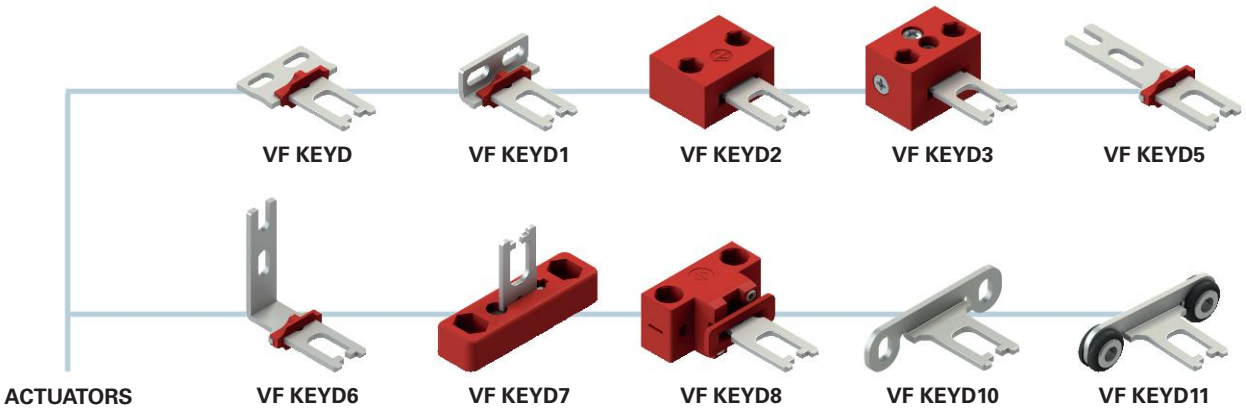
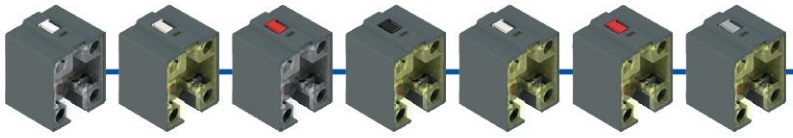
## Selection diagram







**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 FR, FX, FW (standard)**

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

**Threaded conduit entry FK (standard)**

| | |
|---|---|
| **M2** | M20x1.5 (standard) |
| | PG 11 |

**With cable gland**

| | |
|---|---|
| **K23** | for cables Ø 6 … 12 mm |
| **K27** | for cables Ø 3 … 7 mm |

**With M12 plastic connector**

| | |
|---|---|
| **K45** | 8-pole, bottom |
| **K70** | 4-pole, bottom |

**With M12 metal connector**

| | |
|---|---|
| **K40** | 8-pole, bottom |
| **K60** | 4-pole, bottom |

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 block

| | |
|---|---|
| **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 |
| **K45** | M12 plastic connector, 8-pole |
| **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 block

| | |
|---|---|
| **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 |

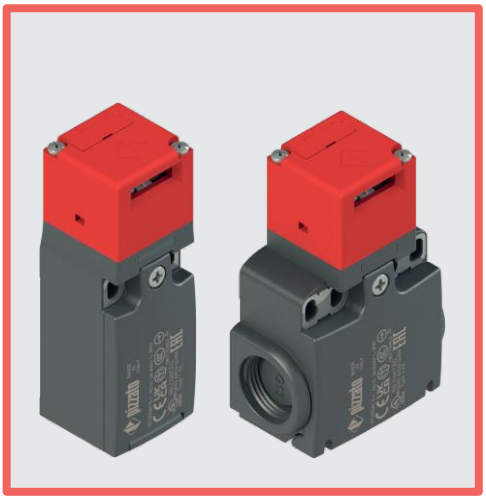
### Pre-installed cable glands or connectors

| | |
|---|---|
| | 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 degrees IP67 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: | 2024010305656753 |
| EAC approval: | RU Д-IT.PA07.B.37848/24 |

