pizzato elettrica

2015-2016

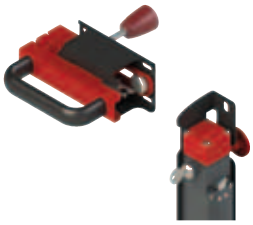
General Catalogue Safety

Index General Catalogue Safety

7 Safety handles

Series VF AP-P for FG-FD series

▶ 143



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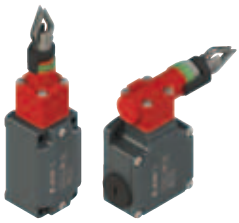

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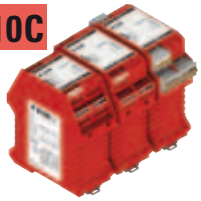

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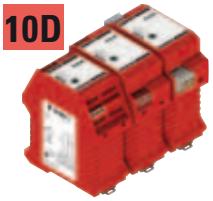

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200 PASSIONATE PROFESSIONALS

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.

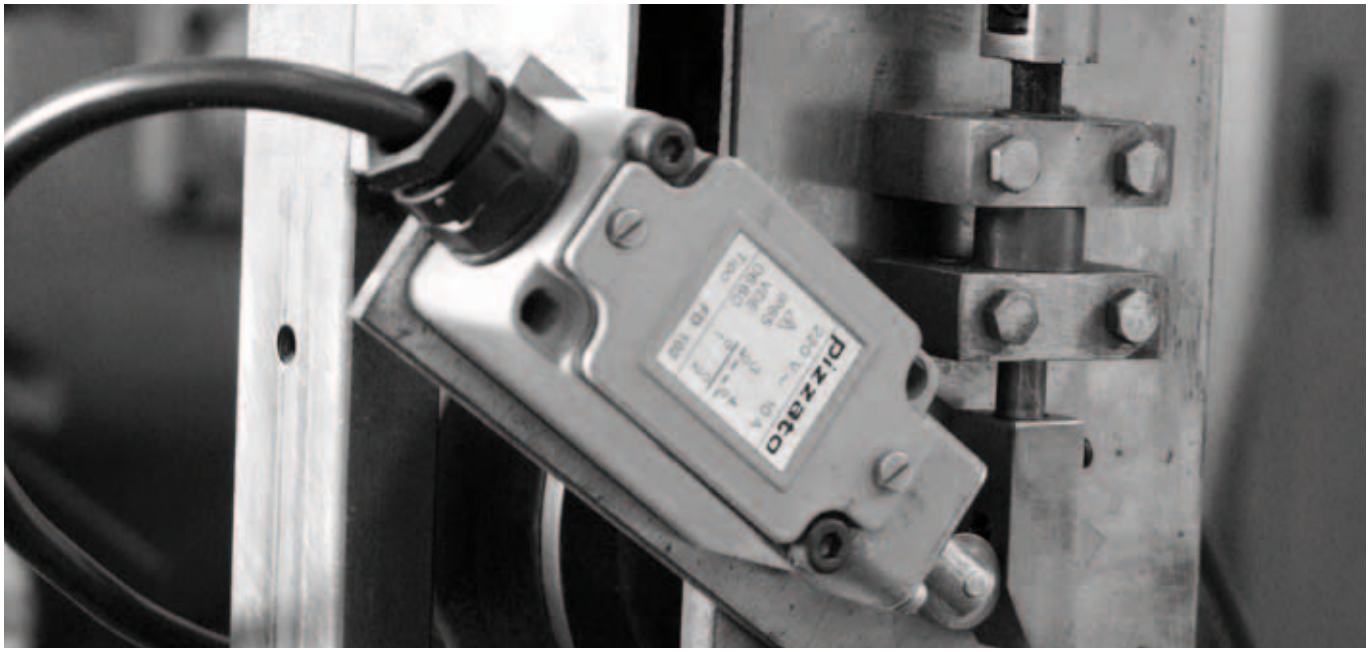
100% MADE IN ITALY

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

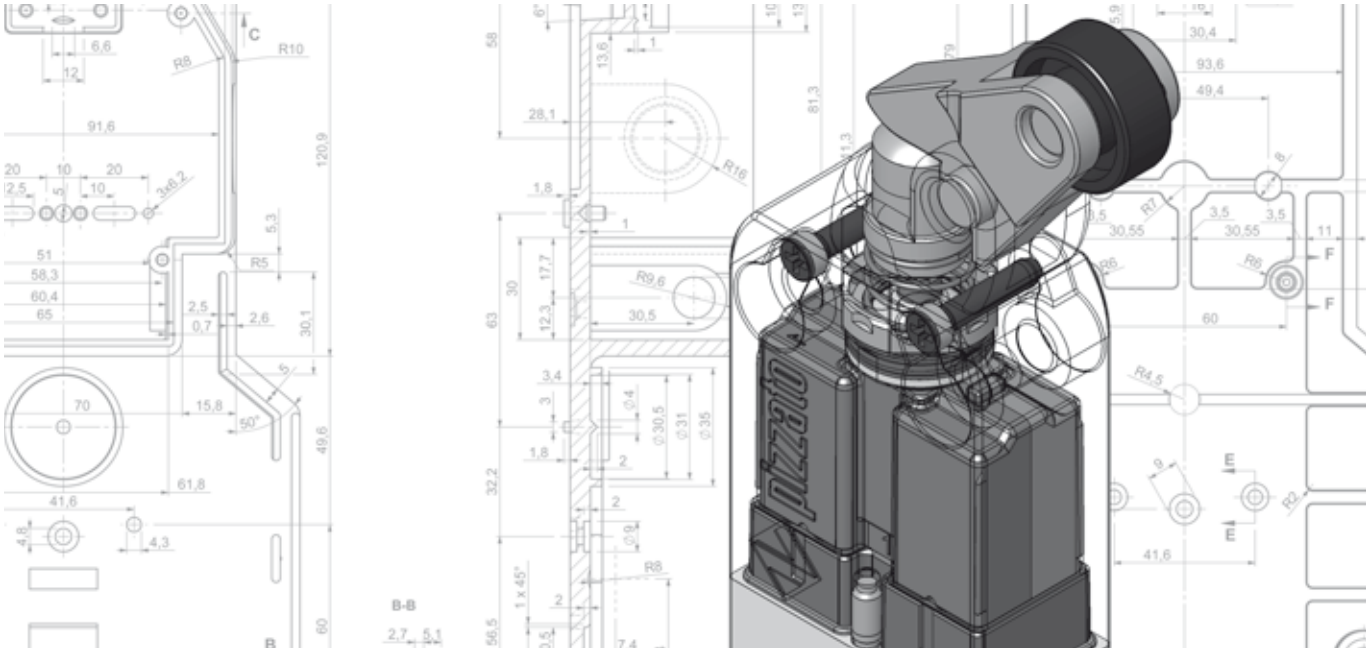
Pizzato Elettrica's product catalogue contains about 7,000 items, with more than 1,300 special codes developed for devices personalised according to clients' specific needs.
Pizzato Elettrica devices can be grouped, according to typology, into three main macro-categories:

• 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.

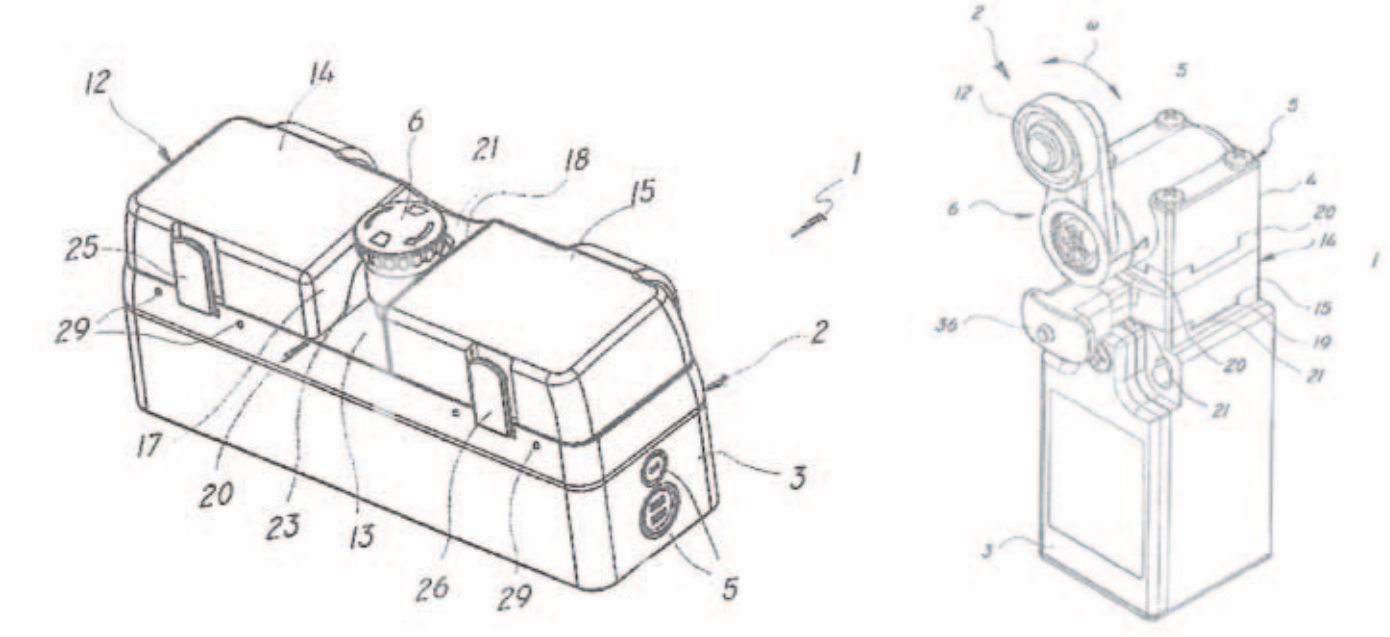
• CSQ, CISQ AND IQNET. The CSQ system is part of the CISQ (Italian Certification of Quality Systems) federation, which consists of the primary certification bodies operating in Italy and its various product sectors. CISQ is the Italian representative within IQNet, the biggest international Quality Systems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

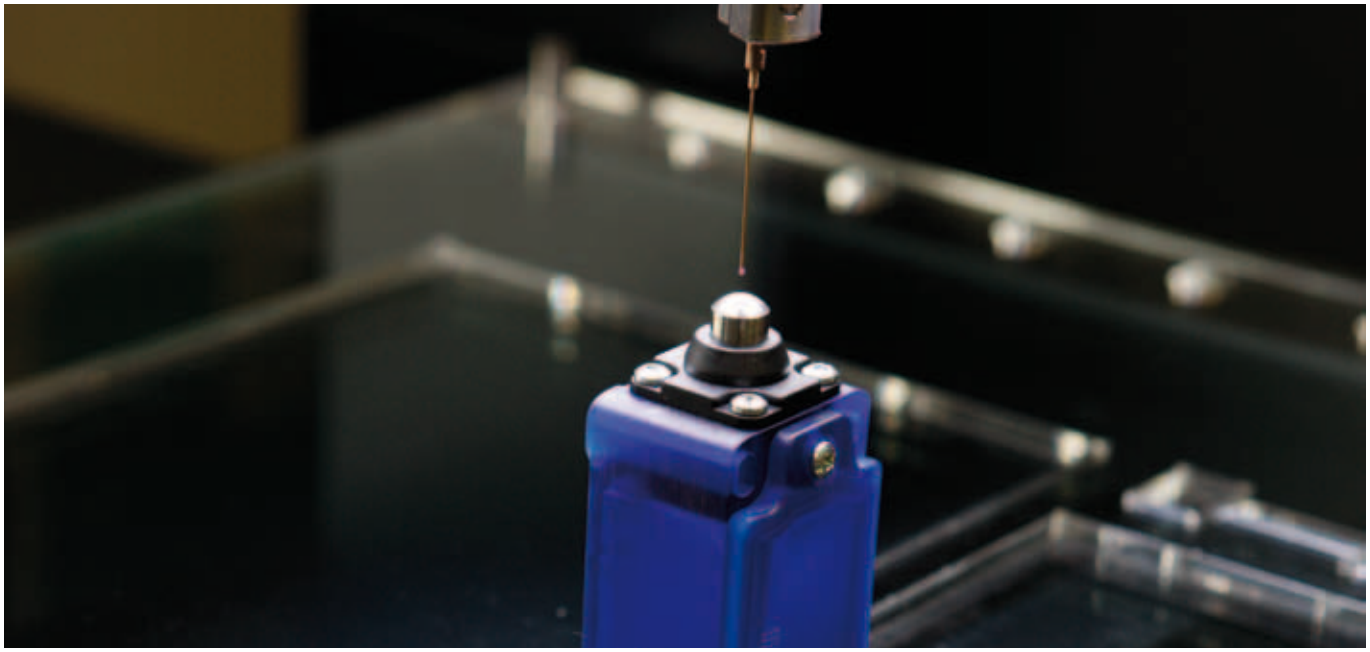
140 REGISTERED PATENTS

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:

RFID safety switches with lock
NG series

- Actuator holding force 7500 N
- SIL 3/PL e/category 4 with a single device
- Can be connected in series of up to 32 devices, whilst maintaining the maximum PL e safety level
- Protection degrees IP67 and IP69K
- 6 LEDs for immediate diagnosis
- TÜV SÜD approval

▸ 117

CLOSED
OR
CLOSED & LOCK

RFID safety switches with lock
NG series

- Two different safety output actuation modes
- Mode 1: OS safety outputs active with closed and locked protection for machines with inertia
- Mode 2: OS safety outputs active with closed protection for machines without inertia

▸ 117

EDM

RFID safety switches with lock
NG series

- Available with EDM (External Device Monitoring) function
- The switch checks the integrity of the devices connected to the safety outputs.
- No need to install a safety module downstream of the device. Ability to directly drive relays or safety contactors.

▸ 117

Safety handle
P-KUBE 2

- Compatible with NG series RFID safety switches with lock
- Easy to install and simple to operate
- System designed for use with for hinged and sliding doors, on both left and right
- Solid construction
- Intuitive LOCK OUT device
- LOCK-OUT with dual screening: RFID and actuator entry

▸ 151

Safety sensors with RFID technology
ST series

- SIL 3/PL e/category 4 with a single device
- Can be connected in series of up to 32 devices, whilst maintaining the maximum PL e safety level
- Protection degrees IP67 and IP69K
- Version with EDM (External Device Monitoring)
- Version with extended 12 … 24 Vdc power supply range for the automotive sector
- TÜV SÜD approval

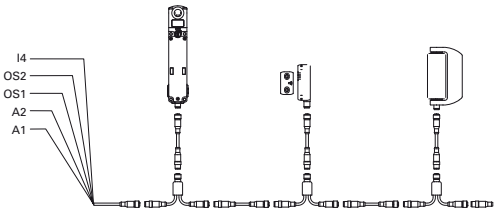
▸ 41

Programmable multifunctional safety modules
CS MP series

- New module configurations available
- New models with 8 safe outputs
- Gemnis Studio software updates
- Ability to manage projects of up to 4x4 sheets
- Text search on desktop objects

▸ 243

Accessories
Y-shaped connectors for series connection



- Error-proof simplified wiring
- Reduced installation times
- PL e/SIL 3/Category 4/ up to 32 devices in series
- Protection degree IP67
- Applies to ST, NG and HX series

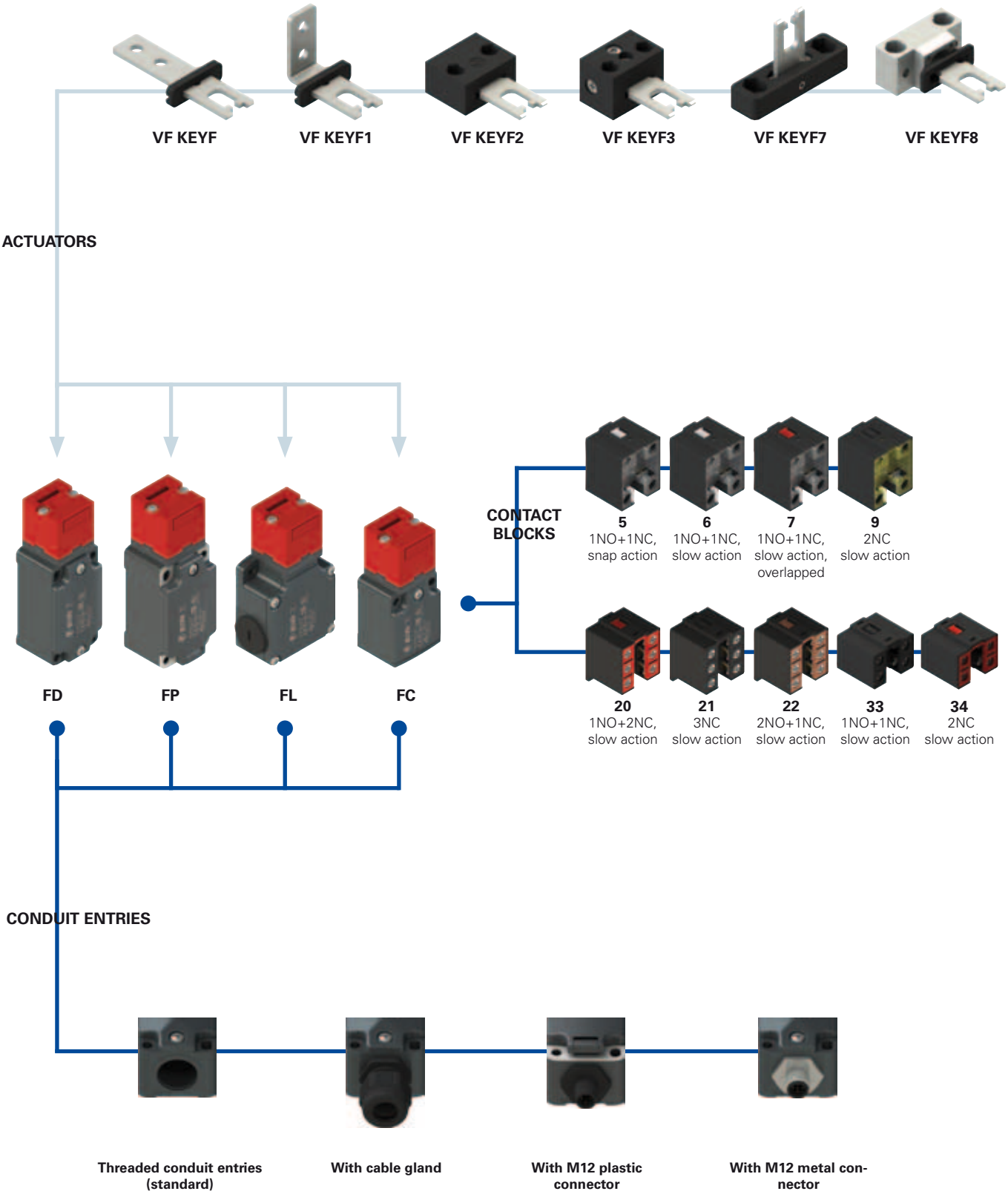
▸ 290

Accessories
Safety screws One-Way

- Available with M4, M5 thread in various lengths
- Material AISI304
- Ideal for actuator fixing in accordance with EN ISO 14119

▸ 287

Selection diagram



Code structure

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

article: **FD 693-** options: **F1G** options: **M2K50T6**

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

Contact blocks	
5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
9	2NC, slow action
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action
33	1NO+1NC, slow action
34	2NC, slow action

Actuators	
	without actuator (standard)
F	straight actuator VF KEYF
F1	angled actuator VF KEYF1
F2	jointed actuator VF KEYF2
F3	jointed actuator adjustable in two directions VF KEYF3
F7	jointed actuator adjustable in one direction VF KEYF7
F8	universal actuator VF KEYF8

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

Threaded conduit entry	
M2	M20x1.5 (standard)
	PG13.5

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.

