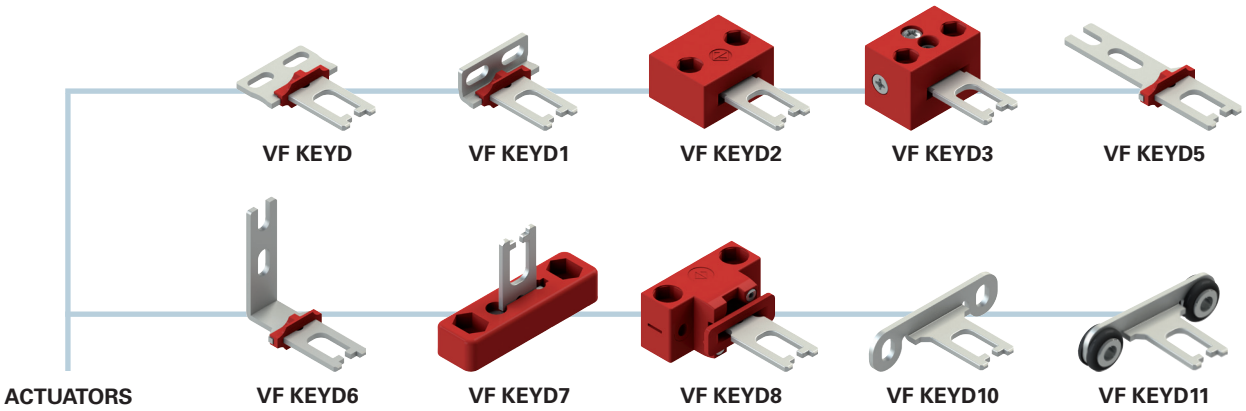
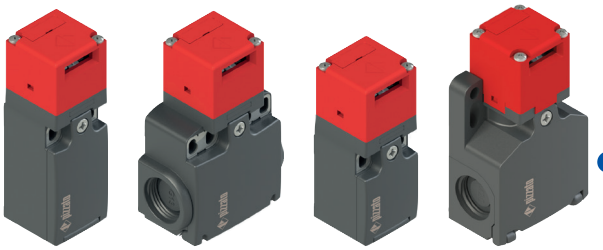
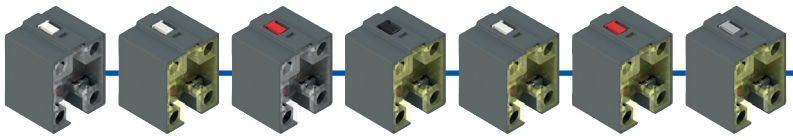
Selection diagram



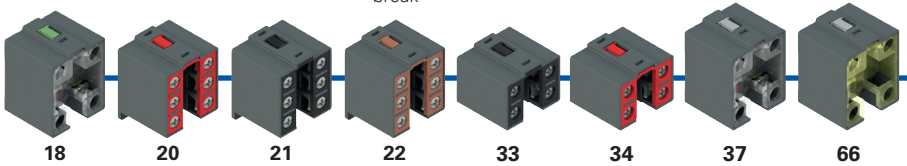


FR FX FK FW

CONTACT BLOCKS



5 1NO+1NC snap action
6 1NO+1NC slow action
7 1NO+1NC slow action, make before break
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, close
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, make before break
66 1NC slow action

CONDUIT ENTRIES

Threaded conduit entry (standard)
With cable gland
With M12 plastic connector
With M12 metal connector

product option
Sold separately as accessory

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, make before break
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, close
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, make before break
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
G1	silver contacts, 2.5 µm gold coating (not for contact blocks 20, 21, 22, 33, 34)