## Technical data

**Housing**

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

| | |
|---|---|
| FR, FK series, one threaded conduit entry: | M20x1.5 (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)<br>IP69K acc. to ISO 20653 (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**

| | |
|---|---|
| "Maximum SIL" up to: | SIL 3 acc. to EN IEC 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)<br>-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 389 |
| Wire cross-sections and wire stripping lengths: | see page 407 |

**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 chapter Utilization requirements from page 385 to page 400.**

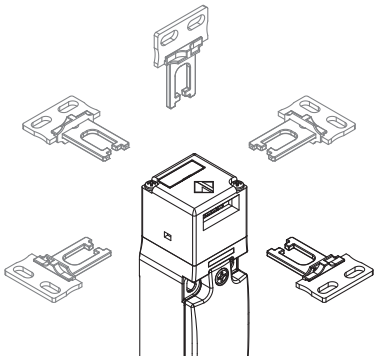
| | Electrical data | | Utilization category |
|---|---|---|---|
| without connector | Thermal current ($I_{th}$):<br>Rated insulation voltage ($U_i$):<br><br>Rated impulse withstand voltage ($U_{imp}$):<br><br>Conditional short circuit current:<br>Protection against short circuits:<br>Pollution degree: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

## Description



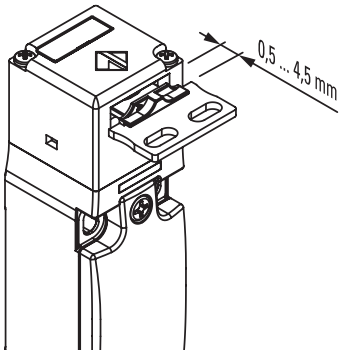
These safety switches are ideal for controlling gates, sliding doors and other guards which protect dangerous parts of machines without inertia. The stainless steel actuator is fastened to the moving part of the guard in such a way that it is separated from the switch each time the guard is opened. A 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.

## Heads with variable orientation



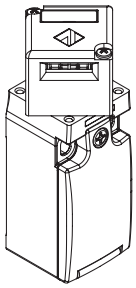
For all switches, the head can be adjusted in 90° steps after removing the two fastening screws. In this way it is possible to actuate the switch from 5 different directions.

## Wide-ranging actuator travel



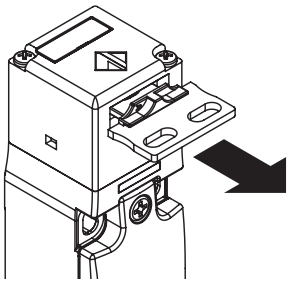

The actuation head of this switch features a wide range of travel. In this way the guard can oscillate along the direction of insertion (4 mm) without causing unwanted machine shutdowns. This wide range of travel is available in all actuators in order to ensure maximum device reliability.

## 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



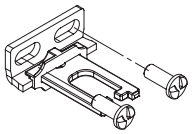
Versions with 30 N actuator holding force instead of the standard 10 N are available.

## 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 357.

## 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 ($U_i$): | 500 Vac<br>400 Vac (for contact blocks 2, 11, 12, 20, 21, 22, 28, 29, 30, 37, 33, 34) |
| Conventional free air thermal current ($I_{th}$): | 10 A |
| Protection against short circuits: | type aM fuse 10 A 500 V |
| Rated impulse withstand voltage ($U_{imp}$): | 6 kV<br>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 ($U_e$): | 400 Vac (50 Hz) |
| Operating current ($I_e$): | 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)<br>A600 pilot duty (720 VA, 120-600 V ac) |
| Environmental Ratings: | FR: Types 1, 4X<br>FX, FK, FW: Types 1, 4X, 12, 13 |

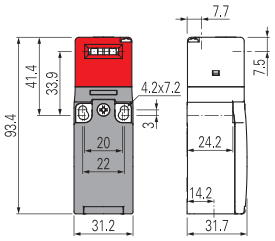
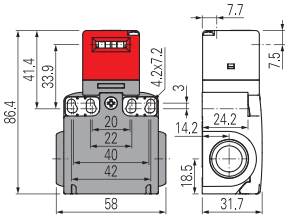
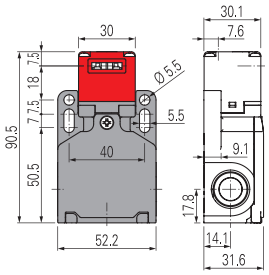
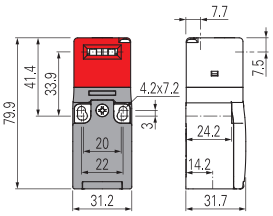
Use 60 or 75 °C copper (Cu) conductor and wire size range 12, 14 AWG, stranded or solid. The terminal tightening torque of 7.1 lb in (0.8 Nm).

