection cap M16x1,5	23	M16x1.5
VF PTG13,5	Protection cap PG13,5	25	PG 13.5
VF PTG11	Protection cap PG11	23	PG 11

All measures in the drawings are in mm

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

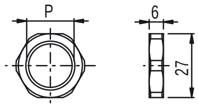
➔ The 2D and 3D files are available at **www.pizzato.com**

Plastic nuts, threaded

100 pcs. packs

Technical data:

Body material:	technopolymer
Tightening torque:	1.2 … 2 Nm



Article	Description	S	CH	P
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

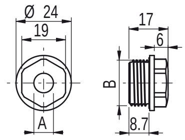
Chock plugs

100 pcs. packs

Technical data:

Body material:	technopolymer
Protection degree:	IP54 acc. to EN 60529
Tightening torque:	0.8 … 1 Nm

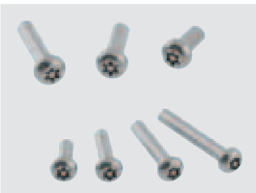
Notes: Use a socket wrench for tightening.



Article	Description	A	B
VF PFM20C8N	Cable gland cap for Ø 8 … Ø 12 mm cable, threaded M20x1.5	7.5	M20x1.5
VF PFM20C4N	Cable gland cap for Ø 4 … Ø 8 mm cable, threaded M20x1.5	3.5	M20x1.5

Safety screws Torx

10 pcs. packs



Pan head screws with Torx fitting and pin, stainless steel.
Where required for applications conforming to EN ISO 14119 use a thread locker.

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 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

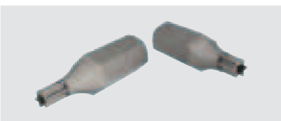
Safety screws One-Way

10 pcs. packs

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

Bits for Torx safety screws

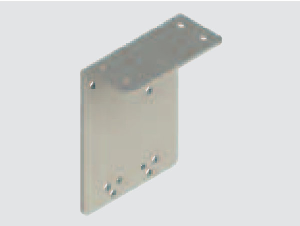


Bits for Torx safety screws with pin with ¼" hexagonal connection

Article	Description
VF VAIT1T20	Bits for M4 screws with Torx T20 fitting
VF VAIT1T25	Bits for M5 screws with Torx T25 fitting

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

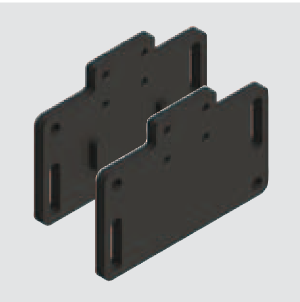
Fixing plates



Metal fixing plate, designed to fix rope switches on the ceiling.
The plate is provided with many fixing holes suitable for all series of switches. 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 the adjustment of the operating point.
Every plate has a double couple of fixing holes, one for standard switches and the other one for switches with reset device. In this way the actuator will always have the same actuating point.

Article	Description
VF SFP1	Fixing plate (FR series)
VF SFP3	Fixing plate (FX series)

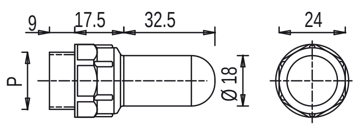
Indicator lights

5 pcs. packs

These indicator lights are used for visualizing a change of the state of an electric contact inside the switch. They can be installed only on series FL, FX, FZ, FW, FG or FS switches by screwing them on one of the conduit entries not used for electric cables, and they can have many different functions: for example, combined with a rope switch (e.g. FL 1878-M2) they can indicate (also in the distance) if the switch has been actuated.
Otherwise, combined with safety switches with separate actuator (e.g. FL 693-M2), they can indicate if the protection is closed correctly or not. Combined with a safety switch with solenoid (FS or FG series), they can indicate if the protection is locked or unlocked. Combined with any switch of FL, FX,, FW or FZ series they can be used to calibrate the actuator. The light indicators are decomposable in two parts for bulb replacement without removing the lamp holder from the switch, and their inner part can rotate in such a way that it can be wired and screwed on the switch without any risk of kinking the wires.

Technical data:

Max. operating voltage Ui:	250 Vac/dc
Rated impulse withstand voltage (U_{imp}):	4 kV
Bulb max. power:	3 W
Protection degree:	IP67 acc. to EN 60529
Bulb connection:	BA9
Cable cross-section:	min. 0.5 mm² max. 1.5 mm²
Ambient temperature:	-25°C … +40°C
Tightening torque:	3 … 4 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 ILI024GM

Bulb type	
I	incandescence
X	without bulb

Bulb voltage	
024	24 Vac/dc ±10%
110	110 Vac/dc ±10%
220	220 Vac/dc ±10%
000	without bulb

Cover colour	
G	yellow
R	red
V	green
W	white

Thread (P)	
M	M20 x 1.5 (standard)
P	PG 13.5

Stock items

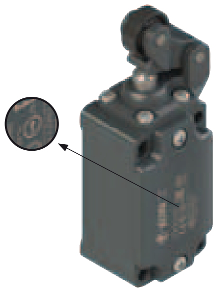
VF ILI024GM
VF ILI024RM
VF ILI024VM
VF ILX000GM
VF ILX000RM
VF ILX000VM

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 in the same protection two or more switches are used, it is possible to connect the contact NO to the safety circuit.
  In this case at least one of the two switches must have a 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 (→).
- Operate the switch **at least with the positive opening force**, indicated between brackets below each article, aside the minimum force value.
- The fixing of the device must occur in compliance with the standard 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 NC normally closed contacts (11-12, 21-22, 31-32) is guaranteed.

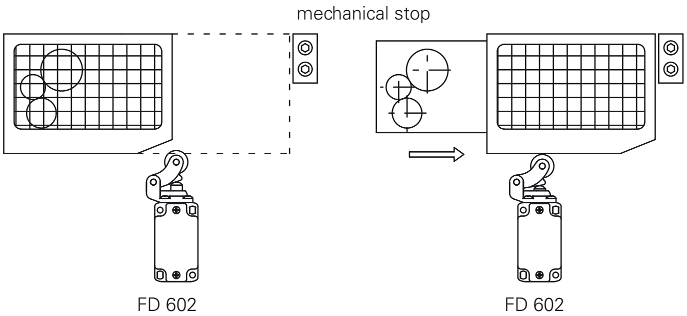


Fig.1

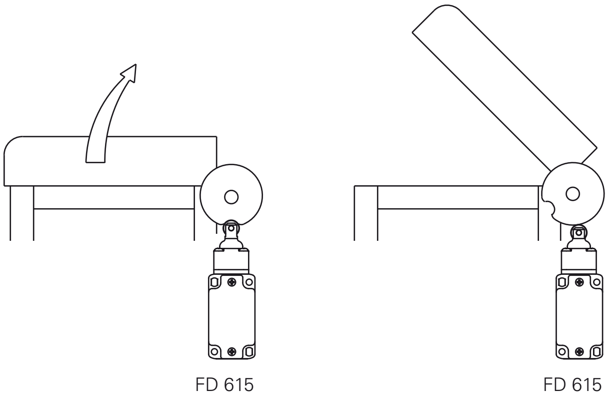


Fig.2

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).

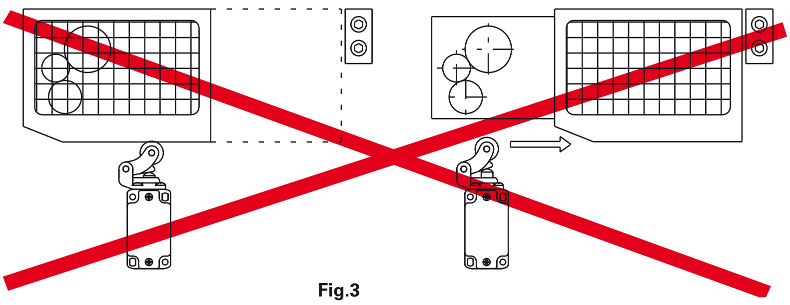


Fig.3

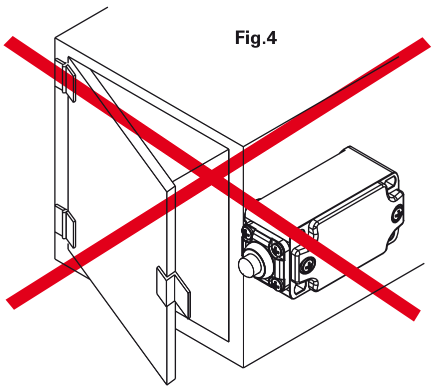
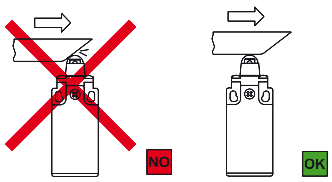


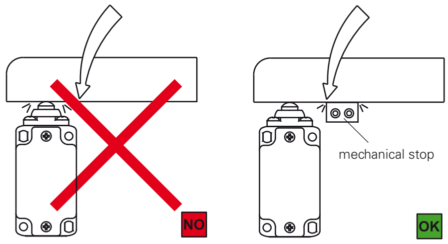
Fig.4

Mechanical stop

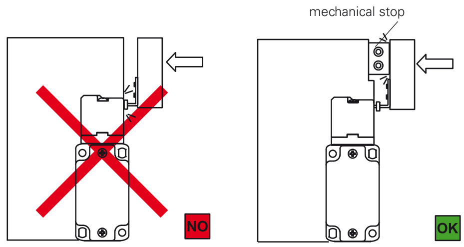
Acc. to EN ISO 14119 paragraph 5.2 letter h) "the position sensors must not be used as mechanical stop".



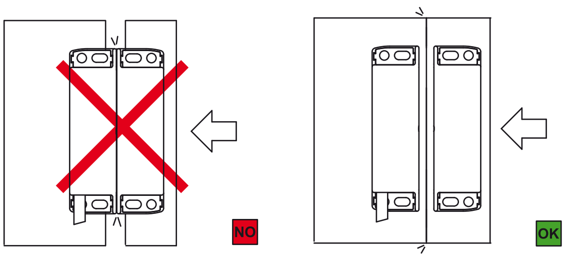
The actuator must not exceed the max. travel as indicated in the travel diagrams.



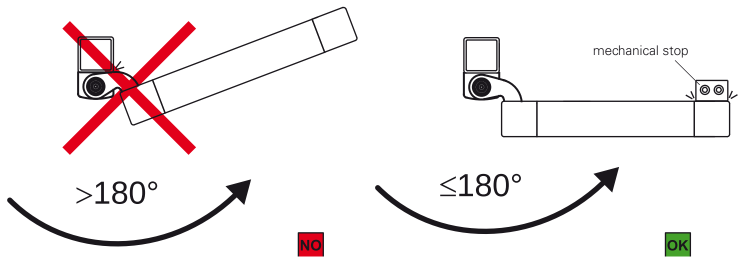
The guard must not make a mechanical stop on the switch head.



The actuator must not strike directly against the switch head.

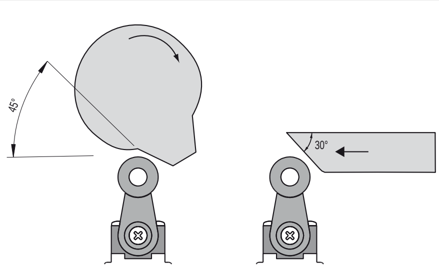
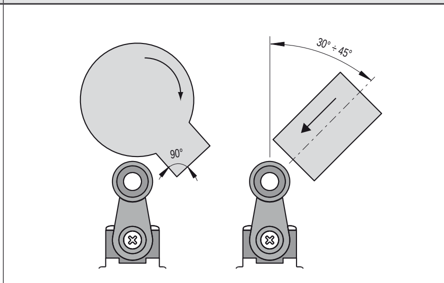
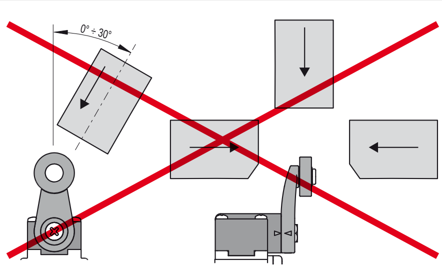
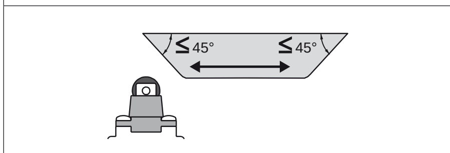
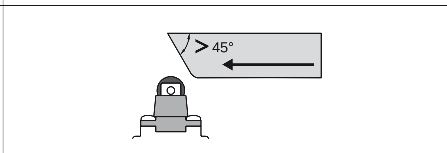
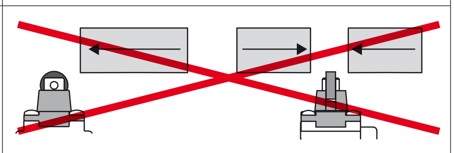
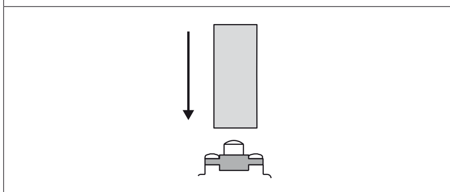
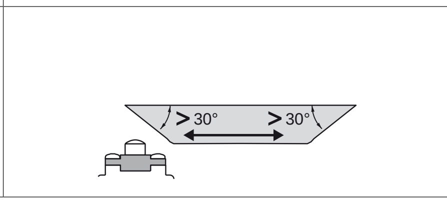
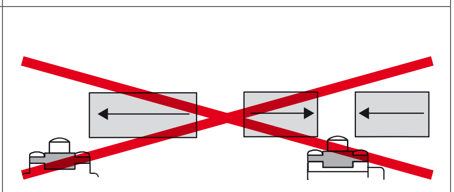


The actuator must not strike directly against the magnetic sensor.



The opening angle of safety hinge switch HP and HC series must not exceed 180°.

Actuation modes

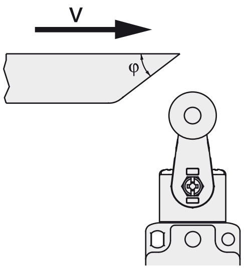
Recommended application	Application to avoid Possible application but with mechanical stress for the switch higher than expected, mechanical endurance is not guaranteed	Forbidden application
		
		
		

Switches for heavy duty applications

Maximum and minimum actuation speed (FD-FL-FP-FC series)

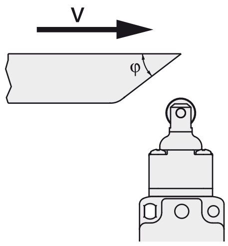
Roller lever - Type 1

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	



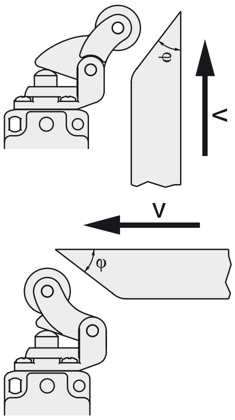
Roller plunger - Type 2

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



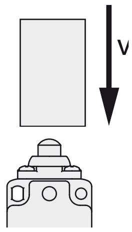
Roller lever - Type 3

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

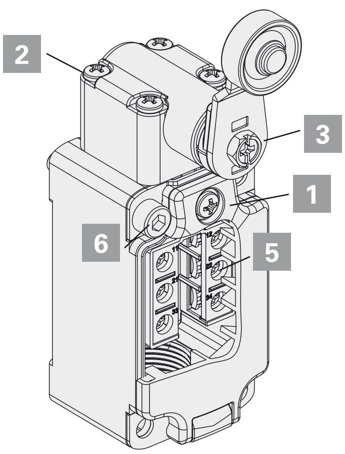


Contact type:

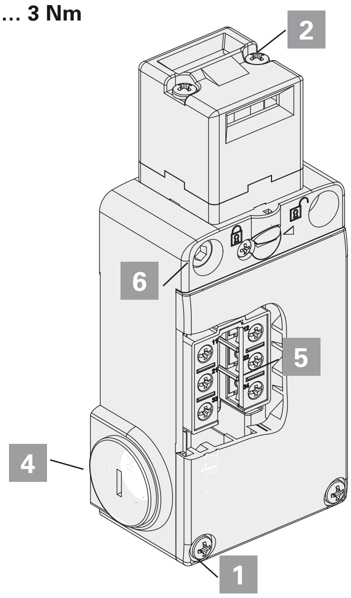
R = snap action
L = slow action

Tightening torques FD-FL-FP-FC-FG-FS-NG series

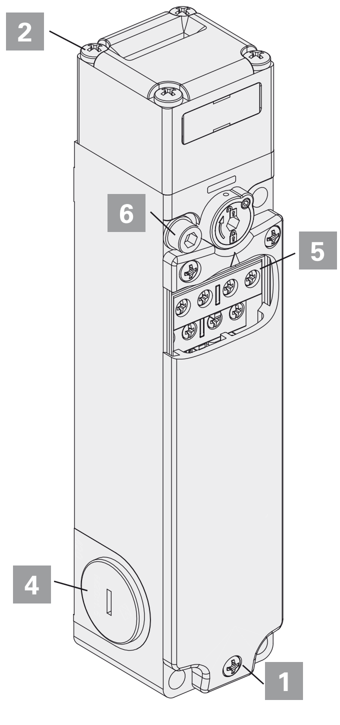
Cover screws 1	**0.8 … 1.2 Nm**
Head screws 2	**0.8 … 1.2 Nm**
Lever screw 3	**0.8 … 1.2 Nm**
Protection caps 4 (conduit entry M20/PG13.5)	**1.2 … 1.6 Nm**
(conduit entry M16/PG11)	**1 … 1.4 Nm**
Contact block screws 5	**0.6 … 0.8 Nm**
M5 body fixing screws (with washer for FS series) 6	**2 … 3 Nm**



FD-FL-FC-FP



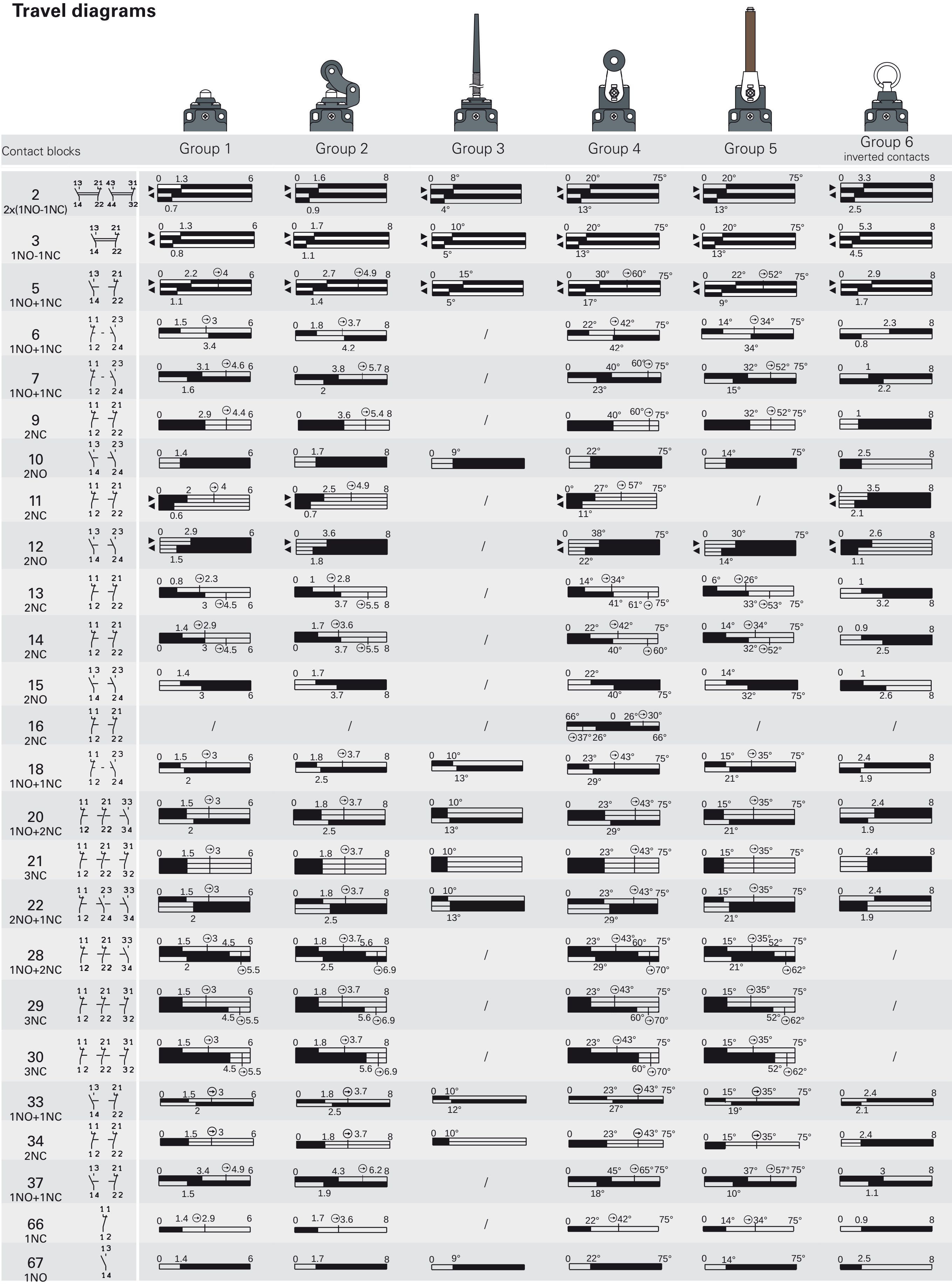
FS



FG-NG

Switches for heavy duty applications FD-FL-FP-FC series

Travel diagrams



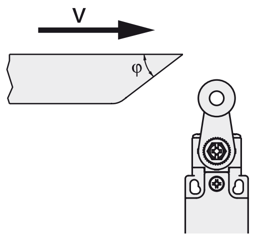
Legend
Closed contact | Open contact | Positive opening travel acc. to EN 60947-5-1 | ▶ Pushing the switch / ◀ Releasing the switch

Switches for normal duty applications

Maximum and minimum actuation speed (FR-FM-FX-FZ-FK series)

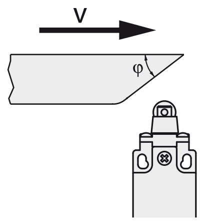
Roller lever - Type 1

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	



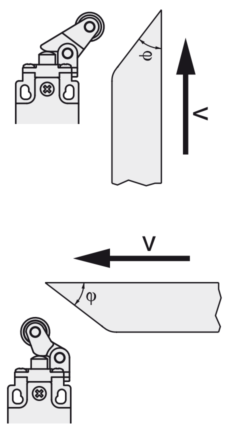
Roller plunger - Type 2

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

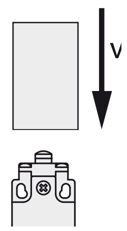


Contact type:

R = snap action
L = slow action

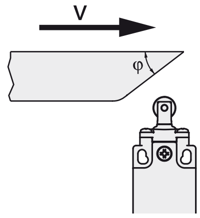
Plunger - Type 4

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

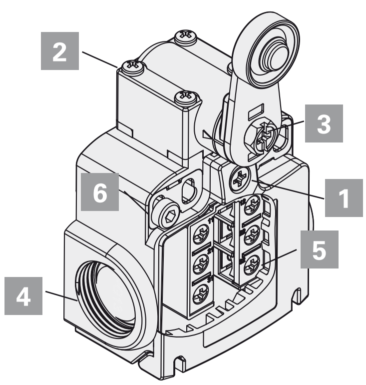


Tightening torques (FR, FX, FK and FW series)

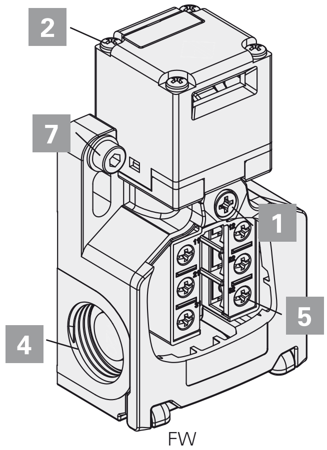
Cover screws 1	0.7 … 0.9 Nm
Head screws 2	0.5 … 0.7 Nm
Lever screw 3	0.7 … 0.9 Nm
Protection caps 4 (conduit entry M20/PG13.5)	1.2 … 1.6 Nm
(conduit entry M16/PG11)	1 … 1.4 Nm
Contact block screws 5	0.6 … 0.8 Nm
M4 body fixing screws (with washer for FR-FK series) 6	2 … 3 Nm
M5 body fixing screws (with washer for FW series) 7	2 … 3 Nm

Tightening torques (FM and FZ 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
M4 body fixing screws 6	2 … 3 Nm



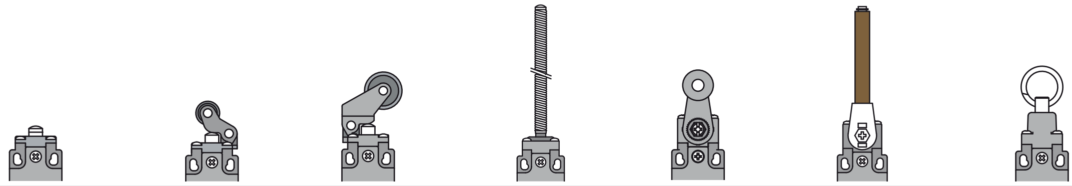
FR-FX-FK-FM-FZ



FW

Switches for normal duty applications (FR-FM-FX-FZ-FK series)

Travel diagrams



Contact blocks	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 3.8 8 / 5
6 1NO+1NC	0 1.5 ⊖3 3.5 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 8 / 2.4	0 7.1 ⊖10.6 13 / 3.7	/	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 8	0 6.7 ⊖10.1 13	/	0 39° ⊖59° 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	0.8 ⊖2.3 / 0 3 ⊖4.5 6	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	3.2 ⊖6.7 13 / 0 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 10.2 13 / 4.6 ⊖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 6 / 1.5	0 5.2 ⊖7.4 8 / 2.3	0 7.8 ⊖11.2 13 / 3.4	/	0 45° ⊖65° 75° / 18°	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 | ► Pushing the switch / ◄ Releasing the switch

Switches with reset W3 for normal duty applications, FR-FM-FX-FZ-FK series

Travel diagrams

Contact blocks		Group 1	Group 2	Group 3	Group 4
6 1NO+1NC	11 23 12 24	0 1 ⊖3 6 R1	0 1.5 ⊖4.5 8 R1.5	0 2.3 ⊖6.9 13 R2.3	0 15° ⊖40° 75° R15°
9 2NC	11 21 12 22	0 1 ⊖4.4 6 R1	0 1.5 ⊖6.6 8 R1.5	0 2.3 ⊖10.1 13 R2.3	0 15° ⊖59° 75° R15°
10 2NO	13 23 14 24	0 1 6 R 1	0 1.5 8 R 1.5	0 2.3 13 R 2.3	0 15° 75° R 15°
20 1NO+2NC	11 21 33 12 22 34	0 1 ⊖3 6 R1	0 1.5 ⊖4.5 8 R1.5	0 2.3 ⊖6.9 13 R2.3	0 15° ⊖40° 75° R15°
21 3NC	11 21 31 12 22 32	0 1 ⊖3 6 R1	0 1.5 ⊖4.5 8 R1.5	0 2.3 ⊖6.9 13 R2.3	0 15° ⊖40° 75° R15°
22 2NO+1NC	11 23 33 12 24 34	0 1 ⊖3 6 R1	0 1.5 ⊖4.5 8 R1.5	0 2.3 ⊖6.9 13 R2.3	0 15° ⊖40° 75° R15°
33 1NO+1NC	13 21 14 22	0 1 ⊖3 6 R1	0 1.5 ⊖4.5 8 R1.5	0 2.3 ⊖6.9 13 R2.3	0 15° ⊖40° 75° R15°
34 2NC	11 21 12 22	0 1 ⊖3 6 R1	0 1.5 ⊖4.5 8 R1.5	0 2.3 ⊖6.9 13 R2.3	0 15° ⊖40° 75° R15°
2 2x(1NO-1NC)	13 21 43 31 14 22 44 32	0 1 6 R1	0 1.5 8 R1.5	0 2.3 13 R2.3	0 15° 75° R15°

Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Pushing the switch / ◄ Releasing the switch | R travel for reset attachment

Prewired switches FA series

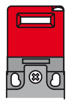
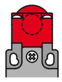
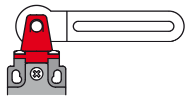
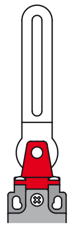
Travel diagrams

