Safety switches with separate actuator

Selection diagram

ACTUATORS

VF KEYD
VF KEYD1
VF KEYD2
VF KEYD3
VF KEYD5
VF KEYD6
VF KEYD7
VF KEYD10

CONTACT BLOCKS

1NO+1NC
1NO+1NC
1NO+1NC
overlapped

1NO+1NC
slow action
slow action
slow action

5
6
7
9

2NC
2NC
2NC
slow action
slow action
slow action

1NO+2NC
3NC
2NO+1NC
1NO+1NC
slow action
slow action
slow action
slow action

20
21
22
33
34

1NO+1NC
1NO+1NC
2NO+1NC
2NC
slow action
slow action
slow action

Threaded conduit entries (standard)
With cable gland assembled
With M12 plastic connector assembled and wired
With M12 metal connector assembled and wired

PRODUCT OPTION
ACCESSORY SOLD SEPARATELY
### Code structure

**Housing**
- **FR** polymer housing, one conduit entry
- **FX** polymer housing, two conduit entries
- **FW** polymer housing, 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
- 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)
- **D** with straight actuator
- **D1** with right-angled actuator
- **D2** with jointed actuator
- **D3** with adjustable jointed actuator in two directions
- **D5** with long actuator
- **D6** with right-angled long actuator
- **D7** with jointed actuator adjustable in one direction
- **D10** with shaped actuator

**Threaded conduit entry**
- **FR** PG 13.5 (standard) (only for FR-FX housing)
- **FX** PG 11 (only for FR-FX housing)
- **M1** M16x1.5
- **M2** M20x1.5
- **M3** 1/2 NPT (only for FR housing)

**Contacts type**
- silver contacts (standard)
- **G** silver contacts gold plated 1 µm

**External metallic parts**
- zinc-plated steel (standard)
- **X** stainless steel

### Preinstalled cable gland or connectors

**FR 693-E3D1XGM2K70**
- no cable gland or connector (standard)
- **K21** with assembled cable gland suitable for Ø 6 to Ø 12 mm cables range
- **K40** with M12 metal connector assembled and wired, 8 poles (only for contact blocks 20, 21, 22)

For the complete list of all combinations, please contact our technical office.

**FK 3393-E3D1XGM1K22**
- no cable gland (standard)
- **K22** with assembled cable gland suitable for Ø 5 to Ø 10 mm cables range
- **K26** with assembled cable gland suitable for Ø 3 to Ø 7 mm cables range

**Threaded conduit entry**
- **PG 11** (standard) (only for FR-FX housing)
- **M1** M16x1.5

**Contacts type**
- silver contacts (standard)
- **G** silver contacts gold plated 1 µm

**External metallic parts**
- zinc-plated steel (standard)
- **X** stainless steel
**Technical data**

**Housing**
Made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin and with double insulation.
FR and FK series one conduit entry
FX series two conduit entries
FW series three knock out conduit entries
Protection degree: IP67 (electrical contacts)

**General data**
Ambient temperature: from -25°C to +80°C
Version for operation in ambient temperature from -40°C to +80°C on request.
Max operating frequency: 3600 operations cycles/hour
Mechanical endurance: 1 million of operations cycles
Max actuating speed: 0.5 m/s
Min. actuating speed: 1 mm/s
Actuator extraction force: 10 N (30 N -E3 version)
(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by IEC 947-5-1 standard.

**Cross section of the conductors (flexible copper wire)**
Contact blocks 20, 21, 22, 33, 34:
- min. $1 \times 0.34 \text{ mm}^2$ (1 x AWG 22)
- max. $2 \times 1.5 \text{ mm}^2$ (2 x AWG 16)
Contact blocks 5, 6, 7, 9:
- min. $1 \times 0.5 \text{ mm}^2$ (1 x AWG 20)
- max. $2 \times 2.5 \text{ mm}^2$ (2 x AWG 14)

**In conformity with standards:**
- Approvals: IEC 60947-5-1, UL 508, GB14048.5-2001

**In conformity with requirements requested by:**
- Positive contact opening in conformity with standards: IEC 60947-5-1, EN 60947-5-1, VDE 0660-206.