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

article: **FC 3393-** options: **F1G** options: **M2K50T6**

Housing	
FC	metal, one conduit entry

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

Actuators	
	without actuator (standard)
F	straight actuator VF KEYF
F1	angled actuator VF KEYF1
F2	jointed actuator VF KEYF2
F3	jointed actuator adjustable in two directions VF KEYF3
F7	jointed actuator adjustable in one direction VF KEYF7
F8	universal actuator VF KEYF8

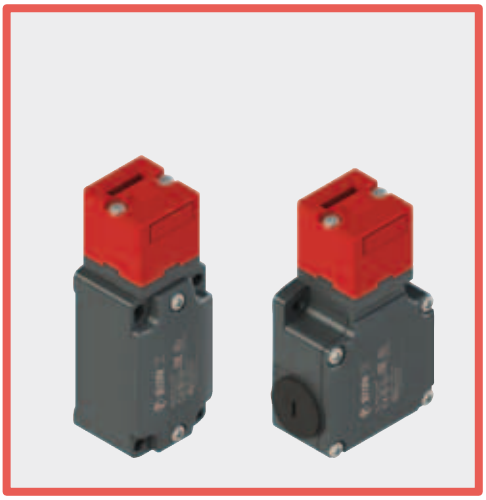
Contact type	
	silver contacts (standard)
G	silver contacts with 1 µm gold coating

Threaded conduit entry	
M2	M20x1.5 (standard)
	PG11

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

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

Safety switches **with separate actuator**



Main features

- Metal housing or technopolymer housing, from one to three conduit entries
- Protection degree IP67
- 9 contact blocks available
- 6 stainless steel actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Technical data

Housing

FP series housing made of glass fiber reinforced technopolymer, self-extinguishing, shock-proof and with double insulation: ⧈
FD, FL and FC series: metal housing, baked powder coating.
Metal head, baked powder coating.

FD, FP, FC series: one threaded conduit entry:	M20x1.5 (standard)
FL series - three threaded conduit entries:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland of equal or higher protection degree

General data

For safety applications up to:	SIL 3 acc. to EN 62061 PL e acc. to EN ISO 13849-1
Mechanical interlock, coded:	type 2 acc. to EN ISO 14119
Coding level:	Low acc. to EN ISO 14119
Safety parameters:	
B_{10d}:	2,000,000 for NC contacts
Service life:	20 years
Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	1 million operating cycles[1]
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s
Tightening torques for installation:	see pages 297-308

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact blocks 5, 6, 7, 9:	min.	1 x 0.5 mm²	(1 x AWG 20)
	max.	2 x 2.5 mm²	(2 x AWG 14)

Markings and quality marks:

IMQ approval:	EG605
UL approval:	E131787
CCC approval:	2007010305230000 (FD-FL-FC series) 2007010305230014 (FP series)
EAC approval:	RU C-IT ДМ94.B.01024

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, BG-GS-ET-15, UL 508, CSA 22.2 No.14.
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14, GB14048.5-2001.

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

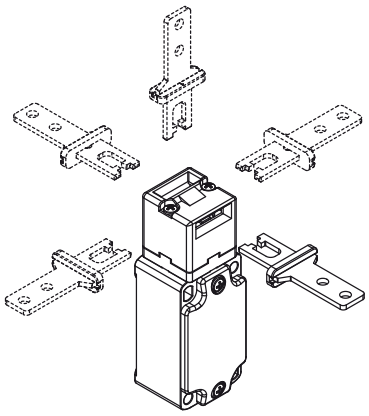
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.**

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

Description

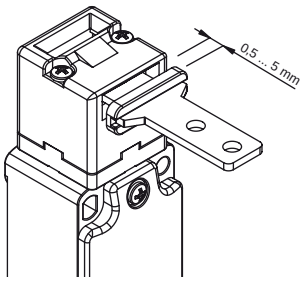
These safety switches are ideal for controlling gates, sliding doors and other guards which protect dangerous parts of machines without inertia.
The stainless steel actuator is fastened to the moving part of the guard, so it is removed from the switch on every opening of the guard. The switch mechanism guarantees that removing the actuator forces the positive opening of the electrical contacts. Easy to install, these switches can be applied to any kind of protection (with hinge, sliding and removable ones). Besides, the possibility to actuate the switch only with its actuator guarantees that the machine can be restarted only when the guard has been closed. Made of rugged materials and with oversized thickness, these switches are designed for the use on heavy guards.

Orientable heads



Removing the two fastening screws, in all switches, the head can be rotated in 90° steps. In this way it is possible to actuate the switch from 5 different directions.

Wide-ranging actuator travel



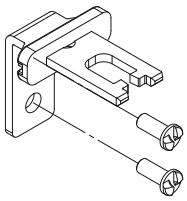
The head of this switch is equipped with an actuator with a wide range of travel. In this way the guard can oscillate along the direction of insertion (4.5mm) without causing unwanted machine shutdowns. This extensive travel is available in all actuators, in order to ensure maximum device reliability.

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.

Safety screws for actuators



As required by EN ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools. See accessories on page 295.

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.

Characteristics approved by IMQ

Rated insulation voltage (Ui): 500 Vac
400 Vac (for contact blocks 20, 21, 22, 33, 34)
Conventional free air thermal current (Ith): 10 A
Protection against short circuits: type aM fuse 10 A 500 V
Rated impulse withstand voltage (U_{imp}): 6 kV
4 kV (for contact blocks 20, 21, 22, 33, 34)
Protection degree of the housing: IP67
MV terminals (screw terminals)
Pollution degree 3
Utilization category: AC15
Operating voltage (Ue): 400 Vac (50 Hz)
Operating current (Ie): 3 A
Forms of the contact element: Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9, 20, 21, 22, 33, 34

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

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

Characteristics approved by UL

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

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

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

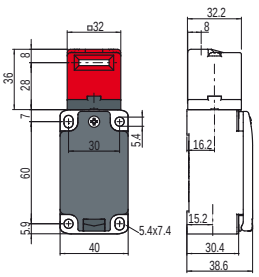
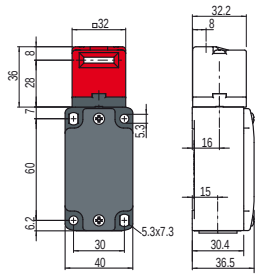
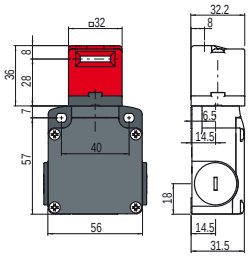
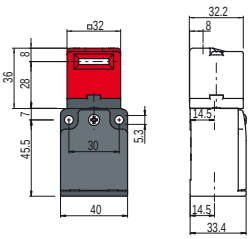
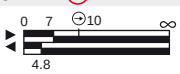
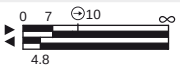
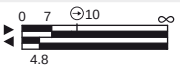
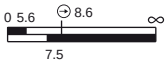
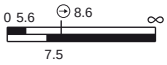
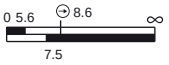
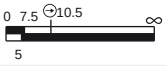
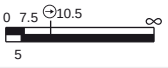
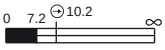
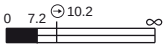
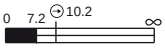
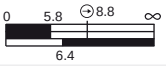
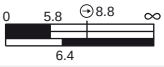
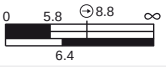
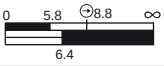
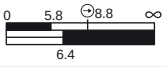
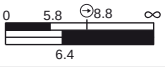
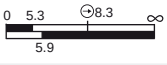
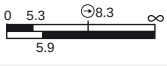
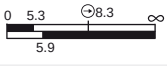
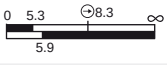
Dimensional drawings

All measures in the drawings are in mm

Contact type:

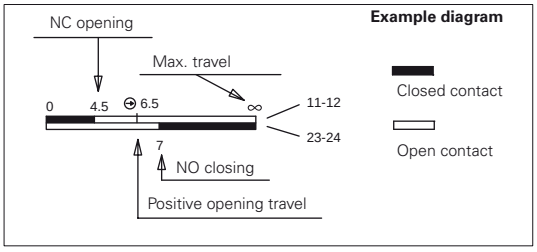
R = snap action
L = slow action
LO = slow action overlapped

Contact blocks

		Technopolymer housing Without actuator	Metal housing Without actuator	Metal housing Without actuator	Metal housing Without actuator
					
5	R	FP 593-M2 ⊖ 1NO+1NC	FD 593-M2 ⊖ 1NO+1NC	FL 593-M2 ⊖ 1NO+1NC	
					
6	L	FP 693-M2 ⊖ 1NO+1NC	FD 693-M2 ⊖ 1NO+1NC	FL 693-M2 ⊖ 1NO+1NC	
					
7	LO	FP 793-M2 ⊖ 1NO+1NC	FD 793-M2 ⊖ 1NO+1NC	FL 793-M2 ⊖ 1NO+1NC	
					
9	L	FP 993-M2 ⊖ 2NC	FD 993-M2 ⊖ 2NC	FL 993-M2 ⊖ 2NC	
					
20	L	FP 2093-M2 ⊖ 1NO+2NC	FD 2093-M2 ⊖ 1NO+2NC	FL 2093-M2 ⊖ 1NO+2NC	
					
21	L	FP 2193-M2 ⊖ 3NC	FD 2193-M2 ⊖ 3NC	FL 2193-M2 ⊖ 3NC	
					
22	L	FP 2293-M2 ⊖ 2NO+1NC	FD 2293-M2 ⊖ 2NO+1NC	FL 2293-M2 ⊖ 2NO+1NC	
					
33	L	FP 3393-M2 ⊖ 1NO+1NC	FD 3393-M2 ⊖ 1NO+1NC	FL 3393-M2 ⊖ 1NO+1NC	FC 3393-M2 ⊖ 1NO+1NC
					
34	L	FP 3493-M2 ⊖ 2NC	FD 3493-M2 ⊖ 2NC	FL 3493-M2 ⊖ 2NC	FC 3493-M2 ⊖ 2NC
					
Min. force		10 N (18 N ⊖)	10 N (18 N ⊖)	10 N (18 N ⊖)	10 N (18 N ⊖)

How to read travel diagrams

All measures in the diagrams are in mm



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

Utilization limits

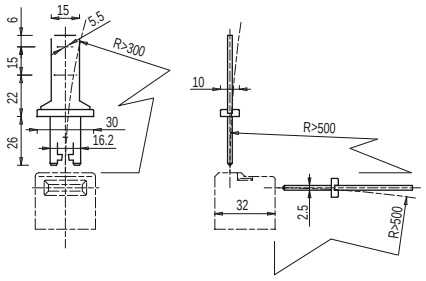
Do not use where dust and dirt may penetrate in any way into the head and deposit there, in particular where metal dust, concrete or chemicals are spread. Adhere to the EN ISO 14119 requirements regarding low level of coding for interlocks. Do not use in environments with the presence of explosive or flammable gas. In these cases, use ATEX products (check the specific Pizzato catalogue).

Stainless steel actuators

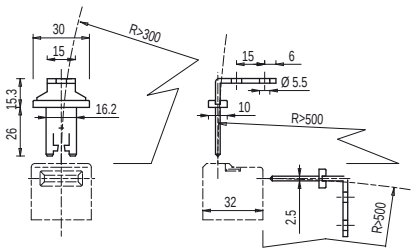
All measures in the drawings are in mm

IMPORTANT: These actuators can be used with items of the FD, FP, FL, FC and FS series only (e.g. FD 693-M2).
Low level of coding acc. to EN ISO 14119.

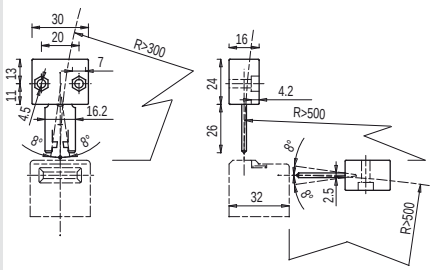
Article	Description
VF KEYF	Straight actuator



Article	Description
VF KEYF1	Angled actuator

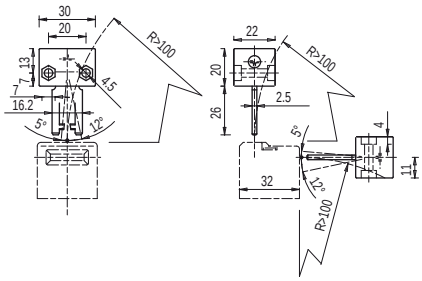


Article	Description
VF KEYF2	Jointed actuator



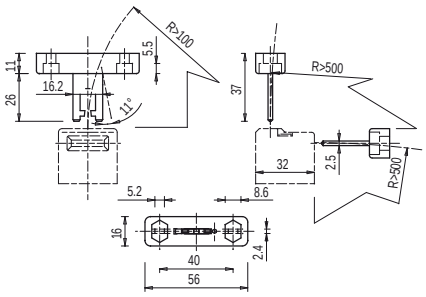
The actuator can flex in four directions for applications where the door alignment is not precise.

Article	Description
VF KEYF3	Actuator adjustable in two directions



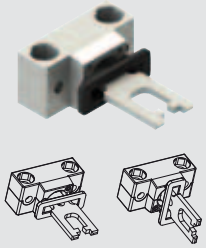
Actuator adjustable in two directions for doors with reduced dimensions.

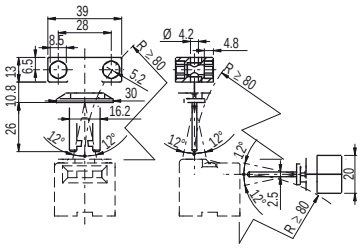
Article	Description
VF KEYF7	Actuator adjustable in one direction



Actuator adjustable in one direction for doors with reduced dimensions.