Contact blocks		Group 1	Group 2	Group 3	Group 4
41 1NO+1NC	13 21 14 22	0 1.8 5 1.1	0 4.2 9.9 2.3	0 12° 4°	0 22° 70° 8°
45 1NO+1NC	13 21 14 22	0 1.8 ⊖4 5 1	0 4.2 ⊖8 9.9 2	0 13° 3°	0 22° ⊖52° 70° 7°
46 1NO+1NC	13 21 14 22	0 1.3 ⊖2.8 5 3.2	0 2.7 ⊖5.6 9.9 6.8		0 13° ⊖33° 70° 43°
48 1NO+1NC	13 21 14 22	0 1.3 ⊖2.8 5 1.8	0 2.7 ⊖5.6 9.9 4	0° 7° 12°	0 14° ⊖34° 70° 22°

Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Pushing the switch / ◄ Releasing the switch

Switches for safety applications, FR-FM-FX-FZ-FK-FW series

Travel diagrams

Contact blocks		Group 8	Group 9	Group 10	Group 11
5 1NO+1NC	11 23 12 24	0 6.3 ⊖9.3 ∞ 4.6	0 11° ⊖31° 347° 4°	0 10° ⊖25° 180° 3°	90° ⊖25° 10° 0 10° ⊖25° 90° 3° 3°
6 1NO+1NC	13 21 14 22	0 4.7 ⊖7.2 ∞ 7	0 6° ⊖16° 347° 18°	0° 6° ⊖14° 180° 21°	90° 14°⊖ 6° 0° 6° ⊖14° 90° 21° 21°
7 1NO+1NC	11 21 12 22	0 6.6 ⊖9.1 ∞ 5	0° 15° ⊖25° 347° 7°	/	/
9 2NC	11 21 12 22	0 6.5 ⊖9 ∞	0 6° ⊖16° 347°	0 15° ⊖23° 180°	90° ⊖23° 0° ⊖23° 90° 15° 15°
11 2NC	11 21 12 22	0 5.8 ⊖8.8 ∞ 3.9	/	/	/
13 2NC	11 21 12 22	0 3.5 ⊖6 ∞ 6.6 ⊖9.1	/	/	/
14 2NC	11 21 12 22	0 4.8 ⊖7.3 ∞ 7 ⊖9.5	0 5° ⊖15° 347° 17° ⊖27°	/	/
18 1NO+1NC	11 23 12 24	0 5 ⊖7.5 ∞ 5.8	0 6° ⊖16° 347° 8°	0° 5° ⊖13° 180° 8°	90° 13°⊖ 5° 0° 5° ⊖13° 90° 8° 8°
20 1NO+2NC	11 21 33 12 22 34	0 5.3 ⊖7.8 ∞ 5.8	0 6° ⊖16° 347° 9°	0 5° ⊖13° 180° 8°	90° 13°⊖ 5° 0° 5° ⊖13° 90° 8° 8°
21 3NC	11 21 31 12 22 32	0 5.3 ⊖7.8 ∞	0 6° ⊖16° 347°	0 5° ⊖13° 180°	90° 13°⊖ 5° 0° 5° ⊖13° 90°
22 2NO+1NC	11 23 33 12 24 34	0 5.3 ⊖7.8 ∞ 5.8	0 6° ⊖16° 347° 9°	0 5° ⊖13° 180° 8°	90° 13°⊖ 5° 0° 5° ⊖13° 90° 8° 8°
33 1NO+1NC	13 21 14 22	0 5.3 ⊖7.8 ∞ 5.8	0 6° ⊖16° 347° 9°	0 5° ⊖13° 180° 8°	90° 13°⊖ 5° 0° 5° ⊖13° 90° 8° 8°
34 2NC	11 21 12 22	0 5.3 ⊖7.8 ∞	0 6° ⊖16° 347°	0 5° ⊖13° 180°	90° 5° 0° 5° 90° 13°⊖ ⊖13°
37 1NO+1NC	13 21 14 22	0 7.2 ⊖9.7 ∞ 4.5	/	/	/
66 1NC	11 12	0 4.6 ⊖7.1 ∞	0 7° ⊖17° 347'	0 6° ⊖14° 180°	90° 6° 0° 6° 90° 14°⊖ ⊖14°

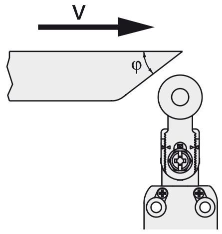
Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Pushing the switch / ◄ Releasing the switch

Modular prewired switches (NA-NB-NF series)

Maximum and minimum actuation speed

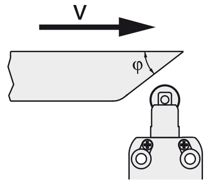
Roller lever - Type 1

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	



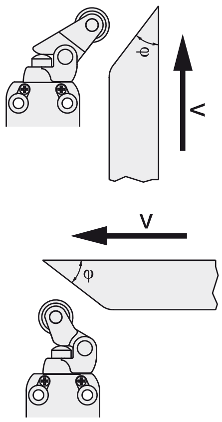
Roller plunger - Type 2

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



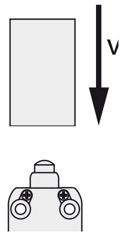
Roller lever - Type 3

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



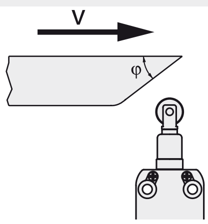
Plunger - Type 4

Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
0,5	1	0,01



Roller plunger - Type 5

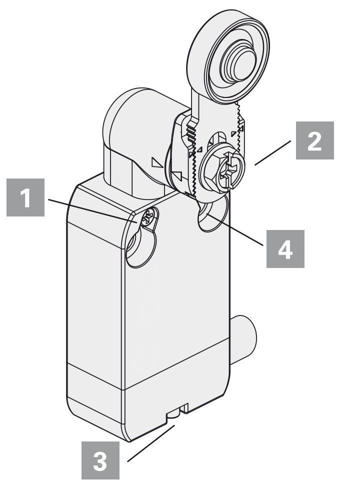
φ	Vmax (m/s)	Vmin (mm/s) L	Vmin (mm/s) R
15°	0,3	4	0,04



Contact type:

R = snap action
L = slow action

Screw tightening torques



For NA and NB series:

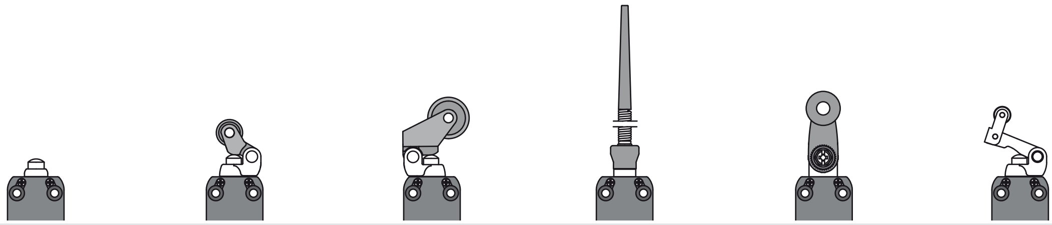
Head screws 1	**0.5 … 0.7 Nm**
Lever screws 2	**0.8 … 1.2 Nm**
Connector screw 3	**0.3 … 0.6 Nm**
M4 body fixing screws 4	**2 … 3 Nm**

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 body fixing screws 4	**2 … 3 Nm**

Modular prewired switches (NA-NB-NF series)

Travel diagrams



Contact blocks	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 in deviation	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

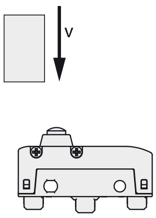
Legend
Closed contact | Open contact | ⊖ Positive opening travel acc. to EN 60947-5-1 | ► Pushing the switch / ◄ Releasing the switch

Microswitches MK series

Maximum and minimum actuation speed

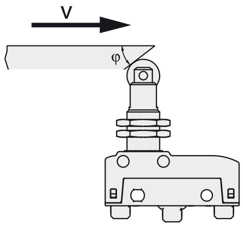
Plunger - Type 1

Vmax (m/s)	Vmin (mm/s)
0,5	0,05



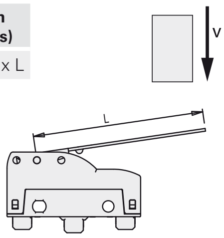
Roller plunger - Type 2

φ	Vmax (m/s)	Vmin (mm/s)
15°	0,6	0,2
30°	0,3	0,1
45°	0,1	0,05



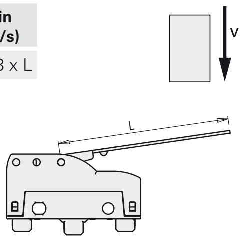
Lever with direct action (D) - Type 3

Vmax (m/s)	Vmin (mm/s)
0,03 x L	0,0166 x L



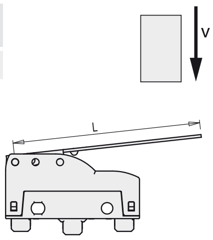
Lever with inverted action (R) - Type 4

Vmax (m/s)	Vmin (mm/s)
0,015 x L	0,0083 x L



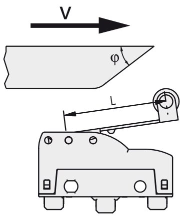
Lever with back direct action (F) - Type 5

Vmax (m/s)	Vmin (mm/s)
0,01 x L	0,0047 x L



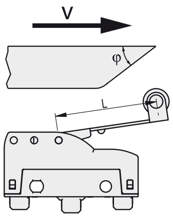
Roller lever with direct action (D) - Type 6

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



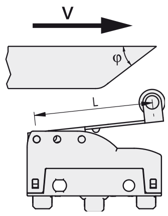
Roller lever with inverted action (R) - Type 7

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

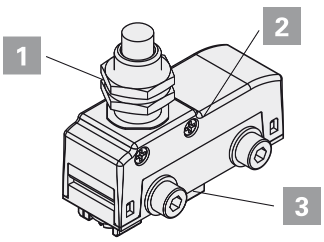


Roller lever with back direct action (F) - Type 8

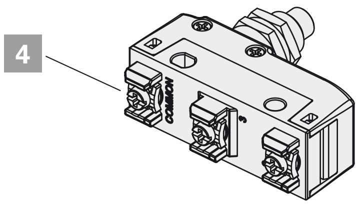
φ	Vmax (m/s)	Vmin (mm/s)
15°	0,032 x L	0,0188 x L
30°	0,016 x L	0,0094 x L
45°	0,01 x L	0,0047 x L



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 prescriptions

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 perforated housing for inserting the wires. In order to guarantee an adequate protection degree of the device, the wiring through the hole must be done with an appropriate sealing that prevents polluting agents from entering. For a correct wiring then the cable glands, fittings, connectors and other means must have the IP protection degree according to EN 60529 equal to or higher than the one 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 entails the cessation of the warranty on the item and relieves the manufacturer of any liability.

Device utilization

- 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 to be operated 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 actuating travel.
- Do not exceed the maximum actuation travel.
- Avoid contact 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 whole device.
- In case the device is deformed or damaged replace it completely. There is no guarantee of working for a deformed or damage device.
- Always attach the following instructions in the manual of the machine where the device is installed
- The preservation of the following instructions for use has to allow their consultation for the whole utilization period of the device.

Wiring and installation

- The installation has to be made by qualified staff.
- Limit the use of these devices to control functions.

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.
- Turn off the power before access to the contacts, also during the wiring.
- Do not paint or varnish the devices.
- It is possible to install the product only on flat and clean surfaces.
- Do not bend or deform the device during installation.
- Do not use the device as a support for other parts of the machine (e.g. wireways, conduits, etc.)
- The device must be fixed to the machine through the holes provided on 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 the installation do not pull the electrical cables connected to the device. If high traction is applied to the cables (not supported by an appropriate cable gland) the device contact block may be damaged.
- During wiring comply with the following requirements:
- Comply with the minimum and maximum sections of electrical conductors admitted by terminals (if present).
- Tighten the electrical terminals with the torque indicated in this catalog (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, terminals, cable numbering systems and any other part do not obstruct the cover from closing correctly or if pressed between them do not damage or compress the internal contact block.
- For the device 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 the 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 is shorter than the maximum travel allowed by the device.
- After installation, periodically check for correct device operation.

Do not use in the following environments:

- Environment where dust and dirt can cover the device and by sedimenting stop its correct working.
- Environment where sudden changes of temperature cause condensation.
- Environment where ice formation on the device is possible.
- Environment where the application causes knocks or vibrations which can damage the device.
- Environment with presence of explosive and inflammable gas or dust.

Utilization limits

- Use the devices following the instructions, complying with their working limits and the standards in force.
- The devices have specific application limits (min. and max. ambient temperature, mechanical endurance, protection degree, utilization categories, etc.). These limits are satisfied by the different devices only if singularly taken and not in combination among them. For further information contact our technical department.
- The utilization implies compliance and acknowledgement of the following standards: EN 60204-1, EN 60947-5-1, ISO 12100, EN ISO 14119.
- Contact our Technical dept. 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 on the following instructions.
  - In nuclear power stations, trains, airplanes, cars, buses, incinerators, medical devices or any application where the safety of two or more persons depend on the correct operation of the device.

Additional prescription for safety applications

Provided that all previous requirements for the devices installed for safety application are fulfilled, further additional prescriptions have to be observed:

- The utilization in any case implies compliance and acknowledgement of the following standards: IEC 60204-1, IEC 60947-5-1,ISO 12100, EN ISO 14119, EN 62061, EN ISO 13849-1, EN ISO 13850.
- Always connect the protection fuse (or equivalent device) 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 doesn't have to be less than one a year.
- After the 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 is shorter than the maximum travel allowed by the device.
- When the device is installed with safety functions, the duration of its use is limited. After 20 years from the date of manufacture, the device must be replaced completely, although still functioning. The production date can be derived from the production lot on the item. Example: A10 FD7-411. The 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.)

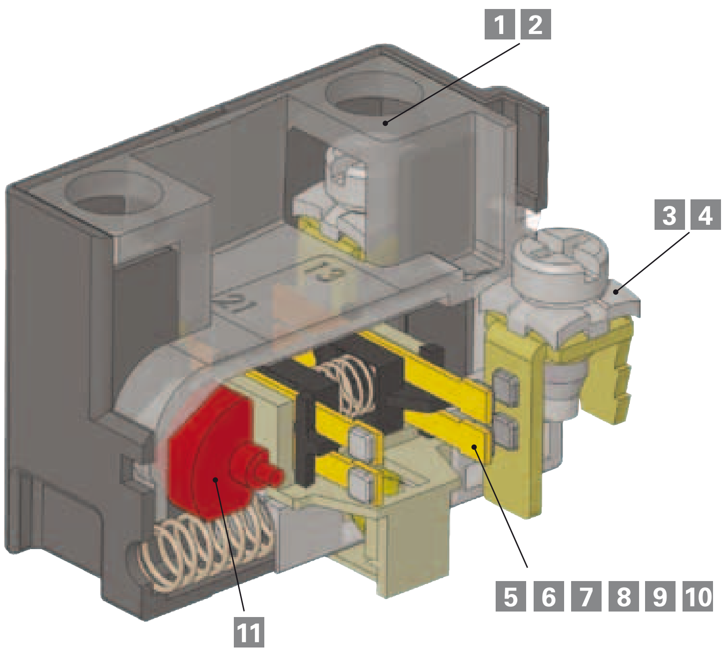
Features

The contact blocks developed by the company Pizzato Elettrica contain the experience gained in 30 years of technological development and in millions of pieces sold. The contact blocks range available shown in this chapter is one of the widest 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 intend to be a selection of all contact blocks, but cannot be used to determine complete characteristics of the switch equipped with that contact block. For example, when a contact block with positive opening is used in a switch with a not rigid actuator, the result is a switch that on the whole is not one with positive opening.

The complete list of contact blocks currently in production is visible on page 315.

On page 253, the features of the electronic contact block E1, which can be used on position switches for a series of surveys, otherwise complex even with electronic sensors, are explained in detail. On the market doesn't exist an electronic sensor that at the same time has the characteristics of operation precision and repeatability, ability of the switching point adjustment, working temperature and price of this unit.



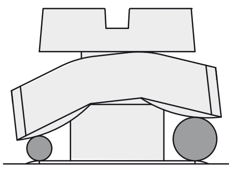
1 Captive screws

Switches with this characteristic have clamping screws that remain in seat 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 a protection degree IP20, in accordance with the standard EN 60529, therefore they are protected against access to dangerous parts with diameter over 12 mm.

3 Clamping screw plates for different diameter cables



These clamping screw plates have a particular "roofing tile" structure and are connected loosely to the clamping screw. In this way, during the wires fixing, the clamping screw plate is able to suit to cables of different diameter (see picture) and tends to tighten the wires toward the screw instead of permitting them to escape towards the outside.

4 Self-lifting clamping screw plates

Switches with this feature have clamping screw plates that go up or down turning the clamping screw, permitting an easy and quick wiring.

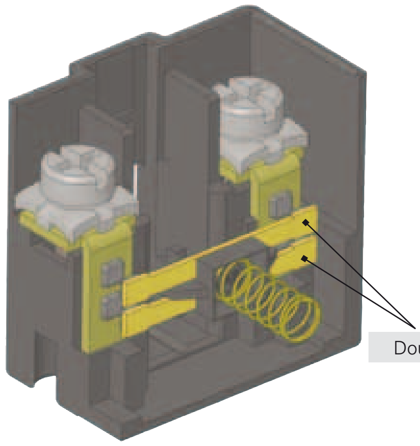
5 Contact material: gold-plated silver alloy

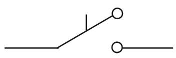
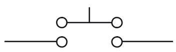
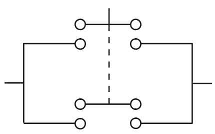
The contact blocks can be supplied with silver electric contacts with a special gold-plated surface, with total gold thickness of one micron. This type of treatment can be useful in environments which are aggressive against silver (very humid or sulphurous atmospheres) and in case of very small electric charges, usually with low voltages and supply currents. The gold thickness used has been studied for resistance to millions of mechanical cycles.

6 Contact technology and reliability

Sometimes, hardly ever, an electric contact may not work. A commutation failure is a typical consequence of an occasional presence of a high resistance on the contacts due to dust, a slight layer of oxidation, or impurity of any kind that remains inside the switch during its wiring. The repeatability of this type of phenomena depends not only on the switch, but also on the environmental working conditions and the type of load the switch drives. These effects are more evident with low electrical loads, when the electric voltage does not succeed in perforating thin layers of oxide or small dust grains.
This type of malfunction may be accepted in the hand-operated devices, because it is enough to repeat the operation in order to make everything work again. This is not the case with position switches, where a failure in a switch could cause considerable damage to the machinery.
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 of the switches: movable contacts with double interruption and twin bridge (type C).
As you can see from the table below, this last structure (type C) features the same contact resistance (*R*) of the simple mobile contact (type A), but with a much lower probability of failure (*fe*).
In fact, defined *x* the probability of a single interruption failure, it results that in the contact type A the commutation failure probability *fe=x*, in the type B *fe* ≅ 2 ξ, whereas in the type C it is *fe* $^{4\cdot x}$*2*
This means that if in a certain situation the probability of a single interruption failure ^{x} is equal, for instance, to 1x10-*4* (1 failed interruption every 10.000) we will have:

- 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	Failure probability fe
A		simple mobile contact	R=Rc	fe=x
B		mobile contact, double interruption	R=2·Rc	$fe=2x-x^2$
C		mobile contact, double interruption, twin bridge	$R=\frac{2\cdot Rc}{2}=Rc$	$fe=4x^2-4x^3+x^4$

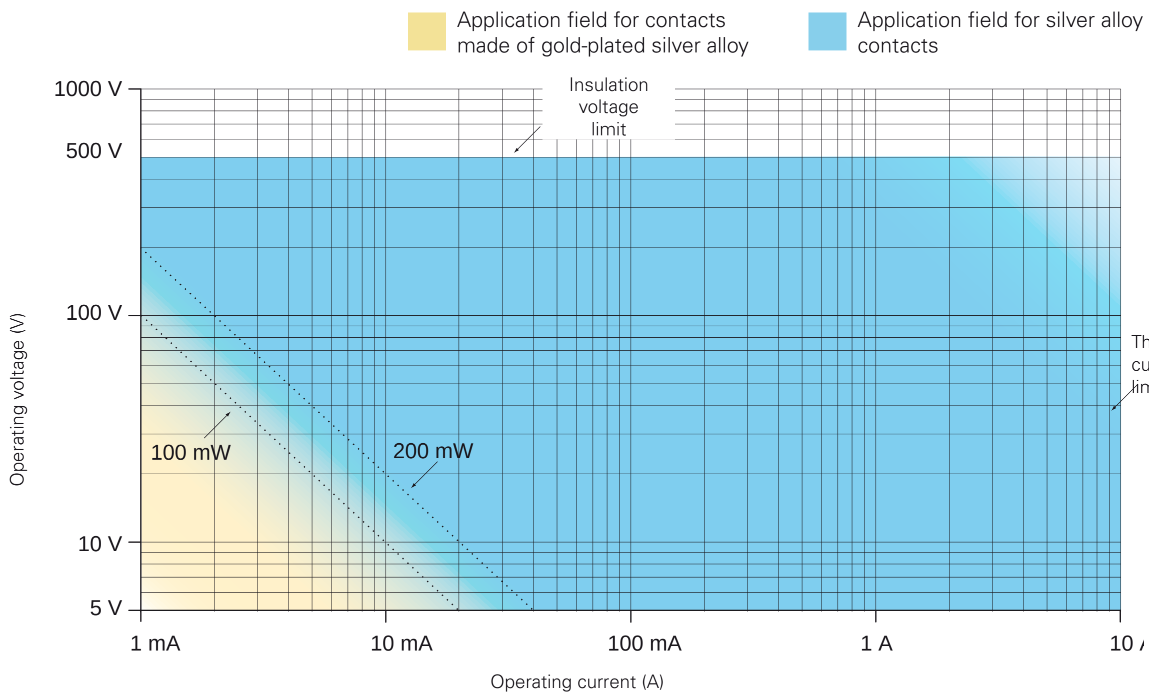
7 Minimum operating voltages and currents for reliable switching

The electric contact reliability depends on a lot of elements that change their effect in accordance with the load type. For high power loads it is essential that the contact should be able to eliminate the heat created during switching. For low power loads, instead, it is important that oxides or other impurities do not obstruct the passing of the electric signal. The choice of the electric contacts material is a compromise between different and sometimes opposing requirements. For position switches contacts a silver alloy is usually used that has proved suited to switching of loads in the range of approximately 1 kW to 0.1 W. Moving below this power range, effects may occur due to the oxide which is created naturally when silver makes contact with the air; just as 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 not possible to define a fix threshold beyond which the "missing switching phenomenon" does not appear, because there are a lot of mechanical end electric parameters that influence this value. For example, a good twin bridge electric contact in laboratory is able to switch without signal loss loads in the µW range for dozens of millions of handling operations. However, this does not mean that the same contact is able to provide the same services when the switch operates in an area with sudden changes of temperature (condensate formation) or with few switchings (oxides formation).

To avoid part of this type of problems, for very low loads are used gold plated contacts, profiting from the non-oxidability of this material. The thickness of the gold-plating should be adequate to be mechanically resistant to switching and to be electrically resistant to possible sparks that may vaporize it. It is for this reason that Pizzato Elettrica uses micron thickness gold plating suitable for millions of working cycles. Gold platings with lower thickness have simply an aesthetic function, suitable only for protection of the product against oxidation when kept in stock for long time.

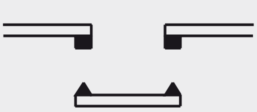
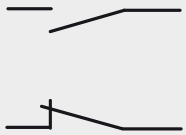
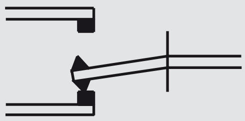
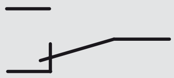
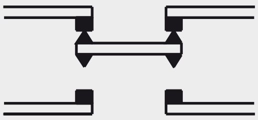
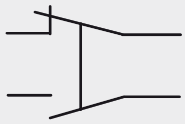
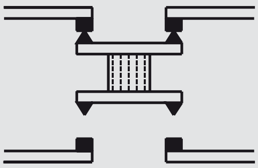
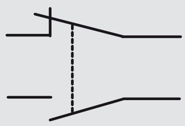
The minimum current and voltage values suggested by Pizzato Elettrica are readable on the diagram below, divided in two areas defined by a steady power limit. These values identify voltage and current combinations with high commutation reliability in most industrial fields. The lower voltage and current limits shown in the diagram are typical minimum values in industrial application that may also be reduced in not generical conditions. It is recommended, however, to always evaluate that the power signal to commutate should be 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, especially with signal powers lower than 10 mW.



100 mW Suggested limit for general applications with snap action contact blocks with silver alloy contacts**.**

200 mW Suggested limit for general applications with snap 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
Symbol "**+**" between contact designs (e.g. X+X, Za+Za, X+X+Y, etc.) indicates the combinations of simple contact blocks **electrically separated** between each other.
The **electrically separated contacts allow** the application of different voltages on the contacts and the connection of loads on different polarities (figure 1).

Prescriptions and restrictions for Za contacts
Electrical loads must be connected to the same phase or polarity. The contacts **are not** electrically separated, connection of different voltages between the NC contact and the NO contact is not allowed (fig. 2 and 3).
Also, as prescribed by the standard EN 60947-5-1 paragraph K.7.1.4.6.1, if Za contacts with positive opening for safety applications are used, the following restrictions have to be adopted:
" If the control accessory has shifting contacts components with design C or Za, **you have to use only one contact component** (closure or cutoff). In case of shifting contact with design Zb, both contacts may be used..."

Zb design contact

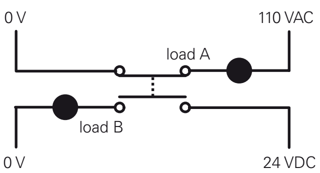


figure 1: **correct**

Za design contact

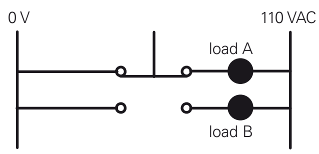


figure 2: **correct**

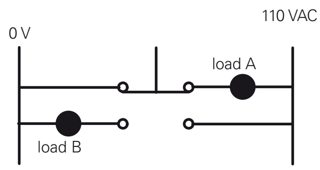
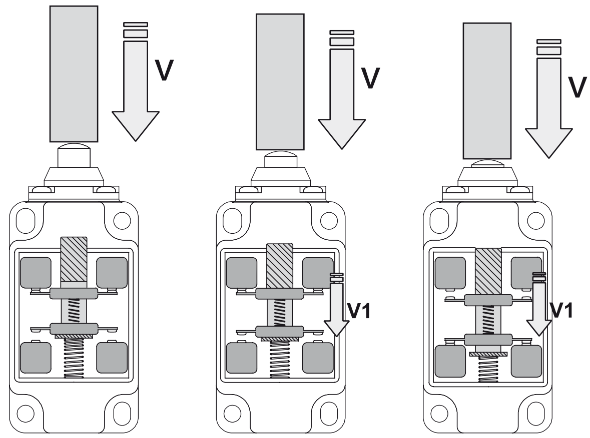


figure 3: **incorrect**

9 Contact block with dependent action: slow action and snap action

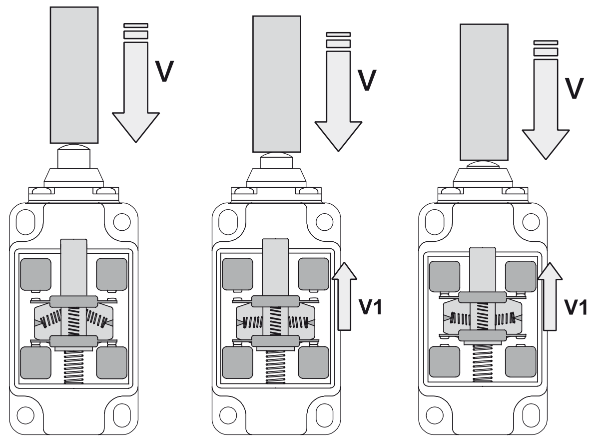
Contact blocks with slow action:: component where the speed of the contact movement (*V1*) depends on the speed of the switch actuation (**V**). The contact armature advances at a rate proportional to the actuation speed.
The slow action contact block is suitable for applications having low to medium currents and quick actuation movements. It has no differential travel.