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

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

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

Ambient temperature

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

article / options / options

FK 3393-E3D1XGM2K24T6

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

M2	M20x1.5 (standard)
	PG 11

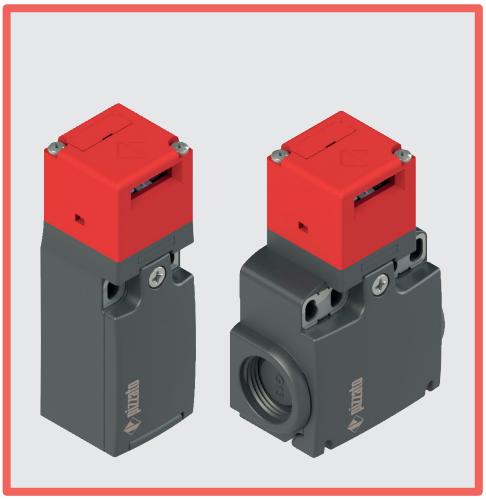
Pre-installed cable glands or connectors

	no cable gland or connector (standard)
K24	cable gland for cables Ø 5 ... 10 mm
K70	M12 plastic connector, 4-pole

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

Ambient temperature

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



Main features

- Technopolymer housing, from one to three conduit entries
- Hinged cover, fixed with single captive screw
- Metal plates on mounting holes of the housing (FR, FX, FK)
- Protection degree IP 67 and IP69K
- 15 contact blocks available
- 10 stainless steel actuators available
- Versions with M12 connector
- Versions with gold-plated silver contacts

Quality marks:

IMQ approval:	EG610
UL approval:	E131787
CCC approval:	2021000305000101
EAC approval:	RU C-IT.УТ03.B.00035/19

Technical data

Housing

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

FR series, one 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)
FW series - three knock-out threaded conduit entries:	M20x1.5 (standard)
Protection degree FR, FK, FX:	IP67 acc. to EN 60529 (with cable gland of equal or higher protection degree) IP69K acc. to ISO 20653 (with cable gland of equal or higher protection degree)
Protection degree FW:	IP67 acc. to EN 60529 (with cable gland of equal or higher protection degree)

General data

SIL (SIL CL) up to:	SIL 3 acc. to EN 62061
Performance Level (PL) up to:	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 parameter B_{10D}:	2,000,000 for NC contacts
Mission time:	20 years
Ambient temperature:	-25°C … +80°C (standard) -40°C … +80°C (T6 option)
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	1 million operating cycles
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s
Actuator extraction force:	10 N~ (30 N~ -E3 versions)
Tightening torques for installation:	see page 439
Wire cross-sections and wire stripping lengths:	see page 461

In compliance with standards:
IEC 60947-5-1, IEC 60947-1, IEC 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN IEC 63000, BG-GS-ET-15, UL 508, CSA C22.2 No. 14.
Approvals:
EN 60947-5-1, UL 508, CSA C22.2 No. 14, GB/T14048.5.

Compliance with the requirements of:
Machinery Directive 2006/42/EC, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1.

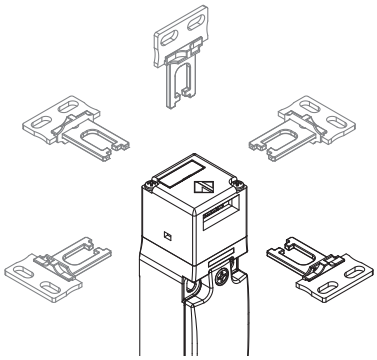
⚠ **If not expressly indicated in this chapter, for correct installation and utilization of all articles see the instructions given on pages 439 to 454.**

Electrical data			Utilization category
without connector	Thermal current (I_{th}):	10 A	Alternating current: AC15 (50÷60 Hz) U_e (V) 250 400 500 I_e (A) 6 4 1 Direct current: DC13 U_e (V) 24 125 250 I_e (A) 3 0.55 0.3
	Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 20, 21, 22, 33, 34)	
	Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20, 21, 22, 33, 34)	
	Conditional short circuit current:	1000 A acc. to EN 60947-5-1	
	Protection against short circuits:	type aM fuse 10 A 500 V	
	Pollution degree:	3	
with M12 connector, 4-pole	Thermal current (I_{th}):	4 A	Alternating current: AC15 (50÷60 Hz) U_e (V) 24 120 250 I_e (A) 4 4 4 Direct current: DC13 U_e (V) 24 125 250 I_e (A) 3 0.55 0.3
	Rated insulation voltage (U_i):	250 Vac 300 Vdc	
	Protection against short circuits:	type gG fuse 4 A 500 V	
	Pollution degree:	3	
with M12 connector, 8-pole	Thermal current (I_{th}):	2 A	Alternating current: AC15 (50÷60 Hz) U_e (V) 24 I_e (A) 2 Direct current: DC13 U_e (V) 24 I_e (A) 2
	Rated insulation voltage (U_i):	30 Vac 36 Vdc	
	Protection against short circuits:	type gG fuse 2 A 500 V	
	Pollution degree:	3	

