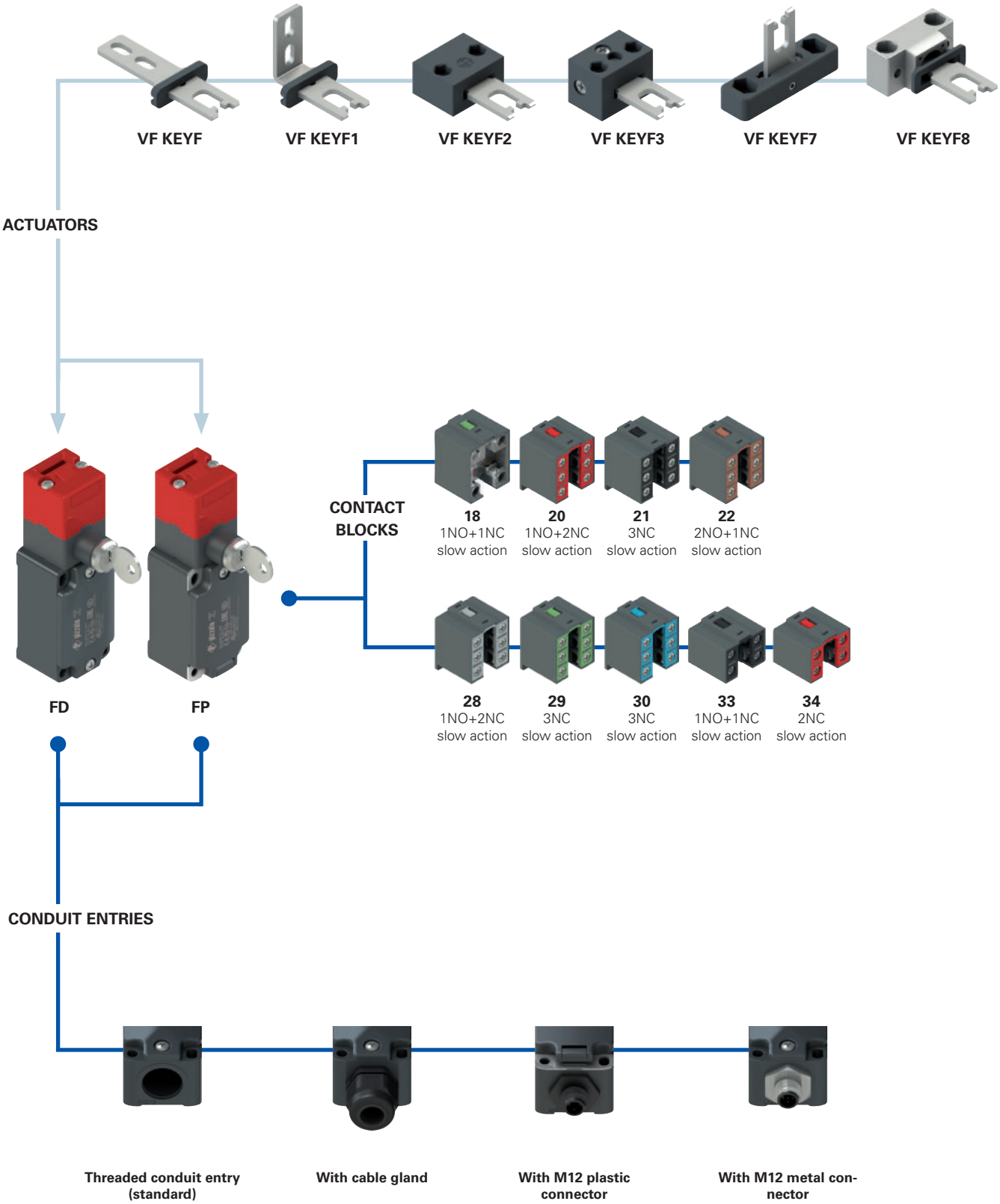
## Selection diagram




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

**FD 1899-F1GM2K50T6V200**

| Housing | |
|---|---|
| **FD** | metal, one conduit entry |
| **FP** | technopolymer, one conduit entry |

| Contact block | | |
|---|---|---|
| | Contacts activated by the lock | Contacts activated by actuator extraction |
| **18** | 1NO+1NC | |
| **20** | 1NO+2NC | |
| **21** | 3NC | |
| **22** | 2NO+1NC | |
| **28** | 1NO+1NC | 1NC |
| **29** | 2NC | 1NC |
| **30** | 1NC | 2NC |
| **33** | 1NO+1NC | |
| **34** | 2NC | |

| 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 |
| **G1** | silver contacts, 2.5 µm gold coating (not for contact blocks 20, 21, 22, 28, 29, 30, 33, 34) |