V = V1



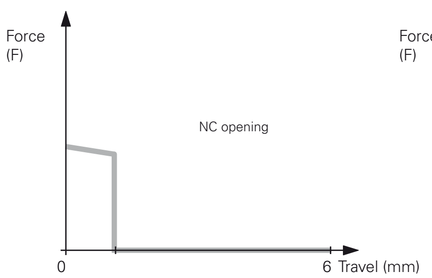
Contact block with snap action: component where the speed of the contact movement (**V1**) doesn't depend on the speed of the switch actuation (**V**). After reaching a predetermined point in travel, the contact armature snaps causing the contacts switching.
The snap action contact block is suitable for applications having high currents and/or slow actuation movements. This kind of contact block has a differential travel.

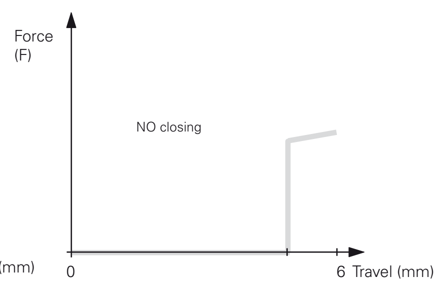
V ≠ V1

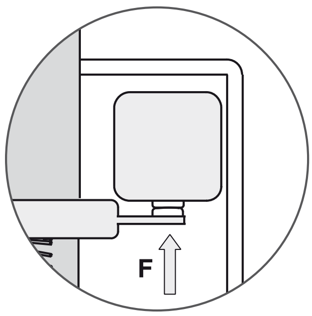


10 Contact block: diagrams of the force on the contacts

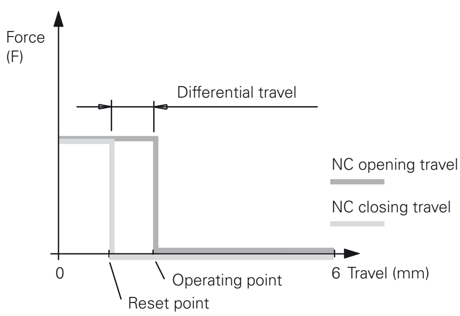
The following diagrams shows the relationship between of the force exerted on the contacts (**F**) compared to the switch armature travel.



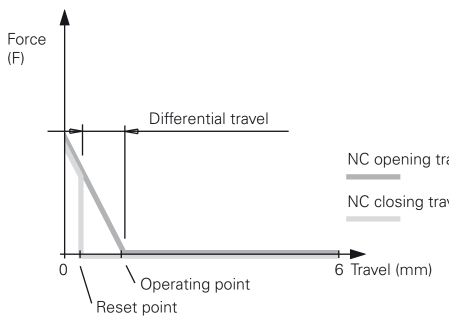




Contact blocks with slow action

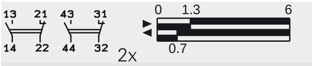
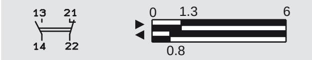
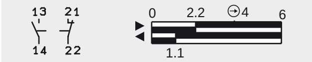
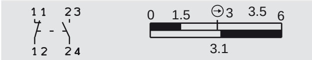
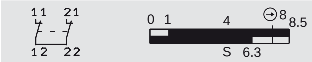
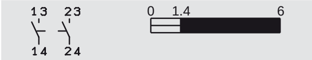
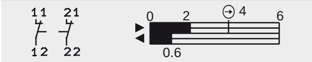
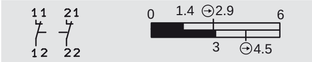
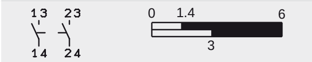
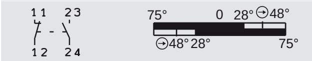
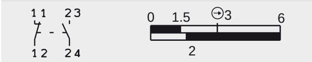
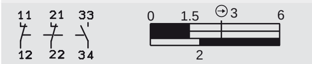
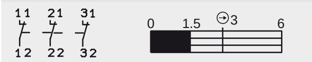
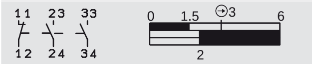
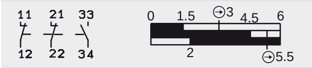
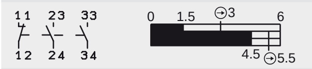
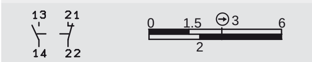
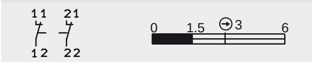
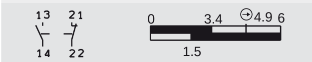
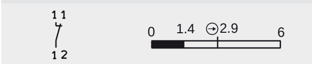
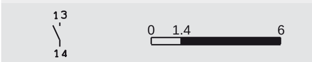


Contact blocks with snap action and constant pressure 5, 11, 12. The pressure on the contact remains constant while approaching to the snap point.



Contact blocks with snap action 2, 3, 17
The pressure on the contact decreases while approaching to the snap point.

Contact blocks FD-FP-FL-FC-FR-FM-FX-FZ-FK-FW-FS series

Contact blocks		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	Available
6	1NO+1NC		Zb	slow action	yes	Double interruption, twin bridge	yes	yes	Available
7	1NO+1NC		Zb	slow action	yes	Double interruption, twin bridge	yes	yes	Available
8	1NC		Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
9	2NC		Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
10	2NO		X+X	slow action	no	Double interruption, twin bridge	yes	yes	Available
11	2NC		Y+Y	snap action	yes	Double interruption, twin bridge	yes	yes	Available
12	2NO		X+X	snap action	no	Double interruption, twin bridge	yes	yes	Available
13	2NC		Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
14	2NC		Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
15	2NO		X+X	slow action	no	Double interruption, twin bridge	yes	yes	Available
16	2NC		Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
18	1NO+1NC		Zb	slow action	yes	Double interruption, twin bridge	yes	yes	Available
20	1NO+2NC		Y+Y+X	slow action	yes	Double interruption, twin bridge	yes	yes	Available
21	3NC		Y+Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
22	2NO+1NC		Y+X+X	slow action	yes	Double interruption, twin bridge	yes	yes	Available
28	1NO+2NC		Y+Y+X	slow action	yes	Double interruption, twin bridge	yes	yes	Available
29	3NC		Y+Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
30	3NC		Y+Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
33	1NO+1NC		Zb	slow action	yes	Double interruption, twin bridge	yes	yes	Available
34	2NC		Y+Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
37	1NO+1NC		Zb	slow action	yes	Double interruption, twin bridge	yes	yes	Available
66	1NC		Y	slow action	yes	Double interruption, twin bridge	yes	yes	Available
67	1NO		X	slow action	no	Double interruption, twin bridge	yes	yes	Available
E1	1NO-1NC		PNP	electronic	no	electronic	no	no	/

Contact blocks FG series

Contact blocks	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			slow action	yes	With double interruption and twin bridge and double support	yes	yes	Available

Contact blocks NA-NB-NF series

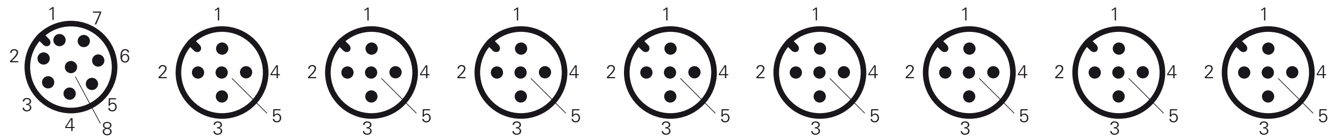
Contact blocks		Contact diagram	Linear travel diagram	Contact design	Operation type	Positive opening	Contact type	Captive screws	Terminals with finger protection	Gold-plated contacts
B11	1NO+1NC		0 1.5 4 5 / 0.9	Zb	snap action	yes	Double interruption	/	/	Available
B02	2NC		0 1.5 4 5 / 0.9	Y+Y	snap action	yes	Double interruption	/	/	Available
B12	1NO+2NC		0 1.5 4 5 / 0.9	X+Y+Y	snap action	yes	Double interruption	/	/	Available
B22	2NO+2NC		0 1.5 4 5 / 0.9	X+X+Y+Y	snap action	yes	Double interruption	/	/	Available
G11	1NO+1NC		0 1.4 2.9 5 / 3.1	Zb	slow action	yes	Double interruption	/	/	Available
G02	2NC		0 1.4 2.9 5	Y+Y	slow action	yes	Double interruption	/	/	Available
G12	1NO+2NC		0 1.4 2.9 5 / 3.1	X+Y+Y	slow action	yes	Double interruption	/	/	Available
G22	2NO+2NC		0 1.4 2.9 5 / 3.1	X+X+Y+Y	slow action	yes	Double interruption	/	/	Available
H11	1NO+1NC		0 1.4 2.9 5 / 1	Zb	slow action	yes	Double interruption	/	/	Available
H12	1NO+2NC		0 1.4 2.9 5 / 1	X+Y+Y	slow action	yes	Double interruption	/	/	Available
H22	2NO+2NC		0 1.4 2.9 5 / 1	X+X+Y+Y	slow action	yes	Double interruption	/	/	Available
L11	1NO+1NC		0 1.4 2.9 5 / 1.8	Zb	slow action	yes	Double interruption	/	/	Available
L12	1NO+2NC		0 1.4 2.9 5 / 1.8	X+Y+Y	slow action	yes	Double interruption	/	/	Available
L22	2NO+2NC		0 1.4 2.9 5 / 1.8	X+X+Y+Y	slow action	yes	Double interruption	/	/	Available
BA1	1NO+1NC in deviation		0 1.5 4 5 / 0.9	C	snap action	yes	Double interruption	/	/	Available

Contact blocks HP series

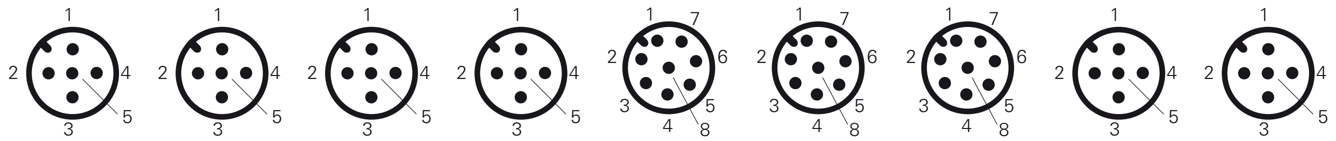
Contact blocks		Contact diagram	Linear travel diagram	Contact design	Operation type	Positive opening	Contact type	Captive screws	Terminals with finger protection	Gold-plated contacts
50C	1NO+1NC		0 4° 8° 180° / 1.5°	Zb	snap action	yes	Double interruption	/	/	Available
50D	2NC		0 4° 8° 180° / 1.5°	Y+Y	snap action	yes	Double interruption	/	/	Available
50 F	1NO+2NC		0 4° 8° 180° / 1.5°	X+Y+Y	snap action	yes	Double interruption	/	/	Available
50M	2NO+2NC		0 4° 8° 180° / 1.5°	X+X+Y+Y	snap action	yes	Double interruption	/	/	Available
52C	1NO+1NC		0 3° 7° 180° / 5°	Zb	slow action	yes	Double interruption	/	/	Available
52D	2NC		0 3° 7° 180°	Y+Y	slow action	yes	Double interruption	/	/	Available
52 F	1NO+2NC		0 3° 7° 180° / 5°	X+Y+Y	slow action	yes	Double interruption	/	/	Available
52M	2NO+2NC		0 3° 7° 180° / 5°	X+X+Y+Y	slow action	yes	Double interruption	/	/	Available
53C	1NO+1NC		0 3° 7° 180° / 1°	Zb	slow action	yes	Double interruption	/	/	Available
53 F	1NO+2NC		0 3° 7° 180° / 1°	X+Y+Y	slow action	yes	Double interruption	/	/	Available
53M	2NO+2NC		0 3° 7° 180° / 1°	X+X+Y+Y	slow action	yes	Double interruption	/	/	Available

Connection diagram for assembled connectors

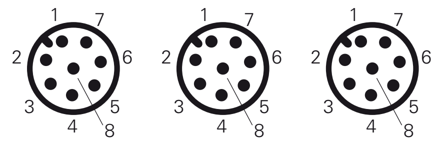
For FD - FL - FM - FZ - FC series with metal housing



Contact block 2 1NO-1NC+1NO-1NC		Contact block 5 1NO+1NC		Contact block 6 1NO+1NC		Contact block 7 1NO+1NC		Contact block 9 2NC		Contact block 10 2NO		Contact block 11 2NC		Contact block 12 2NO		Contact block 13 2NC	
M12 connector, 8 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles	
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.**
NO	3-4	NC	1-2	NC	1-2	NC	1-2	NC	1-2	NO	1-2	NC	1-2	NO	1-2	NC (1°)	1-2
NC	5-6	NO	3-4	NO	3-4	NO	3-4	NC	3-4	NO	3-4	NC	3-4	NO	3-4	NC (2°)	3-4
NC	7-8	ground	5	ground	5	ground	5	ground	5	ground	5	ground	5	ground	5	ground	5
NO	1-2																

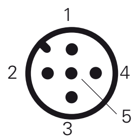


Contact block 14 2NC		Contact block 15 2NO		Contact block 16 2NC		Contact block 18 1NO+1NC		Contact block 20 2NC+1NO		Contact block 21 3NC		Contact block 22 1NC+2NO		Contact block 33 1NC+1NO		Contact block 34 2NC	
M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 5 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 5 poles		M12 connector, 5 poles	
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.**
NC (1°)	1-2	NO (1°)	1-2	NC, lever at the right	1-2	NC	1-2	NC	3-4	NC	3-4	NC	3-4	NC	1-2	NC	1-2
NC (2°)	3-4	NO (2°)	3-4	NC, lever to the left	3-4	NO	3-4	NC	5-6	NC	5-6	NO	5-6	NO	3-4	NC	3-4
ground	5	ground	5	ground	5	ground	5	NO	7-8	NC	7-8	NO	7-8	ground	5	ground	5
								ground	1	ground	1	ground	1				



Contact block 28 2NC+1NO		Contact block 29 3NC		Contact block 30 3NC	
M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles	
Contacts	**Pin no.**	**Contacts**	**Pin no.**	**Contacts**	**Pin no.**
NC	3-4	NC	3-4	NC	3-4
NC	5-6	NC	5-6	NC	5-6
NO	7-8	NC	7-8	NC	7-8
ground	1	ground	1	ground	1

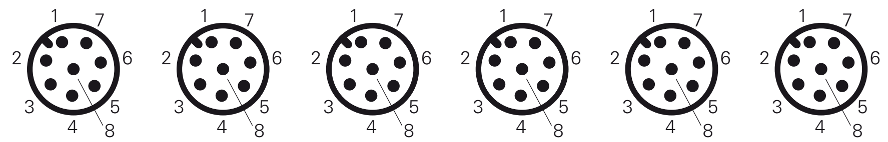
Contact block E1
PNP



M12 connector, 5 poles

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

For FS series with technopolymer housing

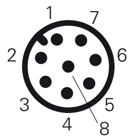


Contact block 18 1NO+1NC		Contact block 20 2NC+1NO		Contact block 21 3NC		Contact block 28 2NC+1NO		Contact block 29 3NC		Contact block 30 3NC	
M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles		M12 connector, 8 poles	
Contacts	**Pin 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
NC	3-4	NC	3-4	NC	3-4	NC	3-4	NC	3-4	NC	3-4
NO	5-6	NC	5-6	NC	5-6	NC	5-6	NC	5-6	NC	5-6
		NO	7-8	NC	7-8	NO	7-8	NC	7-8	NC	7-8

Connection diagram for assembled connectors

For FP - FR - FX - FW series with technopolymer housing

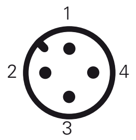
Contact block 2
1NO-1NC+1NO-1NC



M12 connector, 8 poles

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

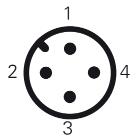
Contact block 5
1NO+1NC



M12 connector, 4 poles

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

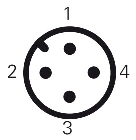
Contact block 6
1NO+1NC



M12 connector, 4 poles

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

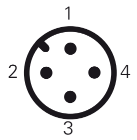
Contact block 7
1NO+1NC



M12 connector, 4 poles

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

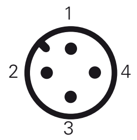
Contact block 9
2NC



M12 connector, 4 poles

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

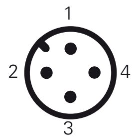
Contact block 10
2NO



M12 connector, 4 poles

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

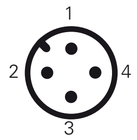
Contact block 11
2NC



M12 connector, 4 poles

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

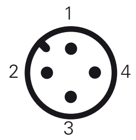
Contact block 12
2NO



M12 connector, 4 poles

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

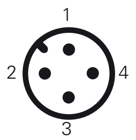
Contact block 13
2NC



M12 connector, 4 poles

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

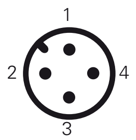
Contact block 14
2NC



M12 connector, 4 poles

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

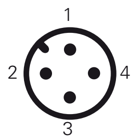
Contact block 15
2NO



M12 connector, 4 poles

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

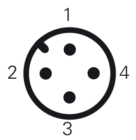
Contact block 16
2NC



M12 connector, 4 poles

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

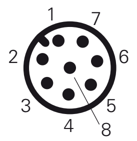
Contact block 18
1NO+1NC



M12 connector, 4 poles

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

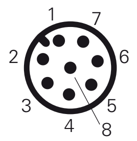
Contact block 20
2NC+1NO



M12 connector, 8 poles

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

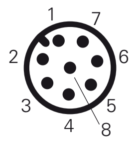
Contact block 21
3NC



M12 connector, 8 poles

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

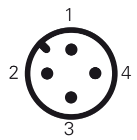
Contact block 22
1NC+2NO



M12 connector, 8 poles

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

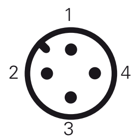
Contact block 33
1NC+1NO



M12 connector, 4 poles

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

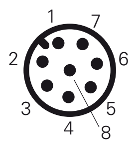
Contact block 34
2NC



M12 connector, 4 poles

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

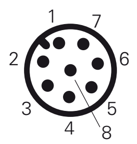
Contact block 28
2NC+1NO



M12 connector, 8 poles

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

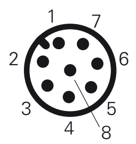
Contact block 29
3NC



M12 connector, 8 poles

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

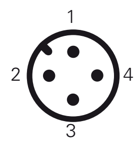
Contact block 30
3NC



M12 connector, 8 poles

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

Contact block E1
PNP

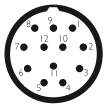


M12 connector, 4 poles

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

For FG series with metal housing and M23 connector

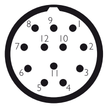
Contact block
60A
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

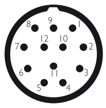
Contact block
60B
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10
ground	11

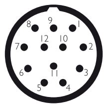
Contact block
60C
4NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

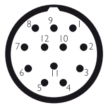
Contact block
60D
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

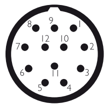
Contact block
60E
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10
ground	11

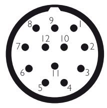
Contact block
60F
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

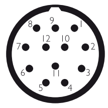
Contact block
60G
4NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

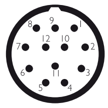
Contact block
60H
4NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

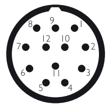
Contact block
60I
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10
ground	11

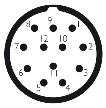
Contact block
60L
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

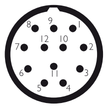
Contact block
60M
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

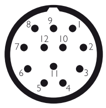
Contact block
60N
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

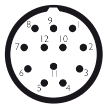
Contact block
60P
4NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

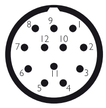
Contact block
60R
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

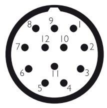
Contact block
60S
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

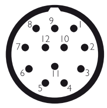
Contact block
60T
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10
ground	11

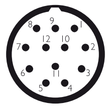
Contact block
60U
4NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

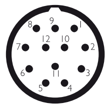
Contact block
60V
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

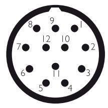
Contact block
60X
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NC	7-8
NC	9-10
ground	11

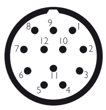
Contact block
60Y
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

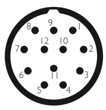
Contact block
61A
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10
ground	11

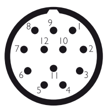
Contact block
61B
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

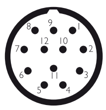
Contact block
61C
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

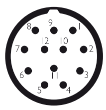
Contact block
61D
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

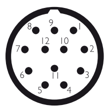
Contact block
61E
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

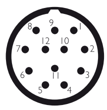
Contact block
61G
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

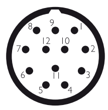
Contact block
61H
2NO+2NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

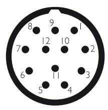
Contact block
61M
3NO+1NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

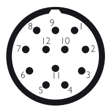
Contact block
61R
1NO+3NC



M23 connector
12 poles

Contacts	Pin no.
A1-A2	1-2
NC	3-4
NC	5-6
NC	7-8
NO	9-10
ground	11

Contact block
61S
3NO+1NC

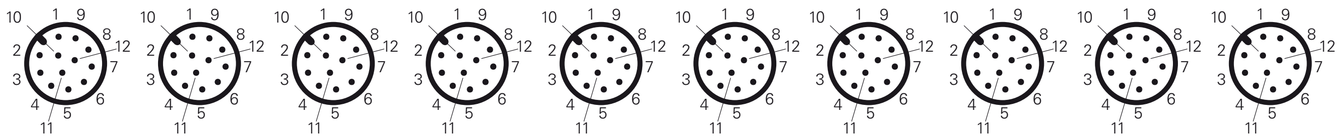


M23 connector
12 poles

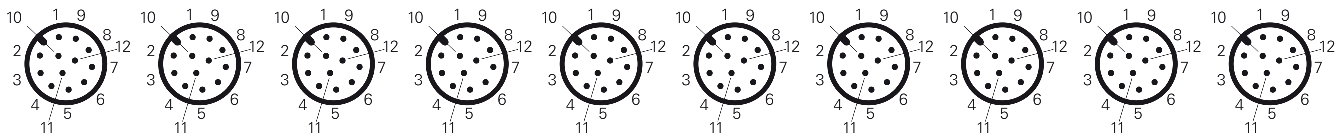
Contacts	Pin no.
A1-A2	1-2
NO	3-4
NC	5-6
NO	7-8
NO	9-10
ground	11

For FG series with metal housing and M12 connector

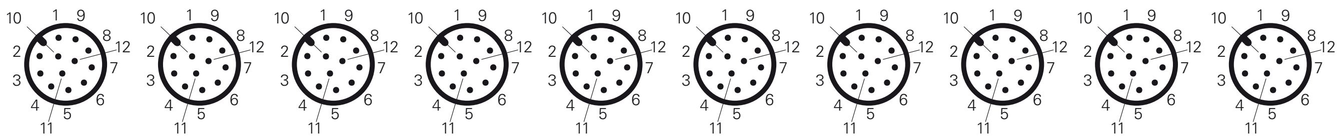
	Contact block 60A 2NO+2NC	Contact block 60B 1NO+3NC	Contact block 60C 4NC	Contact block 60D 1NO+3NC	Contact block 60E 1NO+3NC	Contact block 60F 2NO+2NC	Contact block 60G 4NC	Contact block 60H 4NC	Contact block 60I 1NO+3NC	Contact block 60L 2NO+2NC
	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles
Pin no.	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**
1-2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2
3-4	NC	NC	NC	NO	NC	NC	NC	NC	NC	NC
5-6	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
7-8	NO	NC	NC	NC	NC	NO	NC	NC	NC	NO
9-10	NO	NO	NC	NC	NO	NO	NC	NC	NO	NO



	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
	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles
Pin no.	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**
1-2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2
3-4	NO	NO	NC	NC	NC	NC	NC	NC	NO	NC
5-6	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
7-8	NO	NO	NC	NO	NO	NC	NC	NO	NC	NO
9-10	NO	NO	NC	NO	NO	NO	NC	NO	NC	NO



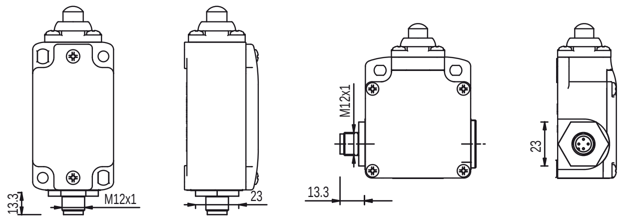
	Contact block 61A 1NO+3NC	Contact block 61B 2NO+2NC	Contact block 61C 3NO+1NC	Contact block 61D 3NO+1NC	Contact block 61E 3NO+1NC	Contact block 61G 3NO+1NC	Contact block 61H 2NO+2NC	Contact block 61M 3NO+1NC	Contact block 61R 1NO+3NC	Contact block 61S 3NO+1NC
	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles	M12 connector 12 poles
Pin no.	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**	**Contacts**
1-2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2	A1-A2
3-4	NC	NC	NO	NO	NO	NO	NC	NO	NC	NO
5-6	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
7-8	NC	NO	NO	NO	NO	NO	NO	NO	NC	NO
9-10	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO



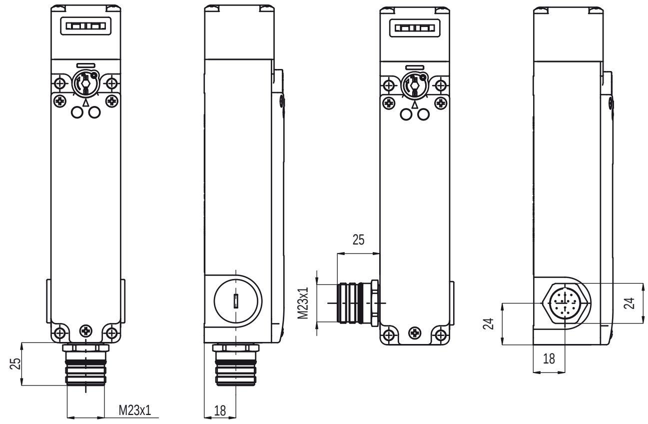
Note: the wires connected to pins 11 and 12 of the M12 connector can be used to activate the LEDs in FG series configurations with freely connectable LEDs.

Outline dimension with assembled connectors

Switch with M12 connector mounted below	Switch with M12 connector, mounted at the right, at the left, or below	Switch with M23 connector mounted below	Switch with M23 connector, mounted at the right or left



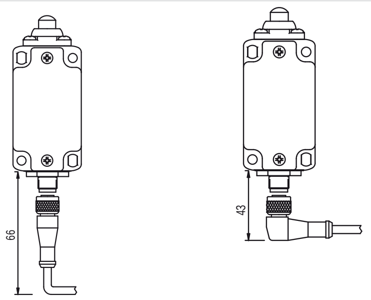
FD - FP - FL - FC - FR - FM - FX - FZ - FW - FS - FG - NG series

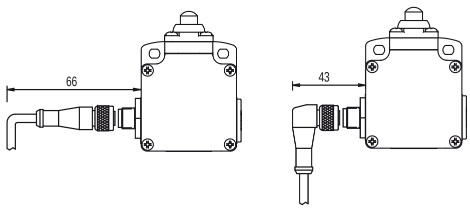


FG - NG series

Minimum distances required for insertion of the connectors

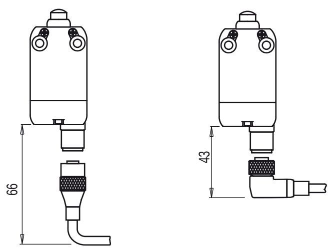
Switch with M12 connector mounted below	Switch with M12 connector, mounted at the right or left

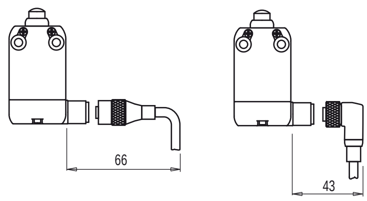




FD - FP - FL - FC - FR - FM - FX - FZ - FW - FS - FG - NG series

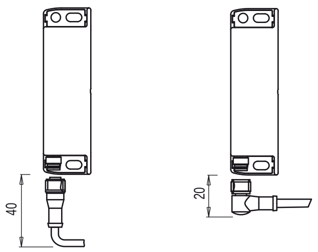
Switch with M12 connector, at bottom	Switch with M12 connector, at the right





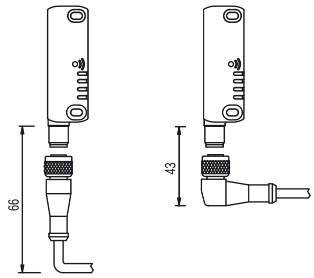
NA - NB - NF series

Sensor with M8 connector



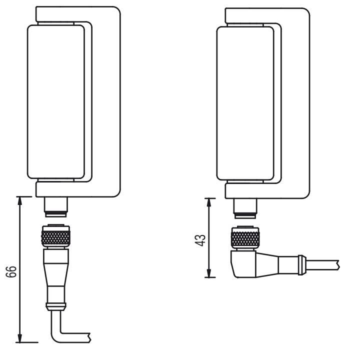
SR series

Sensor with M12 connector



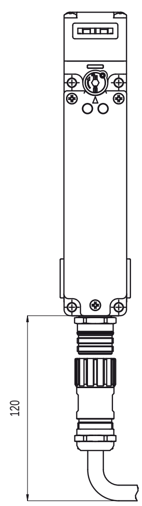
ST series

Hinge with M12 connector

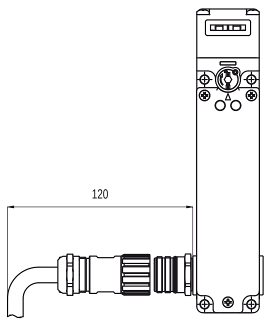


HP - HX series

Switch with M23 connector
mounted below



Switch with M23 connector,
mounted at the right or left



FG - NG series

1- Foreword

Purpose of this section is to provide the machine manufacturer with a quick introduction on some standards related to machine safety, to clarify some basic principles and to provide some application examples. This brief guide refers only to the aspects related to the Functional Safety of the machine, that is all the measures aimed at protecting the machinery operator from the risks arising by their operation, and at aspects relating to the design and selection of interlock devices for guards.
It does not mention risks due to other hazards as for example electric energy presence, pressure containers, explosive atmospheres etc. which anyhow shall be evaluated by the machine manufacturer.
This document has been prepared by Pizzato Elettrica best knowledge, considering the standards and interpretations and the existent technologies in year 2015. Since some of the directives are being applied for the first time in these months it cyeart be excluded that in the meantime further directives or interpretations by the official bodies will modify the evaluations provided in this document. Therefore the examples here reported must be always evaluated by the final user according to the technology/directive progress report and they do not relieve users of their own responsibilities. Pizzato Elettrica does not take any responsibility on the reported examples and does not exclude the possibility of involuntary data errors nor inaccuracy.