Description

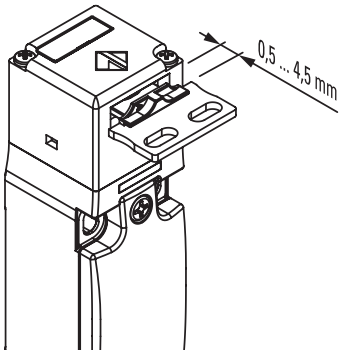
These safety switches are ideal for controlling gates, sliding doors and other guards which protect dangerous parts of machines without inertia. The stainless steel actuator is fastened to the moving part of the guard in such a way that it is separated from the switch each time the guard is opened. A special mechanism ensures that removing the actuator forces the positive opening of the electrical contacts. Easy to install, these switches can be used with all types of guards (with hinge as well as sliding and removable types). The possibility to actuate the switch only with a specific actuator guarantees that the machine can be restarted only after the guard has been closed.

Head with variable orientation



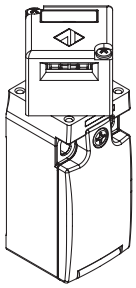
For all switches, the head can be adjusted in 90° steps after removing the two fastening screws. In this way it is possible to actuate the switch from 5 different directions.

Wide-ranging actuator travel



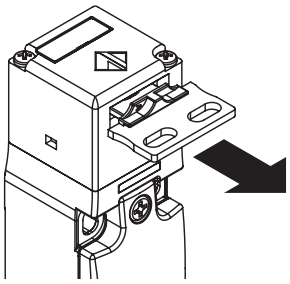
The actuation head of this switch features a wide range of travel. In this way the guard can oscillate along the direction of insertion (4 mm) without causing unwanted machine shutdowns. This wide range of travel is available in all actuators in order to ensure maximum device reliability.

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



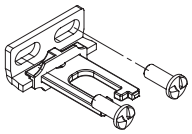
Versions with 30 N actuator holding force instead of the standard 10 N are available.

Protection degrees IP67 and IP69K

IP69K
IP67

These devices are designed to be used under the toughest environmental conditions, and they pass the IP67 immersion test acc. to EN 60529. They can therefore be used in all environments where the maximum degree of protection is required for the housing. Due to their special design, these devices are suitable for use in equipment subjected to cleaning with high pressure hot water jets. These devices meet the IP69K test requirements according to ISO 20653 (water jets with 100 bar and 80°C).

Safety screws for actuators



As required by EN ISO 14119, the actuator must be fixed immovably to the guard 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 by using common tools. See accessories on page 419.

Extended temperature range

-40°C

These devices are also available in a special version suitable for an ambient operating temperature range from -40°C up to +80°C.

They can therefore be used for applications in cold stores, sterilisers and other equipment with low temperature environments. The special materials used to produce these versions retain their characteristics even under these conditions, thereby expanding the installation possibilities.

Features approved by IMQ

Rated insulation voltage (Ui):	500 Vac 400 Vac (for contact blocks 2, 11, 12, 20, 21, 22, 28, 29, 30, 37, 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, 28, 29, 30, 33, 34)
Protection degree of the housing:	IP67
MV terminals (screw terminals)	
Pollution degree:	3
Utilization category:	AC15
Operating voltage (Ue):	400 Vac (50 Hz)
Operating current (Ie):	3 A

Forms of the contact element: Za, Za+Za, X+X, Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X, Y, X.
Positive opening of contacts on contact blocks 5, 6, 7, 8, 9, 11, 13, 14, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30, 33, 34, 37, 38, 39, 66.
In compliance with standards: EN 60947-1, EN 60947-5-1, fundamental requirements of the Low Voltage Directive 2014/35/EU.