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

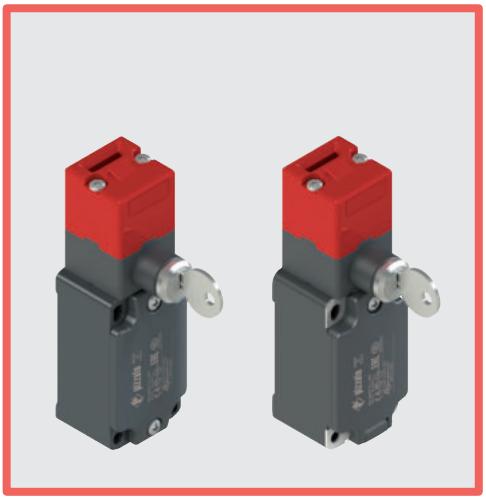
| Pre-installed cable glands or connectors | |
|---|---|
| | no cable gland or connector (standard) |
| **K23** | cable gland for cables Ø 6 … 12 mm |
| **…** | … |
| **K50** | M12 metal connector, 5-pole |
| **…** | … |

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

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

| Lock key coding | |
|---|---|
| | one standard key coding (371) |
| **V200** | up to 8 different key codings |

# Safety switches with separate actuator and **key release**



**Main features**

- Metal housing or technopolymer housing, one conduit entry
- Protection degree IP67
- 9 contact blocks available
- 6 stainless steel actuators available
- Versions with assembled M12 connector
- Versions with gold-plated silver contacts
- Strong actuator locking (1000 N)
- Release of the actuator by key

**Quality marks:**

| | |
|---|---|
| IMQ approval: | EG605 |
| UL approval: | E131787 |
| CCC approval: | 2021000305000099 |
| EAC approval: | RU C-IT.УТ03.B.00035/19 |

## Technical data

### Housing

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

| | |
|---|---|
| One threaded conduit entry: | M20x1.5 (standard) |
| Protection degree: | 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 |
| Interlock with mechanical lock, coded: | type 2 acc. to EN ISO 14119 |
| Coding level: | low acc. to EN ISO 14119 |
| Safety parameters: | |
| $B_{10D}$: | 1,000,000 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: | 500,000 operating cycles |
| Max. actuation speed: | 0.5 m/s |
| Min. actuation speed: | 1 mm/s |
| Maximum force before breakage $F_{1max:}$ | 1000 N acc. to EN ISO 14119 |
| Max. holding force $F_{Zh}$: | 770 N acc. to EN ISO 14119 |
| Max. clearance of the actuator: | 4.5 mm |
| Actuator extraction force: | 30 N |
| Tightening torques for installation: | see page 441 |
| 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 443 to 454.**

| **Electrical data** | | | **Utilization category** |
|---|---|---|---|
| without connector | Thermal current ($I_{th}$): | 10 A | |
| | Rated insulation voltage ($U_i$): | 500 Vac 600 Vdc<br>400 Vac 500 Vdc<br>(contact blocks 20, 21, 22, 28, 29, 30, 33, 34) | Alternating current: AC15 (50÷60 Hz)<br>$U_e$ (V) 250 400 500<br>$I_e$ (A) 6 4 1 |
| | Rated impulse withstand voltage ($U_{imp}$): | 6 kV<br>4 kV (contact blocks 20, 21, 22, 28, 29, 30, 33, 34) | Direct current: DC13<br>$U_e$ (V) 24 125 250<br>$I_e$ (A) 3 0.55 0.3 |
| | 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 and 5-pole | Thermal current ($I_{th}$): | 4 A | Alternating current: AC15 (50÷60 Hz)<br>$U_e$ (V) 24 120 250<br>$I_e$ (A) 4 4 4 |
| | Rated insulation voltage ($U_i$): | 250 Vac 300 Vdc | Direct current: DC13<br>$U_e$ (V) 24 125 250<br>$I_e$ (A) 3 0.55 0.3 |
| | 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)<br>$U_e$ (V) 24<br>$I_e$ (A) 2 |
| | Rated insulation voltage ($U_i$): | 30 Vac 36 Vdc | Direct current: DC13<br>$U_e$ (V) 24<br>$I_e$ (A) 2 |
| | Protection against short circuits: | type gG fuse 2 A 500 V | |
| | Pollution degree: | 3 | |