2 -Design in safety. The European standards structure.

In order to be freely marketed in the countries of the European Community every device or machinery must comply with Community Directives. They establish the general principles in order for the manufacturer not to place on the market hazardous products for operators. The products and different possible hazards as a whole are very wide, that's why throughout the time many different directives have been issued. As an example we quote the low voltage directive 2006/95/EC, the explosive atmosphere directive 2014/34/UE, the electromagnetic compatibility directive 2004/108/EC, etc. Any hazard due to machinery functioning is governed by Machinery Directive 2006/42/EC.
The conformity to directives is certified by the manufacturer's issue of the Conformity Declaration and by the application of the CE marking on the machine itself.

For the risks assessment of the machine and realization of safety systems to protect the operator from those risks, the European Committees for Standardization CEN and CENELEC have issued a series of standards which translate into technical requirements the contents of directives. The standards published on the Official Journal of the European Union are to be intended as harmonized. The manufacturer who applies those standards to certify his own machineries has a presumption of conformity to the directives.

The machine safety standards are divided into three types: A, B and C.
Type A standards: give basic concepts, principles for design and general aspects that can be applied to machinery.
Type B standards: deal particularly with one or more aspects concerning the safety and they are also divided into:
• B1: standards concerning some safety aspects (e.g. safety distances, temperatures, noise, etc.)
• B2: standards concerning safety devices (e.g. two-hand controls, interlocking devices, etc.)
Type C standards: deal with detailed safety requirements for particular groups of machines (e.g. hydraulic presses, injection machineries,…).

The manufacturer of devices or machineries must first verify if the product is covered by a type C standard. If so, the standard gives the safety requirements, otherwise type B standards for any specific aspect or device of the product shall apply. Failing further requirements, the manufacturer shall follow general guidelines stated in type A standards.

TYPE A STANDARDS
for example:

EN ISO 12100. Safety of machinery - General design principles - Risk assessment and risk reduction.

TYPE B1 STANDARDS
for example:

EN 62061. Functional safety of safety-related electrical, electronic and programmable electronic control systems.
EN ISO 13849-1 and -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 for guards
EN 60204-1. Electrical equipment of machines
EN 60947-5-1. Electromechanical control devices.

TYPE C STANDARDS
for example:

EN 201. Machinery for rubber and plastic material - Injection machines
EN 415-1. Safety of wrapping machines
EN 692. Mechanical presses
EN 693. Hydraulic presses
EN 848-1. Safety of wood-working machines – Miller on one single side with rotating tool – Part 1: Single-shaft vertical miller (router)

3 - Designing safe machines. Risks analysis.

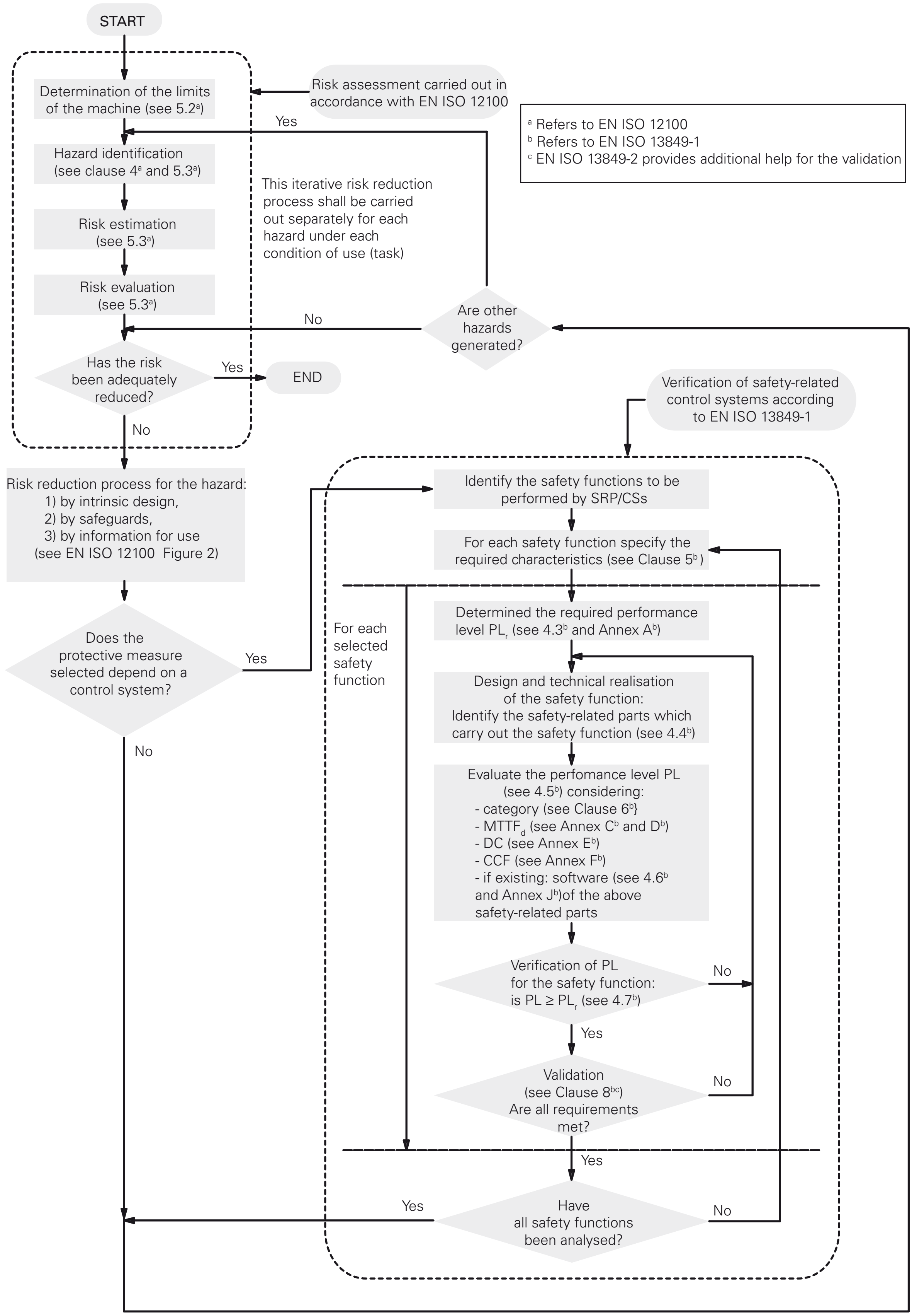
The first step to build a safe machine is to identify all possible hazards to which the machine operators are exposed. The hazards identification and classification allow to define the risks for the operator, that is the combination of the possibility that the hazard occurs and the type of possible injury for the operator.

The methodology of risk analysis and assessment, of procedures for their reduction, is defined by standard EN ISO 12100. This contains a cyclic analysis model such that, once the initial objectives are agreed, the analysis of risks and possible solutions to reduce these risks are repeatedly evaluated until the objectives are met.

The model introduced by this standards provides for proceeding with the risks reduction/elimination after an analysis through a process as follows:
1) risks elimination at the origin, through the system structure and the use of inherently safe design principles
2) risks reduction by safeguarding and control systems
3) manifestation of residual risks by informing the users

Since each machinery presents hazards and it's not possible to completely eliminate all possible risks, the objective is to reduce the machinery risks to residual acceptable levels.

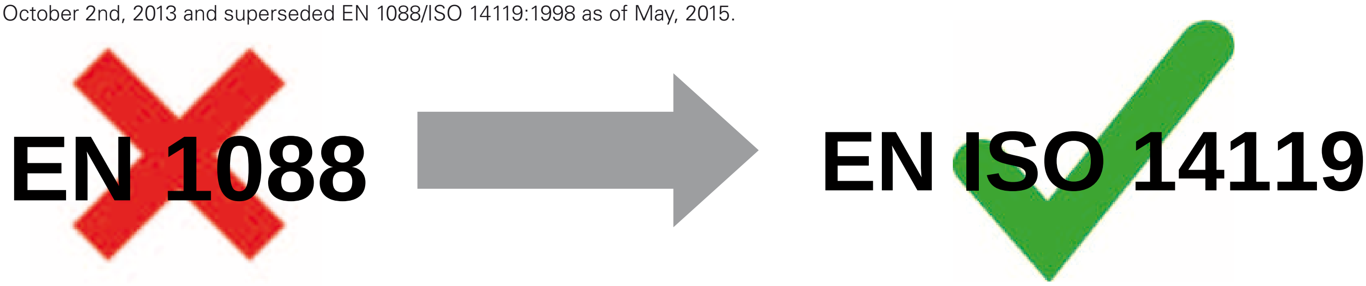
In case the risk is reduced through a control system, EN ISO 13849-1 comes into play which provides an evaluation model of the quality system. This way, for a specific level risk it's possible to use a safety function of equal or superior level.



Note: This figure has been obtained by the combination of figures 1 and 3 of EN 13849-1. The original tests are in English.

4- Design and selection of interlocking devices associated with guards (EN ISO 14119)

New European standard EN ISO 14119 "Interlocking devices associated with guards – Principles for design and selection" came into force on October 2nd, 2013 and superseded EN 1088/ISO 14119:1998 as of May, 2015.



The standard involves machine designers as well as the interlock device manufacturers (and system integrators), providing requirements for the creation of the device and its correct installation.
The standard highlights some little clear aspects and considers additional technologies used for interlocking devices; defines some parameters (actuator type and level of coding) and regulates the specifications for correct installation, so as to increase the protection against guard manipulation.
The standard also considers other aspects related to interlocking device (e.g. guard locking principle, electromagnetic lock, auxiliary release, escape and emergency release, etc.) which are not detailed here.

Coding level of the actuators

An important change introduced by the standard is the definition ofa coded actuator and the classification of the level of coding:
• **coded actuator** – actuator especially designed to actuate a specific interlocking device;
• **low level coded actuator** – actuator for which 1 to 9 variations in code are available
(e.g. the magnetic sensors SR series or the safety switches with separate actuator FS, FG, FR, FD…);
• **medium level coded actuator** - actuator for which 10 to 1000 variations in code are available;
• **high level coded actuator** - actuator for which more than 1000 variations in code are available
(e.g. the sensors of the SX series with RFID technology or the interlocking devices NG series with RFID technology and guard locking)

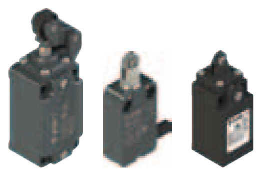
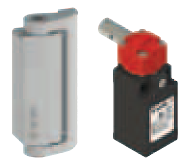
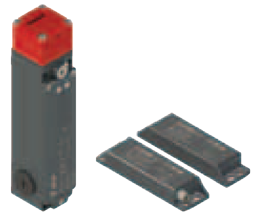
Types of interlocking devices

Standard EN ISO 14119 defines different types of interlocking devices:
• **Interlocking device type 1** - mechanical actuation by uncoded actuator
(e.g. hinge interlocking devices HP series)
• **Interlocking device type 2** - mechanical actuation by coded actuator
(e.g. safety switches with separate actuator of the FR, FS, FG, … series)
• **Interlocking device type 3** - non-contact actuation by uncoded actuator
• **Interlocking device type 4** - non-contact actuation by coded actuator
(e.g. RFID safety sensors ST and NG series)

Examples of actuation principle		Actuator examples		Type
Mechanical	Direct contact/force	Not encoded	Rotating cam	Type 1
			Linear cam	
			Hinge	
		Encoded	Key actuated	Type 2
			Trapped key	
Without contact	Inductive	Not encoded	Ferromagnetic material	Type 3
	Magnetic		Magnet, solenoid	
	Capacitive		Any suitable object	
	Ultrasounds		Any suitable object	
	Optical		Any suitable object	
	Magnetic	Encoded	Magnetically coded	Type 4
	RIFD		RFID, encoded	
	Optical		Optical, encoded	

Excerpt from EN ISO 14119 - Table 1

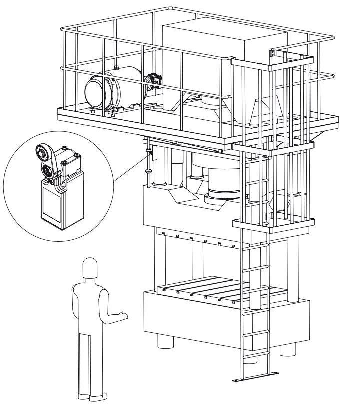
Requirements for the design and the installation of interlocking devices according to EN ISO 14119 to reduce defeating of guards.

<table>
<tr><td rowspan="3">Principles and measures against defeating</td><td colspan="2">Type 1 device</td><td rowspan="2">Type 2 and type 4 devices (low level coded actuators)</td><td rowspan="2">Type 2 and type 4 devices (high level coded actuators)</td></tr>
<tr><td>Rotary or linear cam safety switches</td><td>Hinge safety switches</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Installation out of reach (1)</td><td rowspan="5">X</td><td></td><td rowspan="4">X</td><td></td></tr>
<tr><td>Shielding, physical obstruction (2)</td><td></td><td></td></tr>
<tr><td>Installation in hidden position (3)</td><td></td><td></td></tr>
<tr><td>Status monitoring or cyclic testing (4)</td><td></td><td></td></tr>
<tr><td>Non-detachable fixing of device and actuator</td><td></td><td></td><td></td></tr>
<tr><td>Non-detachable fixing of device</td><td></td><td>M</td><td></td><td></td></tr>
<tr><td>Non-detachable fixing of actuator</td><td></td><td>M</td><td>M</td><td>M</td></tr>
<tr><td>Additional interlocking device and plausibility check</td><td>R</td><td></td><td>R</td><td></td></tr>
</table>

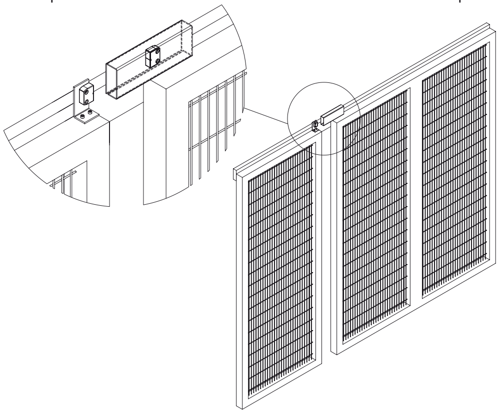
Excerpt from EN ISO 14119 - Table 3

X: obligation to apply at least one of the measures listed in the "Principles and measures to prevent circumvention" column
M: obligatory measure
R: recommended measure

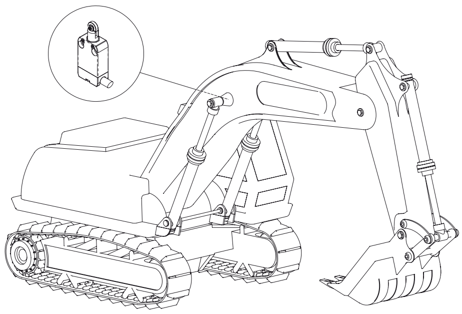
It is obvious that in order to meet all the requirements of EN ISO 14119, it is easier to use devices with RFID technology with a high level of coding and hinge switches, as it is necessary to fulfil only a few requirements in order to prevent circumvention of the devices themselves.
Devices with low or medium coding levels require additional measures to ensure an adequately robust application to counteract tampering.



(1) - Installation out of reach



(2) - Shielding, physical obstruction



(3) - Installation in hidden position

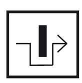
(4) – A status monitoring can be made for example in a machine where the working cycle is easily predictable, so as to verify that at the end or during specific phases of the working cycle the guards are actually open (e.g. to remove the processed material or to make quality controls); in case the system control does not detect the guard opening actions, an alarm is generated and the machine stopped.

Guard locking devices and holding force

The manufacturer of the guard locking device shall ensure that in the engage position, the guard locking device withstands at least the specified holding force F_{Zh}. This force shall be at the most equal to the maximum holding force divided by a safety coefficient equal to 1.3.

$$F_{Zh} = \frac{F_{1max}}{1{,}3}$$

For example, a device with maximum specified force F_{Zh} =2000 N must pass a test with a maximum holding force equal to F_{1max} =2600 N.
An interlocking device with guard locking shall provide both the interlocking function (guard open/closed) and the guard locking function (locked/unlocked). Each of these functions may require a different PL safety level (ref. EN ISO 13849-1). In most cases the PL of the guard locking function is lower than the PL of the interlocking function. (See paragraph 8.4, note 2 of EN ISO 14119).
To highlight that an interlocking device provides also the locking monitoring, the new standard requires that the product shall have the symbol represented aside.



5 - Normative present situation. Reason of changes, new standards and some overlapping

"Traditional" standards for Functional Safety as EN 954-1 had the great merit of formalizing some of the basic principles in the safety circuits analysis in accordance to deterministic principles. On the other hand they don't deal with programmable electronic devices at all, and generally they suffer the passed time. To include the programmable electronic devices in the control system analysis, the new standards approach is basically probabilistic therefore new statistical variables have been introduced.

This approach original standard is the IEC 61508 which deals the safety of complex programmable electronic systems. It's an impressive standard (divided in 8 sections for a total amount of almost 500 pages) suitable for different application fields (process industry, industrial machineries, nuclear plants), so that it has achieved the status of type A standard (not harmonized). The standard introduces the SIL concept (Safety Integrity Level) that is a probabilistic indication of a system residual risk.

From IEC 61508 comes EN 62061, which in particular concerns safety in industrial machineries complex and programmable electronic systems. The concepts introduced by this standard allow the application generally to any control system with electric, electronic and programmable electronic technology (excluding non-electric technology systems).

EN ISO 13849, developed by CEN under ISO aegis, also comes from this probabilistic approach but it tries to make the manufacturer used to the EN 954-1 concepts pass to the new concepts in a less traumatic way. The standard is applied to electromechanical, hydraulic, not complex electronic systems and to some programmable electronic systems with predefined structures. EN ISO´ 13849 is a type B1 standard, it introduces the PL concept (Performance Level) that is, as for SIL, a probabilistic indication of machinery residual risk. In this standard it is indicated a correlation between SIL and PL; there are concepts borrowed by EN 61508 (as DC and CCF) and it is established a reference with safety categories of EN 954-1.

In the functional safety field for control circuits safety, there are presently two standards in force (year 2013):
• EN ISO 13849-1. Type B1 standard which uses the PL concept.
• EN 62061. Type B1 standard which uses the SIL. concept.

Important note.
EN 13849-1 is a type B1 standard, therefore if a machinery is already classified by a type C standard is this last one to prevail. All type C standards previously developed are based on concepts of EN 954-1. For manufacturers of machineries covered by a type C standard, the introduction time of new standards could be different according to the updating speed of the various technical committees.

The two standards EN 62061 and EN ISO 13849-1 show a discrete overlapping concerning the application field. For several aspects they are alike and there's a precise link between the two different symbols (SIL and PL) which indicates the two standards analysis result.

The recommendation on the two standards application ambit is stated in EN ISO 13849-1, table 1 and, as you can see, both standards can be applied for wide products typologies.

PL EN ISO 13849-1	**a**	**b**	**c**	**d**	**e**	
SIL EN 62061 - IEC 61508	**-**	**1**		**2**	**3**	(4)
PFH_d	10^{-4}	10^{-5}	$3x10^{-6}$	10^{-6}	10^{-7}	10^{-8}
A hazardous failure every n years	~1	~10	~40	~100	~1000	~10000

Table 1 - Recommended application of EN 62061 and EN ISO 13849-1

	Technology used by the part of the control system that is linked to safety	EN ISO 13849-1	EN 62061
A	Not electrical, hydraulic for example	X	Not handled
B	Electromechanical, for example relays and/or non-complex electronics	Limited to designated architectures[a] and up to PL=e	All architectures up to SIL 3
C	Complex electronics, for example programmable	Limited to designated architectures[a] and up to PL=d	All architectures up to SIL 3
D	A combined with B	Limited to designated architectures[a] and up to PL=e	X[c]
E	C combined with B	Limited to designated architectures (see note 1) and up to PL=d	All architectures up to SIL 3
F	C combined with A or C combined with A and B	X[b]	X[c]

X indicates that the line is covered by the international standard shown in the head of the column

a. Designated architectures are defined in clause 6.2 (EN ISO 13849-1) to provide a simplified approach to quantification of the performance level

b. For complex electronics: the designated architectures are used according to this part of EN ISO 13849-1 and up to PL=d, or any architecture which is compliant with EN 62061

c. For non-electrical technologies, the parts are used as subsystems in accordance with this part of EN ISO 13849-1

Note. Taken from table 1 of EN ISO 13849-1:2006

The choice of the standard to be used is up to the manufacturer according to the adopted technology. We believe that EN ISO 13849-1 is a standard easier to apply thanks to its mediate approach and reutilization of the concepts already known to the market.

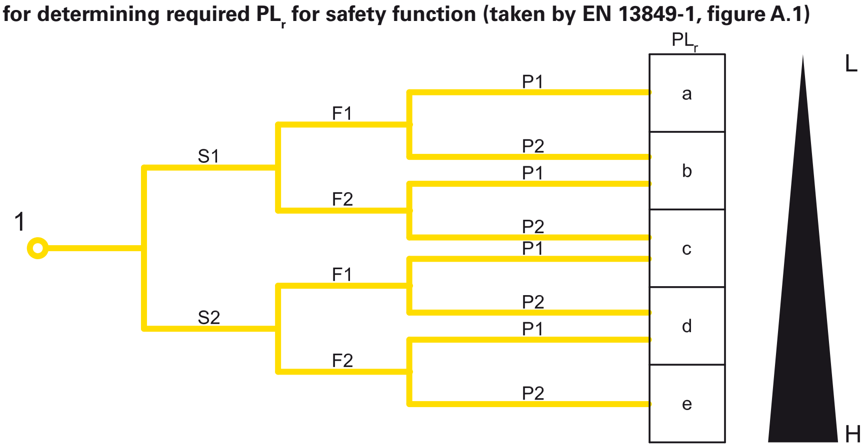
Note: In 2008 the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA) has introduced a report (BGIA Report 2/2008) on the EN ISO 13849-1 application where it is stated that the recommendations and restrictions for EN ISO 13849-1 applications must be considered obsolete, therefore even in case of programmable electronics (case C and E in the above table) the limit can be considered PL e.

6- EN ISO 13849-1 and new parameters: PL, $MTTF_d$, DC, CCF

EN ISO 13849-1 provides the manufacturer with an iterative method to assess if a machine risk can be limited to an acceptable residual risk through adequate safety functions. The adopted method provides for each risk an hypothesis-analysis-validation cycle at the end of which it must be demonstrated that every intended safety function is adequate to the related risk being considered.

The first step consists in the evaluation of the Performance Level required by each safety function. The first step consists in the evaluation of the Performance Level required by each safety function. As for EN 954-1, also EN 13849 uses a graph for a machine function risk analysis (figure A.1) determining, instead of a required safety category, a Required Performance level or PL_r for the safety function which protects that machine part. The machinery manufacturer, starting from the graph point 1 and answering to S, F and P questions, will identify the PL_r for the intended safety function. The manufacturer then shall make a system to protect the machinery operator with a PL performance level equal or greater than the required.

Risk graph for determining required PL_r for safety function (taken by EN 13849-1, figure A.1)



Key

1 Starting point for evaluation of safety function's contribution to risk reduction
L Low contribution to risk reduction
H High contribution to risk reduction
PL_r Required performance level

Risk parameters

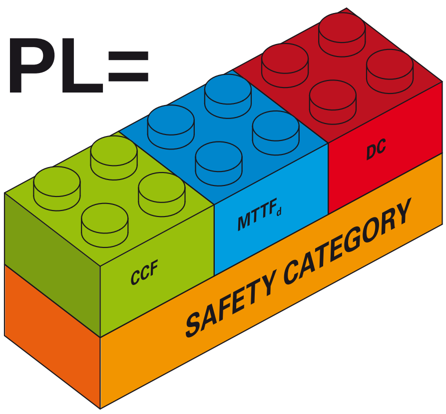
S Severity of injury
S1 slight (normally reversible injury)
S2 serious (normally irreversible injury or death)
F Frequency and/or exposure to hazard
F1 seldom-to-less-often and/or exposure time is short
F2 frequent-to-continuous and/or exposure time is long
P Possibility of avoiding hazard or limiting harm
P1 possible under specific conditions
P2 scarcely possible

Note: It would be easier for a manufacturer not having to repeat the machine risk analysis and try to use the data already derived from an EN 954-1 risk analysis.
Generally this is not possible since with the new standard the risk graph changed (see figure above) therefore, with identical risks, the required safety function levels can have changed. The German Institute BGIA in its report 2008/2 on EN ISO 13849-1 suggests that a conversion could be adopted through a worst-case approach as in the following table. For further information refer to the mentioned report.

Category requested by EN 954-1		Performance Level requested (PLr) and Category requested acc. to EN ISO 13849-1
B	→	b
1	→	c
2	→	d, Category 2
3	→	d, Category 3
4	→	e, Category 4

Five performance levels are set out, from PLa to PLe on risk increasing and each one of them identifies a numerical range of average probability of dangerous failure per hour. For example PLd defines that the average probability of a dangerous failure per hour is included between $1x10^{-6}$ and $1x10^{-7}$, that is about 1 dangerous failure every 100-1000 years.

PL	Average probability of dangerous failure 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	$<10^{-7}$

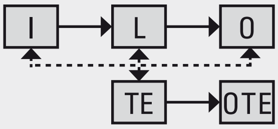
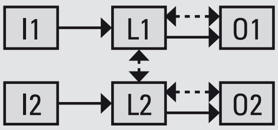
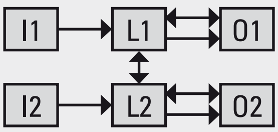


Other measures are also necessary to achieve the PL of a control system, which are:
1. The system Safety Category which derives from the architecture (structure) of the control system and its behaviour under fault conditions
2. $MTTF_d$ of components
3. DC or system Diagnostic Coverage.
4. CCF or system Common Cause Failure.

Safety Categories.
The majority of control circuits normally used are represented by a logic block structure:
- Input or signals input
- Logic or processing signals logic
- Output or control signals output

differently combined according to the control circuit structure.

EN ISO 13849-1 allows for five different basic circuit structures termed Designated Architectures. These architectures, combined with the fault-mode behaviour and some minimum values of $MTTF_d$, DC and CCF, indicate the system control Safety Category as shown in the following table. EN ISO 13849-1 Safety Categories therefore are not the same but they extend the Safety Category concept introduced by the previous EN 954-1.