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

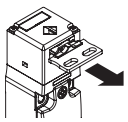
**Please contact our technical department for the list of approved products.**

# 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<br>Without actuator | Technopolymer housing<br>Without actuator | Technopolymer housing<br>Without actuator | Technopolymer housing<br>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 392 - group 8 | page 392 - group 8 | page 392 - group 8 | page 392 - 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 coding level 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

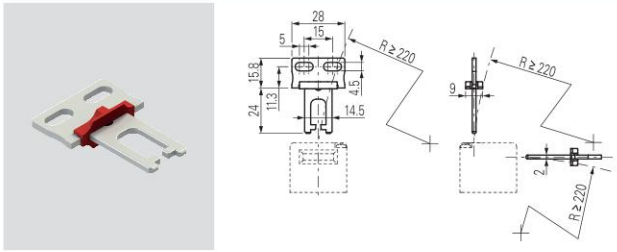
**Accessories** See page 357

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

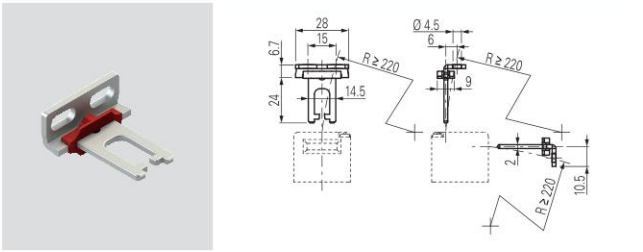
## Stainless steel actuators

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

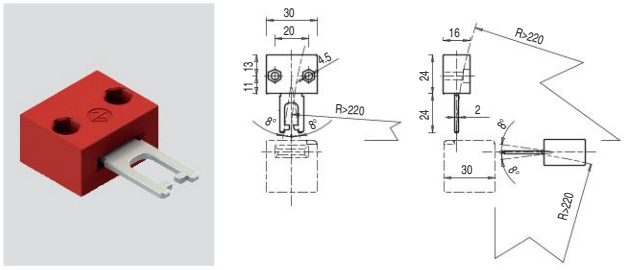
| Article | Description |
|---|---|
| VF KEYD | Straight actuator |



| Article | Description |
|---|---|
| VF KEYD1 | Angled actuator |

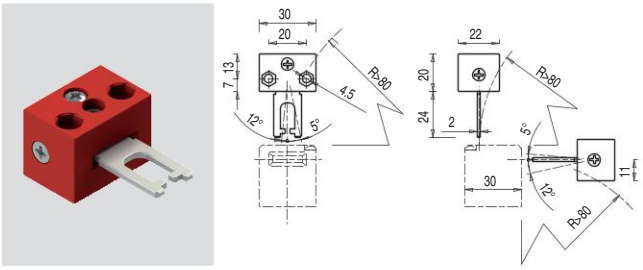


| Article | Description |
|---|---|
| VF KEYD2 | Jointed actuator |



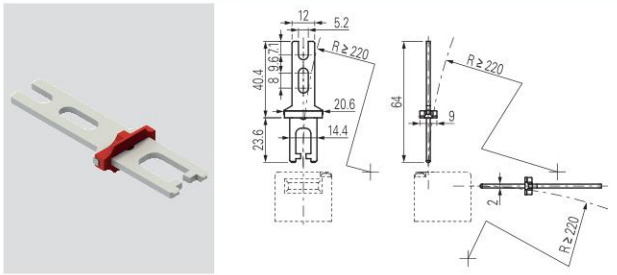
The actuator can flex in four directions for applications where the guard alignment is not precise.