## Features approved by IMQ

| | |
|---|---|
| Rated insulation voltage (Ui): | 500 Vac<br>400 Vac (for contact blocks 2, 11, 12, 20, 21, 22, 28, 29, 30, 33, 34, 37) |
| 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<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 (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)<br>A600 pilot duty (720 VA, 120-600 V ac) |
| Environmental Ratings: | 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).

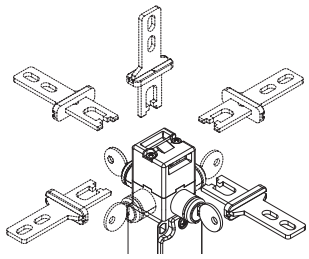
For FP series: the hub is to be connected to the conduit before the hub is connected to the enclosure.

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

## Description

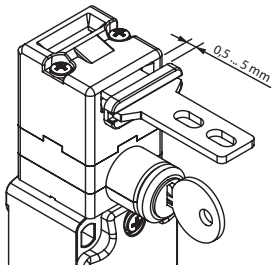
In these switches, equipped with a sturdy lock, the actuator can be removed from the head only after a complete 180° rotation of the key in the lock. The electrical contacts are switched as the key is turned; the actuator is released only after the NC contacts have been positively opened. Contacts activated by the lock are reset to the initial position only with inserted actuator and with the key in the locking position. It is impossible to rotate the key when the key locking device is unlocked and the actuator is removed (C state). These switches are considered interlocks with guard locking in accordance with ISO 14119, and the product is marked on the side with the symbol shown.

## Head and release devices with variable orientation



The head can be quickly turned to each of the four sides of the switch by unfastening the two fastening screws.
The auxiliary key release device can be rotated in 90° steps as well. This enables the switch to assume 32 different configurations.

## Adjustment range



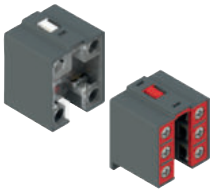

The actuation head of this switch features a wide range of travel. In this way the guard can oscillate along the direction of insertion (4.5 mm) without causing unwanted machine shutdowns. This wide range of travel is available in all actuators in order to ensure maximum device reliability.

## Protection degree IP67

**IP67**

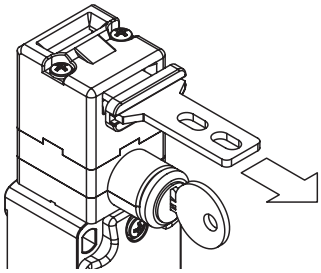
These devices are designed to be used under the toughest environmental conditions, and they pass the IP67 immersion test acc. to EN 60529. They can therefore be used in all environments where the maximum degree of protection is required for the housing.

## Contact block



Contact blocks with captive screws, finger protection, twin bridge contacts and double interruption for higher contact reliability.

## Holding force of the unlocked actuator



The inside of each switch features a device which holds the actuator in its closed position. Ideal for all those applications where several guards are unlocked simultaneously, but only one is actually opened. The device keeps all the unlocked guards in their position with a retaining force of approx. 30 N, stopping any vibrations or gusts of wind from opening them.