Article	Description
VF KEYF8	Universal actuator





Joined and two directions adjustable actuator for doors with reduced dimensions.
The actuator has two couples of fixing holes and it is possible to rotate by 90° the actuator-working plan.
Body material: zinc alloy

Accessories

Article	Description
VF KB1	Actuator entry locking device

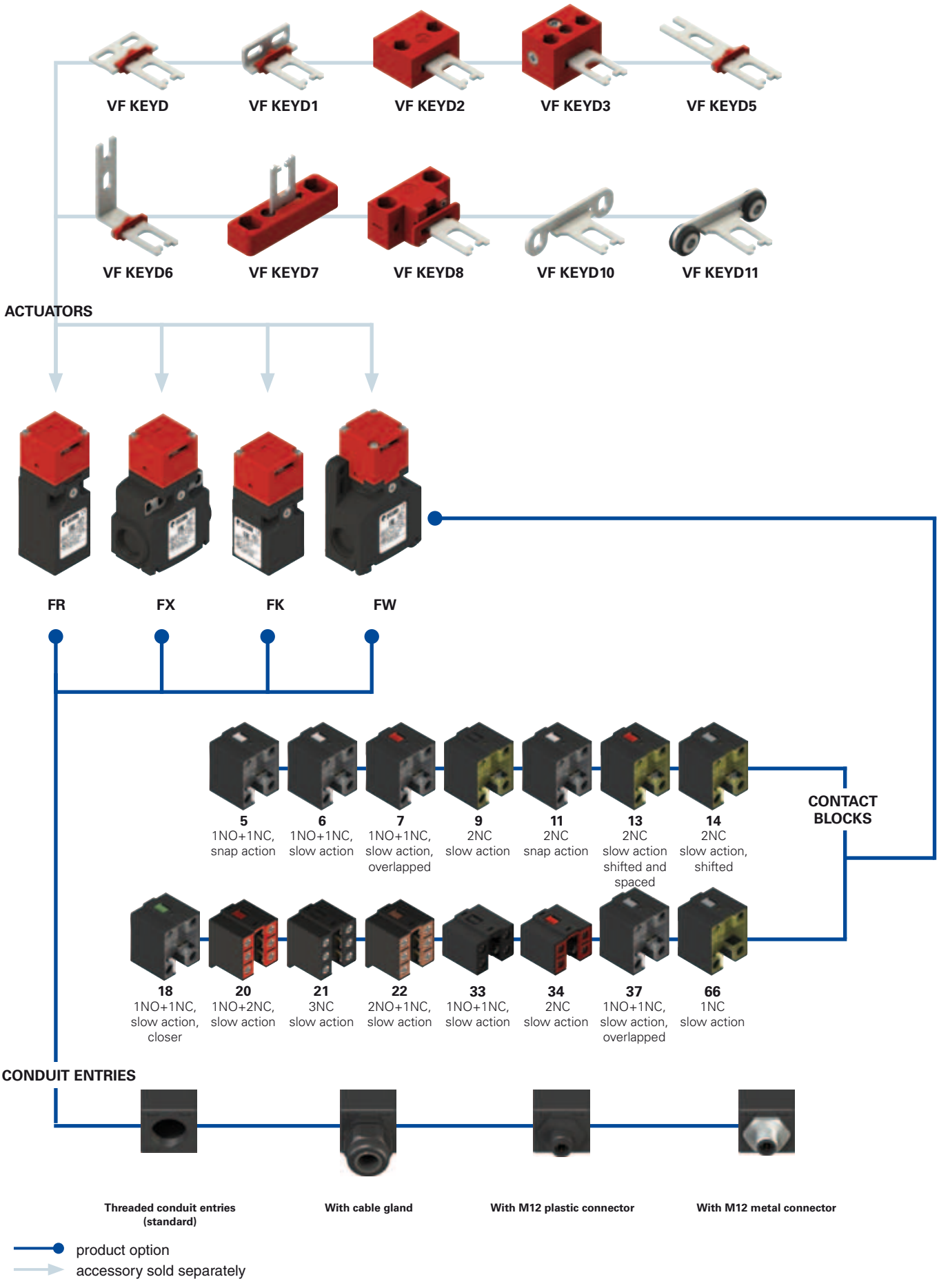
Padlockable device to lock the actuator entry in order to prevent from the accidental closing of the door behind operators while they are inside the machine.

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

Accessories See page 287

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

Selection diagram



Code structure

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

article | options | options

FR 693-E3D1XGM2K70T6

Housing

FR	technopolymer, one conduit entry
FX	technopolymer, two conduit entries
FW	technopolymer, three conduit entries

Contact blocks

5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action, overlapped
9	2NC, slow action
11	2NC, snap action
13	2NC, slow action, shifted and spaced
14	2NC, slow action, shifted
18	1NO+1NC, slow action, closer
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action
33	1NO+1NC, slow action
34	2NC, slow action
37	1NO+1NC, slow action, overlapped
66	1NC, slow action

Head type

92	detachable head(FW housing only)
93	non-detachable head(FR, FX and FK housing only)

Actuator extraction force

	10 N (standard)
E3	30 N

Actuators

	without actuator (standard)
D	straight actuator VF KEYD
D1	angled actuator VF KEYD1
D2	jointed actuator VF KEYD2
...	.....

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Contact type

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

Threaded conduit entry

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

Pre-installed cable glands or connectors

	without cable gland or connector (standard)
K23	cable gland for cables Ø 6...Ø 12 mm
...	.....
K70	M12 plastic connector, 4 poles
...	.....

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

Ambient temperature

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

article | options | options

FK 3393-E3D1XGM1K24T6

Housing

FK	technopolymer, one conduit entry

Contact blocks

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

Actuator extraction force

	10 N (standard)
E3	30 N

Actuators

	without actuator (standard)
D	straight actuator VF KEYD
D1	angled actuator VF KEYD1
D2	jointed actuator VF KEYD2
...	.....

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

Contact type

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

Threaded conduit entry

M1	M16x1.5(standard)
	PG 11

Pre-installed cable glands

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

Ambient temperature

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

Safety switches **with separate actuator**

Main features

- Technopolymer housing, from one to three conduit entries
- Protection degree IP67
- 15 contact blocks available
- 8 stainless steel actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Markings and quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2007010305230013 (FR-FX-FK-FW series)
EAC approval:	RU C-IT ДМ94.B.01024

Technical data

Housing

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

FR series, one threaded conduit entry:	M20x1.5 (standard)
FK series: one threaded conduit entry:	M16x1.5 (standard)
FX series - two knock-out threaded conduit entries:	M20x1.5 (standard)
Three FW series knock-out threaded conduit entries:	M20x1.5 (standard)
Protection degree:	IP67 acc. to EN 60529 with cable gland having equal or higher protection degree

General data

For safety applications up to:	SIL 3 acc. to EN 62061 PL e acc. to EN ISO 13849-1
Mechanical interlock, coded:	type 2 acc. to EN ISO 14119
Coding level:	Low acc. to EN ISO 14119
Safety parameters:	
B_{10d}:	2,000,000 for NC contacts
Service life:	20 years
Ambient temperature:	-25°C … +80°C
Max. actuation frequency:	3600 operating cycles[1]/hour
Mechanical endurance:	1 million operating cycles[1]
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s
Actuator extraction force	10 N (-E3 versions: 30 N)
Tightening torques for installation:	see pages 7/1-7/12

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

Cable cross section (flexible copper strands)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0.34 mm²	(1 x AWG 22)
	max.	2 x 1.5 mm²	(2 x AWG 16)
Contact blocks 5, 6, 7, 9,11, 13, 14, 18, 37, 66:	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, BG-GS-ET-15, UL 508, CSA 22.2 No.14
Approvals:
IEC 60947-5-1, UL 508, CSA 22.2 No.14 GB14048.5-2001.

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

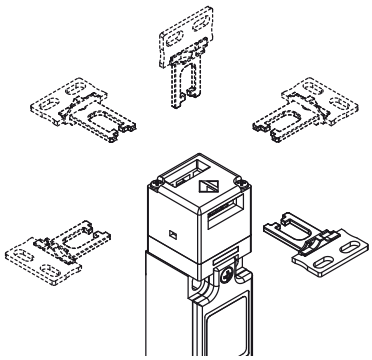
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308.**

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

Description

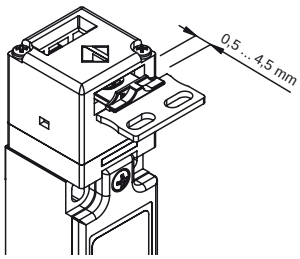
These safety switches are ideal for controlling gates, sliding doors and other guards which protect dangerous parts of machines without inertia. The stainless steel actuator is fastened to the moving part of the guard, so it is removed from the switch on every opening of the guard. The switch mechanism guarantees that removing the actuator forces the positive opening of the electrical contacts. Easy to install, these switches can be applied to any kind of protection (with hinge, sliding and removable ones). Besides, the possibility to actuate the switch only with its actuator guarantees that the machine can be restarted only when the guard has been closed.

Orientable heads



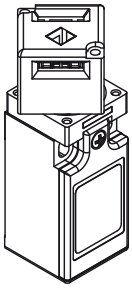
Removing the two fastening screws, in all switches, the head can be rotated in 90° steps. In this way it is possible to actuate the switch from 5 different directions.

Wide-ranging actuator travel



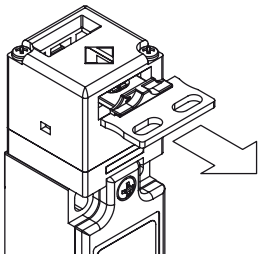
The head of this switch is equipped with an actuator with a wide range of travel. In this way the guard can oscillate along the direction of insertion (4mm) without causing unwanted machine shutdowns. This extensive travel is available in all actuators, in order to ensure maximum device reliability.

Not detachable head



To make head adjustment safer and smoother, these switches are equipped with a special head to body coupling system. This system makes it impossible to remove the head from the device even during adjustment, thus rendering the use of one-way screws unnecessary for locking the head in position once adjustment is complete. This solution is available for the FR, FX and FK series.

Versions with 30 N actuator extraction force



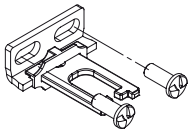
Versions with 30 N actuator holding force instead of the standard 10 N are available.

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.

Safety screws for actuators



As required by EN ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools. See accessories on page 295.

Extended temperature range

-40°C

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

Characteristics approved by IMQ

Rated insulation voltage (Ui): 500 Vac
400 Vac (for contact blocks 20, 21, 22, 33, 34)
Conventional free air thermal current (Ith): 10 A
Protection against short circuits: type aM fuse 10 A 500 V
Rated impulse withstand voltage (U_{imp}): 6 kV
4 kV (for contact blocks 20, 21, 22, 33, 34)
Protection degree of the housing: IP67
MV terminals (screw terminals)
Pollution degree 3
Utilization category: AC15
Operating voltage (Ue): 400 Vac (50 Hz)
Operating current (Ie): 3 A
Forms of the contact element: Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact blocks 5, 6, 7, 9,11, 13, 14, 18, 20, 21, 22, 33, 34, 66
In conformity with standards: EN 60947-1, EN 60947-5-1+ A1:2009, fundamental requirements of the Low Voltage Directive 2006/95/EC.

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

Characteristics approved by UL

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

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

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

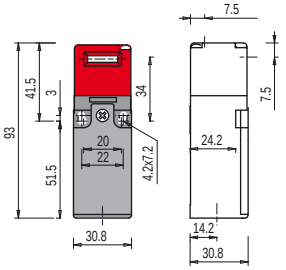
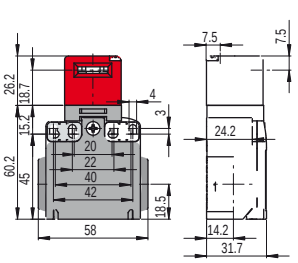
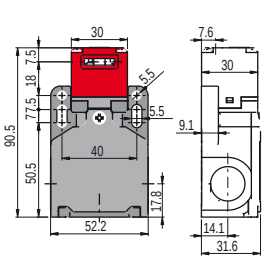
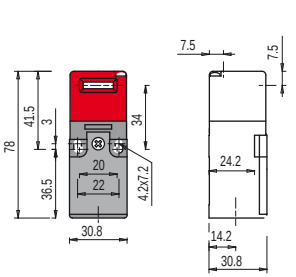
Dimensional drawings

All measures in the drawings are in mm

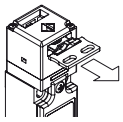
Contact type:

R = snap action
L = slow action
LO = slow action overlapped
LS = slow action shifted
LV = slow action shifted and spaced
LA = slow action closer

Contact blocks

		Technopolymer housing Without actuator	Technopolymer housing Without actuator	Technopolymer housing Without actuator	Technopolymer housing Without actuator
					
5	R	FR 593-M2 → 1NO+1NC	FX 593-M2 → 1NO+1NC	FW 592-M2 → 1NO+1NC	
6	L	FR 693-M2 → 1NO+1NC	FX 693-M2 → 1NO+1NC	FW 692-M2 → 1NO+1NC	
7	LO	FR 793-M2 → 1NO+1NC	FX 793-M2 → 1NO+1NC	FW 792-M2 → 1NO+1NC	
9	L	FR 993-M2 → 2NC	FX 993-M2 → 2NC	FW 992-M2 → 2NC	
11	R	FR 1193-M2 → 2NC	FX 1193-M2 → 2NC	FW 1192-M2 → 2NC	
13	LV	FR 1393-M2 → 2NC	FX 1393-M2 → 2NC	FW 1392-M2 → 2NC	
14	LS	FR 1493-M2 → 2NC	FX 1493-M2 → 2NC	FW 1492-M2 → 2NC	
18	LA	FR 1893-M2 → 1NO+1NC	FX 1893-M2 → 1NO+1NC	FW 1892-M2 → 1NO+1NC	
20	L	FR 2093-M2 → 1NO+2NC	FX 2093-M2 → 1NO+2NC	FW 2092-M2 → 1NO+2NC	
21	L	FR 2193-M2 → 3NC	FX 2193-M2 → 3NC	FW 2192-M2 → 3NC	
22	L	FR 2293-M2 → 2NO+1NC	FX 2293-M2 → 2NO+1NC	FW 2292-M2 → 2NO+1NC	
33	L	FR 3393-M2 → 1NO+1NC	FX 3393-M2 → 1NO+1NC	FW 3392-M2 → 1NO+1NC	FK 3393-M1 → 1NO+1NC
34	L	FR 3493-M2 → 2NC	FX 3493-M2 → 2NC	FW 3492-M2 → 2NC	FK 3493-M1 → 2NC
37	LO	FR 3793-M2 → 1NO+1NC	FX 3793-M2 → 1NO+1NC	FW 3792-M2 → 1NO+1NC	
66	L	FR 6693-M2 → 1NC	FX 6693-M2 → 1NC	FW 6692-M2 → 1NC	
Min. force		10 N (18 N →)	10 N (18 N →)	10 N (18 N →)	10 N (18 N →)
Travel diagrams		page 304 - group 8	page 304 - group 8	page 304 - group 8	page 304 - group 8

All switches listed above are available in a version with 30N actuator extraction force. To obtain these products, the order code must be changed by adding the extension "-E3", for example FR 693-M2E3.



Min. force 30 N version	30 N (38 N →)	30 N (38 N →)	30 N (38 N →)	30 N (38 N →)

Utilization limits

Do not use where dust and dirt may penetrate in any way into the head and deposit there, in particular where metal dust, concrete or chemicals are spread. Adhere to the EN ISO 14119 requirements regarding low level of coding for interlocks. Do not use in environments with the presence of explosive or flammable gas. In these cases, use ATEX products (check the specific Pizzato catalogue).

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

Accessories See page 287

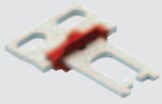
→ The 2D and 3D files are available at **www.pizzato.com**

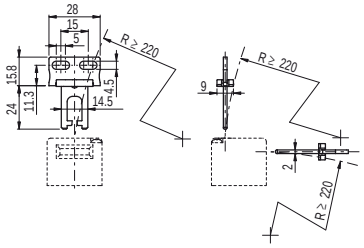
Stainless steel actuators

All measures in the drawings are in mm

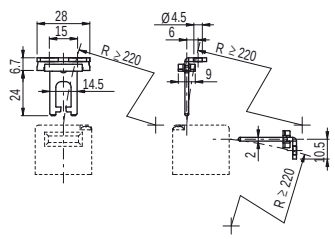
IMPORTANT: These actuators can be used with items of the FR, FX, FK and FW series (e.g. FR 693-M2).
Low level of coding acc. to EN ISO 14119.

Article	Description
VF KEYD	Straight actuator

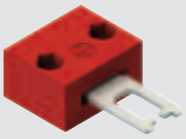


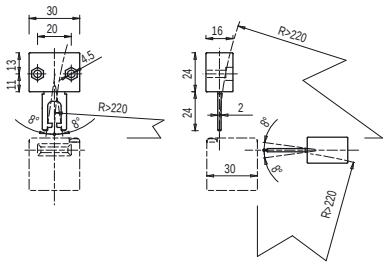


Article	Description
VF KEYD1	Angled actuator



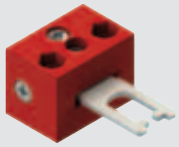
Article	Description
VF KEYD2	Jointed actuator

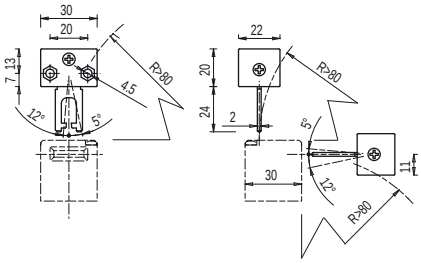




The actuator can flex in four directions for applications where the door alignment is not precise.

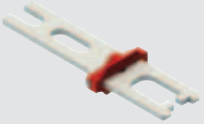
Article	Description
VF KEYD3	Actuator adjustable in two directions

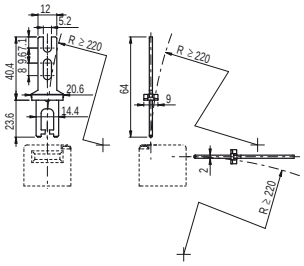




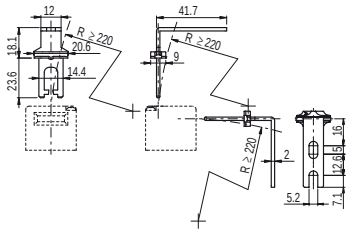
Actuator adjustable in two directions for doors with reduced dimensions.