| Article | Description |
|---|---|
| VF KEYD3 | Actuator adjustable in two directions |

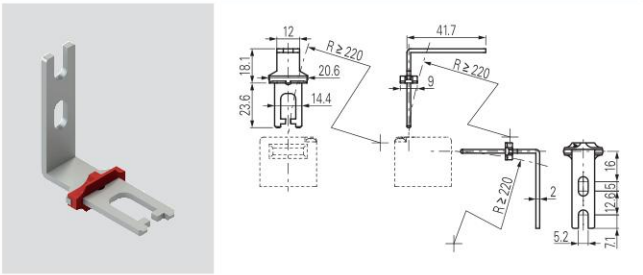


Actuator adjustable in two directions for guards with reduced dimensions.

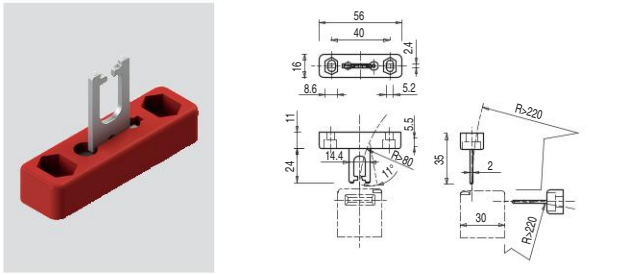
| Article | Description |
|---|---|
| VF KEYD5 | Extended actuator |



| Article | Description |
|---|---|
| VF KEYD6 | Extended actuator, angled |

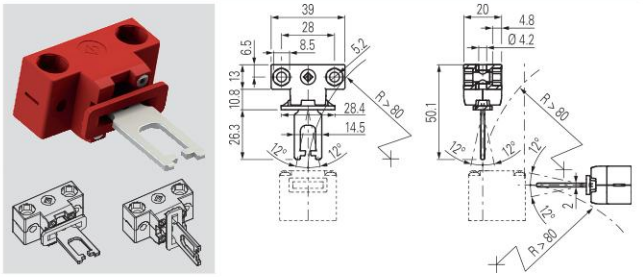


| Article | Description |
|---|---|
| VF KEYD7 | Actuator adjustable in one direction |



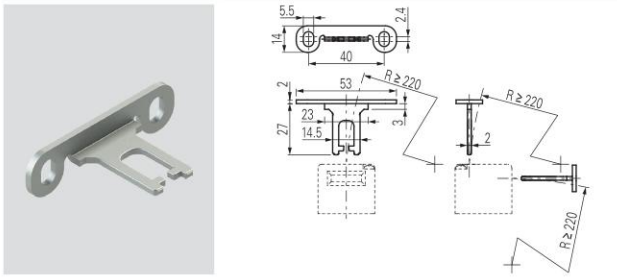
Actuator adjustable in one direction for guards with reduced dimensions.

| Article | Description |
|---|---|
| VF KEYD8 | Universal actuator |

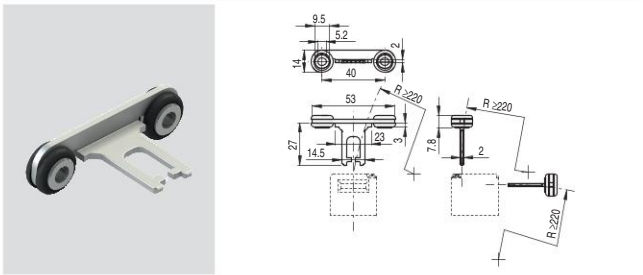


Jointed actuator for guards with poor alignment, adjustable in two dimensions for small doors; can be mounted in various positions.
The fixing body has two pairs of bore holes; it is provided for rotating the working plane of the actuator by 90°.

| Article | Description |
|---|---|
| VF KEYD10 | Profiled actuator |



| Article | Description |
|---|---|
| VF KEYD11 | Profiled actuator |



All values in the drawings are in mm

**Accessories** See page 357

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