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**Main data**
- Housing polymer housing, from one to three conduit entries
- Protection degree IP67
- 9 contact blocks available
- 8 stainless steel actuators available
- M12 assembled connector versions
- Silver contacts gold plated versions

**Markings and quality marks:**
- Approval IMQ: EG610 (FR-FX-FK series)
- Approval UL: E131787
- Approval CCC: 2007070305230013 (FR-FX-FK series)
- Approval EZU: 1010151

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If not expressly indicated in this chapter, for the right installation and the correct utilization of all articles see requirements indicated from page 6/1 to page 6/8.
Safety switches **with separate actuator**

**Description**

These safety switches are ideal to control gates, sliding doors and other guards protecting dangerous parts of machine. 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. All products (except FW series) are equipped with a particular mechanical hooking that does not allow the separation of the head from the body during its positioning.

**Rotating heads**

Removing the two fastening screws, in all switches, the head can be rotated in 90° steps.

**Actuator regulation zone**

This switch has a wide backlash of the actuator into the head (4 mm) for an easier installation. With closed door, check that the actuator doesn’t knock straight against the head of the switch; it must be in the adjustment zone (0.5…4.5 mm)

**Not detachable head**

The action head type “93” is completely interchangeable and compatible with previous head type “92”, but it has the advantage to be not detachable from the switch body even if it is always adjustable in 90° steps (Pizzato Elettrica patent). The new head is safer because it cannot be ruined during installation. The head fixing screws have been reduced to only two (instead of the previous four) and so the rotation operation will be quicker and cheaper.

**Installation examples**

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.

Do not use where explosive or inflammable gas is present.

**Data type approved by IMQ, CCC and EZU**

- Rated insulation voltage (Ui): 500 VAC
- 400 VAC for contact blocks 20, 21, 22, 33, 34
- Thermal current (Ith): 10 A
- Protection against short circuits: fuse 10 A 500 V type aM
- Protection degree: IP67
- MV terminals (screw clamps)
- Pollution degree 3
- Utilization category: AC15
- Operation voltage (Ue): 400 VAC (50 Hz)
- Operation current (Ie): 3 A
- Forms of the contact element: Zb, Y+Y+, Y+Y+X, Y+X+Y, Y+X+X
- Positive opening of contacts on contact block 5, 6, 7, 9, 20, 21, 22, 33, 34
- In conformity with standards: EN60947-1, EN 60947-5-1 and subsequent modifications and completions, fundamental requirements of the Low Voltage Directive 73/23 EEC and subsequent modifications and completions.

**Data type approved by UL**

- Utilization categories: Q300 (69 VA, 125-250 VDC)
- A600 (720 VA, 120-600 VAC)
- Data of the housing type 1, 4X (indoor use only), 12, 13
- In conformity with standard: UL 508
- For all contact blocks use 60 or 75 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 7.1 Lb-In.

**Not detachable head**

The action head type “93” is completely interchangeable and compatible with previous head type “92”, but it has the advantage to be not detachable from the switch body even if it is always adjustable in 90° steps (Pizzato Elettrica patent). The new head is safer because it cannot be ruined during installation. The head fixing screws have been reduced to only two (instead of the previous four) and so the rotation operation will be quicker and cheaper.

**Versions with 30 N actuator extraction force**

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

**Data type approved by UL**

Utilization categories: Q300 (69 VA, 125-250 VDC)
A600 (720 VA, 120-600 VAC)
Data of the housing type 1, 4X (indoor use only), 12, 13
In conformity with standard: UL 508
For all contact blocks use 60 or 75 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 7.1 Lb-In.