## Extended temperature range

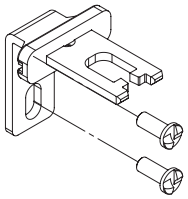
**-40°C**

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

## Laser engraving

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

## Safety screws for actuators

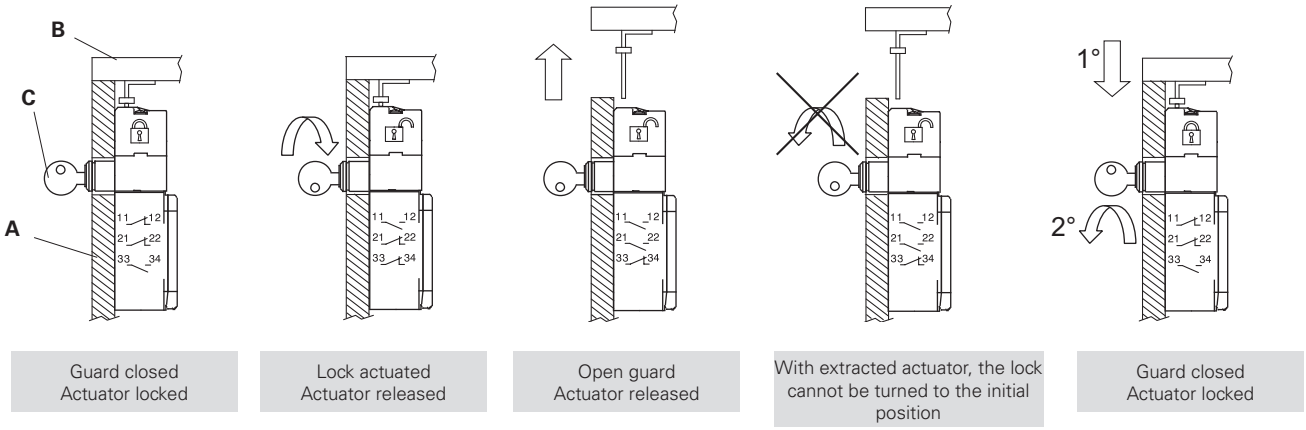


As required by ISO 14119, the actuator must be fixed immovably to the guard frame. Pan head safety screws with one-way fitting are available for this purpose. With this screw type, the actuators cannot be removed or tampered by using common tools. See accessories on page 419.

# Safety switches with separate actuator and **key release**

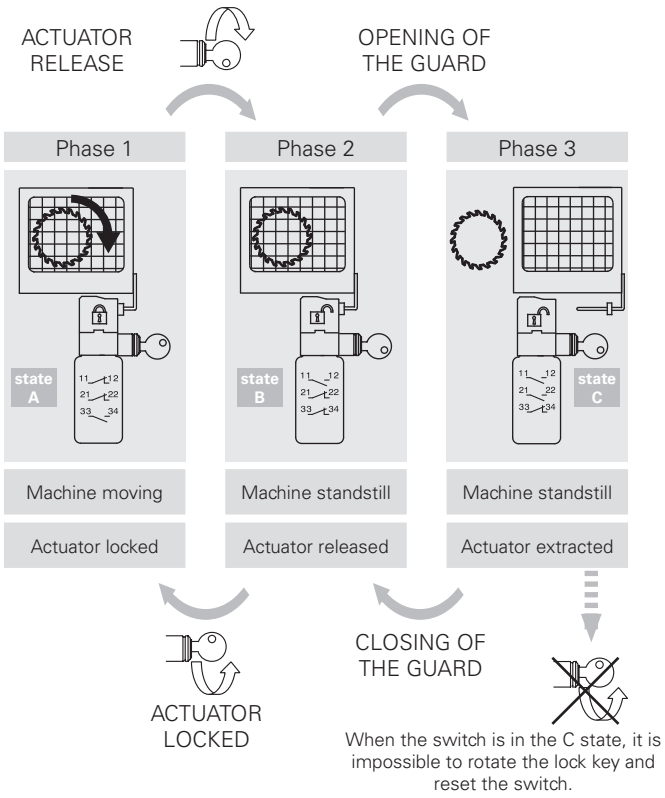
## Operation

The switch is fastened to the machine body (A), while the stainless steel actuator is fastened to the guard (B). Once installed, the switch will firmly lock the actuator. To remove the actuator, the lock must be unlocked by turning the key (C). When the actuator is removed, the key cannot be put into the initial position anymore. The example shows how the contacts of the lock and actuator are switched and how the switch can be installed within the machine in such a way that only the release device is visible from the outside.