Article	Description
VF KEYD5	Extended actuator

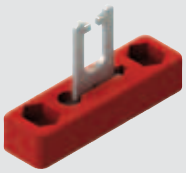


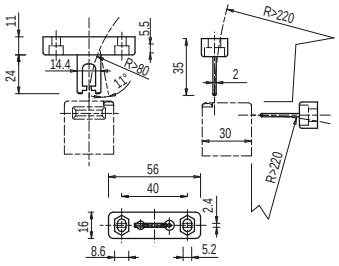


Article	Description
VF KEYD6	Extended angled actuator



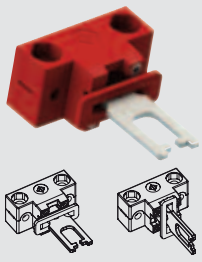
Article	Description
VF KEYD7	Actuator adjustable in one direction

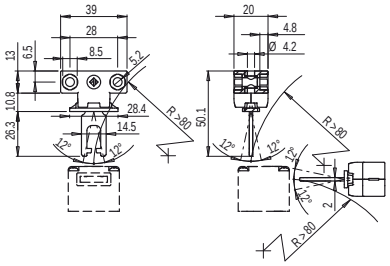




Actuator adjustable in one direction for doors with reduced dimensions.

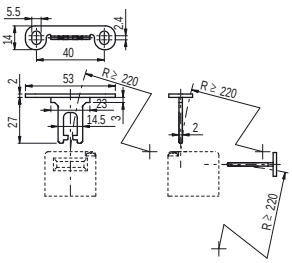
Article	Description
VF KEYD8	Universal actuator



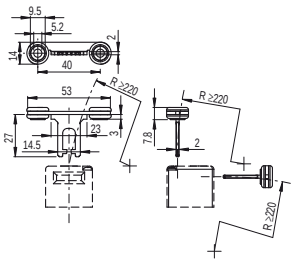


Joined and two directions adjustable actuator for doors with reduced dimensions.
The actuator has two couples of fixing holes and it is possible to rotate by 90° the actuator-working plan.

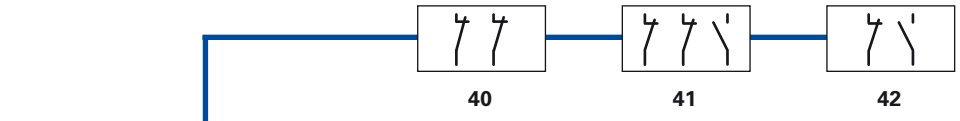
Article	Description
VF KEYD10	Shaped actuator



Article	Description
VF KEYD11	Shaped actuator



Selection diagram



40
2NC

41
2NC+1NO

42
1NC+1NO

Contacts imply closed protection

CONTACTS

ACTUATOR

SENSOR

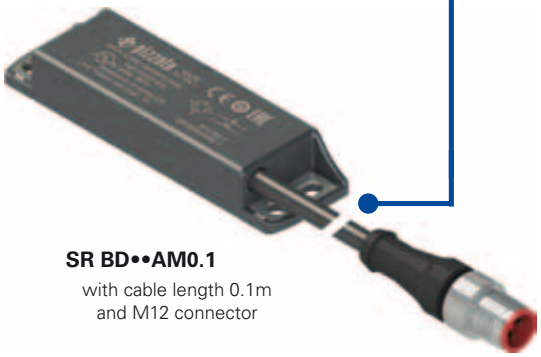
SM B01F
actuation distance 5 mm

SM B02F
actuation distance 8 mm

OUTPUT TYPE

SR BD••AN•
PVC integrated cable

SR BD••ALK
M8 connector



SR BD••AM0.1
with cable length 0.1m
and M12 connector

product option
accessory sold separately

Code structure for sensor with actuator

article: **SR BD40AN2-B01F** options: **-X**

Sensor housing

SR	technopolymer

Contacts (with closed protection)

40	2NC (standard)
41	2NC+1NO (standard)
42	1NC+1NO

Actuator

B01F	complete with actuator SM B01F, actuation distance 5 mm
B02F	complete with actuator SM B02F, actuation distance 8 mm

Type of integrated cable or connector

N1	integrated PVC cable, length 1 m
N2	integrated PVC cable, length 2 m (standard)
...	.....
N10	integrated PVC cable, length 10 m
M0.1	cable, length 0.1 m, with M12 connector
LK	M8 connector (available only with contacts 40 and 42)

External metallic parts

	stainless steel fixing plates (standard)
X	fixing plates and connector body in stainless steel (connector LK available only)

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

Code structure for single sensor

article: **SR BD40AN2** options: **-X**

Sensor housing

SR	technopolymer

Contacts (with closed protection)

40	2NC (standard)
41	2NC+1NO (standard)
42	1NC+1NO

Type of integrated cable or connector

N1	integrated PVC cable, length 1 m
N2	integrated PVC cable, length 2 m (standard)
...	.....
N10	integrated PVC cable, length 10 m
M0.1	cable, length 0.1 m, with M12 connector
LK	M8 connector (available only with contacts 40 and 42)

External metallic parts

	stainless steel fixing plates (standard)
X	fixing plates and connector body in stainless steel (connector LK available only)

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

Single actuator code structure

SM B01F

Actuator

B01F	actuation distance 5 mm
B02F	actuation distance 8 mm

Coded magnetic safety sensor **SR B** series

Main features

- Actuation without contact, mechanical
- Stainless steel fixing plates
- Output contacts: 2NC, 1NO+2NC or 1NO+1NC
- Insensitive to dirt
- Protection degrees IP67 and IP69K
- Coded actuator
- Technopolymer housing
- Versions with M8 or M12 connector

Markings and quality marks:

UL approval:	E131787
TÜV SÜD approval:	Z10 15 08 75157 008
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
EMC Directive 2004/108/EC.

Technical data

Housing
Housing made of glass fiber reinforced technopolymer, self-extinguishing.
Versions with integrated cable 4 x 0.25 mm² or 6 x 0.25 mm², length 2 m, other lengths on request.
Versions with M8 connector
Versions with cable, length 0.1 m, M12 connector

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

General data

For safety applications up to:	SIL 3 acc. to EN 62061 PL e acc. to EN ISO 13849-1
Interlock without contact, coded:	type 4 acc. to EN ISO 14119
Coding level:	Low acc. to EN ISO 14119
Safety parameters:	
B_{10d}:	20,000,000 (with compatible Pizzato Elettrica safety modules) 400,000 (at max. load: DC12 24 V 250 mA)
Service life:	20 years
Ambient temperature:	-25°C … +80°C
Vibration resistance:	10 gn (10...150 Hz) acc. to IEC 60068-2-6
Shock resistance:	30 gn; 11 ms acc. to EN 60068 2 27
Pollution degree	3
Screw tightening torque:	0.8 … 2 Nm

In conformity with standards:
IEC 60947-1, EN 60947-1, IEC 60947-5-1, EN 60947-5-1, EN 60947-5-2, EN 60947-5-3 (in connection with safety module), EN ISO 14119, EN ISO 12100, EN ISO 13849-1, EN ISO 13849-2, IEC 60204-1, EN 60204-1, IEC 60529, EN 60529, ISO 20653, UL 508, CSA 22.2 No.14 .
Approvals:
UL 508, CSA 22.2 No.14 , EN ISO 13849-1, EN 60947-5-3, EN 50178, EN 61508-1, EN 61508-2, EN 61508-4, IEC 62061, EN 60947-1.

Actuation data

Assured operating distance Sao	5 mm with actuator SM B01F
Assured release distance Sar	15 mm with actuator SM B01F
Assured operating distance Sao	8 mm with actuator SM B02F
Assured release distance Sar	20 mm with actuator SM B02F
Repeat accuracy	≤ 10%
Switching frequency	up to 150 Hz
Distance between two sensors	Min. 50 mm

Electrical data

Rated insulation voltage Ui:	120 Vac (with cable) 60 Vac / 75 Vdc (with M8 connector) 120 Vac (with 4-pin M12 connector) 30 Vac / 36 Vdc (with 8-pin M12 connector)
Rated impulse withstand voltage (U_{imp}):	6 kV 1.5 kV (with connector)
Thermal current Ith:	0.25 A
Max. switching load:	6 W (resistive load)
Rated operating voltage Ue:	24 Vac/dc
Rated operating current Ie:	0.25 A (resistive load)
Protection fuse:	0.25 A type F
Electrical endurance:	1 million operating cycles

Connection with safety modules for safety applications:
Connection with safety modules CS AR-01••••; CS AR-02••••; CS AR-04••••; CS AR-05••••; CS AR-06••••; CS AR-08••••; CS AR-46•024; CS AR-91••••; CS AT-0•••••; CS AT-1•••••; CS AT-3•••••; CS FS-5•••••; CS MF•••••-••; CS MP•••••-••.
When connected to the safety module the sensor can be classified as a control circuit device to PDF-M (EN 60947-5-3).
The system can be used in safety circuits to PL e/SIL 3/category 4 in accordance with EN ISO 13849-1.

Characteristics approved by UL

Utilization categories: 24 Vdc, 0.25 A (resistive load).

Data of housing type 1, 4X "indoor use only", 12.

Accessory for CS series.

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

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

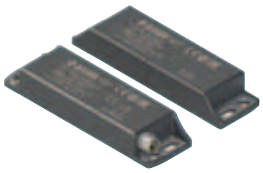
Characteristics approved by TÜV SÜD

Supply voltage: 24 Vac/dc
Rated operating current (max.): 0.25 A
Ambient temperature: -25°C … +80°C
Protection degree: IP67
PL, category: PL e, category 4 with CS AR-08

In conformity with standards: 2006/42/EEC Machine Directive, EN ISO 13849-1:2008, EN 60947-5-3/A1:2005, EN 50178:1997, EN 61508-1:1998 (SIL 1-3), EN 61508-2:2000 (SIL 1-3), EN 61508-4:1998 (SIL 1-3), IEC 62061:2005 (SIL CL 3), EN 60947-1

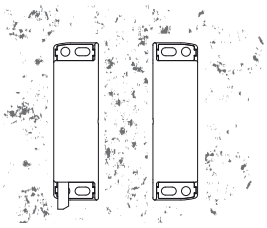
Please contact our technical service for the list of approved products.

Description



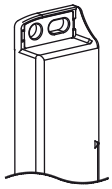
Coded magnetic sensors are devices suitable for monitoring protections and guards of machines without inertia which, when linked to a safety module, can create a system with safety category up to SIL 3 according to EN 62061, up to PL e according to EN ISO 13849-1 and up to category 4 according to EN ISO 13849-1. These products are composed by a magnetic field monitoring sensor, which is connected to the machine structure; and by a coded magnetic actuator, which has to be connected to the movable guard. When sensor and actuator are neared (closed guard), the sensor recognizes the actuator and provides to actuate electric contacts. The sensor is manufactured to be activated only by the correct coded actuator and not through a common magnet.

Insensitivity to dirt



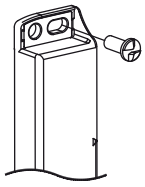
Magnetic sensors are totally sealed and retain their safety characteristics also where dirt and dust are present (not ferromagnetic material). This characteristic, joined with the shape without recesses, make them especially proper to the use in the agro-industrial sector.

Stainless steel fixing plates



In order to avoid that the fixing on non-perfectly plane surfaces could damage the fixing slots, magnetic sensors are provided with stainless steel fixing plates. Also in presence of right fixing surfaces, this solution makes the sensor stronger to mechanical stresses.

Safety screws for actuators

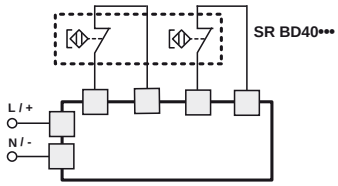


As required by EN ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools. See accessories on page 295.

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.

Compatible safety modules

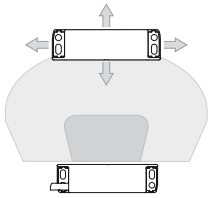


These magnetic sensors have been checked and tested for operation with suitable safety modules (see list). Using completed and tested solutions, the customer has the certainty to have no electric incompatibility between sensor and safety module, and has a higher reliability guarantee.

Sensors	Compatible safety modules	Safety module output contacts	
		Instantaneous contacts	Delayed contacts
SR BD40A•• SR BD41A•• SR BD42A••[a]	CS AR-01••••[b]	2NO+1NC	/
	CS AR-02••••[b]	3NO	/
	CS AR-04••••[b]	3NO+1NC	/
	CS AR-05••••	3NO+1NC	/
	CS AR-06••••	3NO+1NC	/
	CS AR-08••••	2NO	/
	CS AR-46•024	1NO	/
	CS AR-91••••	2NO+1PNP	/
	CS AT-0•••••	2NO+1NO	2NO
	CS AT-1•••••	3NO	2NO
	CS AT-3•••••	2NO	1NO
	CS FS-5•••••	1NO+1NC+1CO	/
	CS MP•••••-••	see page 243	see page 243
	CS MF•••••-••	see page 271	see page 271

[a] Compatible with CS MF202••-P4 (page 276) and CS MP•••••-•• only.
[b] Compatible with modules with production batch later than 04/2014 only.
For features of the safety modules see page 181.

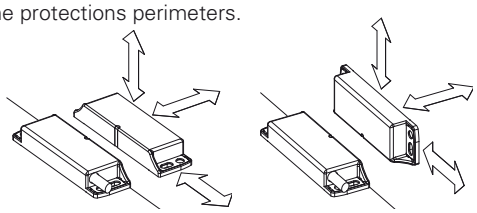
Wide actuation zone



Because of their intrinsic characteristics, magnetic sensors have a wide actuation zone, which make them appreciated in the use of inaccurate protections or for protection that can change their mechanic characteristics through the time.
In this type of sensors actuation distances may change according to the actuator displacement direction from the sensor.

Actuation from many directions

The magnetic sensors have been designed in order to be activated by the related actuator from many directions. In this way, the customer has the max. flexibility about the placing of the devices along the protections perimeters.



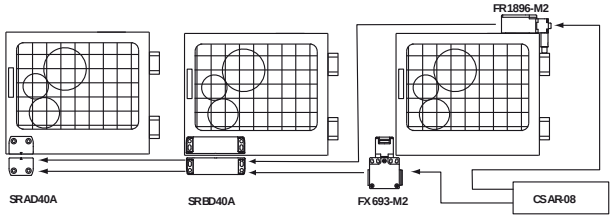
Protection degrees IP67 and IP69K

IP69K
IP67

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

Connection of sensors and switches in series

The magnetic sensors can be connected in series with the only limitation that the overall resistance, of sensors and the related wiring, has to be not higher than the admitted max. value of the module, which typically is equal to 50 ohm (see module features). It is a very high value that, with normal wiring, allows the use of dozens of sensors without problems. It is also possible to realize mixed circuit solutions connecting in series magnetic sensor to safety switches, with the only limitation of the above mentioned max. electric resistance.
We remind you that connection in series of two or more coded sensors reduce the system self-monitoring capacity which passes to category 3 in conformity with EN ISO 13849-1.
It is advisable to use safety modules by Pizzato Elettrica.

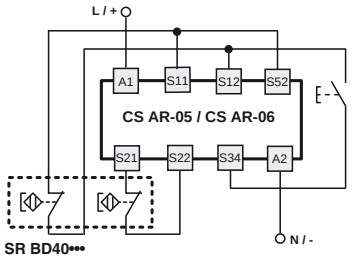


Connection with safety modules

Connection with safety modules CS AR-05 or CS AR-06

Input configuration with manual start (CS AR-05) and monitored start (CS AR-06)

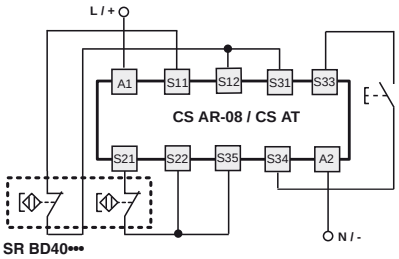
2 channels



Connection with safety module CS AR-08 or CS AT

Input configuration with manual start

2 channels



For features of the safety modules see page 181.