Cate-gory	Summary of requirements	System behaviour	Principles used to achieve safety	$MTTF_d$ of each channel	DC_{avg}	CCF
B	Safety-related parts of control systems and/or their protective equipment, as well as their components, shall be designed, constructed, selected, assembled and combined in accordance with relevant standards so that they can withstand the expected influences. Basic safety principles shall be used. Architecture: 	The occurrence of a fault can lead to the loss of the safety function.	Mainly characterized by selection of components	Low or Medium	None	Not relevant
1	Requirements of category B shall apply. Well-tried components and well-tried safety principles shall be used. Architecture: 	The occurrence of a fault can lead to the loss of the safety function but the probability of occurrence is lower than for Category B.	Mainly characterized by selection of components	High	None	Not relevant
2	Requirements of category B and the use of well-tried safety principles shall apply. Safety function shall be checked at suitable intervals by the machine control system. Architecture: 	The occurrence of a fault can lead to the loss of the safety function between the checks. The loss of the safety function is detected by the check.	Mainly characterized by structure	Low to High	Low to Medium	See Annex F
3	Requirements of category B and the use of well-tried safety principles shall apply. Safety-related parts shall be designed so that: – a single fault in any of these parts does not lead to the loss of the safety function, and – whenever reasonably practicable, the single fault is detected. Architecture: 	When a single fault occurs the safety function is always performed. Some, but not all faults will be detected. Accumulation of undetected faults can lead to the loss of the safety function.	Mainly characterized by structure	Low to High	Low to Medium	See Annex F
4	Requirements of category B and the use of well-tried safety principles shall apply. Safety-related parts shall be designed, so that: – a single fault in any of these parts does not lead to a loss of the safety function, and - a single fault is detected at or before the next demand upon the safety function. If this is not possible, then the accumulation of undetected faults must not lead to the loss of the safety function. Architecture: 	When a single fault occurs the safety function is always performed. Detection of accumulated faults reduces the probability of the loss of the safety function (high DC). The faults will be detected in time to prevent the loss of the safety function.	Mainly characterized by structure	High	High (including accumulation of faults)	See Annex F

MTTF$_d$ **("Mean Time To Dangerous Failure",).**
This parameter tries to determine the system component "safety quality" by defining its mean lifetime before a dangerous failure (note that it is not a generic failure) stated in years. Practically, the calculation of the MTTF$_d$ is based on numerical values supplied by the components manufacturers. Where there's a lack of data the standard itself lists some typical values in specific reference tables (EN ISO 13849-1 Annex C). The calculation leads to a numerical value included in 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

In case of wearable components (typically mechanic and hydraulic devices), instead of the component MTTF$_d$, the manufacturer shall provide the component B$_{10d}$ data that is the average number of the component operations until 10% of the units studied have failed dangerously.
The component B$_{10d}$ has to be converted to MTTF$_d$ by the machine manufacturer with the formula:

$$MTTF_d = \frac{B_{10d}}{0{,}1 \cdot n_{op}}$$

Where n$_{op}$= component mean number of annual operations.
Assuming the machine daily operating frequency and the daily operating hours, n$_{op}$ can be determined from:

$$n_{op} = \frac{d_{op} \cdot h_{op} \cdot 3600s/h}{t_{ciclo}}$$

where
d$_{op}$= operating time in days per year
h$_{op}$= operating time in hours (h) per day
t$_{ciclo}$= cycle time (s)

Note that the MTTF$_d$ parameter, when it derives from a wearable component, does not depend only from the component itself but also from the application. A electromechanical device with low operating frequency, e.g. a contactor only used for emergency stop, generally has a high MTTF$_d$ but if the same device is used for normal cycle operation here the contactor MTTF$_d$, with low cycle time, can drop dramatically.

All the control circuit single components are used to calculate the circuit MTTF$_d$ according to its structure. In one channel architecture circuits (as in category B, 1 and 2) every single components contribution is linear and the channel MTTF$_d$ calculation is determined from:

$$\frac{1}{MTTF_d} = \sum_{i=1}^{N} \frac{1}{MTTF_{d\,i}}$$

In order to avoid too optimistic interpretation the maximum MTTF$_d$ value of each channel is restrained to 100 years. No channel with MTTF$_d$ inferior to 3 years is allowed.

In case of two channel systems (categories 3 and 4) the circuit MTTF$_d$ calculation is determined from symmetrically arranging the two channels MTTF$_d$ using the following formula:

$$MTTF_d = \frac{2}{3}\left[MTTF_{dC1} + MTTF_{dC2} - \frac{1}{\frac{1}{MTTF_{dC1}} + \frac{1}{MTTF_{dC2}}}\right]$$

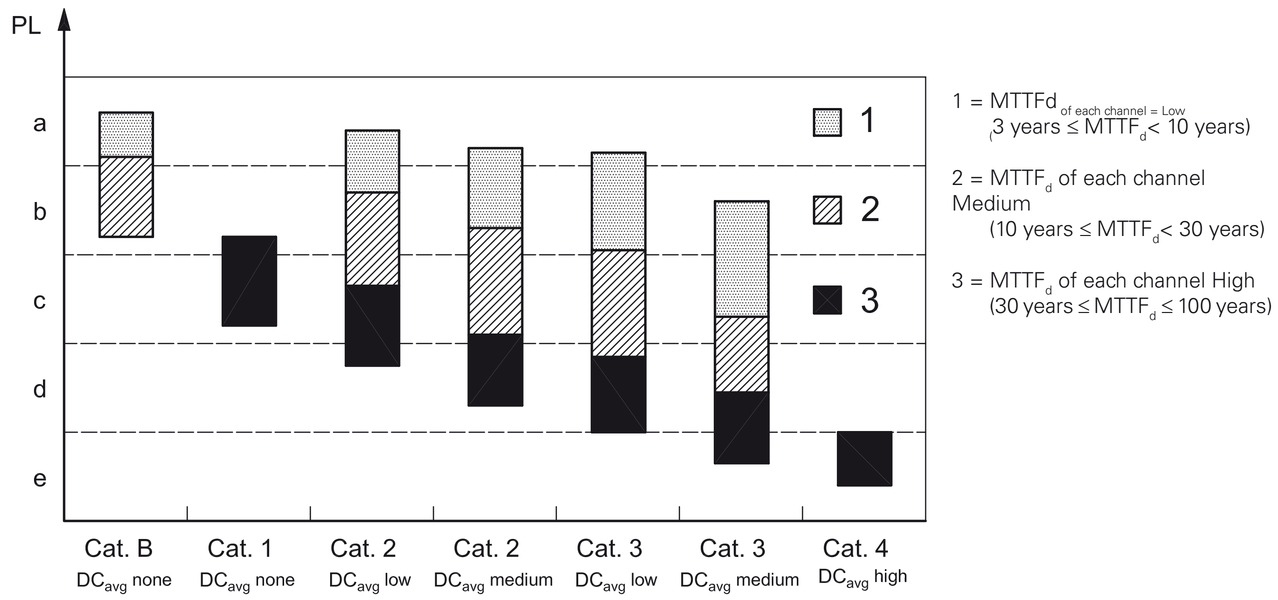
DC ("Diagnostic Coverage").
This parameter tries to indicate the effectiveness of a system' self-test monitoring its possible failures. According to the percentage of dangerous failures detectable by the system the diagnostic coverage shall be different. The DC parameter is a percentage value which is estimated by some values stated in a table (EN ISO 13849-1 annex E) according to the measures adopted by the manufacturer to detect any anomaly in its circuit. Since, in general, there are different measures to detect different anomalies in the same circuit, the average value or DC$_{avg}$ calculation results in four levels, which are:
High DC$_{avg}$≥ 99%
Medium 90% ≤ DC$_{avg}$<99%
Low 60% ≤ DC$_{avg}$<90%
None DC$_{avg}$ < 60%
The None diagnostic coverage is admitted only for systems with architecture B or 1.

CCF ("Common Cause Failures")
Only in case of category 2, 3 or 4 systems for the calculation of PL it is necessary also the evaluation of possible common cause failure or CCF that can invalidate the systems redundancy. The evaluation is made by a check-list (EN ISO 13849-1 Annex F) which determines points from 0 to 100 according to the adopted solutions against common cause failures. The minimum value admitted for categories 2,3 and 4 is 65 points.

PL ("Performance Level")

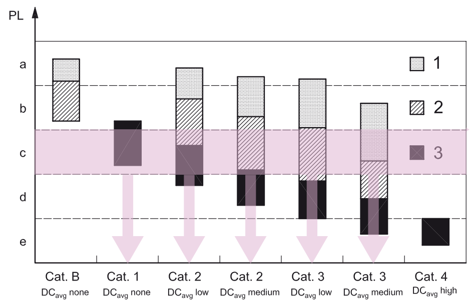
Knowing all this data, EN ISO 13849-1 determines the system PL by a correlation table (EN ISO 13849-1 Annex K) or by a simplified graphic figure (EN ISO 13849-1 paragraph 4.5) as follows.

Relationship between categories DC_{avg}, $MTTF_d$ of each channel and PL (taken from EN 13849-1, figure 5)



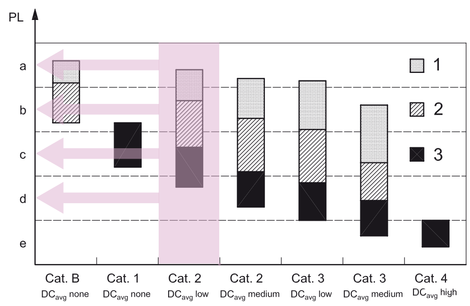
This image is very useful since it can be read from different point of view. Given a certain PL_r the graph shows all the different solutions which determine that PL, that is the possible circuit structures which provide the same PL.

For instance, observing the figure, to obtain a system having a PL equal to "c" level all the following solutions are possible:
1. Category 3 system with little affordable components ($MTTF_d$=low) and medium DC.
2. Category 3 system with affordable components ($MTTF_d$=medium) and low DC.
3. Category 2 system with affordable components ($MTTF_d$=medium) and medium DC.
4. Category 2 system with affordable components ($MTTF_d$=medium) and low DC.
5. Category 1 system with highly affordable components ($MTTF_d$=high).



At the same time the figure, chosen a circuit structure, allows to immediately see the max. PL reachable according to the average diagnostic coverage and the components $MTTF_d$. Therefore the manufacturer can exclude at once some circuit structures because not adequate to the required PL_r.

In general though, to identify the system PL do not refer to this figure since in many cases the graphic areas superimpose on the different PL margin lines. Instead, the table in EN ISO 13849-1 Annex K can be used for a precise determination of the circuit PL.



Notes

Safety parameters table

The B10d data shown in the table refer to the mechanical life of the device contacts, under normal ambient conditions. NO contacts may be used within the safety circuit only if combined with an NC contact, and must be monitored (for example, by a PLC or safety module). The value in B10d for NC and NO contacts refers to a maximum electrical load equal to 10% of the current value shown in the application category. Mission time (for all items indicated below): 20 years.

Electromechanical 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 lock and solenoid	1,000,000	5,000,000	20%
FS	Safety switches with separate actuator with lock and solenoid	1,000,000	4,000,000	20%
F• ••96 F• ••95	Safety switch with pin for hinge	1,000,000	5,000,000	20%
F• ••C•	Switches with slotted hole lever for swing 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 (used with compatible Pizzato Elettrica safety modules)	20,000,000	20,000,000	50%
SR	Magnetic safety sensors (used at max. load: DC12 24 V 250 mA)	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	Prewired modular 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 1PU1••••••	Single maintained buttons	2,000,000	50%
E2 1PU2••••••	Single spring-return buttons	30,000,000	50%
E2 1PD••••••, E2 1PT••••••	Double and triple buttons	2,000,000	50%
E2 1PE••••••	Emergency buttons	600,000	50%
E2 1SE••••••, E2 1SL••••••	Selector switches and illuminated selector switches	2,000,000	50%
E2 1SC••••••	Selector switches with key	600,000	50%
E2 1PQ••••••	Quadruple buttons	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 pin for hinge	500,000	2,500,000	20%
F• ••C•-EX•	Switches with slotted hole lever for swing 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	4018	H	2.29E-11	3	e	4
ST	Safety sensors with RFID technology	4077	H	1.46E-09	3	e	4
NG	RFID safety switches with lock	1883	H	8.07 E-10	3	e	4
CS AM-01	Standstill monitor safety module	145	M	1.94E-09	2	d	3
CS AR-01, CS AR-02	Safety module for monitoring of guards and emergency stops	227	H	1.18E-10	3	e	4
CS AR-04	Safety module for monitoring of guards, emergency stops	152	H	1.84E-10	3	e	4
CS AR-05, CS AR-06	Safety module for monitoring of guards, emergency stops and light barriers	152	H	1.84E-10	3	e	4
CS AR-07	Safety module for monitoring of guards and emergency stops	111	H	7.56E-10	3	e	4
CS AR-08	Safety module for monitoring of guards, emergency stops and light barriers	218	H	4.58E-10	3	e	4
CS AR-20, CS AR-21	Safety module for monitoring of guards and emergency stops	225	H	4.18E-10	3	e	3
CS AR-22, CS AR-23	Safety module for monitoring of guards and emergency stops	151	H	5.28E-10	3	e	3
CS AR-24, CS AR-25	Safety module for monitoring of guards and emergency stops	113	H	6.62E-10	3	e	3
CS AR-40, CS AR-41	Safety module for monitoring of guards and emergency stops	225	H	4.18E-10	2	d	2
CS AR-46	Safety module for monitoring of guards and emergency stops	435	-	3.32E-08	1	c	1
CS AR-51	Safety module for monitoring of safety mats and bumpers	209	H	9.43E-09	3	e	4
CS AR-90	Safety module for monitoring of lift floor leveling	382	H	5.03E-10	3	e	4
CS AR-91	Safety module for monitoring of lift floor leveling	227	H	1.18E-10	3	e	4

B_{10d}: Number of operations before 10% of the components have failed dangerously
B_{10}: Number of operations before 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-93	Safety module for monitoring of lift floor leveling	227	H	1.34E-10	3	e	4
CS AR-94	Safety module for monitoring of lift floor leveling	213	H	5.62E-09	3	e	4
CS AR-94•U12	Safety module for monitoring of lift floor leveling	227	H	1.13E-10	3	e	4
CS AR-95	Safety module for monitoring of lift floor leveling	213	H	5.42E-09	3	e	4
CS AT-0•, CS AT-1•	Safety module with timer for monitoring of guards and emergency stops	84	H	9.01E-09	3	e	4
CS AT-3•	Safety module with timer for monitoring of guards and emergency stops	74	H	4.05E-09	3	e	4
CS DM-01	Safety module for monitoring of two-hand controls	142	H	2.99E-08	3	e	4
CS DM-02	Safety module for monitoring of two-hand controls	206	H	2.98E-08	3	e	4
CS DM-20	Safety module for monitoring of two-hand controls	42	-	1.32E-06	1	c	1
CS FS-1•	Safety timer module	146	H	1.62E-09	3	e	4
CS FS-2•, CS FS-3•	Safety timer module	205	M	1.10E-08	2	d	3
CS FS-5•	Safety timer module	349	M	1.17E-08	2	d	3
CS ME-01	Contact expansion module	76	H	6.38E-10	①	①	①
CS ME-02	Contact expansion module	113	H	2.84E-09	①	①	①
CS ME-03	Contact expansion module	208	M	2.45 E-08	①	①	①
CS ME-20	Contact expansion module	113	H	3.07E-09	①	①	①
CS ME-3•	Contact expansion module	112	H	2.77E-09	①	①	①
CS M•201	Multifunctional safety module	133	H	4.54E-10	3	e	4
CS M•202	Multifunctional safety module	573	H	4.73E-10	3	e	4
CS M•203	Multifunctional safety module	101	H	5.74E-10	3	e	4
CS M•204	Multifunctional safety module	132	H	5.32E-10	3	e	4
CS M•205	Multifunctional safety module	406	H	4.83E-10	3	e	4
CS M•206	Multifunctional safety module	643	H	2.85E-10	3	e	4
CS M•207	Multifunctional safety module	407	H	5.39E-09	3	e	4
CS M•208	Multifunctional safety module	588	H	6.17E-09	3	e	4
CS M•301	Multifunctional safety module	126	H	8.92E-10	3	e	4
CS M•302	Multifunctional safety module	604	H	3.45E-10	3	e	4
CS M•303	Multifunctional safety module	459	H	9.11E-10	3	e	4
CS M•304	Multifunctional safety module	97	H	1.01E-09	3	e	4
CS M•305	Multifunctional safety module	503	H	7.24E-10	3	e	4
CS M•306	Multifunctional safety module	99	H	8.25E-10	3	e	4
CS M•307	Multifunctional safety module	276	H	5.84E-09	3	e	4
CS M•308	Multifunctional safety module	514	H	6.42E-09	3	e	4
CS M•309	Multifunctional safety module	469	H	6.61E-09	3	e	4
CS M•401	Multifunctional safety module	413	H	1.16E-09	3	e	4
CS M•402	Multifunctional safety module	452	H	6.67E-09	3	e	4
CS M•403	Multifunctional safety module	416	H	6.86E-09	3	e	4

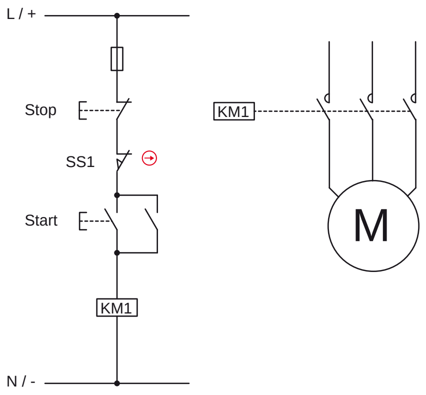
B_{10d}: Number of operations before 10% of the components have failed dangerously
B_{10}: Number of operations before 10% of the components have failed
B_{10}/B_{10d}: ratio of total failures to dangerous failures.
$MTTF_d$: Mean Time To Dangerous Failure

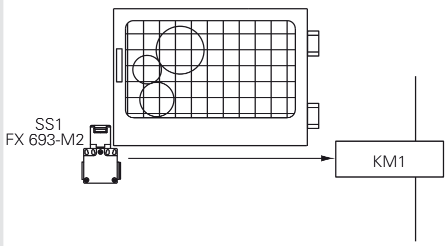
DC: Diagnostic Coverage
PFH_d: Probability of Dangerous Failure per hour
SIL CL: Safety Integrity Level Claim Limit. Maximum achievable SIL according to EN 62061
PL: Performance Level. PL acc. to EN ISO 13849-1

① Dependent from the base module

EXAMPLE 1
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**1**
Performance Level	**PL c**





The control circuit in the figure has a guard monitoring function. If the guard is open the engine must not start. The hazards analysis points out how the system does not have inertia, that is the engine, once de-energizing the power, stops faster than opening the guard. The risk analysis shows the required PL_r target is PL c. t is necessary to verify if the assumed control system, which has a one channel structure, has a PL higher or equal to PL_r.

Description of the safety function
The guard position is detected by the switch with separate actuator SS1 which operates directly on the contactor KM1. The contactor KM1 that controls the moving parts is usually activated by the buttons Start and Stop but the working cycle analysis shows that also the guard is open at every operation cycle. Consequently, the contactor and the switch number of operation can be considered equal.
The circuit structure is one channel type without supervision (category B or 1) where there are only Input (switch) and Output (contactor) components.
The safety function is not performed when a device failure occurs.
No measures for fault detection are implemented.

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 tested device according to EN ISO 13849-2 table D.4. The device B_{10d} value is supplied by the manufacturer (see page 271) equal to 2,000,000 operations.
- KM1 is a contactor used at nominal value. It's a well tested device in accordance with EN ISO 13849-2 table D.4. Its B_{10d} value is equal to 2,000,000 operations. This value is determined from the standard tables (see EN ISO 13849-1 table C.1).

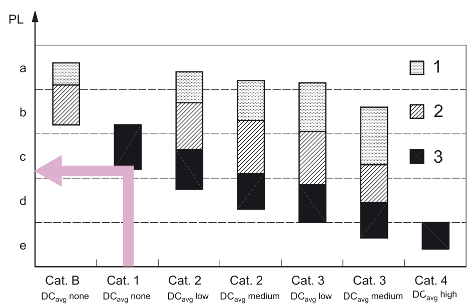
Assumption of the frequency of use
- It is assumed that the machinery is used for 365 days per year, for three shifts of 8 hours and 600 s cycle time. Therefore the operations per year both for the contactor and the switch is equal to maximum N_{op}=(365x24x3,600)/600=52,560.
- An operation of the start button every 300 seconds is assumed. The annual operations are at maximum equal to n_{op}/year=105,120
- KM1 contactor shall be actuated both for the machine normal start-stop and the restart after the guard opening. n_{op}/year=52,560+105,120 = 157,680

$MTTF_d$ **Calculation**
The$MTTF_d$ of the SS1 switch is equal to: $MTTF_d = B_{10d}/(0,1 \times n_{op}) = 2000000/(0,1 \times 52560) = 381$ years
The$MTTF_d$ of the KM1 contactor is equal to: $MTTF_d = B_{10d}/(0,1 \times n_{op}) = 2000000/(0,1 \times 157680) = 127$ years
In consequence the one channel circuit $MTTF_d$ is equal to: 1/(1/381+1/127)=95 years

Diagnostic Coverage DC_{avg}
No measures for fault detection are implemented therefore the diagnostic coverage is None, admitted condition for the considered circuit which is in category 1.

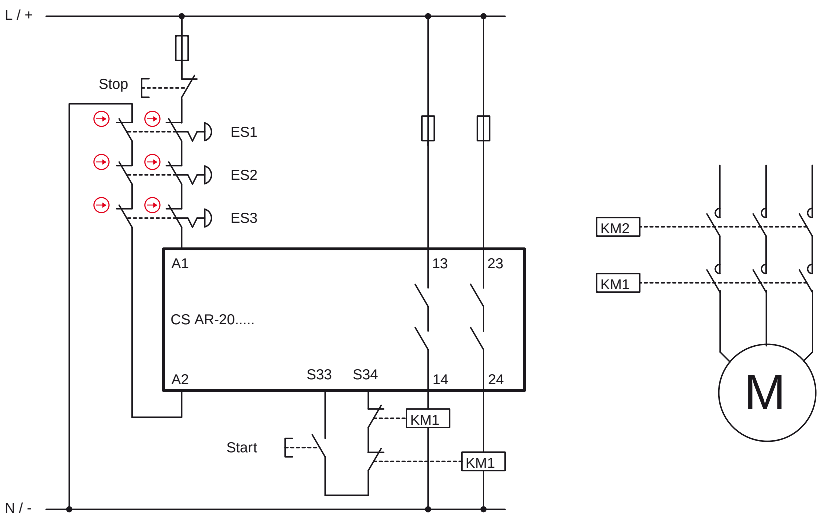
CCF Common Cause Failure
No CCF calculation is necessary for a category 1 circuit.

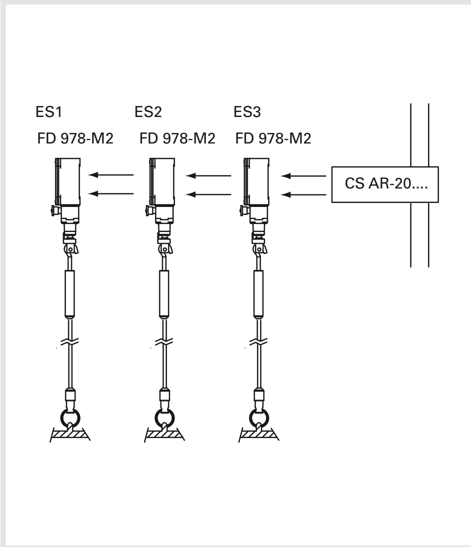
PL verification
From the standard table or figure 5 we can verify that for a Category 1 circuit with $MTTF_d$=95 years the resulting PL of the control circuit is PL c. Therefore the PL_r target is reached.



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 emergency device causes the safety module and the two contactors KM1 and KM2 to intervene.
The ES1, ES2, ES3 device signal is redundantly read by the CS safety module. Also the KM1 and KM2 contactors (with forcibly guided contacts) are monitored by CS via the feedback circuit.

Device data:
- 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, KM2 are contactors used at nominal load. The device B_{10d} value is equal to 2,000,000 (see EN ISO 13849-1 Table C.1)
- CS is a safety module (CS AR-20) with $MTTF_d$=225 years (see page 271) and DC= High
- The circuit architecture is two channels type in category 3

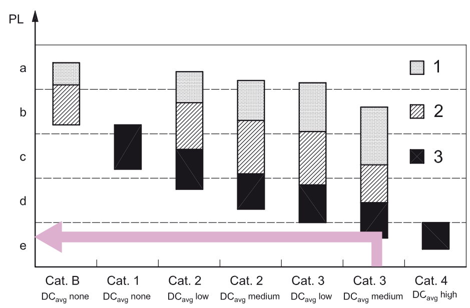
Assumption of the frequency of use
- Twice a month n_{op}/year = 24
- Start button operation: 4 times a day
- Assuming 365 working day, contactors shall intervene 4 x 365 + 24 = 1,484 times/year
- Switches are operated with the same frequency.
- The case of more buttons pushed together is not considered.

$MTTF_d$ **Calculation**
- $MTTF_{d\ ES1,ES2,ES3}$ = 833.333 years
- $MTTF_{d\ KM1,KM2}$ = 13.477 years
- $MTTF_{d\ CS}$ = 225 years
- $MTTF_{d\ CH1}$ =221 years. Value restricted to 100 years. The channels are symmetric thus $MTTF_d$=100 years (High)

Diagnostic Coverage DC_{avg}
- KM1 and KM2 contactors are monitored by CS via the feedback circuit. DC=99% (High)
- The CS AR-20 safety module has a High diagnostic coverage.
- Not all faults in the emergency device series can be detected. The diagnostic coverage is 90% (Medium)

CCF Common Cause Failure
We assume a score > 65 (based on EN ISO 13849-1 - annex F).

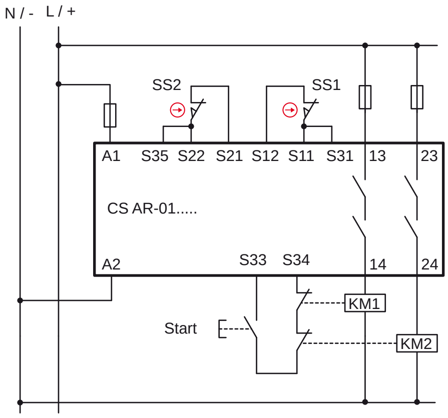
PL verification
- A category 3 circuit with $MTTF_d$=High and DC_{avg}= High can reach a PL e.

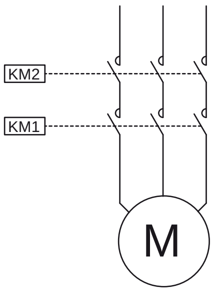


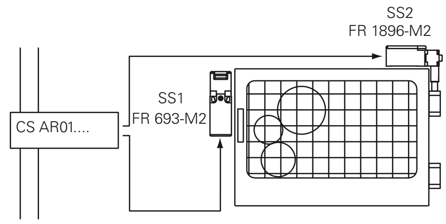
Any information or application example, included the connection diagrams, described in this document are to be intended as purely descriptive.
The choice and application of the products in conformity with the standards, in order to avoid damage to persons or goods, is the user's responsibility.

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 SS1 and SS2 switches to intervene; consequently the safety module and the KM1 and KM2 contactors do the same.
The SS1, SS2 device signal is redundantly monitored by the CS safety module.
The switches have a different operating principle.
Also the KM1 and KM2 contactors (with forcibly guided contacts) are monitored by CS via the feedback circuit.