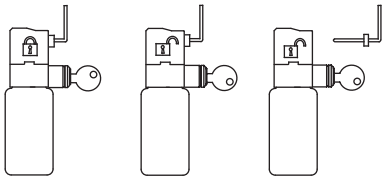

| Guard closed<br>Actuator locked | Lock actuated<br>Actuator released | Open guard<br>Actuator released | With extracted actuator, the lock cannot be turned to the initial position | Guard closed<br>Actuator locked |
|---|---|---|---|---|

## Operating phases




When the switch is in the C state, it is impossible to rotate the lock key and reset the switch.

## Contact positions related to switch states

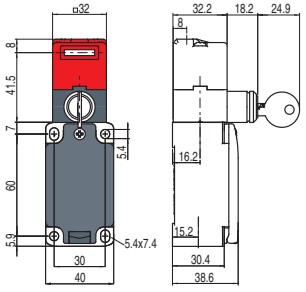
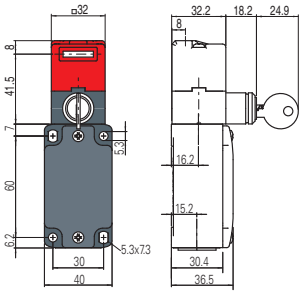
| Operating state | state A | state B | state C |
|---|---|---|---|
| Actuator | Inserted and locked | Inserted and released | Extracted |
| Lock | Closed | Open | Open |
| Contact blocks |  | | |
| FD 1899<br>1NO+1NC controlled by the lock | 11–12<br>23–24 | 11 12<br>23 24 | 11 12<br>23 24 |
| FD 2099<br>1NO+2NC controlled by the lock | 11–12<br>21–22<br>33–34 | 11 12<br>21 22<br>33 34 | 11 12<br>21 22<br>33 34 |
| FD 2199<br>3NC controlled by the lock | 11–12<br>21–22<br>31–32 | 11 12<br>21 22<br>31 32 | 11 12<br>21 22<br>31 32 |
| FD 2299<br>2NO+1NC controlled by the lock | 11–12<br>23–24<br>33–34 | 11 12<br>23 24<br>33 34 | 11 12<br>23 24<br>33 34 |
| FD 2899<br>1NO+1NC controlled by the lock<br>1NC controlled by the actuator | 11–12<br>21–22<br>33–34 | 11 12<br>21 22<br>33 34 | 11 12<br>21 22<br>33 34 |
| FD 2999<br>2NC controlled by the lock<br>1NC controlled by the actuator | 11–12<br>21–22<br>31–32 | 11 12<br>21 22<br>31 32 | 11 12<br>21 22<br>31 32 |
| FD 3099<br>1NC controlled by the lock<br>2NC controlled by the actuator | 11–12<br>21–22<br>31–32 | 11 12<br>21 22<br>31 32 | 11 12<br>21 22<br>31 32 |

The key can be extracted from the lock with locked or released actuator.

## Limits of use

Do not use where dust and dirt may penetrate in any way into the head and deposit there. Especially not where powder, shavings, concrete or chemicals are sprayed. 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 gas. In these cases, use ATEX products (see dedicated Pizzato catalogue).

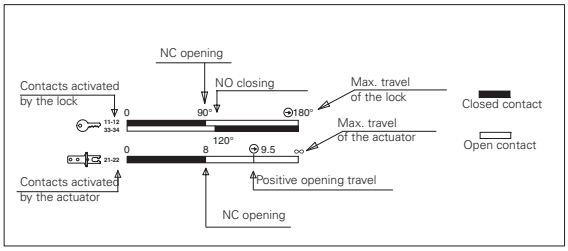
**Attention!** These switches alone are not suitable for applications where operators may physically enter the dangerous area, because an eventual closing of the door behind them could restart the machine operation. In these cases, the maintenance personnel must use the actuator entry locking device VF KB1 shown on page 122.