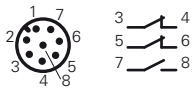
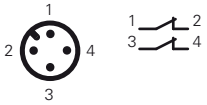
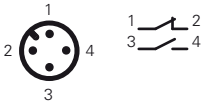
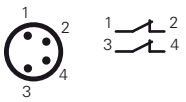
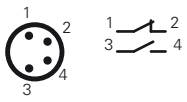
Internal connections with cable

Contacts imply closed protection

With cable (2NC)	With cable (1NC+1NO)	With cable (2NC+1NO)
Black White Brown Blue	Black White Brown Blue	Green Brown Grey Pink White Yellow

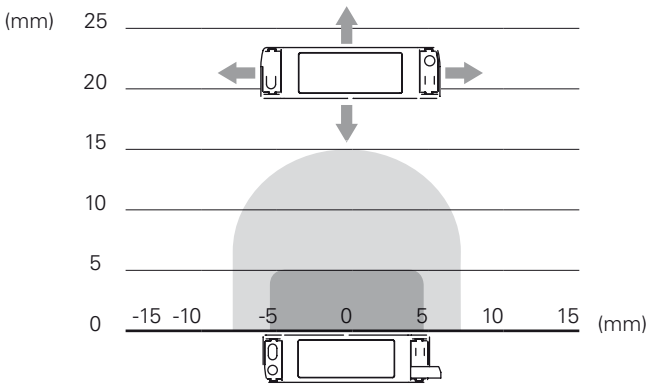
Internal connections with connector

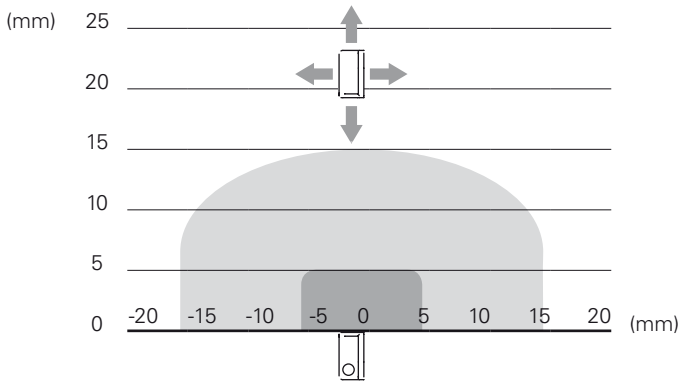
Contacts imply closed protection

With M12 connector (2NC+1NO)	With M12 connector (2NC)	With M12 connector (1NC+1NO)	With M8 connector (2NC)	With M8 connector (1NC+1NO)
				

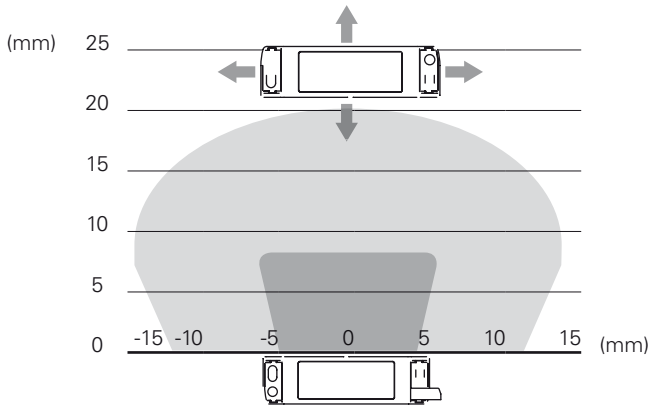
Sockets See page 287

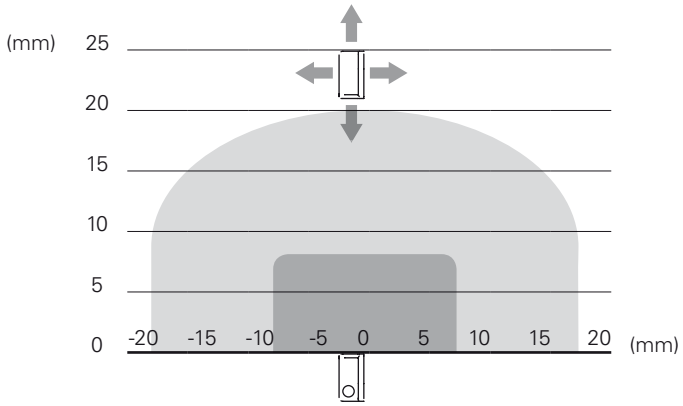
Operating distance SR BD•••••-B01F





Operating distance SR BD•••••-B02F

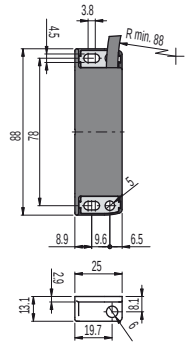
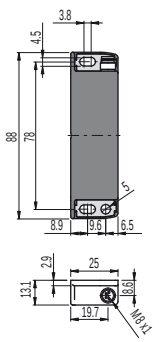
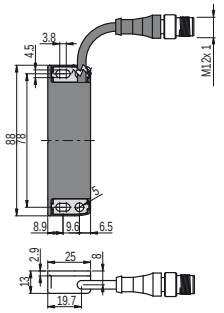


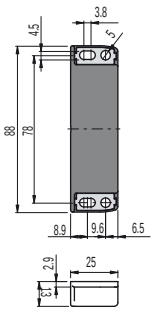


Legend:
Assured operating distance Sao
Assured release distance Sar
Note: The drawing of the activation areas is indicative.

Dimensional drawings

All measures in the drawings are in mm

integrated cable, length 2 m		M8 connector		cable length 0.1 m and M12 connector	
					
SR BD40AN2	2NC	SR BD40ALK	2NC	SR BD40AM0.1	2NC
SR BD41AN2	1NO+2NC			SR BD41AM0.1	1NO+2NC
SR BD42AN2	1NO+1NC	SR BD42ALK	1NO+1NC	SR BD42AM0.1	1NO+1NC

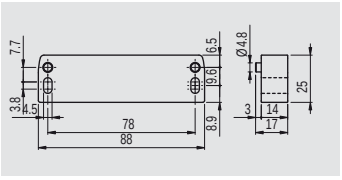
coded actuator Low level of coding acc. to EN ISO 14119	
	
SM B01F	Actuation distance 5 mm
SM B02F	Actuation distance 8 mm

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

Accessories See page 287

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

Spacer



This spacer is placed between the magnetic safety sensors and metal surfaces that can deviate the magnetic field created by the sensor: with this specific spacer between them the sensor activation and deactivation distances remain the same.

Article	Description
VS SP1BA1	Spacers for SR B series sensors

Coded magnetic sensors used for safety applications

A coded magnetic sensor alone can not be used for safety functions because its working principles are not considered safe by the standards (as are, for example, the positive opening on mechanical switches). For this reason a coded magnetic sensor, in order to be used in safety applications, has to be compulsory connected to a proper safety module which controls correct operation, through a circuit with at least two channels.

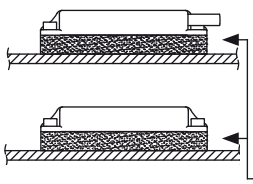
Utilization limits

- The installation must be performed by qualified staff only.
- Before installation and at regular interval, check the right contacts switching and the system operation of the sensor and the associated safety module.
- Do not use a hammer for adjustment.
- Do not use the sensor as a mechanical stop.
- Observe the assured operating and release distances.
- Adhere to the EN ISO 14119 requirements regarding low level of coding for interlocks.
- Do not install the sensor and the actuator on strong magnetic field.
- Keep away from iron filing.

Shock, vibrations and wear:
- Do avoid impact with the sensor. Excessive shock and vibrations may affect correct operation of the sensor.
- The actuator must not strike sensor.
- In case of damages or wear is necessary to change the whole device, included the actuator.

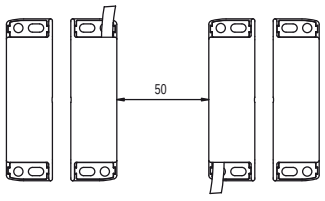
Attention during wiring:
- Keep load under the value indicated in the electrical data.
- When the sensor contacts are used without the respective safety module, connect in series to each contact the protection fuse indicated in the electrical data.
- Turn off the power supply before access to the switch connection contacts, also during the wiring.

Installation on ferromagnetic material



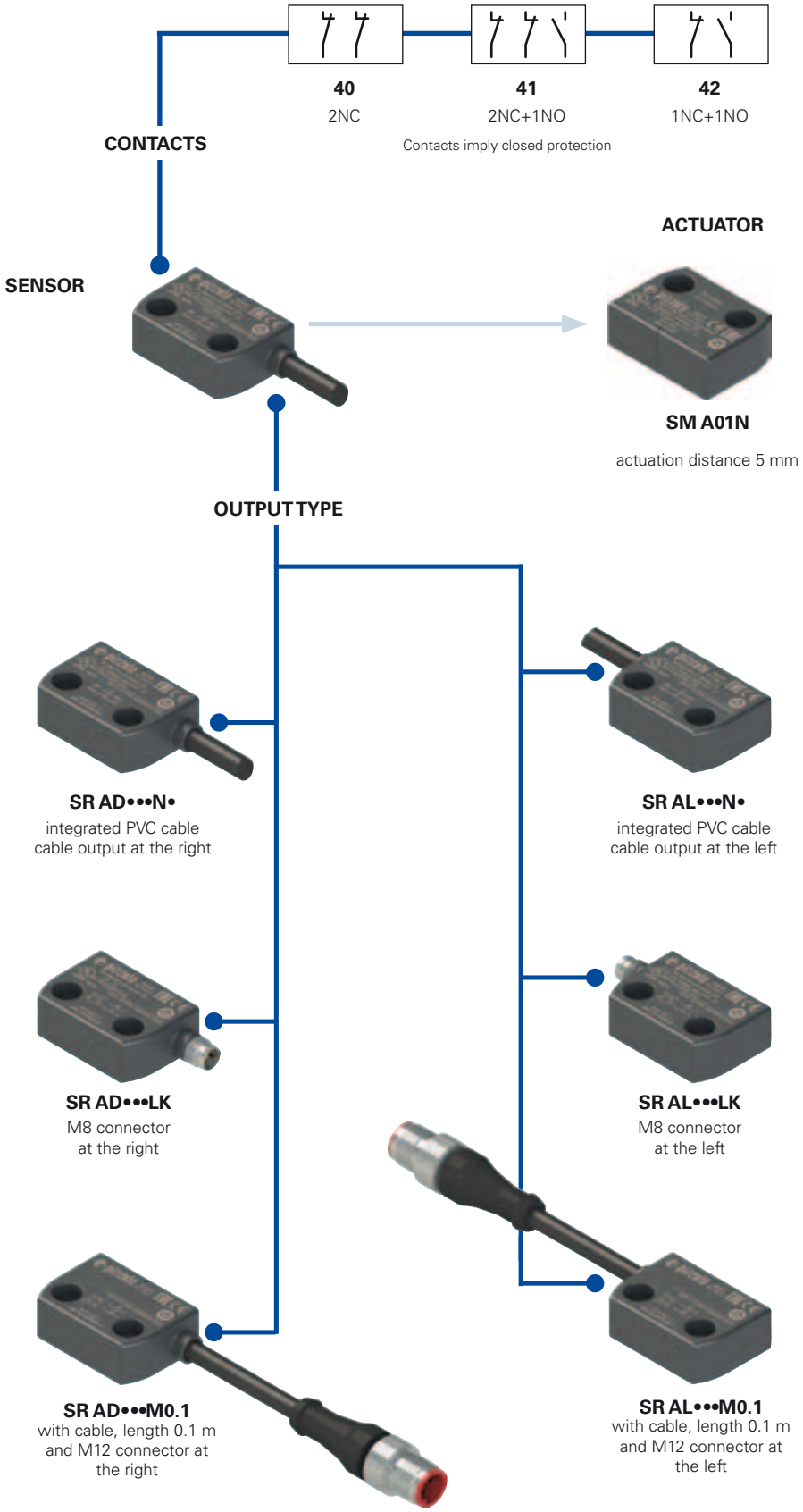
- If possible do not mount the sensor and the actuator on ferromagnetic materials.
- In order to avoid switching distances reductions, use VS SP1AA1 spacers.

Multiple systems sensor-actuator assembly



The minimum mounting gap between sensor-actuator systems must be at least 50 mm.

Selection diagram



product option
accessory sold separately

Code structure for sensor with actuator

article | options

SR AD40AN2-A01N-X

Sensor housing

SR	technopolymer

Output direction, connections

D	output at the right
L	output at the left

Contacts (with closed protection)

40	2NC (standard)
41	2NC+1NO (standard)
42	1NC+1NO

Type of integrated cable or connector

N1	integrated PVC cable, length 1 m
N2	integrated PVC cable, length 2 m (standard)
...	.....
N10	integrated PVC cable, length 10 m
M0.1	cable, length 0.1 m, with M12 connector
LK	M8 connector (available only with contacts 40 and 42)

Actuator

A01N	complete with actuator SM A01N actuation distance 5 mm

External metallic parts

	brass, nickel-plated, where present (standard)
X	stainless steel connector body (LK connector available only)

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

Code structure for single sensor

article | options

SR AD40AN2-X

Sensor housing

SR	technopolymer

Output direction, connections

D	output at the right
L	output at the left

Contacts (with closed protection)

40	2NC (standard)
41	2NC+1NO (standard)
42	1NC+1NO

Type of integrated cable or connector

N1	integrated PVC cable, length 1 m
N2	integrated PVC cable, length 2 m (standard)
...	.....
N10	integrated PVC cable, length 10 m
M0.1	cable, length 0.1 m, with M12 connector
LK	M8 connector (available only with contacts 40 and 42)

External metallic parts

	brass, nickel-plated, where present (standard)
X	stainless steel connector body (LK connector available only)

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

Single actuator code structure

SM A01N

Actuator

A01N	actuation distance 5 mm

Safety coded magnetic sensor **SR A** series

Main features

- Actuation without contact, mechanical
- Output contacts: 2NC, 1NO+2NC or 1NO+1NC
- Insensitive to dirt
- Protection degrees IP67 and IP69K
- Coded actuator
- Technopolymer housing
- Versions with M8 or M12 connector

Markings and quality marks:

UL approval:	E131787
TÜV SÜD approval:	Z10 15 08 75157 008
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
EMC Directive 2004/108/EC.

Technical data

Housing
Housing made of glass fiber reinforced technopolymer, self-extinguishing.
Versions with integrated cable 4 x 0.25 mm² or 6 x 0.25 mm², length 2 m, other lengths on request.
Versions with M8 connector
Versions with cable, length 0.1 m, M12 connector

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

General data

For safety applications up to:	SIL 3 acc. to EN 62061 PL e acc. to EN ISO 13849-1
Interlock without contact, coded:	type 4 acc. to EN ISO 14119
Coding level:	Low acc. to EN ISO 14119
Safety parameters:	
B_{10d}:	20,000,000 (with compatible Pizzato Elettrica safety modules) 400,000 (at max. load: DC12 24 V 250 mA)
Service life:	20 years
Ambient temperature:	-25°C … +80°C
Vibration resistance:	10 gn (10...150 Hz) acc. to IEC 60068-2-6
Shock resistance:	30 gn; 11 ms acc. to EN 60068 2 27
Pollution degree	3
Screw tightening torque:	0.8 … 2 Nm

In conformity with standards:
IEC 60947-1, EN 60947-1, IEC 60947-5-1, EN 60947-5-1, EN 60947-5-2, EN 60947-5-3 (in connection with safety module), EN ISO 14119, EN ISO 12100, EN ISO 13849-1, EN ISO 13849-2, IEC 60204-1, EN 60204-1, IEC 60529, EN 60529, ISO 20653, UL 508, CSA 22.2 No.14 .
Approvals:
UL 508, CSA 22.2 No.14 , EN ISO 13849-1, EN 60947-5-3, EN 50178, EN 61508-1, EN 61508-2, EN 61508-4, IEC 62061, EN 60947-1.

Actuation data

Assured operating distance Sao	5 mm with actuator SM A01N
Assured release distance Sar	15 mm with actuator SM A01N
Repeat accuracy	≤ 10%
Switching frequency	up to 150 Hz
Distance between two sensors	Min. 50 mm

Electrical data

Rated insulation voltage Ui:	120 Vac (with cable) 60 Vac / 75 Vdc (with M8 connector) 120 Vac (with 4-pin M12 connector) 30 Vac / 36 Vdc (with 8-pin M12 connector)
Rated impulse withstand voltage (U_{imp}):	6 kV 1.5 kV (with connector)
Thermal current Ith:	0.25 A
Max. switching load:	6 W (resistive load)
Rated operating voltage Ue:	24 Vac/dc
Rated operating current Ie:	0.25 A (resistive load)
Protection fuse:	0.25 A type F
Electrical endurance:	1 million operating cycles

Connection with safety modules for safety applications:
Connection with safety modules CS AR-01••••; CS AR-02••••; CS AR-04••••; CS AR-05••••; CS AR-06••••; CS AR-08••••; CS AR-46•024; CS AR-91••••; CS AT-0•••••; CS AT-1•••••; CS AT-3•••••; CS FS-5•••••; CS MF•••••-••; CS MP•••••-••.
When connected to the safety module the sensor can be classified as a control circuit device to PDF-M (EN 60947-5-3).
The system can be used in safety circuits to PL e/SIL 3/category 4 in accordance with EN ISO 13849-1.

Characteristics approved by UL

Utilization categories: 24 Vdc, 0.25 A (resistive load).

Data of housing type 1, 4X "indoor use only", 12.

Accessory for CS series.

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

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

Characteristics approved by TÜV SÜD

Supply voltage: 24 Vac/dc
Rated operating current (max.): 0.25 A
Ambient temperature: -25°C … +80°C
Protection degree: IP67
PL, category: PL e, category 4 with CS AR-08

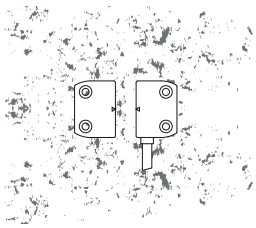
In conformity with standards: 2006/42/EEC Machine Directive, EN ISO 13849-1:2008, EN 60947-5-3/A1:2005, EN 50178:1997, EN 61508-1:1998 (SIL 1-3), EN 61508-2:2000 (SIL 1-3), EN 61508-4:1998 (SIL 1-3), IEC 62061:2005 (SIL CL 3), EN 60947-1

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

Description

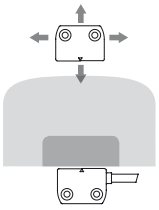
Coded magnetic sensors are devices suitable for monitoring protections and guards of machines without inertia which, when linked to a safety module, can create a system with safety category up to SIL 3 according to EN 62061, up to PL e according to EN ISO 13849-1 and up to category 4 according to EN ISO 13849-1. These products are composed by a magnetic field monitoring sensor, which is connected to the machine structure; and by a coded magnetic actuator, which has to be connected to the movable guard. When sensor and actuator are neared (closed guard), the sensor recognizes the actuator and provides to actuate electric contacts. The sensor is manufactured to be activated only by the correct coded actuator and not through a common magnet.