Device data:

- SS1 (FR 693-M2) is a switch with positive opening. The B_{10d} value is equal to 2,000,000 (see page 271)
- SS2 (FR 1896-M2) is a hinge operating switch with positive opening. B_{10d}= 5.000.000 (see page 271)
- KM1, KM2 are contactors used at nominal load. B_{10d} = 2,000,000 (see EN ISO 13849-1 - Table C.1)
- CS is a safety module (CS AR-01) with $MTTF_d$=227 years and DC= High

Assumption of the frequency of use

365 days/year, 16 h/day, 1 operation every 4 minutes (240 s). n_{op}/year = 87,600

$MTTF_d$ **Calculation**

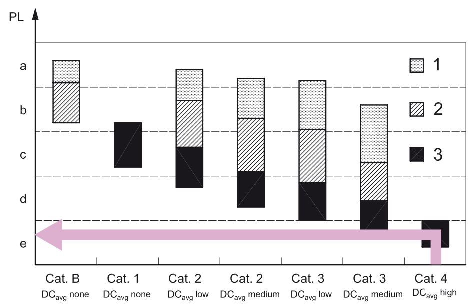
- $MTTF_{d\ SS1}$ = 228 years
- $MTTF_{d\ SS2}$ = 571 years
- $MTTF_{d\ KM1,KM2}$ = 228 years
- $MTTF_{d\ CS}$= 227 years
- $MTTF_{d\ CH1}$ = 67 years (SS1,CS,KM1)
- $MTTF_{d\ CH2}$ = 77 years (SS2,CS,KM2)
- $MTTF_d$: symmetrically arranging the two channels, the result is $MTTF_d$ =72.1 years (High)

Diagnostic Coverage DC_{avg}

- SS1, SS2 have DC=99% since SS1, SS2 contacts are monitored by the CS and they have different operating principles.
- KM1 and KM2 contactors are monitored by CS via the feedback circuit. DC=99% (High)
- The CS AR-01 has an internal redundant and self-monitoring circuit. DC = High
- DC_{avg}= High

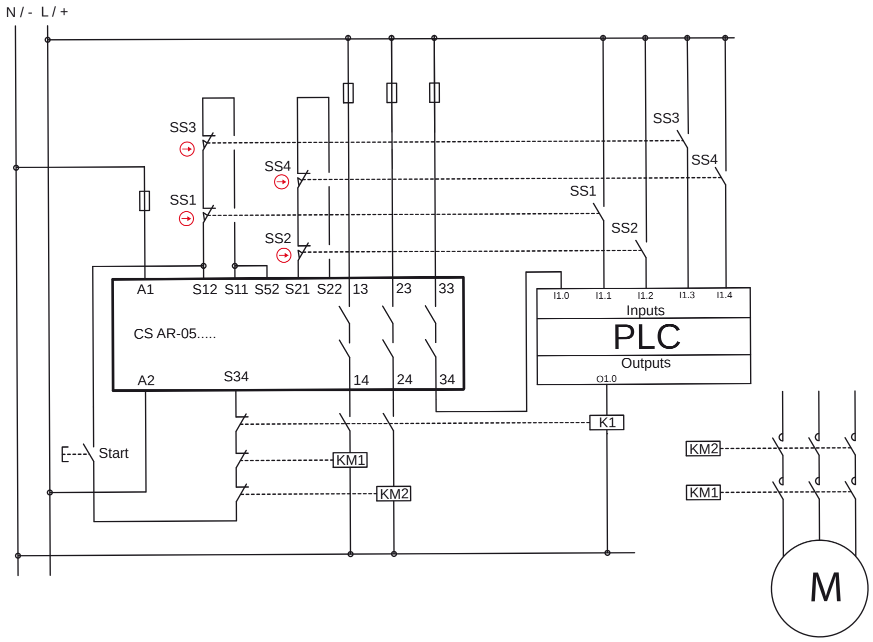
PL verification

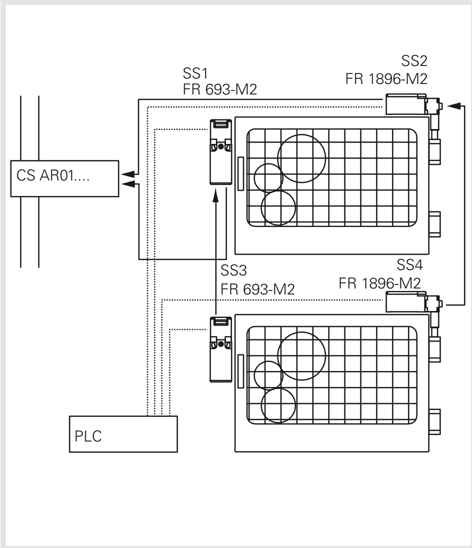
A category 4 circuit with $MTTF_d$=72.1 years and DC_{avg}=High corresponds to a PL e.



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 causes the SS1, SS2 switches to intervene on the first guard and SS3, SS4 on the second; the switches trigger the safety module and the KM1 and KM2 contactors.
The SS1, SS2 and SS3, SS4 device signal is redundantly monitored by the CS safety module, furthermore the switch auxiliary contact is monitored by PLC.
The switches have a different operating principle.
Also the KM1 and KM2 contactors (with forcibly guided contacts) are monitored by CS via the feedback circuit.

Device data:
- SS1, SS3 (FR 693-M2) are switches with positive opening. The B_{10d} value is equal to 2,000,000 (see page 271)
- SS2, SS4 (FR 1896-M2) is a hinge operating switch with positive opening. B_{10d}= 5.000.000 (see page 271)
- KM1, KM2 are contactors used at nominal load. The device B_{10d} value is equal to 2,000,000 (see EN ISO 13849-1 table C.1)
- CS is a safety module (CS AR-05) with $MTTF_d$=152 years and DC= High

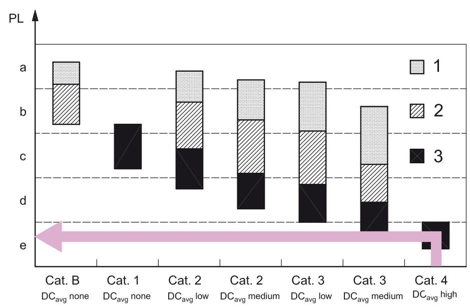
Assumption of the frequency of use
- 4 times per hour for 24 h/day and 365 days/year equal to n_{op}/year = 35,040
- The contactors will operate for twice the number of operations = 70,080

$MTTF_d$ **Calculation**
- $MTTF_{d\ SS1,SS3}$ = 571 years; $MTTF_{d\ SS2,SS4}$ = 1.427 years
- $MTTF_{d\ KM1,KM2}$ = 285 years
- $MTTF_{d\ CS}$ = 152 years
- $MTTF_{d\ Ch1}$ = 84 years (SS1,CS,KM1) / (SS3,CS,KM1)
- $MTTF_{d\ Ch2}$ = 93 years (SS2,CS,KM2) / (SS4,CS,KM2)
- $MTTF_d$: symmetrically arranging the two channels, the result is $MTTF_d$ =88.6 years (High).

Diagnostic Coverage DC_{avg}
- KM1, KM2 contacts are monitored by CS via the feedback circuit. DC=99%
- All auxiliary contacts of the switches are monitored by 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 Failure
- We assume a score > 65 (based on EN ISO 13849-1 - annex F).

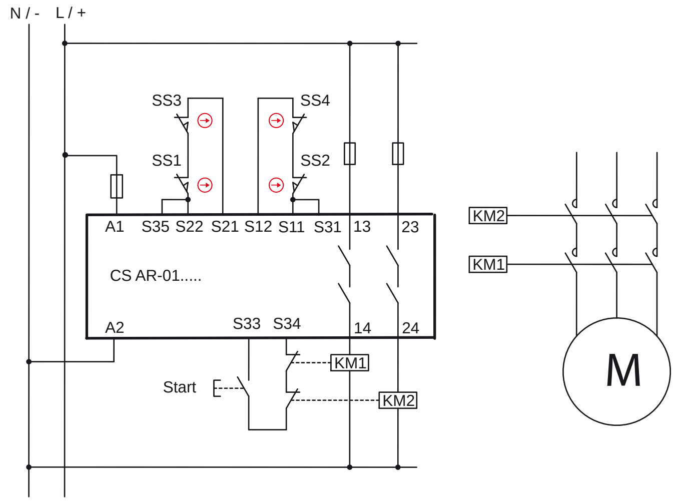
PL verification
- A category 4 circuit with $MTTF_d$=88.6 years (High) and DC_{avg}=High corresponds to a PL e.

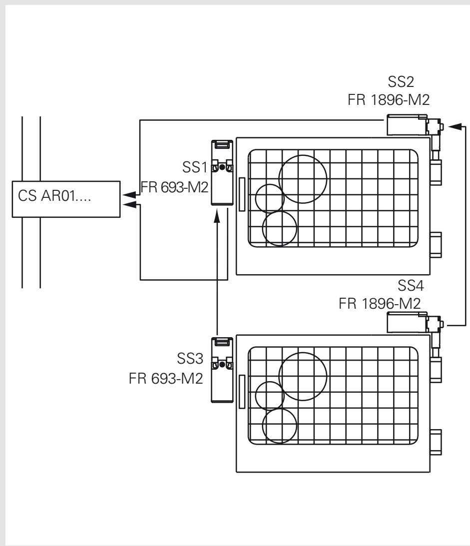


Any information or application example, included the connection diagrams, described in this document are to be intended as purely descriptive.
The choice and application of the products in conformity with the standards, in order to avoid damage to persons or goods, is the user's responsibility.

EXAMPLE 5
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**3**
Performance Level	**PL e**





Description of the safety function
The opening of a guard causes the SS1, SS2 switches to intervene on the first guard and SS3, SS4 on the second; the switches trigger the safety module and the KM1 and KM2 contactors.
The SS1, SS2 and SS3, SS4 device signal is redundantly monitored by the CS safety module.
The switches have a different operating principle.
Also the KM1 and KM2 contactors (with forcibly guided contacts) are monitored by CS via the feedback circuit.

Device data:
- SS1, SS3 (FR 693-M2) are switches with positive opening. The B_{10d} value is equal to 2,000,000 (see page 271)
- SS2, SS4 (FR 1896-M2) is a hinge operating switch with positive opening. B_{10d}= 5.000.000 (see page 271)
- KM1, KM2 are contactors used at nominal load. The device B_{10d} value is equal to 2,000,000 (see EN ISO 13849-1 table C.1)
- CS is a safety module (CS AR-01) with $MTTF_d$=227 years and DC= High

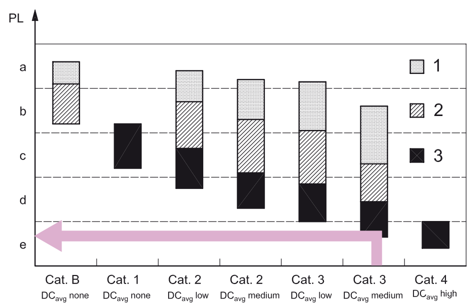
Assumption of the frequency of use
- 2 times per hour for 16 h/day and 365 days/year equal to n_{op}/year = 11,680
- The contactors will operate for twice the number of operations = 23,360

$MTTF_d$ **Calculation**
- $MTTF_{d\ SS1,SS3}$ = 1,712 years
- $MTTF_{d\ SS2,SS4}$ = 4,281 years
- $MTTF_{d\ KM1,KM2}$ = 856 years
- $MTTF_{d\ CS}$ = 227 years
- $MTTF_{d\ CH1}$ = 162 years (SS1,CS,KM1) / (SS3,CS,KM1)
- $MTTF_{d\ CH2}$ = 172 years (SS2,CS,KM2) / (SS4,CS,KM2)
- $MTTF_d$ = value restricted to 100 years

Diagnostic Coverage DC_{avg}
- KM1, KM2 contacts are monitored by CS via the feedback circuit. DC=99%
- Not all faults in the switch series can be detected. DC=60%
- The CS AR-01 module has a DC= High
- We assume a diagnostic coverage of 92% (Medium)

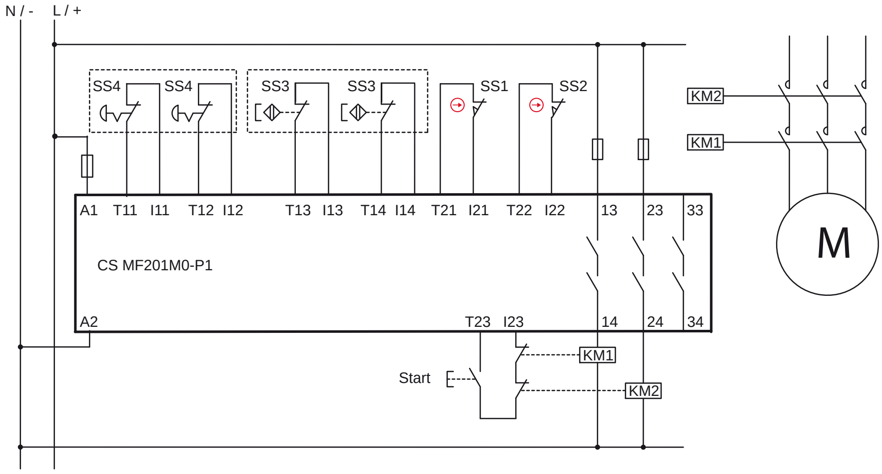
CCF Common Cause Failure
- We assume a score > 65 (based on EN ISO 13849-1 - annex F).

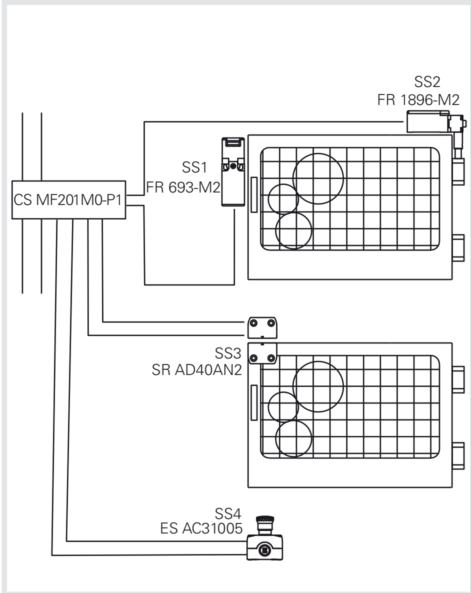
PL verification
- A category 3 circuit with $MTTF_d$=100 years and DC_{avg}=medium corresponds to a PL e.



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 causes the SS1, SS2 switches to intervene on the first guard and SS3 sensor on the second; the switches trigger the safety module and the KM1 and KM2 contactors.
The SS1, SS2 and SS3 device signals are redundantly monitored by the CS MF safety module.
There is also an emergency button, which is also connected with a double channel to the safety module.
Also the KM1 and KM2 contactors (with forcibly guided contacts) are monitored by CS MF via the feedback circuit.

Device data:
- SS1 (FR 693-M2) is a switch with positive opening. B_{10d} = 2,000,000 (see page 271)
- SS3 (FR 1896-M2) is a hinge operating switch with positive opening. B_{10d}= 5.000.000 (see page 271)
- SS3 (SR AD40AN2) is a magnetic safety sensor. B_{10d} = 20,000,000 (see page 271)
- SS4 (ES AC31005) is a box with emergency button (E2 1PERZ4531) with two NC contacts. B_{10d}= 600.000 (see page 271)
- KM1, KM2 are contactors used at nominal load. B_{10d} = 2,000,000 (see Table C.1 of EN ISO 13849-1)
- CS MF201M0-P1 is a safety module with $MTTF_d$=842 years and DC=99%

Assumption of the frequency of use
- Each gate is opened 2 times per hour for 16 h/day and 365 days/year equal to n_{op}/year = 11,680
- It is assumed that the emergency pushbutton is actuated at most 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
- $MTTF_{d\ KM1,KM2}$ = 843 years
- $MTTF_{d\ CS}$ = 842 years
- $MTTF_{d\ CH1}$ = 338 years (SS1,CS,KM1)
- $MTTF_{d\ CH2}$ = 383 years (SS2,CS,KM2)
- $MTTF_d$ = value restricted to 100 years

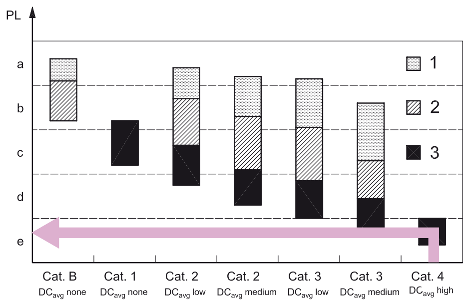
Guard SS3
- $MTTF_d$ SS3 = 17,123 years
- $MTTF_d$ KM1,KM2 = 843 years
- $MTTF_d$ CS = 842 years
- $MTTF_d$ = 411 years
- $MTTF_d$ = value restricted to 100 years

Emergency button SS4
- $MTTF_d$ SS4 = 16,438 years
- $MTTF_d$ KM1,KM2 = 843 years
- $MTTF_d$ CS = 842 years
- $MTTF_d$ = 410 years
- $MTTF_d$ = value restricted to 100 years

Diagnostic Coverage DC_{avg}
- KM1, KM2 contacts are monitored by CS MF via the feedback circuit. DC=99%
- All faults in the device series SS1, SS2 and SS3 can be detected. DC=99%
- The CS MF201M0-P1 module has a DC=99%
- We assume a diagnostic coverage of 99% (High)

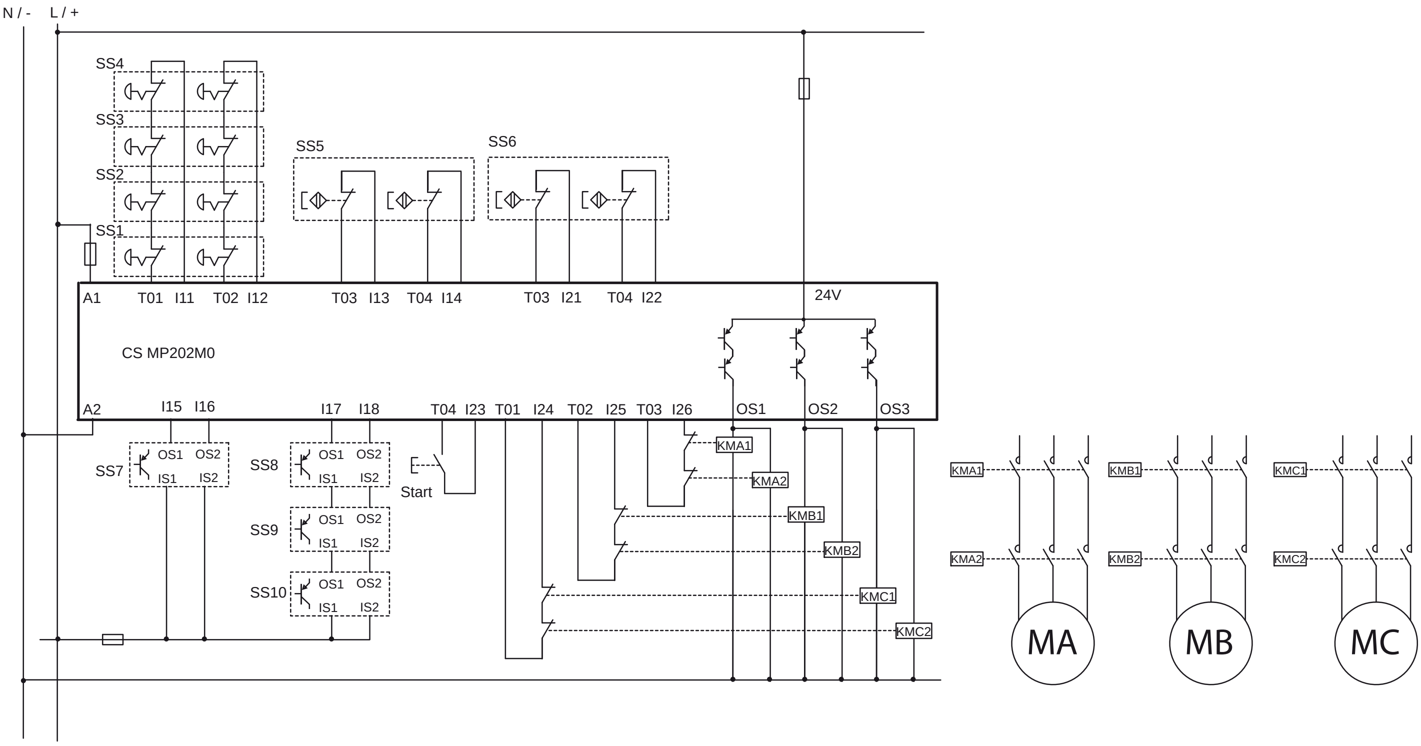
CCF Common Cause Failure
- We assume a score > 65 (based on EN ISO 13849-1 - annex F).

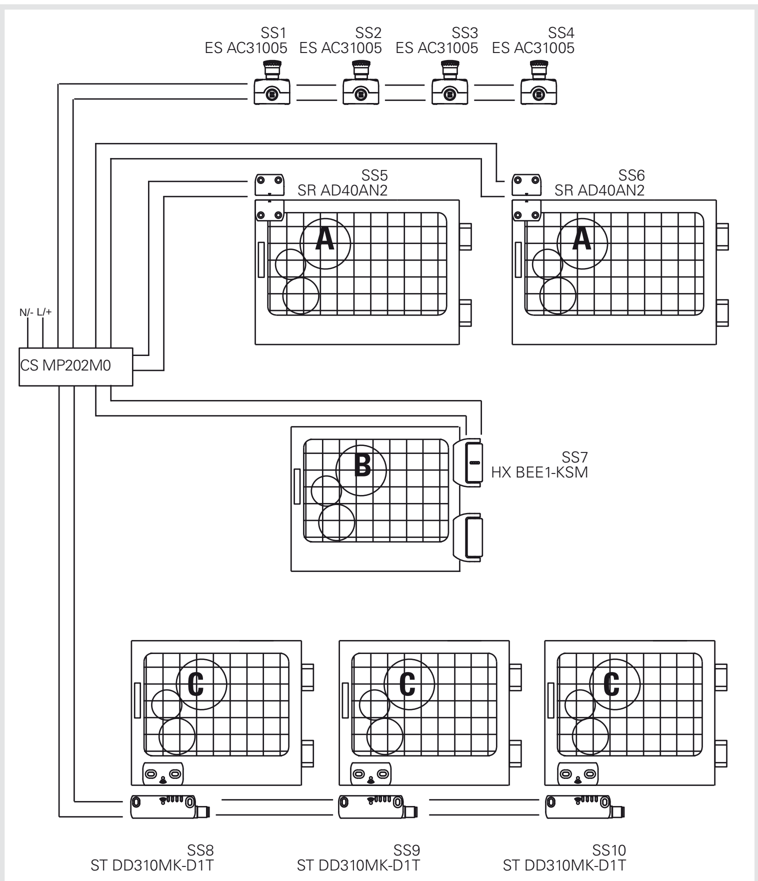
PL verification
- A category 4 circuit with $MTTF_d$=100 years and DC_{avg}= High corresponds to a PL e.
- The safety functions connected to guards SS1/SS2, SS3 and to the button have PL e.

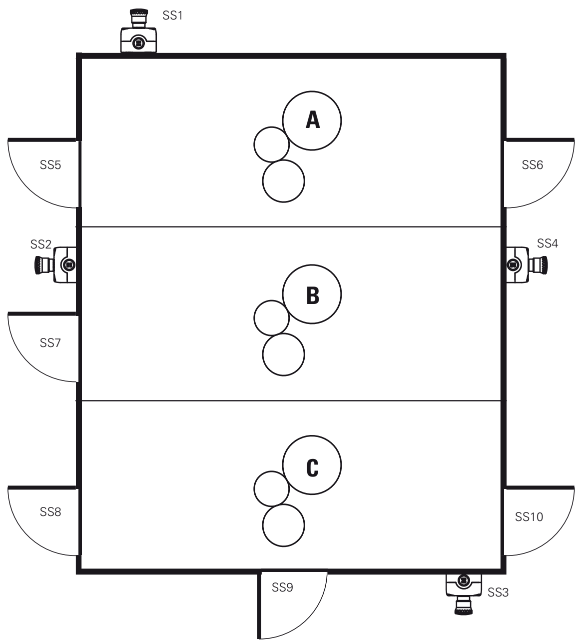


EXAMPLE 7
Application: Guard monitoring

Reference standard EN ISO 13849-1	
Safety category	**4**
Performance Level	**PL e**







Description of the safety function

The machine is divided into 3 different zones: access to each area is controlled by guards, and there is a series of 4 emergency buttons. When activating the emergency button, the CS MP safety module and the forcibly guided contactors KMA1/2, KMB1/2, KMC1/2 stop all motors.
The opening of a guard in zone A causes the intervention of device SS5 or SS6, which triggers the CS MP safety module and contactors KMA1 and KMA2, thus stopping the MA motor. Devices SS5, SS6 are connected separately and with a double channel to the CS MP safety module.
The opening of the guard in zone B causes the intervention of SS7, which triggers the CS MP safety module and the two contactors KMB1 and KMB2, thus stopping the MB motor. The SS7 hinge has two OSSD outputs and is controlled redundantly by the CS MP safety module.
The opening of a guard in zone C causes the intervention of device SS8, SS9 or SS10, which triggers the safety module and the two contactors KMC1 and KMC2, thus stopping the MC motor. Sensors SS8, SS9 and SS10 are connected to each other via to the OSSD outputs, and are redundantly controlled by the CS MP safety module.

Device data

• SS1,SS2,SS3 and SS4 (ES AC31005) are emergency buttons (E2 1PERZ4531) with 2 NC contacts. B_{10d} = 600,000 (see page 271)
• SS5 and SS6 (SR AD40AN2) are magnetic safety sensors. B_{10d} = 20,000,000 (see page 271)
• SS7 (HX BEE1-KSM) is a safety hinge with OSSD outputs. $MTTF_d$= 4077 years / DC=99% (see page 271)
• SS8, SS9 and SS10 (ST DD310MK-D1T) are safety sensors with RFID technology and OSSD outputs. $MTTF_d$= 4077 years / DC=99% (see page 271)
• KMA, KMB and KMC are contactors used at nominal load. B_{10d} = 2,000,000 (see Table C.1 of EN ISO 13849-1)
• CS MP202M0 is a safety module with $MTTF_d$=2035 years / DC=99%

Assumption of the frequency of use

• Each zone A gate is opened 2 times per hour for 16 h/day and 365 days/year equal to n_{op}/year = 11,680. The contactors will operate for twice the number of operations = 23,360
• Zone B gate is opened 4 times per hour for 16 h/day and 365 days/year equal to n_{op}/year = 23,360. The contactors will operate for a given number of operations = 23,360
• Each zone C gate is opened once per hour for 16 h/day and 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 pushbutton is actuated at most once a week, n_{op}/year = 52
• Fault exclusion: it is hypothesized that the pairs of contactors connected in parallel to the respective safety outputs are permanently cabled inside the electrical panel; therefore, the possibility of short circuit between +24V and contactors is excluded. (see Table D.4, 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 = 1141 years
• $MTTF_d$ e-stop = 727 years, value restricted to 100 years

Zone A guards
• $MTTF_d$ SS5/SS6 = 17.123 years
• $MTTF_d$ CS = 2035 years
• $MTTF_d$ KMA1,KMA2 = 856 years
• $MTTF_d$ A = 582 years (SS5/SS6,CS,KMA), value restricted to 100 years

Zone B gate
• $MTTF_d$ SS7 = 4.077 years
• $MTTF_d$ CS = 2035 years
• $MTTF_d$ KMB1,KMB2 = 856 years
• $MTTF_d$ B = 525 years (SS7,CS,KMB), value restricted to 100 years

Zone C guards
• $MTTF_d$ SS8/SS9/SS10 = 4.077 years
• $MTTF_d$ CS = 2035 years
• $MTTF_d$ KMC1,KMC2 = 1141 years
• $MTTF_d$ C = 620 years (SS8/SS9/SS10,CS,KMC), value restricted to 100 years

Diagnostic Coverage DC_{avg}

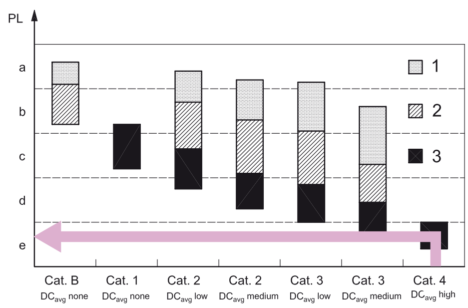
• KMA, KMB e KMC contacts are monitored by CS MP via the feedback circuit. DC=99%
• All faults of the various devices can be detected. DC=99%
• CS MP202M0 module has a DC=99%
• For each function we assume a diagnostic coverage of 99%

CCF Common Cause Failure

• We assume a score > 65 for all safety functions (based on EN ISO 13849-1 annex F).