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

Features approved by UL

Electrical Ratings:	Q300 pilot duty (69 VA, 125-250 V dc) A600 pilot duty (720 VA, 120-600 V ac)
Environmental Ratings:	FR: Types 1, 4X FX, FK, FW: Types 1, 4X, 12, 13

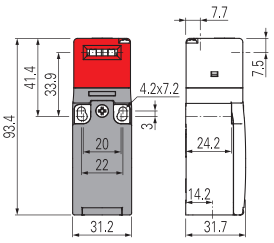
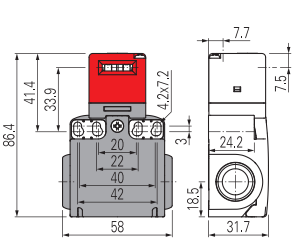
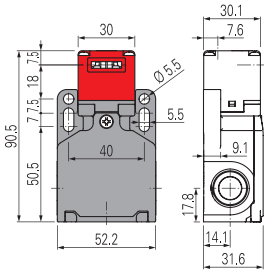
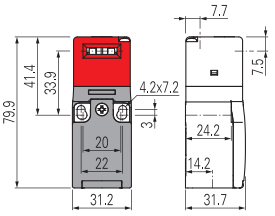
Use 60 or 75 °C copper (Cu) conductor and wire size range 12, 14 AWG, stranded or solid. The terminal tightening torque of 7.1 lb in (0.8 Nm).

The hub is to be connected to the conduit before the hub is connected to the enclosure.

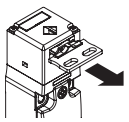
Please contact our technical department for the list of approved products.

Safety switches **with separate actuator**

Contact type:
R = snap action
L = slow action
LO = slow action make before break
LS = slow action shifted
LV = slow action shifted and spaced
LA = slow action close

Contact block		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-M2 → 1NO+1NC
34	L	FR 3493-M2 → 2NC	FX 3493-M2 → 2NC	FW 3492-M2 → 2NC	FK 3493-M2 → 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	/
Actuating force		10 N (18 N →)	10 N (18 N →)	10 N (18 N →)	10 N (18 N →)
Travel diagrams		page 446 - group 8	page 446 - group 8	page 446 - group 8	page 446 - group 8

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



Extraction force for 30 N versions	30 N~ (38 N →)	30 N~ (38 N →)	30 N~ (38 N →)	30 N~ (38 N →)

Limits of use

- 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 presence of explosive or flammable gases or dusts. In these cases use ATEX products (see dedicated Pizzato catalogue).

All values in the drawings are in mm

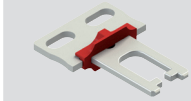
Accessories See page 419

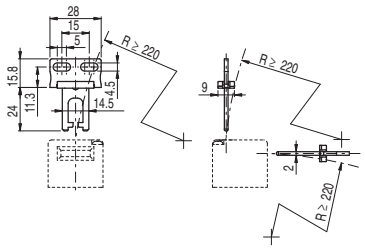
→ The 2D and 3D files are available at **www.pizzato.com**

Stainless steel actuators

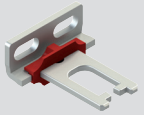
IMPORTANT: These actuators can only be used with items of the FR, FX, FK and FW series (e.g. FR 693-M2).
Low level of coding acc. to EN ISO 14119.