Insensitivity to dirt



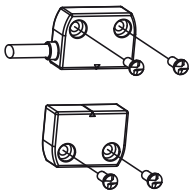
Magnetic sensors are totally sealed and retain their safety characteristics also where dirt and dust are present (not ferromagnetic material).
This characteristic, joined with the shape without recesses, make them especially proper to the use in the agro-industrial sector.

Wide actuation zone



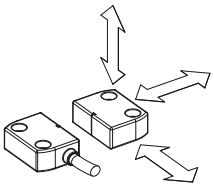
Because of their intrinsic characteristics, magnetic sensors have a wide actuation zone, which make them appreciated in the use of inaccurate protections or for protection that can change their mechanic characteristics through the time.
In this type of sensors actuation distances may change according to the actuator displacement direction from the sensor.

Safety screws for actuators



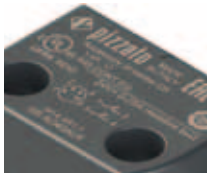
As required by EN ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools. See accessories on page 295.

Actuation from many directions



The magnetic sensors have been designed in order to be activated by the related actuator from many directions.
In this way, the customer has the max. flexibility about the placing of the devices along the protections perimeters.

Laser engraving



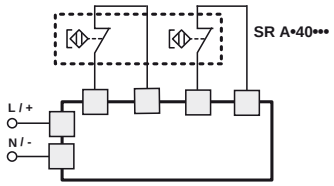
All devices are indelibly marked with a dedicated laser system that allows the marking to be also suitable for extreme environments. This system that does not use labels, prevents the loss of plate data and the marking is more resistant over time.

Protection degrees IP67 and IP69K

IP69K
IP67

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

Compatible safety modules



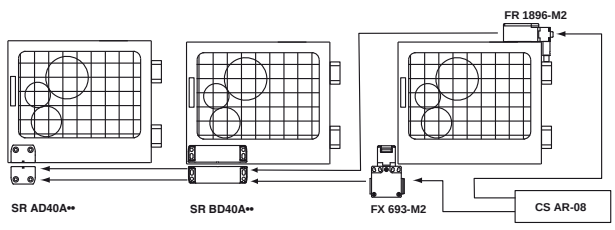
These magnetic sensors have been checked and tested for operation with suitable safety modules (see list). Using completed and tested solutions, the customer has the certainty to have no electric incompatibility between sensor and safety module, and has a higher reliability guarantee.

Sensors	Compatible safety modules	Safety module output contacts	
		Instantaneous contacts	Delayed contacts
SR AD40A•• SR AD41A•• SR AD42A••[a]	CS AR-01••••[b]	2NO+1NC	/
	CS AR-02••••[b]	3NO	/
	CS AR-04••••[b]	3NO+1NC	/
	CS AR-05••••	3NO+1NC	/
	CS AR-06••••	3NO+1NC	/
	CS AR-08••••	2NO	/
	CS AR-46•024	1NO	/
	CS AR-91••••	2NO+1PNP	/
	CS AT-0•••••	2NO+1NO	2NO
	CS AT-1•••••	3NO	2NO
	CS AT-3•••••	2NO	1NO
	CS FS-5•••••	1NO+1NC+1CO	/
	CS MP•••••-••	see page 243	see page 243
	CS MF•••••-••	see page 271	see page 271

[a] Compatible with CS MF202••-P4 (page 276) and CS MP•••••-•• only.
[b] Compatible with modules with production batch later than 04/2014 only.
For features of the safety modules see page 181.

Connection of sensors and switches in series

The magnetic sensors can be connected in series with the only limitation that the overall resistance, of sensors and the related wiring, has to be not higher than the admitted max. value of the module, which typically is equal to 50 ohm (see module features). It is a very high value that, with normal wiring, allows the use of dozens of sensors without problems. It is also possible to realize mixed circuit solutions connecting in series magnetic sensor to safety switches, with the only limitation of the above mentioned max. electric resistance.
We remind you that connection in series of two or more coded sensors reduce the system self-monitoring capacity which passes to category 3 in conformity with EN ISO 13849-1. It is advisable to use safety modules by Pizzato Elettrica.

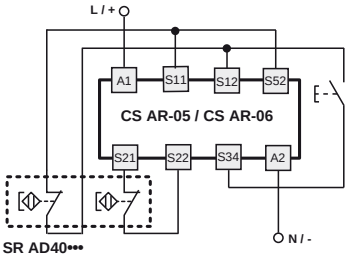


Connection with safety modules

Connection with safety modules CS AR-05 or CS AR-06

Input configuration with manual start (CS AR-05) and monitored start (CS AR-06)

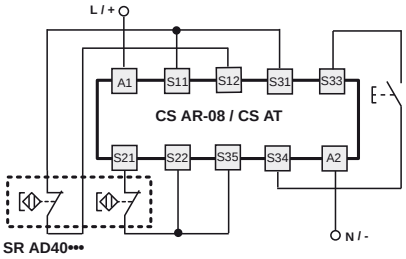
2 channels



Connection with safety module CS AR-08 or CS AT

Input configuration with manual start

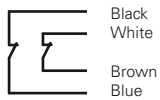
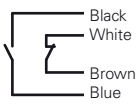
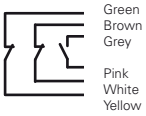
2 channels



For features of the safety modules see page 181.

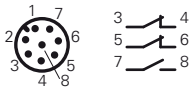
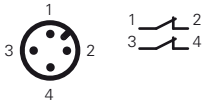
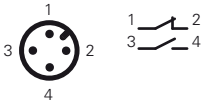
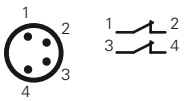
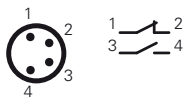
Internal connections with cable

Contacts imply closed protection

With cable (2NC)	With cable (1NC+1NO)	With cable (2NC+1NO)
		

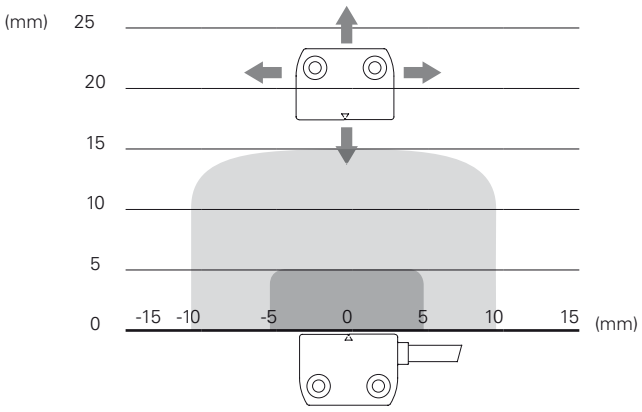
Internal connections with connector

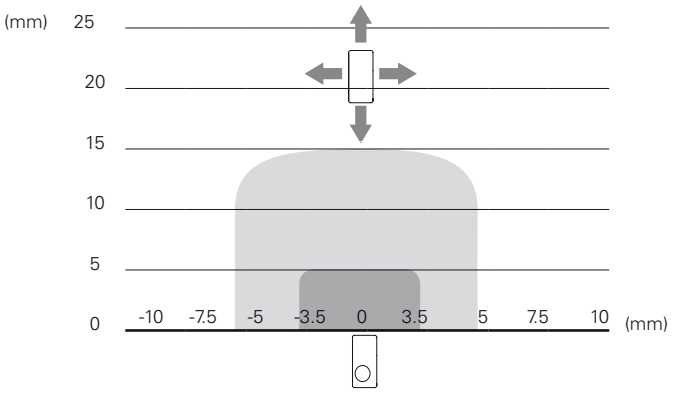
Contacts imply closed protection

With M12 connector (2NC+1NO)	With M12 connector (2NC)	With M12 connector (1NC+1NO)	With M8 connector (2NC)	With M8 connector (1NC+1NO)
				

Sockets See page 287

Operating distance SR AD•••••-A01N



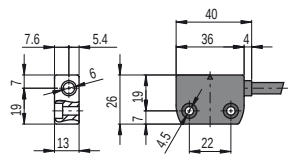
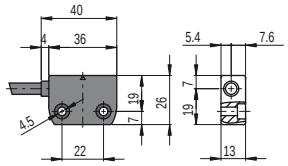


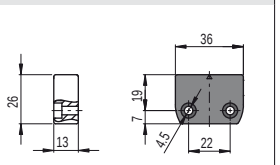
Legend:
Assured operating distance Sao
Assured release distance Sar

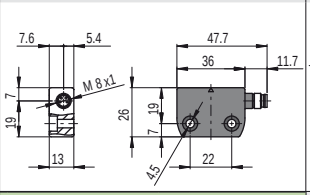
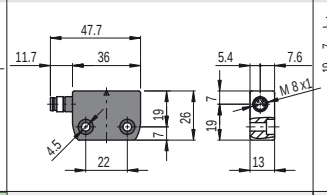
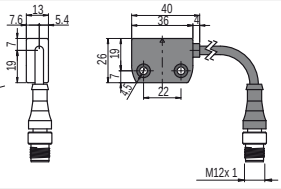
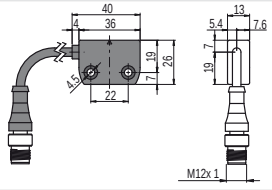
Note: The drawing of the activation areas is indicative.

Dimensional drawings

All measures in the drawings are in mm

cable, length 2 m, at the left		integrated cable, 2 m, at the left	
			
SR AD40AN2	2NC	SR AL40AN2	2NC
SR AD41AN2	1NO+2NC	SR AL41AN2	1NO+2NC
SR AD42AN2	1NO+1NC	SR AL42AN2	1NO+1NC

coded actuator Low level of coding acc. to EN ISO 14119	
	
SM A01N	Actuation distance 5 mm

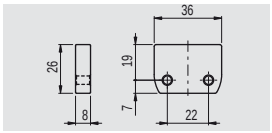
M8 connector, at the right		M8 connector, at the left		cable length 0.1 m and M12 connector, at the right		cable length 0.1 m and M12 connector, at the left	
							
SR AD40ALK	2NC	SR AL40ALK	2NC	SR AD40AM0.1	2NC	SR AL40AM0.1	2NC
				SR AD41AM0.1	1NO+2NC	SR AL41AM0.1	1NO+2NC
SR AD42ALK	1NO+1NC	SR AL42ALK	1NO+1NC	SR AD42AM0.1	1NO+1NC	SR AL42AM0.1	1NO+1NC

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

Accessories See page 287

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

Spacer



This spacer is placed between the magnetic safety sensors and metal surfaces that can deviate the magnetic field created by the sensor: with this specific spacer between them the sensor activation and deactivation distances remain the same. Made of a single block material it suits any application where high cleanness is required since it prevents any material in the installation area from getting and settling inside the drain.

Article	Description
VS SP1AA1	Spacers for SR A series sensors

Coded magnetic sensors used for safety applications

A coded magnetic sensor alone can not be used for safety functions because its working principles are not considered safe by the standards (as are, for example, the positive opening on mechanical switches).
For this reason a coded magnetic sensor, in order to be used in safety applications, has to be compulsory connected to a proper safety module which controls correct operation, through a circuit with at least two channels.

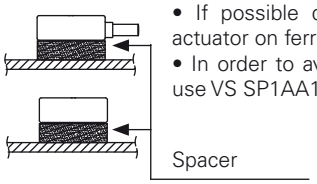
Utilization limits

- The installation must be performed by qualified staff only.
- Before installation and at regular interval, check the right contacts switching and the system operation of the sensor and the associated safety module.
- Do not use a hammer for adjustment.
- Do not use the sensor as a mechanical stop.
- Observe the assured operating and release distances.
- Adhere to the EN ISO 14119 requirements regarding low level of coding for interlocks.
- Do not install the sensor and the actuator on strong magnetic field.
- Keep away from iron filing.

Shock, vibrations and wear:
- Do avoid impact with the sensor. Excessive shock and vibrations may affect correct operation of the sensor.
- The actuator must not strike sensor.
- In case of damages or wear is necessary to change the whole device, included the actuator.

Attention during wiring:
- Keep load under the value indicated in the electrical data.
- When the sensor contacts are used without the respective safety module, connect in series to each contact the protection fuse indicated in the electrical data.
- Turn off the power supply before access to the switch connection contacts, also during the wiring.

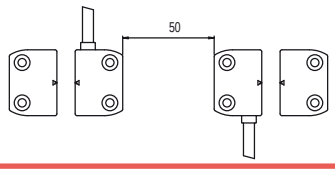
Installation on ferromagnetic material



- If possible do not mount the sensor and the actuator on ferromagnetic materials.
- In order to avoid switching distances reductions, use VS SP1AA1 spacers.

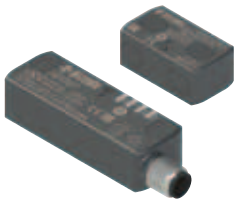
Multiple systems sensor-actuator assembly

The minimum mounting gap between sensor-actuator systems must be at least 50 mm.



ST series safety sensors with RFID technology

Introduction



The ST series sensors, combined with appropriate safety modules, are suitable for controlling protections and guards on machines without inertia, allowing the system within which they are integrated to attain a safety category up to SIL 3 acc. to EN 62061, and up to PL e and category 4 acc. to EN ISO 13849-1.
These sensors use RFID (Radio Frequency IDentification) technology and provide high protection against possible mishandling thanks to the uniqueness of the code transmitted by the actuator. Having no mechanical contacts, they guarantee long working life even in systems subject to frequent opening/closing and operating in hostile environmental conditions.

Maximum safety with a single device

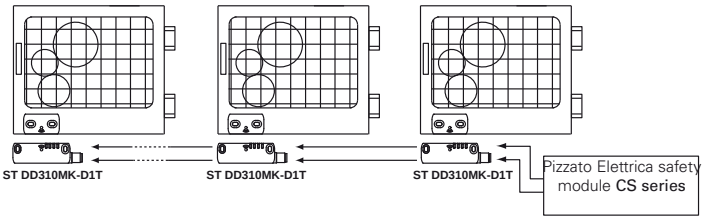
PL e + SIL 3

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

Connection of several sensors in series

PL e + SIL 3

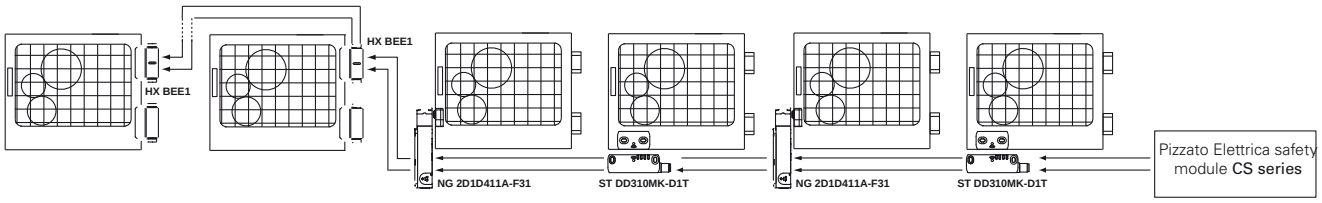
One of the major characteristics of Pizzato Elettrica ST products is that several sensors can be connected in series, up to a maximum number of 32 devices, while maintaining the maximum safety level (PLe) prescribed by the EN 13849-1 standard.
This connection method is permitted in safety systems which, at the end of the chain, feature a safety module evaluating the outputs of last ST sensor.
The fact that the PLe safety level can be maintained even with 32 sensors connected in series indicates the presence of an extremely safe structure inside each individual ST sensor.



Series connection with other devices

PL e + SIL 3

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



High level coded actuators

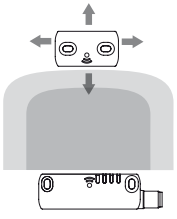
The ST series features an electronic system based on RFID technology to detect the actuator. This system gives a different coding to each actuator and makes it impossible to tamper with a device by using another actuator belonging to the same series. The actuators may have millions of different coding combinations, and are therefore classified as actuators with a high coding level, according to ISO 14119.

Protection degrees IP67 and IP69K

IP69K
IP67

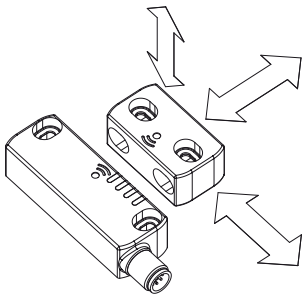
These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529. They can therefore be used in all environments where the maximum protection of the housing is required. Special measures also allow devices to be used even in machines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

Wide actuation zone



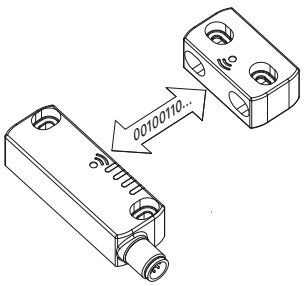
Since they exploit the intrinsic characteristics of RFID technology, the ST series sensors cover a wide activation zone, which makes them particularly suitable in conditions of poorly defined protections or with mechanical characteristics changing over time.