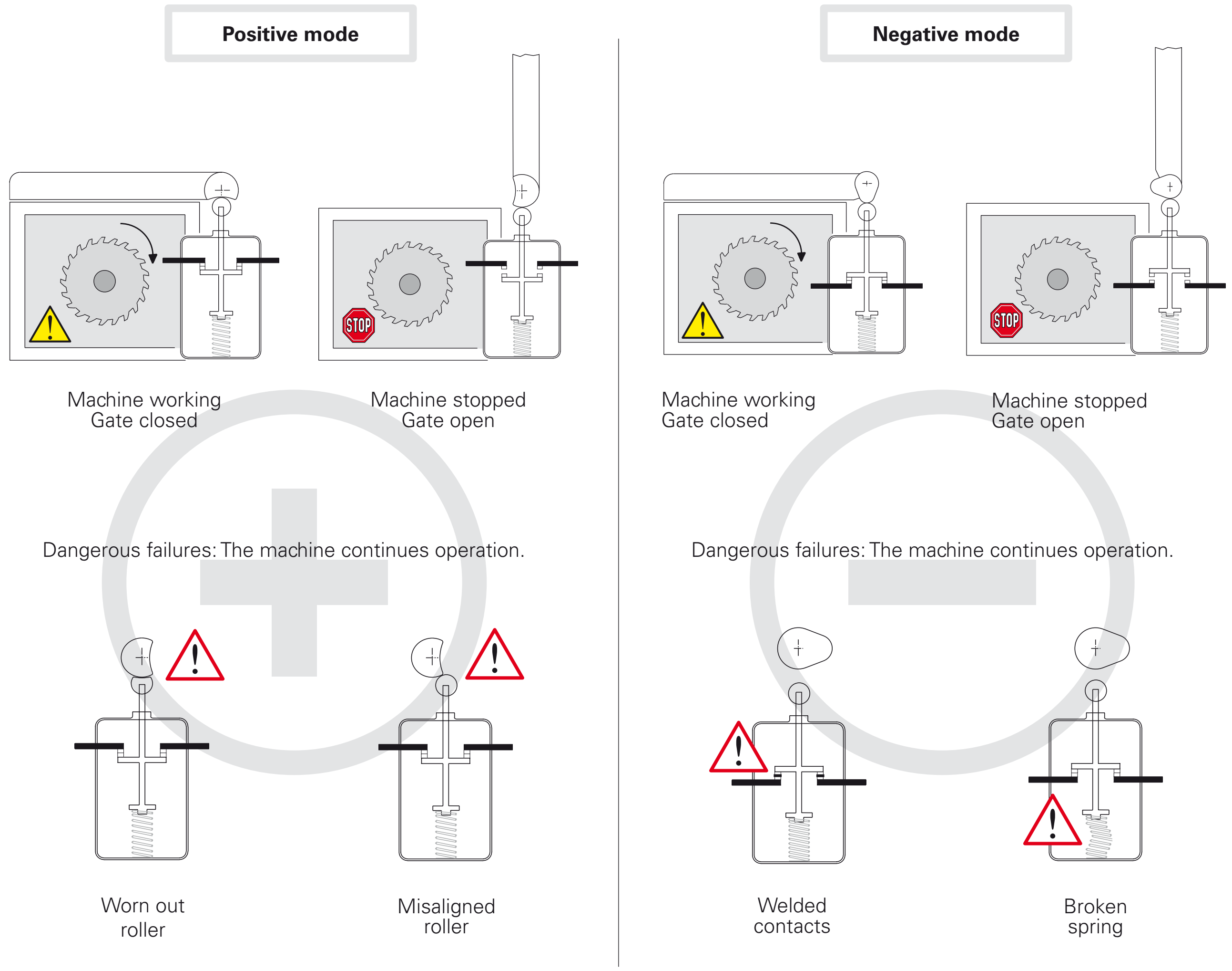
PL verification

• A category 4 circuit with $MTTF_d$=100 years and DC_{avg}= High corresponds to a PL e.
• All safety functions for the guards and the emergency buttons have PL e.



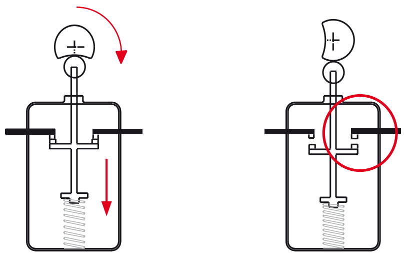
7 - Positive opening, redundancy, diversification and self-control

Positive mode and negative mode.
According to the standard EN ISO 12100, if a mechanical component in motion, directly drives another component, through physical contact or a rigid mechanical linkage, that connection is said to be in a **positive manner**. 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.) their connection is in a **negative manner**.



The positive mode avoids, with preventive maintenance, the dangerous failures indicated above. In negative mode, on the contrary, failures occur inside the switch and are therefore difficult to be detected.
With positive mode, internal failures (welded contacts or broken springs) allow the opening of the contacts and therefore the stop of the machine.

Use of switches in safety applications
When a single switch is used in a safety function, it must be actuated in a positive manner. The opening contact (normally closed), must be with "**positive opening**", in order to be used for safety applications. All switches with the symbol ⊖ are provided with NC contacts with positive opening.



Rigid non-flexible connection between the moving contacts and the actuator, where the actuating force is applied.

If the switches are two or more, it is suggested that they should operate in opposite modes, for example:
- One with a normally closed contact (opening contact) actuated by the guard in positive mode.
- The other with a normally open contact (closing contact), actuated by the guard in negative mode.

This is a common practice, however, it does not exclude, if justified, the use of two switches actuated in a positive mode (see diversification).

Diversification
Safety in the redundant system is increased by **diversification**. It is obtained by the application of two limit switches with different design and/or technology, in order to avoid failures caused by the same reasons. Some examples of diversification are: the use of a switch working in positive manner together with one working in non-positive manner; a switch with mechanical actuation and one with non mechanical actuation (e.g. electronic sensor); two switches with mechanical actuator working in positive manner but with different actuation principles (e.g. one actuator operated FR 693-M2 and one hinge operated FR 1896-M2 switch).

Redundancy
The **Redundancy** is the use of more than one device or system in order to guarantee that, in case of a function failure in one of them, another one is available to perform the safety functions. If the first failure is not detected, an eventual second failure may cause the loss of the safety functions.

Self-monitoring
The **Self-monitoring** consists in the automatic checking of the right function of every device running in the machine working-cycle. Consequently, the next working cycle can be either accepted or rejected.

Redundancy and self-monitoring
The combination of both systems, **redundancy** and **self-monitoring** allows that a first failure in the safety circuit does not cause the loss of safety functions. This first failure will be detected at the next re-start or anyhow before a second failure, which may cause the loss of the safety functions.

Definitions complying with the standards EN 60947-1 and EN 60947-5-1

Control switches
A mechanical switching device which serves the purpose of controlling the operations of switch gear or control-gear, including signalling, electrical interlocking, etc.

Utilization category
A combination of specified requirements related to the conditions in which the switching device fulfils its purpose.

Operating cycle
Succession of two movements, one for closure and second for opening.

Rated current Ie
A current that takes into account the rated operating voltage, the rated frequency, the utilization category and the type of protective enclosure, if appropriate.

Thermal current Ith
Max. value of current to be used for temperature-rise tests of 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 made without repair or replacement.

Mechanical endurance
Number of no-load operating cycles (i.e. without current at the main contacts), under the conditions defined by the corresponding product standard, which can be effected before it becomes necessary to service or replace any mechanical parts.

Contact element
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 element
Contact element which opens or closes the conducting path of its circuit in one location only.

Double interruption contact element
Contact element which opens or closes the conducting path of its circuit in two locations in series.

Make-contact element (normally open)
Contact element which closes a conducting path when the control switch is actuated.

Break-contact element (normally closed)
Contact element which opens a conducting path when the control switch is actuated.

Change-over contact elements
Contact element combination which includes one make-contact element and one break-contact element.

Electrically separated contact elements
Contact elements belonging to the same control switch, but adequately insulated from each other, so they can be connected to electric circuits with different tension.

Independent action contact element (snap action)
Contact element of a manual or automatic control device in which the velocity of contact motion is substantially independent of the actuator's motion velocity.

Dependent action contact element (slow action)
Contact element of a manual or automatic control device, the contact motion velocity of which depends on the actuator's motion velocity.

Minimum actuating force
The minimum force value to be applied to the actuator that will cause all contacts to reach their switched position.

Position switch
Pilot switch the actuating system of which is operated by a moving part of the machine, when that part reaches a predetermined position.

Foot switch
Control switch having an actuator intended to be operated by the force exerted by a foot.

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 determined under prescribed conditions surrounding the complete switching device.

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
Voltage to which dielectric test voltage and creepage distances are referred.

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 blocks
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) on subjects of safety and quality. Its function therefore is to guarantee to the governing authorities of the various countries the fulfilment of their obligations under the law.

IMQ marking

The IMQ (Italian Institute of the Quality Mark) is the organization in Italy (third and independent) whose task is to check and certify the compliance of the materials and the equipment with the safety standards (CEI standards in the electric and electronic branch). This voluntary conformity certification is a guarantee of quality, safety and technical value.

UL marking

UL (Underwriters Laboratories Inc.) is an independent non-profit laboratory 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. Regulations and testing made by UL is often taken as valid, by many governing authorities, with regard to conformity with local regulations on the subject of safety.

CCC marking

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 organization makes preliminary company visits and periodical verification inspections. Position switches cannot be sold in the Chinese territory without this mark.

TÜV SÜD certification 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 marking

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. Devices for emergency stop, 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).
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 apparatus 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: Standard for industrial control equipment. (American standard).
CSA 22-2 no. 14: Standard for industrial control equipment. (Canadian standard).

European directives

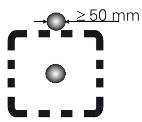
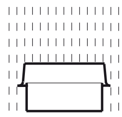
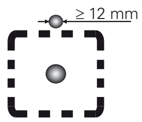
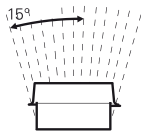
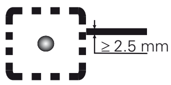
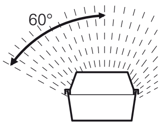
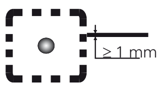
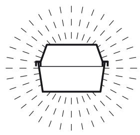
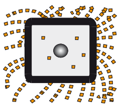
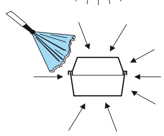
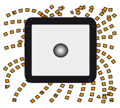
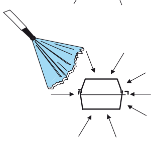
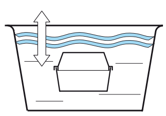
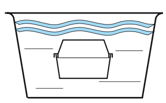
2006/95/EC	Directive on low-voltage switchgear and controlgear
2006/42/EC	Machinery Directive
2004/108/EC	Directive on electromagnetical compatibility
94/9/EC	ATEX Directive

Regulatory Organisations

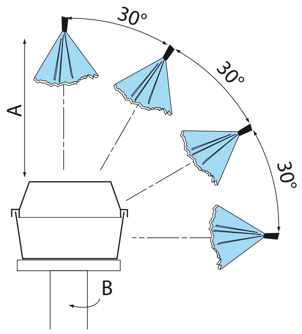
CEI	Comitato Elettrotecnico Italiano (IT)	**NF**	Normes Françaises (FR)
CSA	Canadian Standard Association (CAN)	**VDE**	Verband Deutscher Elektrotechniker (DE)
CENELEC	European Committee for Electrotechnical Standardisation	**UNI**	Ente Nazionale Italiano di Unificazione (IT)
CEN	European Committee for Standardisation	**UL**	Underwriter's Laboratories (USA)
IEC	International Electrotechnical Commission	**TUV**	Technischer Überwachungs-Verein (DE)

Protection degree of the housings for electrical material according to IEC 60529

This table indicates the protection degrees according to IEC 60529, EN 60529, CEI 70-1 standards.
The degrees are identified by the letters IP and 2 numbers. 2 more letters can be added, in order to give the protection degree for people or other features. The first number means the degree of protection against penetration of external solid materials. The second one indicates the degree of protection against penetration of water.

1st number	Description	Protection for the machine	Protection for persons	2nd number	Description	Protection for persons
0		Not protected	Not protected	**0**		Not protected
1		Protected from solid bodies of more than 50 mm in diameter	No access to hazardous parts with back of the hands (Ø 50 mm)	**1**		Protected from drops of water falling vertically
2		Protected from solid bodies of more than 12 mm in diameter	No access to hazardous parts with a finger (Ø 12 mm)	**2**		Protected from drops of water at an angle of 15° max.
3		Protected from solid bodies of more than 2.5 mm in diameter	No access to hazardous parts with tool (Ø 2.5 mm)	**3**		Protected from drops of water at an angle of 60° max.
4		Protected from solid bodies of more than 1 mm in diameter	No access to hazardous parts with wire (Ø 1 mm)	**4**		Protected from splashes of water around it
5		Protected from dust	No access to hazardous parts with wire (Ø 1 mm)	**5**		Protected from jets of water discharged around it
6		Totally protected from dust	No access to hazardous parts with wire (Ø 1 mm)	**6**		Protected from strong jets of water around it
				7		Protected from temporary water immersion (30 minutes in a depth of one meter)
				8		Protected from continuous water immersion by aggrement

Protection degree IP69K according to ISO 20653



ISO 20653 provides a particularly stringent test. The standard provides that a device has to pass a particularly heavy test which 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 temperature 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 each position

Housing features 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 like the kind of gasket or the use of solvent materials.

Type	Use guidance 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	Both indoor and open-air utilization, supplied with a protection degree against falling rain, sprinkling of water and direct water from the pipe. It is not damaged by the freezing of the housing and is rust-proof. Resistant against corrosion.
12	Indoor utilization, supplied 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 standard IEC 60947-1, the pollution degree is a conventional number based on the quantity of conducting hygroscopic dust, ionized gas or salt, on the relative humidity and on the frequency of occurrence, which is translated into hygroscopic absorption or humidity condensation, having the effect of reducing the dielectric rigidity 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 because of conductive dust or rain or snow.

Where not otherwise specified by the applicable standard 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 the particular applications.

Utilization categories for switching elements according to EN 60947-5-1

Alternate current utilization

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 utilization

Utilization category	Destination
DC12	Control of resistive loads and solid state loads with insulation by optocouplers.
DC13	Control of electromagnet loads without economy resistors in circuit
DC14	Control of electromagnet loads with economy resistors in circuit

Legend:

FA ••••-EX5 The dots indicate a generic alphanumeric character

Article code variations

Legend:

FA 4101-•DN → NA B110AB-DN• The codes in grey have been replaced by the code after the arrow

Old article	New article	Old article	New article	Old article	New article
FA 4101-•DN →	NA B110AB-DN•	FA 4550-•DN →	NA B112LE-DN•	FA 4825-•DN →	NA L110HE-DN•
FA 4101-KDM →	NA B110AB-DMK	FA 4550-KDM →	NA B112LE-DMK	FA 4825-KDM →	NA L110HE-DMK
FA 4102-•DN →	NA B110CP-DN•	FA 4551-•DN →	NA B112KE-DN•	FA 4830-•DN →	NA L112KA-DN•
FA 4102-KDM →	NA B110CP-DMK	FA 4551-KDM →	NA B112KE-DMK	FA 4830-KDM →	NA L112KA-DMK
FA 4108-•DN →	NA B110AE-DN•	FA 4552-•DN →	NA B112KF-DN•	FA 4831-•DN →	NA L112KC-DN•
FA 4108-KDM →	NA B110AE-DMK	FA 4552-KDM →	NA B112KF-DMK	FA 4831-KDM →	NA L112KC-DMK
FA 4110-•DN →	NA B110EB-DN•	FA 4554-•DN →	NA B112KG-DN•	FA 4833-•DN →	NA L112LB-DN•
FA 4110-KDM →	NA B110EB-DMK	FA 4554-KDM →	NA B112KG-DMK	FA 4833-KDM →	NA L112LB-DMK
FA 4111-•DN →	NA B110FB-DN•	FA 4555-•DN →	NA B112KP-DN•	FA 4834-•DN →	NA L112LL-DN•
FA 4111-KDM →	NA B110FB-DMK	FA 4555-KDM →	NA B112KP-DMK	FA 4834-KDM →	NA L112LL-DMK
FA 4112-•DN →	NA B110FB-DN•H0	FA 4556-•DN →	NA B112KP-DN•	FA 4840-•DN →	NA L112KD-DN•
FA 4112-KDM →	NA B110FB-DMKH0	FA 4556-KDM →	NA B112KP-DMK	FA 4840-KDM →	NA L112KD-DMK
FA 4113-•DN →	NA B110EE-DN•	FA 4557-•DN →	NA B112KH-DN•	FA 4850-•DN →	NA L112LE-DN•
FA 4113-KDM →	NA B110EE-DMK	FA 4557-KDM →	NA B112KH-DMK	FA 4850-KDM →	NA L112LE-DMK
FA 4115-•DN →	NA B110BB-DN•	FA 4569-•DN →	NA B112LH-DN•	FA 4851-•DN →	NA L112KE-DN•
FA 4115-KDM →	NA B110BB-DMK	FA 4569-KDM →	NA B112LH-DMK	FA 4851-KDM →	NA L112KE-DMK
FA 4117-•DN →	NA B110BB-DN•H0	FA 4601-•DN →	NA G110AB-DN•	FA 4852-•DN →	NA L112KF-DN•
FA 4117-KDM →	NA B110BB-DMKH0	FA 4601-KDM →	NA G110AB-DMK	FA 4852-KDM →	NA L112KF-DMK
FA 4120-•DN →	NA B110HB-DN•	FA 4602-•DN →	NA G110CP-DN•	FA 4854-•DN →	NA L112KG-DN•
FA 4120-KDM →	NA B110HB-DMK	FA 4602-KDM →	NA G110CP-DMK	FA 4854-KDM →	NA L112KG-DMK
FA 4125-•DN →	NA B110HE-DN•	FA 4608-•DN →	NA G110AE-DN•	FA 4855-•DN →	NA L112KP-DN•
FA 4125-KDM →	NA B110HE-DMK	FA 4608-KDM →	NA G110AE-DMK	FA 4855-KDM →	NA L112KP-DMK
FA 4130-•DN →	NA B112KA-DN•	FA 4610-•DN →	NA G110EB-DN•	FA 4856-•DN →	NA L112KP-DN•
FA 4130-KDM →	NA B112KA-DMK	FA 4610-KDM →	NA G110EB-DMK	FA 4856-KDM →	NA L112KP-DMK
FA 4131-•DN →	NA B112KC-DN•	FA 4611-•DN →	NA G110FB-DN•	FA 4857-•DN →	NA L112KH-DN•
FA 4131-KDM →	NA B112KC-DMK	FA 4611-KDM →	NA G110FB-DMK	FA 4857-KDM →	NA L112KH-DMK
FA 4133-•DN →	NA B112LB-DN•	FA 4612-•DN →	NA G110FB-DN•H0	FA 4869-•DN →	NA L112LH-DN•
FA 4133-KDM →	NA B112LB-DMK	FA 4612-KDM →	NA G110FB-DMKH0	FA 4869-KDM →	NA L112LH-DMK
FA 4134-•DN →	NA B112LL-DN•	FA 4613-•DN →	NA G110EE-DN•	FB 4101-•SN →	NB B110AB-DN•
FA 4134-KDM →	NA B112LL-DMK	FA 4613-KDM →	NA G110EE-DMK	FB 4101-KSM →	NB B110AB-SMK
FA 4140-•DN →	NA B112KD-DN•	FA 4615-•DN →	NA G110BB-DN•	FB 4102-•SN →	NB B110CP-DN•
FA 4140-KDM →	NA B112KD-DMK	FA 4615-KDM →	NA G110BB-DMK	FB 4102-KSM →	NB B110CP-SMK
FA 4150-•DN →	NA B112LE-DN•	FA 4617-•DN →	NA G110BB-DN•H0	FB 4108-•SN →	NB B110AE-DN•
FA 4150-KDM →	NA B112LE-DMK	FA 4617-KDM →	NA G110BB-DMKH0	FB 4108-KSM →	NB B110AE-SMK
FA 4151-•DN →	NA B112KE-DN•	FA 4630-•DN →	NA G112KA-DN•	FB 4110-•SN →	NB B110EB-DN•
FA 4151-KDM →	NA B112KE-DMK	FA 4630-KDM →	NA G112KA-DMK	FB 4110-KSM →	NB B110EB-SMK
FA 4152-•DN →	NA B112KF-DN•	FA 4631-•DN →	NA G112KC-DN•	FB 4111-•SN →	NB B110FB-DN•
FA 4152-KDM →	NA B112KF-DMK	FA 4631-KDM →	NA G112KC-DMK	FB 4111-KSM →	NB B110FB-SMK
FA 4154-•DN →	NA B112KG-DN•	FA 4633-•DN →	NA G112LB-DN•	FB 4112-•SN →	NB B110FB-DN•H0
FA 4154-KDM →	NA B112KG-DMK	FA 4633-KDM →	NA G112LB-DMK	FB 4112-KSM →	NB B110FB-SMKH0
FA 4155-•DN →	NA B112KP-DN•	FA 4634-•DN →	NA G112LL-DN•	FB 4113-•SN →	NB B110EE-DN•
FA 4155-KDM →	NA B112KP-DMK	FA 4634-KDM →	NA G112LL-DMK	FB 4113-KSM →	NB B110EE-SMK
FA 4156-•DN →	NA B112KP-DN•	FA 4640-•DN →	NA G112KD-DN•	FB 4115-•SN →	NB B110BB-DN•
FA 4156-KDM →	NA B112KP-DMK	FA 4640-KDM →	NA G112KD-DMK	FB 4115-KSM →	NB B110BB-SMK
FA 4157-•DN →	NA B112KH-DN•	FA 4650-•DN →	NA G112LE-DN•	FB 4117-•SN →	NB B110BB-DN•H0
FA 4157-KDM →	NA B112KH-DMK	FA 4650-KDM →	NA G112LE-DMK	FB 4117-KSM →	NB B110BB-SMKH0
FA 4169-•DN →	NA B112LH-DN•	FA 4651-•DN →	NA G112KE-DN•	FB 4120-•SN →	NB B110HB-DN•
FA 4169-KDM →	NA B112LH-DMK	FA 4651-KDM →	NA G112KE-DMK	FB 4120-KSM →	NB B110HB-SMK
FA 4501-•DN →	NA B110AB-DN•	FA 4652-•DN →	NA G112KF-DN•	FB 4125-•SN →	NB B110HE-DN•
FA 4501-KDM →	NA B110AB-DMK	FA 4652-KDM →	NA G112KF-DMK	FB 4125-KSM →	NB B110HE-SMK
FA 4502-•DN →	NA B110CP-DN•	FA 4654-•DN →	NA G112KG-DN•	FB 4130-•SN →	NB B112KA-DN•
FA 4502-KDM →	NA B110CP-DMK	FA 4654-KDM →	NA G112KG-DMK	FB 4130-KSM →	NB B112KA-SMK
FA 4508-•DN →	NA B110AE-DN•	FA 4655-•DN →	NA G112KP-DN•	FB 4131-•SN →	NB B112KC-DN•
FA 4508-KDM →	NA B110AE-DMK	FA 4655-KDM →	NA G112KP-DMK	FB 4131-KSM →	NB B112KC-SMK
FA 4510-•DN →	NA B110EB-DN•	FA 4656-•DN →	NA G112KP-DN•	FB 4133-•SN →	NB B112LB-DN•
FA 4510-KDM →	NA B110EB-DMK	FA 4656-KDM →	NA G112KP-DMK	FB 4133-KSM →	NB B112LB-SMK
FA 4511-•DN →	NA B110FB-DN•	FA 4657-•DN →	NA G112KH-DN•	FB 4134-•SN →	NB B112LL-DN•
FA 4511-KDM →	NA B110FB-DMK	FA 4657-KDM →	NA G112KH-DMK	FB 4134-KSM →	NB B112LL-SMK
FA 4512-•DN →	NA B110FB-DN•H0	FA 4669-•DN →	NA G112LH-DN•	FB 4140-•SN →	NB B112KD-DN•
FA 4512-KDM →	NA B110FB-DMKH0	FA 4669-KDM →	NA G112LH-DMK	FB 4140-KSM →	NB B112KD-SMK
FA 4513-•DN →	NA B110EE-DN•	FA 4801-•DN →	NA L110AB-DN•	FB 4150-•SN →	NB B112LE-DN•
FA 4513-KDM →	NA B110EE-DMK	FA 4801-KDM →	NA L110AB-DMK	FB 4150-KSM →	NB B112LE-SMK
FA 4515-•DN →	NA B110BB-DN•	FA 4802-•DN →	NA L110CP-DN•	FB 4151-•SN →	NB B112KE-DN•
FA 4515-KDM →	NA B110BB-DMK	FA 4802-KDM →	NA L110CP-DMK	FB 4151-KSM →	NB B112KE-SMK
FA 4517-•DN →	NA B110BB-DN•H0	FA 4808-•DN →	NA L110AE-DN•	FB 4152-•SN →	NB B112KF-DN•
FA 4517-KDM →	NA B110BB-DMKH0	FA 4808-KDM →	NA L110AE-DMK	FB 4152-KSM →	NB B112KF-SMK
FA 4520-•DN →	NA B110HB-DN•	FA 4810-•DN →	NA L110EB-DN•	FB 4154-•SN →	NB B112KG-DN•
FA 4520-KDM →	NA B110HB-DMK	FA 4810-KDM →	NA L110EB-DMK	FB 4154-KSM →	NB B112KG-SMK
FA 4525-•DN →	NA B110HE-DN•	FA 4811-•DN →	NA L110FB-DN•	FB 4155-•SN →	NB B112KP-DN•
FA 4525-KDM →	NA B110HE-DMK	FA 4811-KDM →	NA L110FB-DMK	FB 4155-KSM →	NB B112KP-SMK
FA 4530-•DN →	NA B112KA-DN•	FA 4812-•DN →	NA L110FB-DN•H0	FB 4156-•SN →	NB B112KP-DN•
FA 4530-KDM →	NA B112KA-DMK	FA 4812-KDM →	NA L110FB-DMKH0	FB 4156-KSM →	NB B112KP-SMK
FA 4531-•DN →	NA B112KC-DN•	FA 4813-•DN →	NA L110EE-DN•	FB 4157-•SN →	NB B112KH-DN•
FA 4531-KDM →	NA B112KC-DMK	FA 4813-KDM →	NA L110EE-DMK	FB 4157-KSM →	NB B112KH-SMK
FA 4533-•DN →	NA B112LB-DN•	FA 4815-•DN →	NA L110BB-DN•	FB 4169-•SN →	NB B112LH-DN•
FA 4533-KDM →	NA B112LB-DMK	FA 4815-KDM →	NA L110BB-DMK	FB 4169-KSM →	NB B112LH-SMK
FA 4534-•DN →	NA B112LL-DN•	FA 4817-•DN →	NA L110BB-DN•H0	FB 4501-•SN →	NB B110AB-DN•
FA 4534-KDM →	NA B112LL-DMK	FA 4817-KDM →	NA L110BB-DMKH0	FB 4501-KSM →	NB B110AB-SMK
FA 4540-•DN →	NA B112KD-DN•	FA 4820-•DN →	NA L110HB-DN•	FB 4502-•SN →	NB B110CP-DN•
FA 4540-KDM →	NA B112KD-DMK	FA 4820-KDM →	NA L110HB-DMK	FB 4502-KSM →	NB B110CP-SMK