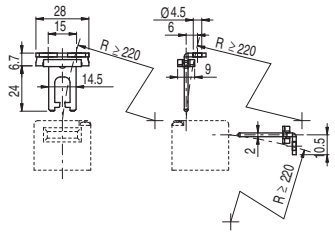
Article	Description
VF KEYD	Straight actuator



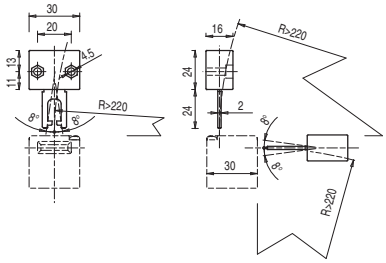


Article	Description
VF KEYD1	Angled actuator



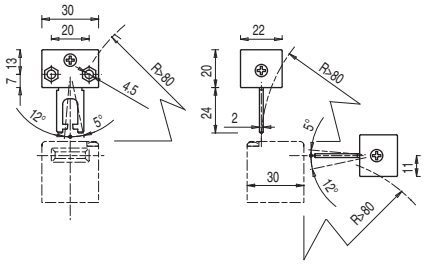


Article	Description
VF KEYD2	Jointed actuator



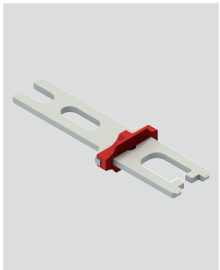
The actuator can flex in four directions for applications where the guard alignment is not precise.

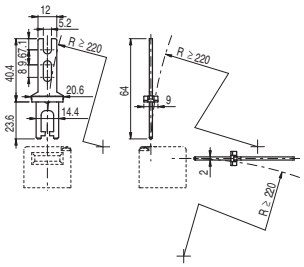
Article	Description
VF KEYD3	Actuator adjustable in two directions



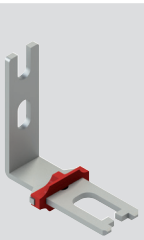
Actuator adjustable in two directions for guards with reduced dimensions.

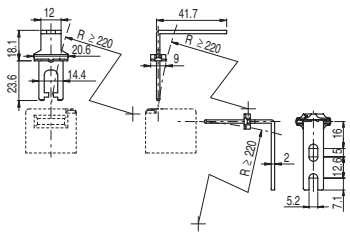
Article	Description
VF KEYD5	Extended actuator



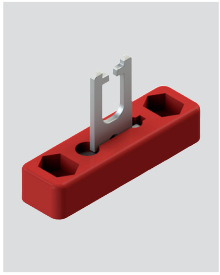


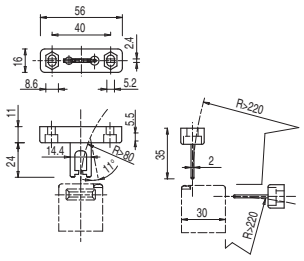
Article	Description
VF KEYD6	Extended actuator, angled





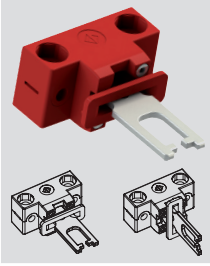
Article	Description
VF KEYD7	Actuator adjustable in one direction

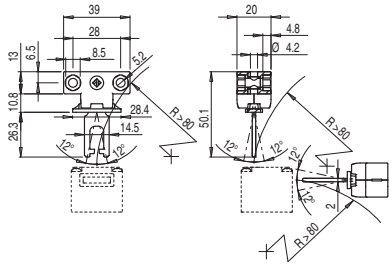




Actuator adjustable in one direction for guards with reduced dimensions.

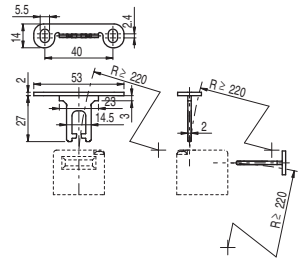
Article	Description
VF KEYD8	Universal actuator



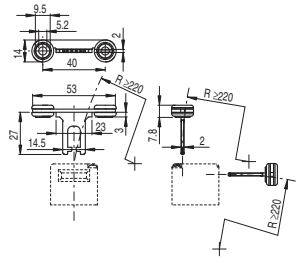


Jointed actuator for guards with poor alignment, adjustable in two dimensions for small doors; can be mounted in various positions.
The fixing body has two pairs of bore holes; it is provided for rotating the working plane of the actuator by 90°.

Article	Description
VF KEYD10	Profiled actuator



Article	Description
VF KEYD11	Profiled actuator



All values in the drawings are in mm

Accessories See page 419

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