Actuation from many directions



Pizzato Elettrica ST series sensors have been designed to be activated from various directions, thus providing the customer with the greatest versatility in positioning the devices along the protection perimeters. Moreover, the actuator can be fixed on 2 perpendicular planes.

Programmability

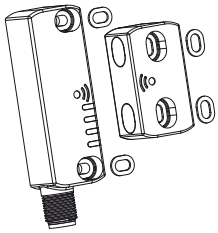


Pizzato Elettrica supplies a programmable version of the ST series sensors. A simple brief operation makes it possible to program the sensor in order for it to recognise the code of a new actuator. The procedure involves the activation of a dedicated input which brings the sensor to a safe state, while waiting for a new code to be memorised. When the actuator is brought closer, the ST sensor carries out a number of checks on the code being received, which must respect certain parameters peculiar to RFID technology.
On completion of these checks, the sensor will indicate, by means of LED signals, that the procedure has been successful.
After programming has been completed, the sensor will only recognise the actuator code corresponding to the last programming operation, thereby preserving the level of safety and reliability in the system where it is installed.

Laser engraving

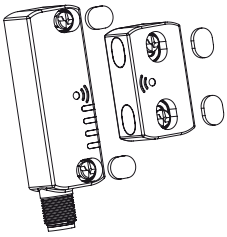
All devices are indelibly marked with a dedicated laser system that allows the marking to be also suitable for extreme environments. This system that does not use labels, prevents the loss of plate data and the marking is more resistant over time.

Stainless steel fixing plates



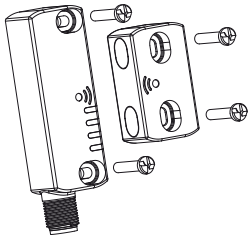
The presence of stainless-steel fixing plates in ST sensors, besides ensuring that fitting on surfaces not perfectly level does not damage the slots, makes the sensor sturdier against mechanical stress. The system therefore becomes safer and more reliable.
It is advisable to block the sensor and the actuator with safety screws in stainless steel.

Double anti-tampering safety



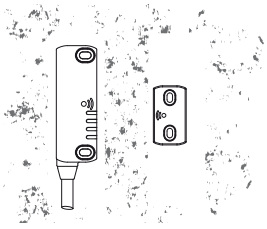
The ST series sensors and respective actuators are supplied with appropriate caps for covering the slots housing the fixing screws. These caps prevent dirt from accumulating, therefore making it easier to clean the system where the sensor is installed and keeping its operational capacity unaltered.
A further mechanical tampering protection is provided by means of fixing screw covers.

Safety screws for actuators



As required by EN ISO 14119, the actuator must be fixed immovably to the door frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered with using common tools. See accessories on page 295.

Insensitivity to dirt



The sensors are totally sealed and retain their safety characteristics also where dirt and dust are present (not ferromagnetic material). This characteristic, joined with the shape without recesses, make them especially proper to the use in the agro-industrial sector.

Four LEDs for immediate diagnosis

As the LEDs have been designed for quick immediate diagnosis, the status of each input and output is highlighted by one specific LED. This makes it possible to quickly identify the interruption points in the safe chain, which device is active, which door is opened and any errors inside the device. All that in a straightforward way without needing to decode complex blinking sequences.

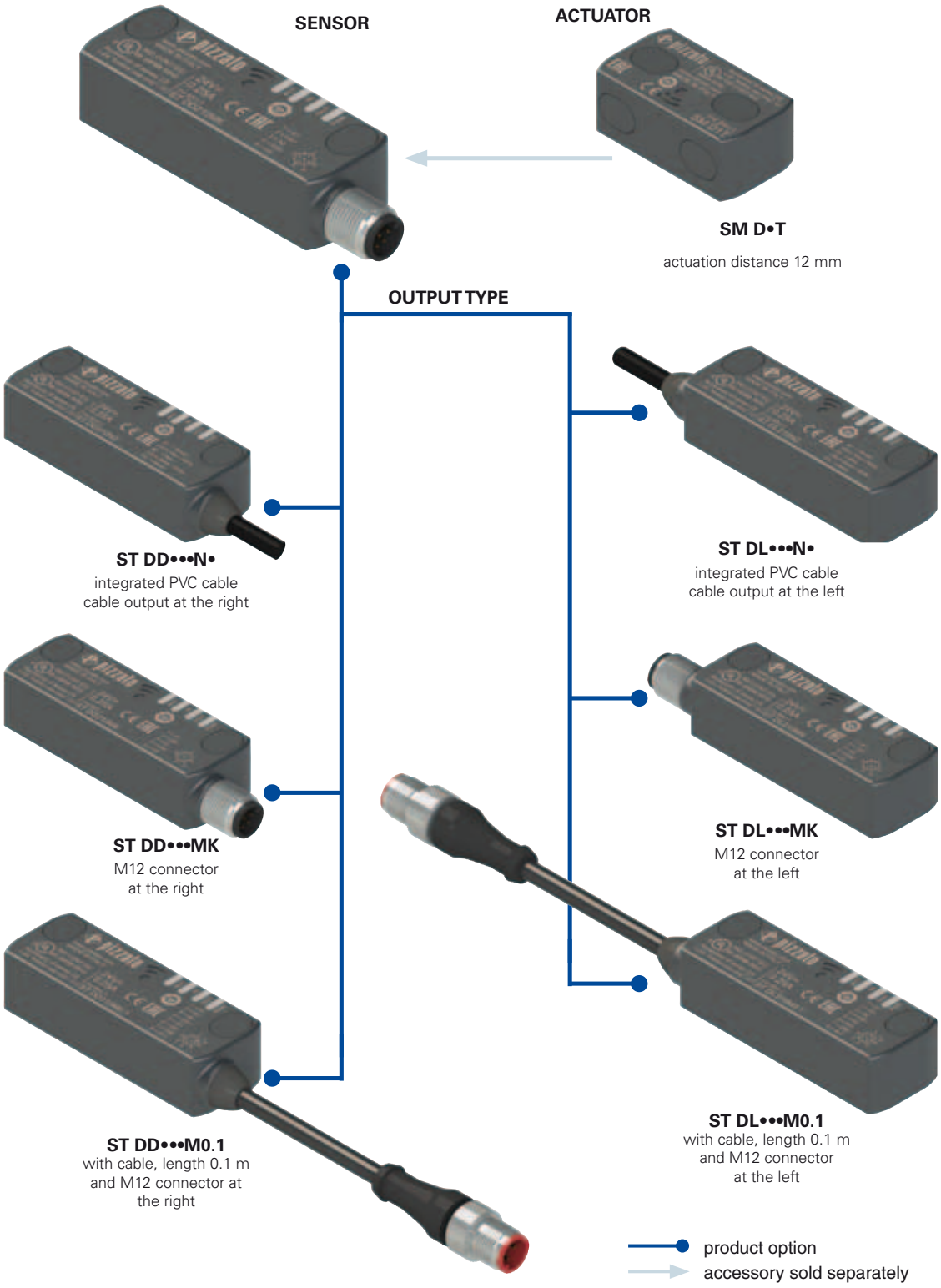
Inverted signalling output

To adapt to specific customer needs, in addition to the standard versions, you can request monitoring output O3 with inverted operation.

External device monitoring

EDM On request we can supply the device with EDM (External Device Monitoring) function, so that the device itself can check the integrity of the relays connected to the safety outputs. These safety relays or safety contactors send a feedback signal to the EDM input, which verifies the consistency of the received signal with the safety outputs state.

Selection diagram



Code structure for sensor with actuator

ST DD420N2-D1T

Output direction, connections	
D	output at the right
L	output at the left

Actuator	
D0T	complete with coded actuator SM D0T
D1T	complete with uniquely coded actuator SM D1T

Inputs, outputs and programming					
	OS safety outputs	NC signalling outputs	IS safety inputs	programming inputs I	EDM inputs
21	2	1	-	-	-
31	2	1	2	-	-
42	2	1	2	1	-
51	2	1	2	-	1
61	2	1 (inverted)	-	-	-
71	2	1 (inverted)	2	-	-
82	2	1 (inverted)	2	1	-

Type of integrated cable or connector	
N2	integrated PVC cable, length 2 m (standard)
...	.....
N10	integrated PVC cable, length 10 m
MK	with 5 or 8 pole stainless steel M12 connector
M0.1	cable, length 0.1 m, with M12 connector not available for ST D•2•••• versions

Supply voltage	
0	24 Vdc (-15% … +10%)
1	12 … 24 Vdc (-30% … +25%)

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

Code structure for single sensor

ST DD420N2

Output direction, connections	
D	output at the right
L	output at the left

Inputs, outputs and programming				
	OS safety outputs	NC signalling outputs	IS safety inputs	programming inputs I
42	2	1	2	1
82	2	1 (inverted)	2	1

Type of integrated cable or connector	
N2	integrated PVC cable, length 2 m (standard)
...	.....
N10	integrated PVC cable, length 10 m
MK	with 5 or 8 pole stainless steel M12 connector
M0.1	cable, length 0.1 m, with M12 connector

Supply voltage	
0	24 Vdc (-15% … +10%)
1	12 ... 24 Vdc (-30% ... +25%)

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

Actuator code structure

SM D1T

Actuator	
D0T	low level coded actuator the switch recognises any type D0T actuator
D1T	high level coded actuator the switch recognises one single actuator

Main features

- Actuation without contact, using RFID technology
- Digitally coded actuator
- Protection degrees IP67 and IP69K
- 4 LEDs for status display of the sensor
- Versions with M12 connector

Markings and quality marks:

UL approval: E131787
TÜV SÜD approval: Z10 12 11 75157 004
EAC approval: RU C-IT ДМ94.B.01024

In conformity with the requirements of:
Machinery Directive 2006/42/EC
EMC Directive 2004/108/EC
R&TTE Directive 1999/05/EC
FCC Part 15

In conformity with standards:
IEC 61508-1, IEC 61508-2, IEC 61508-3, IEC 61508-4, SN 29500, EN ISO 13849-1, EN ISO 13849-2, EN 62061, EN 60947-5-3 / A1, EN 60947-5-2, EN 60947-1, EN 61326-1, EN 61326-3-1, EN 61326-3-2, ETSI 301 489-1, ETSI 301 489-3, ETSI 300 330-2, UL 508, CSA 22.2 No.14

Approvals:
UL 508, CSA 22.2 No. 14, see features approved by TÜV SÜD.

Connection with safety modules for safety applications:
Connection with safety modules CS AR-05••••; CS AR-06••••; CS AR-08••••; CS AT-0•••••; CS AT-1•••••; CS MP•••••.
When connected to the safety module the sensor can be classified as a control circuit device to PDF-M (EN 60947-5-3).
The system can be used in safety circuits to PL e/SIL 3/category 4 in accordance with EN ISO 13849-1.

Technical data

Housing
Housing made of glass fiber reinforced technopolymer, self-extinguishing.
Versions with integrated cable 6 x 0.5 mm² or 8 x 0.34 mm², length 2 m, other lengths on request.
Versions with M12 connector
Versions with cable, length 0.1 m, M12 connector
Protection degree: IP67 acc. to EN 60529
IP69K acc. to ISO 20653
(Protect the cables from direct high-pressure and high-temperature jets)

General data

For safety applications up to:	SIL 3 acc. to EN 62061 PL e acc. to EN ISO 13849-1
Interlock without contact, coded:	type 4 acc. to EN ISO 14119
Level of coding acc. to EN ISO 14119	High with D1T actuator Low with D0T actuator
Safety parameters:	
$MTTF_d$:	4077 years
PFH_d:	1.46E-09
DC:	High
Service life:	20 years
Operating temperature:	-25 … +70°C
Storage and transport temperature:	-25 … +85°C
Vibration resistance:	10 gn (10...150 Hz) acc. to IEC 60068-2-6
Shock resistance:	30 gn; 11 ms acc. to EN 60068 2 27
Pollution degree	3
Screw tightening torque:	0.8 … 2 Nm

Electrical data of inputs IS1/IS2/I3/EDM

Rated operating voltage Ue1:	24 Vdc
Rated current consumption:	5 mA

Electrical data of safety outputs OS1/OS2

Rated operating voltage Ue1:	24 Vdc
Output type:	OSSD, PNP
Maximum current per output Ie1:	0.25 A
Minimum current per output Ie1:	0.5 mA
Utilization category:	DC13; Ue=24 Vdc, Ie=0,25 A
Short circuit detection:	Yes
Protection against overcurrent:	Yes
Auto-resettable internal protection fuse:	0.75 A
Duration of the deactivation impulses at the safety outputs:	< 300 us
Permissible capacitance between outputs:	< 200 nF
Permissible cap. between output and ground:	< 200 nF

Electrical data of signalling output O3

Rated operating voltage Ue1:	24 Vdc
Output type:	PNP
Maximum current per output Ie1:	0.1 A
Utilization category:	Dc12; Ue=24 Vdc; Ie=0,1A
Short circuit detection:	No
Protection against overcurrent:	Yes
Auto-resettable internal protection fuse:	0.75 A

Actuation data

Assured operating distance S_{ao}:	10 mm
Assured release distance S_{ar}:	16 mm
Rated operating distance S_n:	12 mm
Rated release distance S_{nr}:	14 mm
Repeat accuracy:	≤ 10 % S_n
Differential travel:	≤ 20 % S_n
Max. switching frequency:	1 Hz
Distance between two sensors	min. 50 mm

Electrical data

Rated operating voltage Ue:	24 Vdc -15% … +10% SELV
Rated operating current Ie:	0.25 A
Thermal current Ith:	0.25 A
Consumption at voltage Ue:	< 1W
Rated insulation voltage Ui:	32 Vdc
Rated impulse withstand voltage U_{imp}:	1.5 kV
External protection fuse:	1 A type F
Overvoltage category:	III

Characteristics approved by UL

Utilization categories: 24 Vdc, 0.25 A (resistive load).

Inputs supplied by remote class 2 source or limited voltage and limited energy.

Data of housing type 1, 4X "indoor use only", 12.

Accessory for CS series.

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

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

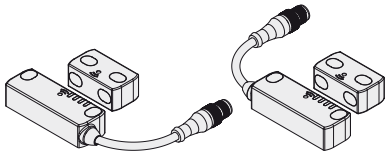
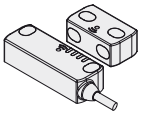
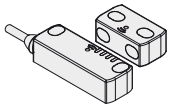
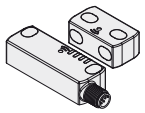
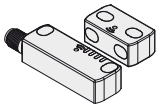
Characteristics approved by TÜV SÜD

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

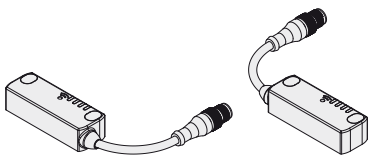
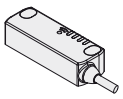
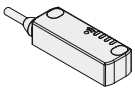
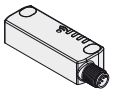
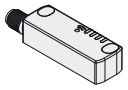
In conformity with standards: 2006/42/EEC Machinery Directive, EN ISO 13849-1:2008, EN 60947-5-3/A1:2005, EN 50178:1997, EN 61508-1:2010 (SIL 3), EN 61508-2:2010 (SIL 3), EN 61508-3:2010 (SIL 3),EN 61508-4:2010 (SIL 3), IEC 62061:2005 (SIL CL 3)

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

Selection table for sensors with actuators

OS safety outputs	NC signalling outputs	IS safety inputs	programming inputs I	EDM inputs	Programmable	 with cable, length 0.1 m, M12 connector at the right	with cable, length 0.1 m, M12 connector at the left	 integrated cable, at the right	 integrated cable, at the left	 M12 connector, at the right	 M12 connector, at the left
2	1	-	-	-	-			ST DD210N•-D•T	ST DL210N•-D•T	ST DD210MK-D•T	ST DL210MK-D•T
2	1	2	-	-	-	ST DD310M0.1-D•T	ST DL310M0.1-D•T	ST DD310N•-D•T	ST DL310N•-D•T	ST DD310MK-D•T	ST DL310MK-D•T
2	1	2	1	-	•	ST DD420M0.1-D•T	ST DL420M0.1-D•T	ST DD420N•-D•T	ST DL420N•-D•T	ST DD420MK-D•T	ST DL420MK-D•T
2	1	2	-	1	-	ST DD510M0.1-D•T	ST DL510M0.1-D•T	ST DD510N•-D•T	ST DL510N•-D•T	ST DD510MK-D•T	ST DL510MK-D•T

Sensor selection table

OS safety outputs	NC signalling outputs	IS safety inputs	programming inputs I	EDM inputs	Programmable	 with cable, length 0.1 m, M12 connector at the right	with cable, length 0.1 m, M12 connector at the left	 integrated cable, at the right	 integrated cable, at the left	 M12 connector, at the right	 M12 connector, at the left
2	1	2	1	-	•	ST DD420M0.1	ST DL420M0.1	ST DD420N•	ST DL420N•	ST DD420MK	ST DL420MK

Accessories See page 287

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

Actuator selection table

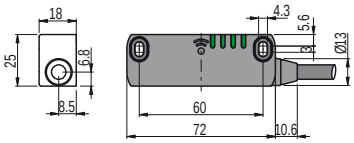
Type of coding	Level of coding acc. to ISO 14119	actuation distance 12 mm
encoded	low	D0T
unequivocally encoded	high	D1T

The use of RFID technology in ST series sensors makes them suitable for several applications. Pizzato Elettrica offers two different versions of actuators, in order to best suit customers' specific needs.
Type D0T actuators are all encoded with the same code. This implies that a sensor associated with an actuator type D0T can be activated by other actuators type D0T.
Type D1T actuators are always encoded with different codes. This implies that a sensor associated with an actuator type D1T can be activated only by a specific actuator. Another D1T type actuator will not be recognised by the sensor until a new association procedure is carried out (reprogramming). After reprogramming, the old actuator D1T will no longer be recognized.