**Limits of utilization**

Please contact our technical service for the list of type approved products.
### Dimensional drawings

<table>
<thead>
<tr>
<th>Contacts type:</th>
<th>polymer housing</th>
<th>polymer housing</th>
<th>polymer housing</th>
<th>polymer housing</th>
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</thead>
<tbody>
<tr>
<td>R = snap action</td>
<td>Switch without actuator</td>
<td>Switch without actuator</td>
<td>Switch without actuator</td>
<td>Switch without actuator</td>
</tr>
<tr>
<td>L = slow action</td>
<td>Slow action overlapped</td>
<td>Overlapped</td>
<td>Overlapped</td>
<td>Overlapped</td>
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<table>
<thead>
<tr>
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<th>FR 593</th>
<th>FX 593</th>
<th>FW 592-M2</th>
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</thead>
<tbody>
<tr>
<td>5 L</td>
<td>1NO+1NC</td>
<td>1NO+1NC</td>
<td>1NO+1NC</td>
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<td></td>
<td>0.85</td>
<td>0.85</td>
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<th>FX 693</th>
<th>FW 692-M2</th>
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</thead>
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<td>1NO+1NC</td>
<td>1NO+1NC</td>
<td>1NO+1NC</td>
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<tr>
<td></td>
<td>0.85</td>
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<th>FW 792-M2</th>
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<td>1NO+1NC</td>
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<th>FX 993</th>
<th>FW 992-M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 L</td>
<td>2NC</td>
<td>2NC</td>
<td>2NC</td>
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<tbody>
<tr>
<td>20 L</td>
<td>1NO+2NC</td>
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<table>
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<tbody>
<tr>
<td>21 L</td>
<td>3NC</td>
<td>3NC</td>
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<th>FW 2292-M2</th>
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</thead>
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<tr>
<td>22 L</td>
<td>2NO+1NC</td>
<td>2NO+1NC</td>
<td>2NO+1NC</td>
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<tr>
<td></td>
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<td>0.85</td>
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<table>
<thead>
<tr>
<th>Contact blocks</th>
<th>FR 3393</th>
<th>FX 3393</th>
<th>FW 3392-M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 L</td>
<td>1NO+1NC</td>
<td>1NO+1NC</td>
<td>1NO+1NC</td>
</tr>
<tr>
<td></td>
<td>0.85</td>
<td>0.85</td>
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<table>
<thead>
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<th>Contact blocks</th>
<th>FR 3493</th>
<th>FX 3493</th>
<th>FW 3492-M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 L</td>
<td>2NC</td>
<td>2NC</td>
<td>2NC</td>
</tr>
<tr>
<td></td>
<td>0.85</td>
<td>0.85</td>
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<tr>
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</table>

**Min. force**

<table>
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<tr>
<th></th>
<th>FR 593</th>
<th>FR 693</th>
<th>FR 793</th>
<th>FR 993</th>
<th>FR 2093</th>
<th>FR 2193</th>
<th>FR 2293</th>
<th>FR 3393</th>
<th>FR 3493</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force</td>
<td>10 N</td>
<td>10 N</td>
<td>10 N</td>
<td>10 N</td>
<td>10 N</td>
<td>10 N</td>
<td>10 N</td>
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<td>10 N</td>
</tr>
<tr>
<td>(min)</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
<td>30 N</td>
</tr>
</tbody>
</table>

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

**How to read travel diagrams**

**IMPORTANT:**

NC contact has to be considered with inserted actuator. In safety applications it is necessary to activate the switch at least up to the positive opening point indicated in the diagrams with the symbol . Operate the switch at least with the positive opening force, indicated between brackets, below each article, next the value of minimum force.

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**How to read travel diagrams**

All measures in the diagrams are in mm.

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**Accessories**

See page 5/1.

All measures in the drawings are in mm.

---
### Actuators stainless steel

**IMPORTANT:** These actuators must be used with FR, FX, FK e FW (e.g. FR 693)

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF KEYD</td>
<td>Straight actuator</td>
<td>VF KEYD1</td>
<td>Right-angled actuator</td>
</tr>
<tr>
<td>VF KEYD2</td>
<td>Jointed actuator</td>
<td>VF KEYD3</td>
<td>Jointed actuator adjustable in two directions</td>
</tr>
<tr>
<td>VF KEYD5</td>
<td>Long actuator</td>
<td>VF KEYD6</td>
<td>Right-angled long actuator</td>
</tr>
<tr>
<td>VF KEYD7</td>
<td>Jointed actuator adjustable in one direction</td>
<td>VF KEYD10</td>
<td>Shaped actuator</td>
</tr>
</tbody>
</table>

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

Actuator adjustable in two directions for doors with reduced dimensions.

Actuator adjustable in one direction for doors with reduced dimensions.