Old article	New article	Old article	New article	Old article	New article
FB 4508-•SN →	NB B110AE-DN•	FB 4656-KSM →	NB G112KP-SMK	FF 4115-KSM →	NF B110BB-SMK
FB 4508-KSM →	NB B110AE-SMK	FB 4657-•SN →	NB G112KH-DN•	FF 4115-KDM→	NF B110BB-DMK
FB 4510-•SN →	NB B110EB-DN•	FB 4657-KSM →	NB G112KH-SMK	FF 4117-•DN →	NF B110BB-DN•H0
FB 4510-KSM →	NB B110EB-SMK	FB 4669-•SN →	NB G112LH-DN•	FF 4117-•SN →	NF B110BB-DN•H0
FB 4511-•SN →	NB B110FB-DN•	FB 4669-KSM →	NB G112LH-SMK	FF 4117-KSM →	NF B110BB-SMKH0
FB 4511-KSM →	NB B110FB-SMK	FB 4801-•SN →	NB L110AB-DN•	FF 4117-KDM→	NF B110BB-DMKH0
FB 4512-•SN →	NB B110FB-DN•H0	FB 4801-KSM →	NB L110AB-SMK	FF 4120-•DN →	NF B110HB-DN•
FB 4512-KSM →	NB B110FB-SMKH0	FB 4802-•SN →	NB L110CP-DN•	FF 4120-•SN →	NF B110HB-DN•
FB 4513-•SN →	NB B110EE-DN•	FB 4802-KSM →	NB L110CP-SMK	FF 4120-KSM →	NF B110HB-SMK
FB 4513-KSM →	NB B110EE-SMK	FB 4808-•SN →	NB L110AE-DN•	FF 4120-KDM→	NF B110HB-DMK
FB 4515-•SN →	NB B110BB-DN•	FB 4808-KSM →	NB L110AE-SMK	FF 4125-•DN →	NF B110HE-DN•
FB 4515-KSM →	NB B110BB-SMK	FB 4810-•SN →	NB L110EB-DN•	FF 4125-•SN →	NF B110HE-DN•
FB 4517-•SN →	NB B110BB-DN•H0	FB 4810-KSM →	NB L110EB-SMK	FF 4125-KSM →	NF B110HE-SMK
FB 4517-KSM →	NB B110BB-SMKH0	FB 4811-•SN →	NB L110FB-DN•	FF 4125-KDM→	NF B110HE-DMK
FB 4520-•SN →	NB B110HB-DN•	FB 4811-KSM →	NB L110FB-SMK	FF 4130-•DN →	NF B112KA-DN•
FB 4520-KSM →	NB B110HB-SMK	FB 4812-•SN →	NB L110FB-DN•H0	FF 4130-•SN →	NF B112KA-DN•
FB 4525-•SN →	NB B110HE-DN•	FB 4812-KSM →	NB L110FB-SMKH0	FF 4130-KSM →	NF B112KA-SMK
FB 4525-KSM →	NB B110HE-SMK	FB 4813-•SN →	NB L110EE-DN•	FF 4130-KDM→	NF B112KA-DMK
FB 4530-•SN →	NB B112KA-DN•	FB 4813-KSM →	NB L110EE-SMK	FF 4131-•DN →	NF B112KC-DN•
FB 4530-KSM →	NB B112KA-SMK	FB 4815-•SN →	NB L110BB-DN•	FF 4131-•SN →	NF B112KC-DN•
FB 4531-•SN →	NB B112KC-DN•	FB 4815-KSM →	NB L110BB-SMK	FF 4131-KSM →	NF B112KC-SMK
FB 4531-KSM →	NB B112KC-SMK	FB 4817-•SN →	NB L110BB-DN•H0	FF 4131-KDM→	NF B112KC-DMK
FB 4533-•SN →	NB B112LB-DN•	FB 4817-KSM →	NB L110BB-SMKH0	FF 4133-•DN →	NF B112LB-DN•
FB 4533-KSM →	NB B112LB-SMK	FB 4820-•SN →	NB L110HB-DN•	FF 4133-•SN →	NF B112LB-DN•
FB 4534-•SN →	NB B112LL-DN•	FB 4820-KSM →	NB L110HB-SMK	FF 4133-KSM →	NF B112LB-SMK
FB 4534-KSM →	NB B112LL-SMK	FB 4825-•SN →	NB L110HE-DN•	FF 4133-KDM→	NF B112LB-DMK
FB 4540-•SN →	NB B112KD-DN•	FB 4825-KSM →	NB L110HE-SMK	FF 4134-•DN →	NF B112LL-DN•
FB 4540-KSM →	NB B112KD-SMK	FB 4830-•SN →	NB L112KA-DN•	FF 4134-•SN →	NF B112LL-DN•
FB 4550-•SN →	NB B112LE-DN•	FB 4830-KSM →	NB L112KA-SMK	FF 4134-KSM →	NF B112LL-SMK
FB 4550-KSM →	NB B112LE-SMK	FB 4831-•SN →	NB L112KC-DN•	FF 4134-KDM→	NF B112LL-DMK
FB 4551-•SN →	NB B112KE-DN•	FB 4831-KSM →	NB L112KC-SMK	FF 4140-•DN →	NF B112KD-DN•
FB 4551-KSM →	NB B112KE-SMK	FB 4833-•SN →	NB L112LB-DN•	FF 4140-•SN →	NF B112KD-DN•
FB 4552-•SN →	NB B112KF-DN•	FB 4833-KSM →	NB L112LB-SMK	FF 4140-KSM →	NF B112KD-SMK
FB 4552-KSM →	NB B112KF-SMK	FB 4834-•SN →	NB L112LL-DN•	FF 4140-KDM→	NF B112KD-DMK
FB 4554-•SN →	NB B112KG-DN•	FB 4834-KSM →	NB L112LL-SMK	FF 4150-•DN →	NF B112LE-DN•
FB 4554-KSM →	NB B112KG-SMK	FB 4840-•SN →	NB L112KD-DN•	FF 4150-•SN →	NF B112LE-DN•
FB 4555-•SN →	NB B112KP-DN•	FB 4840-KSM →	NB L112KD-SMK	FF 4150-KSM →	NF B112LE-SMK
FB 4555-KSM →	NB B112KP-SMK	FB 4850-•SN →	NB L112LE-DN•	FF 4150-KDM→	NF B112LE-DMK
FB 4556-•SN →	NB B112KP-DN•	FB 4850-KSM →	NB L112LE-SMK	FF 4151-•DN →	NF B112KE-DN•
FB 4556-KSM →	NB B112KP-SMK	FB 4851-•SN →	NB L112KE-DN•	FF 4151-•SN →	NF B112KE-DN•
FB 4557-•SN →	NB B112KH-DN•	FB 4851-KSM →	NB L112KE-SMK	FF 4151-KSM →	NF B112KE-SMK
FB 4557-KSM →	NB B112KH-SMK	FB 4852-•SN →	NB L112KF-DN•	FF 4151-KDM→	NF B112KE-DMK
FB 4569-•SN →	NB B112LH-DN•	FB 4852-KSM →	NB L112KF-SMK	FF 4152-•DN →	NF B112KF-DN•
FB 4569-KSM →	NB B112LH-SMK	FB 4854-•SN →	NB L112KG-DN•	FF 4152-•SN →	NF B112KF-DN•
FB 4601-•SN →	NB G110AB-DN•	FB 4854-KSM →	NB L112KG-SMK	FF 4152-KSM →	NF B112KF-SMK
FB 4601-KSM →	NB G110AB-SMK	FB 4855-•SN →	NB L112KP-DN•	FF 4152-KDM→	NF B112KF-DMK
FB 4602-•SN →	NB G110CP-DN•	FB 4855-KSM →	NB L112KP-SMK	FF 4154-•DN →	NF B112KG-DN•
FB 4602-KSM →	NB G110CP-SMK	FB 4856-•SN →	NB L112KP-DN•	FF 4154-•SN →	NF B112KG-DN•
FB 4608-•SN →	NB G110AE-DN•	FB 4856-KSM →	NB L112KP-SMK	FF 4154-KSM →	NF B112KG-SMK
FB 4608-KSM →	NB G110AE-SMK	FB 4857-•SN →	NB L112KH-DN•	FF 4154-KDM→	NF B112KG-DMK
FB 4610-•SN →	NB G110EB-DN•	FB 4857-KSM →	NB L112KH-SMK	FF 4155-•DN →	NF B112KP-DN•
FB 4610-KSM →	NB G110EB-SMK	FB 4869-•SN →	NB L112LH-DN•	FF 4155-•SN →	NF B112KP-DN•
FB 4611-•SN →	NB G110FB-DN•	FB 4869-KSM →	NB L112LH-SMK	FF 4155-KSM →	NF B112KP-SMK
FB 4611-KSM →	NB G110FB-SMK	FF 4101-•DN →	NF B110AB-DN•	FF 4155-KDM→	NF B112KP-DMK
FB 4612-•SN →	NB G110FB-DN•H0	FF 4101-•SN →	NF B110AB-DN•	FF 4156-•DN →	NF B112KP-DN•
FB 4612-KSM →	NB G110FB-SMKH0	FF 4101-KSM →	NF B110AB-SMK	FF 4156-•SN →	NF B112KP-DN•
FB 4613-•SN →	NB G110EE-DN•	FF 4101-KDM→	NF B110AB-DMK	FF 4156-KSM →	NF B112KP-SMK
FB 4613-KSM →	NB G110EE-SMK	FF 4102-•DN →	NF B110CP-DN•	FF 4156-KDM→	NF B112KP-DMK
FB 4615-•SN →	NB G110BB-DN•	FF 4102-•SN →	NF B110CP-DN•	FF 4157-•DN →	NF B112KH-DN•
FB 4615-KSM →	NB G110BB-SMK	FF 4102-KSM →	NF B110CP-SMK	FF 4157-•SN →	NF B112KH-DN•
FB 4617-•SN →	NB G110BB-DN•H0	FF 4102-KDM→	NF B110CP-DMK	FF 4157-KSM →	NF B112KH-SMK
FB 4617-KSM →	NB G110BB-SMKH0	FF 4108-•DN →	NF B110AE-DN•	FF 4157-KDM→	NF B112KH-DMK
FB 4630-•SN →	NB G112KA-DN•	FF 4108-•SN →	NF B110AE-DN•	FF 4169-•DN →	NF B112LH-DN•
FB 4630-KSM →	NB G112KA-SMK	FF 4108-KSM →	NF B110AE-SMK	FF 4169-•SN →	NF B112LH-DN•
FB 4631-•SN →	NB G112KC-DN•	FF 4108-KDM→	NF B110AE-DMK	FF 4169-KSM →	NF B112LH-SMK
FB 4631-KSM →	NB G112KC-SMK	FF 4110-•DN →	NF B110EB-DN•	FF 4169-KDM→	NF B112LH-DMK
FB 4633-•SN →	NB G112LB-DN•	FF 4110-•SN →	NF B110EB-DN•	FF 4501-•DN →	NF B110AB-DN•
FB 4633-KSM →	NB G112LB-SMK	FF 4110-KSM →	NF B110EB-SMK	FF 4501-•SN →	NF B110AB-DN•
FB 4634-•SN →	NB G112LL-DN•	FF 4110-KDM→	NF B110EB-DMK	FF 4501-KSM →	NF B110AB-SMK
FB 4634-KSM →	NB G112LL-SMK	FF 4111-•DN →	NF B110FB-DN•	FF 4501-KDM→	NF B110AB-DMK
FB 4640-•SN →	NB G112KD-DN•	FF 4111-•SN →	NF B110FB-DN•	FF 4502-•DN →	NF B110CP-DN•
FB 4640-KSM →	NB G112KD-SMK	FF 4111-KSM →	NF B110FB-SMK	FF 4502-•SN →	NF B110CP-DN•
FB 4650-•SN →	NB G112LE-DN•	FF 4111-KDM→	NF B110FB-DMK	FF 4502-KSM →	NF B110CP-SMK
FB 4650-KSM →	NB G112LE-SMK	FF 4112-•DN →	NF B110FB-DN•H0	FF 4502-KDM→	NF B110CP-DMK
FB 4651-•SN →	NB G112KE-DN•	FF 4112-•SN →	NF B110FB-DN•H0	FF 4508-•DN →	NF B110AE-DN•
FB 4651-KSM →	NB G112KE-SMK	FF 4112-KSM →	NF B110FB-SMKH0	FF 4508-•SN →	NF B110AE-DN•
FB 4652-•SN →	NB G112KF-DN•	FF 4112-KDM→	NF B110FB-DMKH0	FF 4508-KSM →	NF B110AE-SMK
FB 4652-KSM →	NB G112KF-SMK	FF 4113-•DN →	NF B110EE-DN•	FF 4508-KDM→	NF B110AE-DMK
FB 4654-•SN →	NB G112KG-DN•	FF 4113-•SN →	NF B110EE-DN•	FF 4510-•DN →	NF B110EB-DN•
FB 4654-KSM →	NB G112KG-SMK	FF 4113-KSM →	NF B110EE-SMK	FF 4510-•SN →	NF B110EB-DN•
FB 4655-•SN →	NB G112KP-DN•	FF 4113-KDM→	NF B110EE-DMK	FF 4510-KSM →	NF B110EB-SMK
FB 4655-KSM →	NB G112KP-SMK	FF 4115-•DN →	NF B110BB-DN•	FF 4510-KDM→	NF B110EB-DMK
FB 4656-•SN →	NB G112KP-DN•	FF 4115-•SN →	NF B110BB-DN•	FF 4511-•DN →	NF B110FB-DN•

Old article	New article	Old article	New article	Old article	New article
FF 4511-•SN →	NF B110FB-DN•	FF 4601-•SN →	NF G110AB-DN•	FF 4657-•SN →	NF G112KH-DN•
FF 4511-KSM →	NF B110FB-SMK	FF 4601-KSM →	NF G110AB-SMK	FF 4657-KSM →	NF G112KH-SMK
FF 4511-KDM→	NF B110FB-DMK	FF 4601-KDM→	NF G110AB-DMK	FF 4657-KDM→	NF G112KH-DMK
FF 4512-•DN →	NF B110FB-DN•H0	FF 4602-•DN →	NF G110CP-DN•	FF 4669-•DN →	NF G112LH-DN•
FF 4512-•SN →	NF B110FB-DN•H0	FF 4602-•SN →	NF G110CP-DN•	FF 4669-•SN →	NF G112LH-DN•
FF 4512-KSM →	NF B110FB-SMKH0	FF 4602-KSM →	NF G110CP-SMK	FF 4669-KSM →	NF G112LH-SMK
FF 4512-KDM→	NF B110FB-DMKH0	FF 4602-KDM→	NF G110CP-DMK	FF 4669-KDM→	NF G112LH-DMK
FF 4513-•DN →	NF B110EE-DN•	FF 4608-•DN →	NF G110AE-DN•	FF 4801-•DN →	NF L110AB-DN•
FF 4513-•SN →	NF B110EE-DN•	FF 4608-•SN →	NF G110AE-DN•	FF 4801-•SN →	NF L110AB-DN•
FF 4513-KSM →	NF B110EE-SMK	FF 4608-KSM →	NF G110AE-SMK	FF 4801-KSM →	NF L110AB-SMK
FF 4513-KDM→	NF B110EE-DMK	FF 4608-KDM→	NF G110AE-DMK	FF 4801-KDM→	NF L110AB-DMK
FF 4515-•DN →	NF B110BB-DN•	FF 4610-•DN →	NF G110EB-DN•	FF 4802-•DN →	NF L110CP-DN•
FF 4515-•SN →	NF B110BB-DN•	FF 4610-•SN →	NF G110EB-DN•	FF 4802-•SN →	NF L110CP-DN•
FF 4515-KSM →	NF B110BB-SMK	FF 4610-KSM →	NF G110EB-SMK	FF 4802-KSM →	NF L110CP-SMK
FF 4515-KDM→	NF B110BB-DMK	FF 4610-KDM→	NF G110EB-DMK	FF 4802-KDM→	NF L110CP-DMK
FF 4517-•DN →	NF B110BB-DN•H0	FF 4611-•DN →	NF G110FB-DN•	FF 4808-•DN →	NF L110AE-DN•
FF 4517-•SN →	NF B110BB-DN•H0	FF 4611-•SN →	NF G110FB-DN•	FF 4808-•SN →	NF L110AE-DN•
FF 4517-KSM →	NF B110BB-SMKH0	FF 4611-KSM →	NF G110FB-SMK	FF 4808-KSM →	NF L110AE-SMK
FF 4517-KDM→	NF B110BB-DMKH0	FF 4611-KDM→	NF G110FB-DMK	FF 4808-KDM→	NF L110AE-DMK
FF 4520-•DN →	NF B110HB-DN•	FF 4612-•DN →	NF G110FB-DN•H0	FF 4810-•DN →	NF L110EB-DN•
FF 4520-•SN →	NF B110HB-DN•	FF 4612-•SN →	NF G110FB-DN•H0	FF 4810-•SN →	NF L110EB-DN•
FF 4520-KSM →	NF B110HB-SMK	FF 4612-KSM →	NF G110FB-SMKH0	FF 4810-KSM →	NF L110EB-SMK
FF 4520-KDM→	NF B110HB-DMK	FF 4612-KDM→	NF G110FB-DMKH0	FF 4810-KDM→	NF L110EB-DMK
FF 4525-•DN →	NF B110HE-DN•	FF 4613-•DN →	NF G110EE-DN•	FF 4811-•DN →	NF L110FB-DN•
FF 4525-•SN →	NF B110HE-DN•	FF 4613-•SN →	NF G110EE-DN•	FF 4811-•SN →	NF L110FB-DN•
FF 4525-KSM →	NF B110HE-SMK	FF 4613-KSM →	NF G110EE-SMK	FF 4811-KSM →	NF L110FB-SMK
FF 4525-KDM→	NF B110HE-DMK	FF 4613-KDM→	NF G110EE-DMK	FF 4811-KDM→	NF L110FB-DMK
FF 4530-•DN →	NF B112KA-DN•	FF 4615-•DN →	NF G110BB-DN•	FF 4812-•DN →	NF L110FB-DN•H0
FF 4530-•SN →	NF B112KA-DN•	FF 4615-•SN →	NF G110BB-DN•	FF 4812-•SN →	NF L110FB-DN•H0
FF 4530-KSM →	NF B112KA-SMK	FF 4615-KSM →	NF G110BB-SMK	FF 4812-KSM →	NF L110FB-SMKH0
FF 4530-KDM→	NF B112KA-DMK	FF 4615-KDM→	NF G110BB-DMK	FF 4812-KDM→	NF L110FB-DMKH0
FF 4531-•DN →	NF B112KC-DN•	FF 4617-•DN →	NF G110BB-DN•H0	FF 4813-•DN →	NF L110EE-DN•
FF 4531-•SN →	NF B112KC-DN•	FF 4617-•SN →	NF G110BB-DN•H0	FF 4813-•SN →	NF L110EE-DN•
FF 4531-KSM →	NF B112KC-SMK	FF 4617-KSM →	NF G110BB-SMKH0	FF 4813-KSM →	NF L110EE-SMK
FF 4531-KDM→	NF B112KC-DMK	FF 4617-KDM→	NF G110BB-DMKH0	FF 4813-KDM→	NF L110EE-DMK
FF 4533-•DN →	NF B112LB-DN•	FF 4630-•DN →	NF G112KA-DN•	FF 4815-•DN →	NF L110BB-DN•
FF 4533-•SN →	NF B112LB-DN•	FF 4630-•SN →	NF G112KA-DN•	FF 4815-•SN →	NF L110BB-DN•
FF 4533-KSM →	NF B112LB-SMK	FF 4630-KSM →	NF G112KA-SMK	FF 4815-KSM →	NF L110BB-SMK
FF 4533-KDM→	NF B112LB-DMK	FF 4630-KDM→	NF G112KA-DMK	FF 4815-KDM→	NF L110BB-DMK
FF 4534-•DN →	NF B112LL-DN•	FF 4631-•DN →	NF G112KC-DN•	FF 4817-•DN →	NF L110BB-DN•H0
FF 4534-•SN →	NF B112LL-DN•	FF 4631-•SN →	NF G112KC-DN•	FF 4817-•SN →	NF L110BB-DN•H0
FF 4534-KSM →	NF B112LL-SMK	FF 4631-KSM →	NF G112KC-SMK	FF 4817-KSM →	NF L110BB-SMKH0
FF 4534-KDM→	NF B112LL-DMK	FF 4631-KDM→	NF G112KC-DMK	FF 4817-KDM→	NF L110BB-DMKH0
FF 4540-•DN →	NF B112KD-DN•	FF 4633-•DN →	NF G112LB-DN•	FF 4820-•DN →	NF L110HB-DN•
FF 4540-•SN →	NF B112KD-DN•	FF 4633-•SN →	NF G112LB-DN•	FF 4820-•SN →	NF L110HB-DN•
FF 4540-KSM →	NF B112KD-SMK	FF 4633-KSM →	NF G112LB-SMK	FF 4820-KSM →	NF L110HB-SMK
FF 4540-KDM→	NF B112KD-DMK	FF 4633-KDM→	NF G112LB-DMK	FF 4820-KDM→	NF L110HB-DMK
FF 4550-•DN →	NF B112LE-DN•	FF 4634-•DN →	NF G112LL-DN•	FF 4825-•DN →	NF L110HE-DN•
FF 4550-•SN →	NF B112LE-DN•	FF 4634-•SN →	NF G112LL-DN•	FF 4825-•SN →	NF L110HE-DN•
FF 4550-KSM →	NF B112LE-SMK	FF 4634-KSM →	NF G112LL-SMK	FF 4825-KSM →	NF L110HE-SMK
FF 4550-KDM→	NF B112LE-DMK	FF 4634-KDM→	NF G112LL-DMK	FF 4825-KDM→	NF L110HE-DMK
FF 4551-•DN →	NF B112KE-DN•	FF 4640-•DN →	NF G112KD-DN•	FF 4830-•DN →	NF L112KA-DN•
FF 4551-•SN →	NF B112KE-DN•	FF 4640-•SN →	NF G112KD-DN•	FF 4830-•SN →	NF L112KA-DN•
FF 4551-KSM →	NF B112KE-SMK	FF 4640-KSM →	NF G112KD-SMK	FF 4830-KSM →	NF L112KA-SMK
FF 4551-KDM→	NF B112KE-DMK	FF 4640-KDM→	NF G112KD-DMK	FF 4830-KDM→	NF L112KA-DMK
FF 4552-•DN →	NF B112KF-DN•	FF 4650-•DN →	NF G112LE-DN•	FF 4831-•DN →	NF L112KC-DN•
FF 4552-•SN →	NF B112KF-DN•	FF 4650-•SN →	NF G112LE-DN•	FF 4831-•SN →	NF L112KC-DN•
FF 4552-KSM →	NF B112KF-SMK	FF 4650-KSM →	NF G112LE-SMK	FF 4831-KSM →	NF L112KC-SMK
FF 4552-KDM→	NF B112KF-DMK	FF 4650-KDM→	NF G112LE-DMK	FF 4831-KDM→	NF L112KC-DMK
FF 4554-•DN →	NF B112KG-DN•	FF 4651-•DN →	NF G112KE-DN•	FF 4833-•DN →	NF L112LB-DN•
FF 4554-•SN →	NF B112KG-DN•	FF 4651-•SN →	NF G112KE-DN•	FF 4833-•SN →	NF L112LB-DN•
FF 4554-KSM →	NF B112KG-SMK	FF 4651-KSM →	NF G112KE-SMK	FF 4833-KSM →	NF L112LB-SMK
FF 4554-KDM→	NF B112KG-DMK	FF 4651-KDM→	NF G112KE-DMK	FF 4833-KDM→	NF L112LB-DMK
FF 4555-•DN →	NF B112KP-DN•	FF 4652-•DN →	NF G112KF-DN•	FF 4834-•DN →	NF L112LL-DN•
FF 4555-•SN →	NF B112KP-DN•	FF 4652-•SN →	NF G112KF-DN•	FF 4834-•SN →	NF L112LL-DN•
FF 4555-KSM →	NF B112KP-SMK	FF 4652-KSM →	NF G112KF-SMK	FF 4834-KSM →	NF L112LL-SMK
FF 4555-KDM→	NF B112KP-DMK	FF 4652-KDM→	NF G112KF-DMK	FF 4834-KDM→	NF L112LL-DMK
FF 4556-•DN →	NF B112KP-DN•	FF 4654-•DN →	NF G112KG-DN•	FF 4840-•DN →	NF L112KD-DN•
FF 4556-•SN →	NF B112KP-DN•	FF 4654-•SN →	NF G112KG-DN•	FF 4840-•SN →	NF L112KD-DN•
FF 4556-KSM →	NF B112KP-SMK	FF 4654-KSM →	NF G112KG-SMK	FF 4840-KSM →	NF L112KD-SMK
FF 4556-KDM→	NF B112KP-DMK	FF 4654-KDM→	NF G112KG-DMK	FF 4840-KDM→	NF L112KD-DMK
FF 4557-•DN →	NF B112KH-DN•	FF 4655-•DN →	NF G112KP-DN•	FF 4850-•DN →	NF L112LE-DN•
FF 4557-•SN →	NF B112KH-DN•	FF 4655-•SN →	NF G112KP-DN•	FF 4850-•SN →	NF L112LE-DN•
FF 4557-KSM →	NF B112KH-SMK	FF 4655-KSM →	NF G112KP-SMK	FF 4850-KSM →	NF L112LE-SMK
FF 4557-KDM→	NF B112KH-DMK	FF 4655-KDM→	NF G112KP-DMK	FF 4850-KDM→	NF L112LE-DMK
FF 4569-•DN →	NF B112LH-DN•	FF 4656-•DN →	NF G112KP-DN•	FF 4851-•DN →	NF L112KE-DN•
FF 4569-•SN →	NF B112LH-DN•	FF 4656-•SN →	NF G112KP-DN•	FF 4851-•SN →	NF L112KE-DN•
FF 4569-KSM →	NF B112LH-SMK	FF 4656-KSM →	NF G112KP-SMK	FF 4851-KSM →	NF L112KE-SMK
FF 4569-KDM→	NF B112LH-DMK	FF 4656-KDM→	NF G112KP-DMK	FF 4851-KDM→	NF L112KE-DMK
FF 4601-•DN →	NF G110AB-DN•	FF 4657-•DN →	NF G112KH-DN•	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

General Sales Terms

Orders: Purchasing orders must be booked with us 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 when we recognise virus presence or uncertain origin annexed.

Minimum order amount: Unless specifically agreed, for abroad countries the minimum amount of the order is 200 Euro. A 10 Euro extra fee will be applied to orders below 200 Euro delivered in Italy or San Marino. For deliveries abroad, the extra cost will be 30 Euro.

Prices: List prices does not includes VAT, custom taxes or other similar charges. Unless specifically agreed, prices are not binding and may change without prior notice.

Purchasing Quantity: Some products are supplied in packs. Total order quantity of these items must be multiple of the package content.

Order cancellation/changes: Orders variation could be accepted depending on status of manufacturing process. Changes or cancellation of special article orders will not be accepted.

Supply: The supply will include only what mentioned in the sales confirmation. We reserve the right to stop supply in case of changes in the customer's financial standing.

Delivery date: Delivery is specified on the order confirmation, which shows the expected week of shipment from Pizzato Elettrica, not the date of arrival at the customer's premises. This date is an approximate value and can not be used as a reason of the order non-fulfilment.

Packaging: Packaging is free. Over six boxes, pallets could be necessary for the transport.

Shipment: Good's transport is at customer's risk, even when delivery term is agreed at customer's site. It is a customer obligation to check the number of boxes delivered by the forwarder, to verify packaging damages and to control the weight declared in documents before accept the goods. Any discrepancy or mistakes should be reported by writing within eight days from the good's receipt. If case of Ex works deliveries it is responsibility of customer to verify that forwarder is authorized to the goods carriage in compliance with Italian law.

Warranty: The warranty has a validity of 12 months starting from the delivery date of the material. 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 over the technological limits described in the general catalog, or items that have not received the right maintenance. Pizzato Elettrica engages itself to repair, 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 responsible only for the product's value and refund request are not accepted for machine down-time, repair or expenses for damages direct or indirect as consequence of products performance. It is a manufacturer's responsibility to evaluate the importance of chosen products and any malfunction consequences and adopt necessary technical measures to minimize consequences on machines and people safety (redundancy systems, self-controlled systems, etc). Warranty is subjected to the due payments respect.

Products: Products are subjected to technical improvements in any moment without prior notice.

Payment terms: Payments should be settled within the terms agreed in the sales confirmation. The type of payment is always at buyer's risk, regardless of the means chosen. In case of delayed payment, Pizzato Elettrica reserves the right to stop the delivery of current orders and charge the interest according to the European Directive 2011/7/EU. Technical or commercial claims does not give the right to stop due payments.

Returns: Any return should be previously authorised in writing. Pizzato Elettrica reserves the right to not accept the goods and send it back with freight collect, through the same way of forwarding. Returns have to be sent back within 3 months from the authorization date and no later. After this period, returns will not be accepted.

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.

Notes

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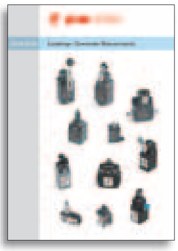
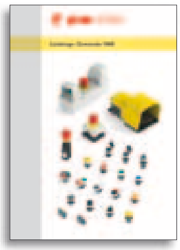
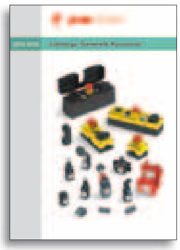


General Catalogue
Detection



General Catalogue
HMI

General Catalogue
Safety



General Catalogue
LIFT

DVD

Web
www.pizzato.com

pizzato elettrica
Passion for Quality

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