| Contact type: L = slow action | Technopolymer housing<br>Without actuator, supplied with two keys | Metal housing<br>Without actuator, supplied with two keys |
|---|---|---|
| Contact block |  |  |
| 18 L | FP 1899-M2 1NO+1NC | FD 1899-M2 1NO+1NC |
| 20 L | FP 2099-M2 1NO+2NC | FD 2099-M2 1NO+2NC |
| 21 L | FP 2199-M2 3NC | FD 2199-M2 3NC |
| 22 L | FP 2299-M2 2NO+1NC | FD 2299-M2 2NO+1NC |
| 28 L | FP 2899-M2 1NO+2NC | FD 2899-M2 1NO+2NC |
| 29 L | FP 2999-M2 3NC | FD 2999-M2 3NC |
| 30 L | FP 3099-M2 3NC | FD 3099-M2 3NC |
| 33 L | FP 3399-M2 1NO+1NC | FD 3399-M2 1NO+1NC |
| 34 L | FP 3499-M2 2NC | FD 3499-M2 2NC |
| Actuating force | 30 N (40 N ⊖) | 30 N (40 N ⊖) |

**Legend:** ⊖ With positive opening according to EN 60947-5-1, interlock with lock monitoring acc. to EN ISO 14119

## How to read travel diagrams

All values in the diagrams are in mm or in degrees




**IMPORTANT:**
**The state of the NC contact** (⊂) refers to the switch with inserted actuator and locked lock. In **safety applications**, actuate the switch **at least up to the positive opening travel** shown in the travel diagrams with symbol ⊖. Actuate the switch **at least with the positive opening force**, reported in brackets below each article, next to the actuating force value.

All values in the drawings are in mm

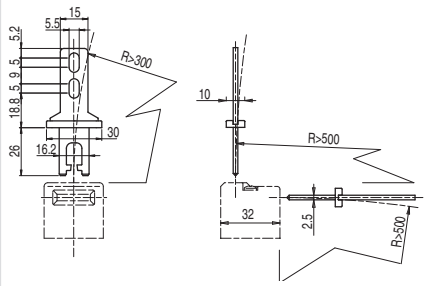
**Accessories** See page 419

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

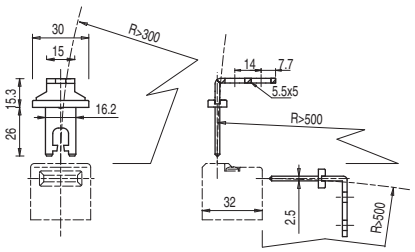
## Stainless steel actuators

**IMPORTANT:** These actuators can be used only with items of the FD, FP, FL, FC, and FS series (e.g. FD 1899-M2).
Low level of coding acc. to EN ISO 14119.

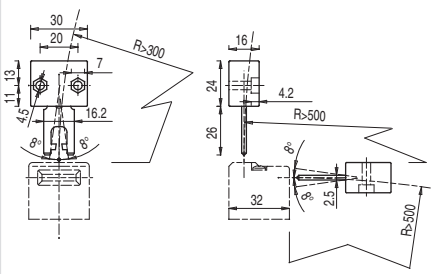
| Article | Description |
|---|---|
| VF KEYF | Straight actuator |




| Article | Description |
|---|---|
| VF KEYF1 | Angled actuator |

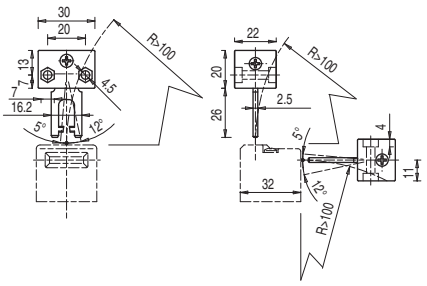



| Article | Description |
|---|---|
| VF KEYF2 | Jointed actuator |



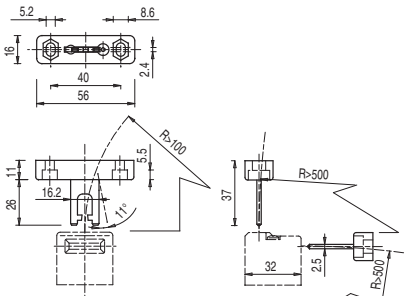

The actuator can flex in four directions for applications where the guard alignment is not precise.

| Article | Description |
|---|---|
| VF KEYF3 | Actuator adjustable in two directions |




Actuator adjustable in two directions for guards with reduced dimensions.

| Article | Description |
|---|---|
| VF KEYF7 | Actuator adjustable in one direction |




Actuator adjustable in one direction for guards with reduced dimensions.