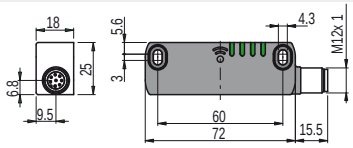
Dimensional drawings

All measures in the drawings are in mm

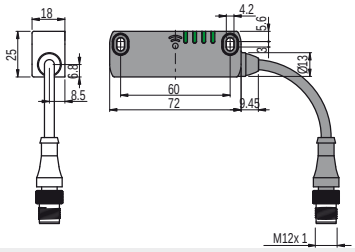
Sensor ST DD•••N• with cable at the right



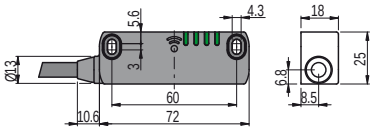
Sensor ST DD•••MK with M12 connector at the right



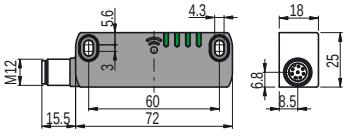
Sensor ST DD•••M0.1 with cable and M12 connector at the right



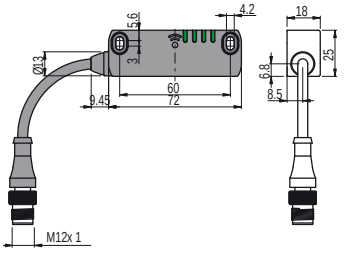
Sensor ST DL•••N• with cable at the left



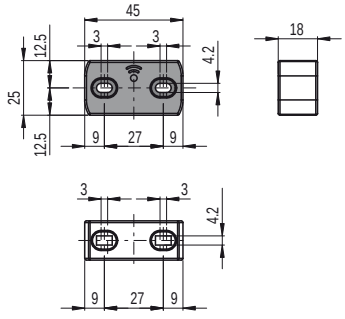
Sensor ST DL•••MK with M12 connector at the left



Sensor ST DL•••M0.1 with cable and M12 connector at the left



Actuator **SM D•T**



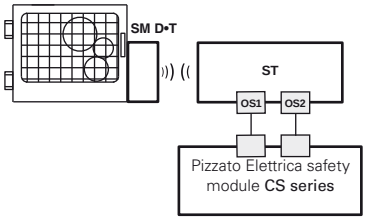
Accessories See page 287

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

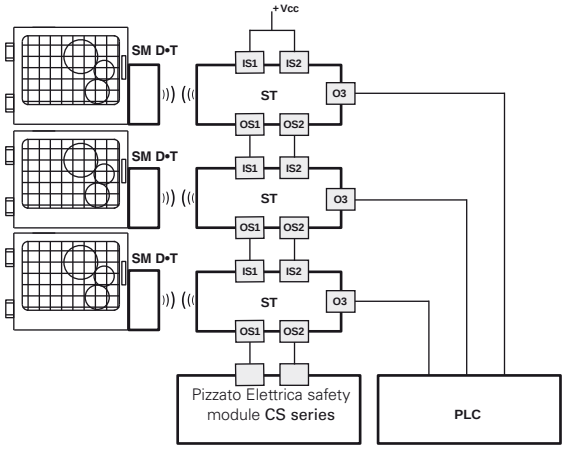
Complete safety system

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

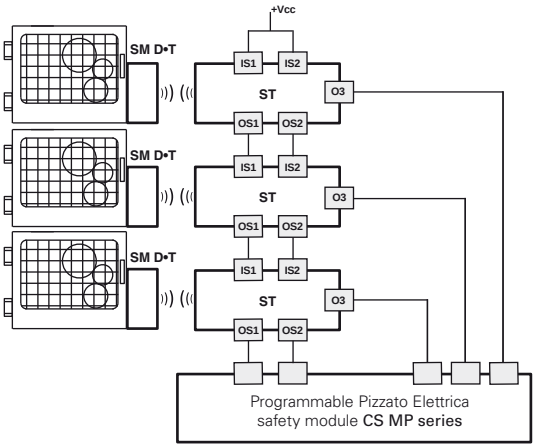
Sensors	Compatible safety modules	Safety module output contacts		
		Instantaneous safety contacts	Delayed safety contacts	Signalling contacts
ST D••••••	CS AR-05••••	3NO	/	1NC
	CS AR-06••••	3NO	/	1NC
	CS AR-08••••	2NO	/	/
	CS AT-0•••••	2NO	2NO	1NC
	CS AT-1•••••	3NO	2NO	/
	CS MP••••••	see page 243		



The ST sensor can be used individually after evaluating the outputs by means of a Pizzato Elettrica safety module (table for safety modules to be combined).

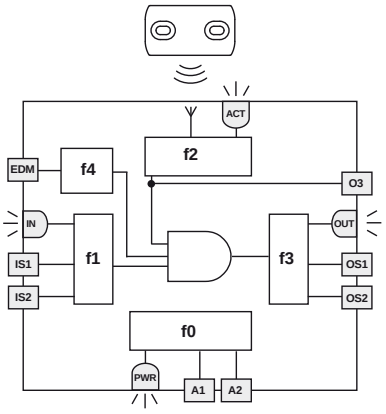


Possible connection in series of several sensors in order to simplify the safety system wiring, after evaluating the outputs from the last sensor in the chain by means of a Pizzato Elettrica safety module (table for safety modules to be combined). Each ST sensor is equipped with a signalling output,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



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

Internal wiring diagram (ST D•42•••)

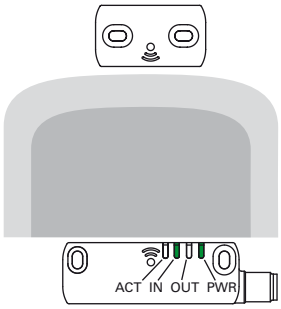


The diagram on the side represents the 5 logic functions which interact inside the sensor.
Function f0 is a global function which deals with the sensor power supply and the internal tests which it cyclically undergoes.
The task of function f1 is to evaluate the status of the sensor inputs, whereas function f2 checks the presence of the actuator inside the sensor operating areas.
Function f3 is intended to activate or deactivate the safety outputs and check for any faults or short circuits in the outputs.
In the EDM versions, the f4 function verifies the consistency of the EDM signal during safety output state changes.
The macro-function, which controls the above mentioned functions, enables the safety outputs only in presence of active inputs with actuator within the safe zone limits.
The status of each function is displayed by the corresponding LED (PWR, IN, ACT, OUT), in such a way that the general sensor status becomes immediately obvious to the operator.

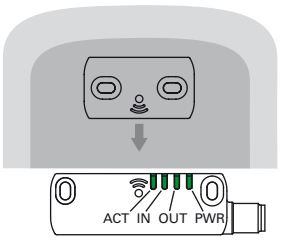
LED	Function
ACT	state of actuator / output O3
IN	status of safety inputs
OUT	status of safety outputs
PWR	power supply/self-diagnosis

Limited and safe activation zones (ST D•42•••)

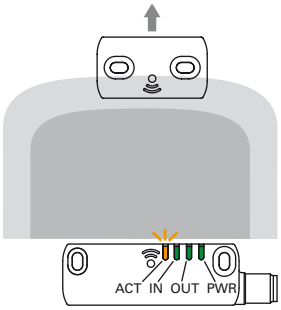
During alignment of the sensor with the actuator, the status LEDs indicate, by means of different colours, the presence of the actuator within the limit activation zone or the safe activation zone. In the figure below an example with sensor ST DD420MK-D1T.



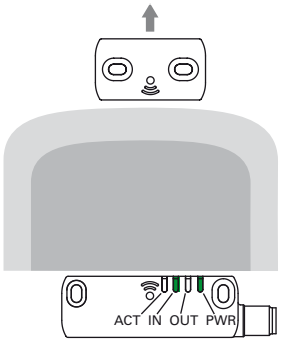
The sensor is supplied with power (LED PWR on, green), the inputs are enabled (LED IN on, green), the outputs are disabled (LED OUT off). The actuator is on the outside of the activation zone (LED ACT off).



When the actuator is brought inside the safe activation zone (dark grey area), the sensor switches on LED ACT to green and enables the outputs (LED OUT on, green).



When the actuator leaves the safe zone, the sensor keeps the outputs enabled; however, by means of the LED ACT (blinking, orange/green), it indicates that the actuator is entering the limit activation zone (light grey area).



When the actuator leaves the limit activation zone, the sensor disables the outputs and switches off the LED OUT and LED ACT.

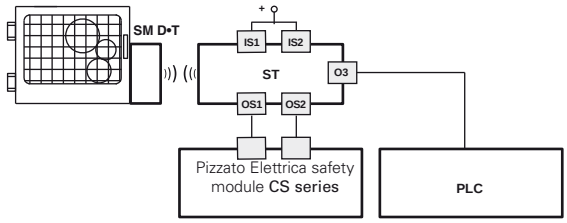
Operating states (ST D•42•••)

PWR LED	OUT LED	IN LED	ACT LED	Status. sensor	Description
○	○	○	○	OFF	Sensor off.
●	○	○	○	POWER ON	Internal tests upon activation.
●	✳	○	✳	RUN	Sensor with inactive inputs.
●	✳	●	✳	RUN	Activation of inputs.
●	✳	◔	✳	RUN	Inputs not coherent. Recommended action: check for presence and/or wiring of inputs.
●	✳	✳	●	RUN	Actuator in safe area. O3 signalling output active.
●	✳	✳	◔	RUN	Actuator in limit zone, O3 active. Recommended action: bring the sensor within the safe activation zone.
●	●	●	●	RUN	Activation of inputs. Actuator in safe area and safety outputs active.
●	◔	✳	✳	ERROR	Error on outputs. Recommended action: check for any short circuits between the outputs, outputs and ground, or outputs and power supply, and restart the sensor.
●	✳	✳	✳	ERROR	Internal error. Recommended action: restart the sensor. If the fault persists, replace the sensor.

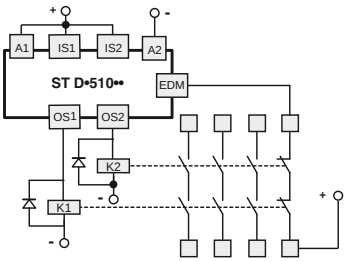
Legend: ○ = off ● = on ◔ = blinking ◑ = alternating colours ✳ = indifferent

Output O3 inverted (ST D•61•••, ST D•71•••, ST D•82•••)

The version with signalling output O3 inverted allows checking of the actual electrical connection of the sensor by an external PLC. In the event of removal of the actuator and switching off of the OS safe outputs, output O3 will become active.

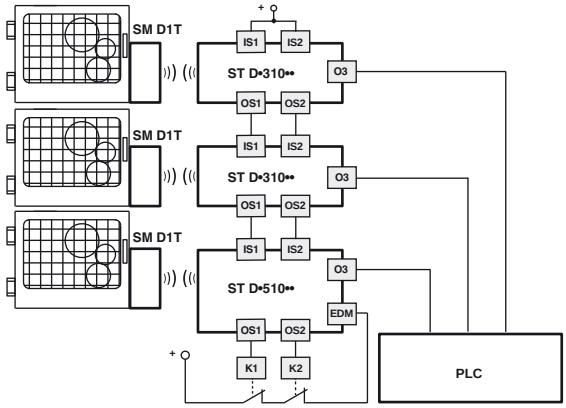


External device monitoring (EDM)



The ST D•51••• version, in addition to maintaining the operating and safety characteristics of the ST series, allows control of **forcibly guided NC contacts of contactors or relays** controlled by the safety outputs of the sensor itself. As an alternative to the relays or contactors you can use Pizzato Elettrica expansion modules CS ME-03. See page 235.

This check is carried out by monitoring of the EDM input (External Device Monitoring as defined in EN 61496-1) of the sensor.



This version, with the IS safety inputs, **can be used at the end of a series** of ST sensors, **up to a maximum number of 32 devices**, while maintaining the maximum PL e safety level according to EN ISO 13849-1.

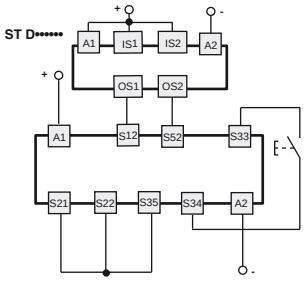
This solution allows you to dispense with the safety module connected to the last device in the chain.

Connection with safety modules

Connection with safety modules CS AR-08••••

Input configuration with monitored start

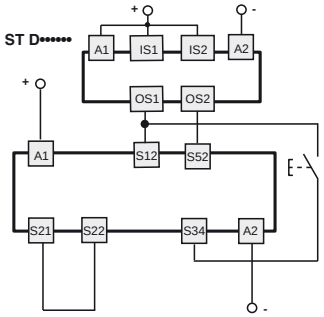
2 channels / Category 4 / up to SIL 3 / PL e



Connection with safety modules CS AR-05•••• / CS AR-06••••

Input configuration with manual start (CS AR-05••••)
or monitored start (CS AR-06••••)

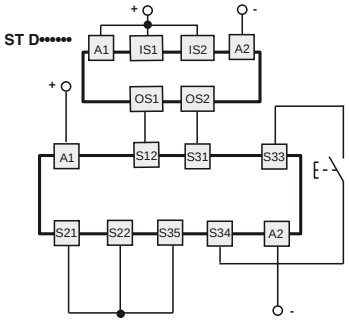
2 channels / Category 4 / up to SIL 3 / PL e



Connection with safety modules CS AT-0••••• / CS AT-1•••••

Input configuration with monitored start

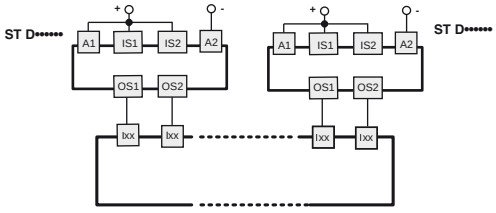
2 channels / Category 4 / up to SIL 3 / PL e



Connection with safety modules CS MP••••0

The connections vary according to the program of the module

Category 4/ up to SIL 3 / PL e



For features of the safety modules see page 181.

Internal connections with cable

	ST D•21•N• ST D•61•N•
cable colour	connection
brown	A1
red/white	OS1
blue	A2
black/white	OS2
black	O3

	ST D•31•N• ST D•71•N•
cable colour	connection
brown	A1
red	IS1
blue	A2
red/white	OS1
black	O3
purple	IS2
black/white	OS2
purple/white	not connected

	ST D•42•N• ST D•82•N•
cable colour	connection
brown	A1
red	IS1
blue	A2
red/white	OS1
black	O3
purple	IS2
black/white	OS2
purple/white	I3

	ST D•51•N•
cable colour	connection
brown	A1
red	IS1
blue	A2
red/white	OS1
black	O3
purple	IS2
black/white	OS2
purple/white	EDM

Internal connections with connector

	ST D•21•M• ST D•61•M•
pin	connection
1	A1
2	OS1
3	A2
4	OS2
5	O3

	ST D•31•M• ST D•71•M•
pin	connection
1	A1
2	IS1
3	A2
4	OS1
5	O3
6	IS2
7	OS2
8	not connected

	ST D•42•M• ST D•82•M•
pin	connection
1	A1
2	IS1
3	A2
4	OS1
5	O3
6	IS2
7	OS2
8	I3

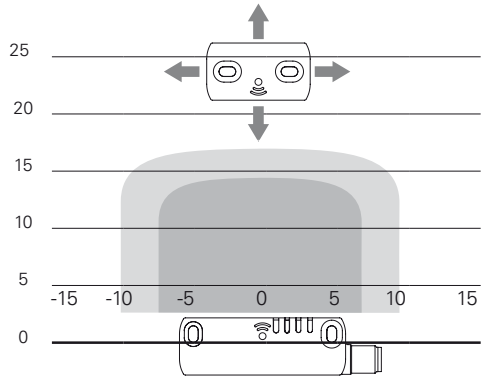
	ST D•51•M•
pin	connection
1	A1
2	IS1
3	A2
4	OS1
5	O3
6	IS2
7	OS2
8	EDM

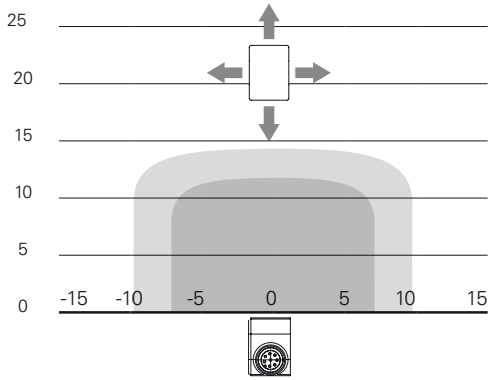
Legend

A1-A2 supply
IS1-IS2 safety inputs
OS1-OS2 safety outputs
O3 signalling output
I3 programming input
EDM input for monitoring of NC contacts of the contactors

Sockets See page 287

Operating distances





Legend:
Rated operating distance S_n (mm)
Rated release distance S_{nr} (mm)
Note: The drawing of the activation areas is indicative.

Series connection

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