All values in the drawings are in mm

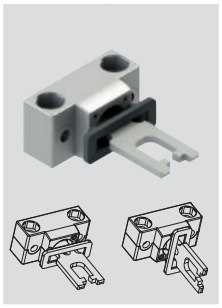
**Accessories** See page 419

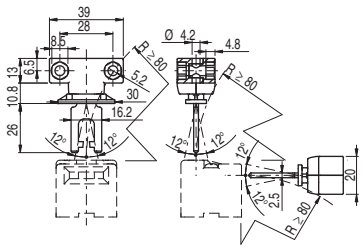
→ The 2D and 3D files are available at **www.pizzato.com**

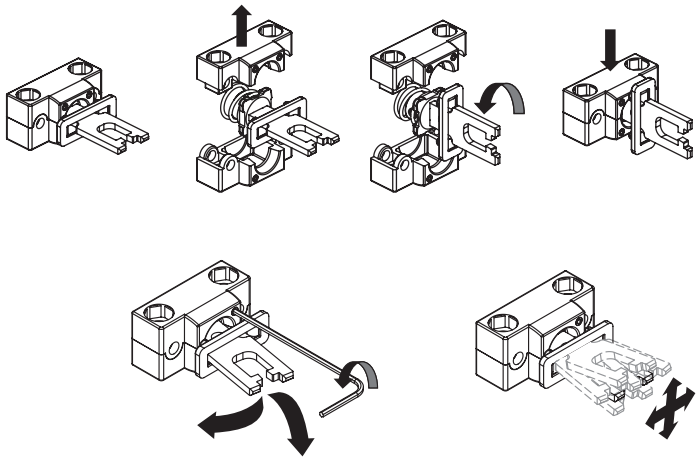
## Universal actuator VF KEYF8

**IMPORTANT:** These actuators can be used only with items of the FD, FP, FL, FC, and FS series (e.g. FD 1899-M2).
Low level of coding acc. to EN ISO 14119.

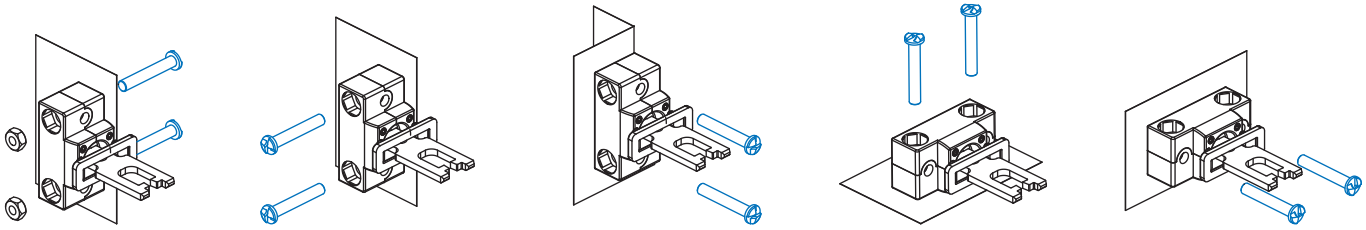
| Article | Description |
|---|---|
| VF KEYF8 | Universal actuator |





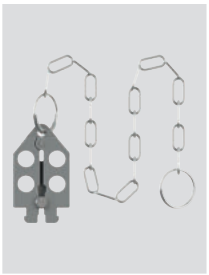



Jointed actuator for guards with poor alignment, adjustable in two dimensions for small doors; can be mounted in various positions.
The metal fixing body has two pairs of bore holes; it is provided for rotating the working plane of the actuator by 90°.



## Accessories

| Article | Description |
|---|---|
| VF KB1 | Lock out device |



Padlockable lock out device to prevent the actuator entry and the accidental closing of the door behind operators while they are in the danger area.
Hole diameter for padlocks: 9 mm.

| Article | Description |
|---|---|
| VF KLA371 | Set of two locking keys |

Extra copy of the locking keys to be purchased if further keys are needed (standard supply: 2 units).
The keys of all switches have the same code. Other codes on request.

All values in the drawings are in mm

**Accessories** See page 419

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