Safety switches with separate actuator

Selection diagram

VF KEYD | VF KEYD1 | VF KEYD2 | VF KEYD3 | VF KEYD5
---|---|---|---|---
VF KEYD6 | VF KEYD7 | VF KEYD8 | VF KEYD10 | VF KEYD11

ACTUATORS

FR | FX | FK | FW
---|---|---|---

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

CONDUIT ENTRIES

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

Head type
92  detachable head (only for FW housing)
93  not detachable head (only for FR-FX housing)

Actuator extraction force
10 N (standard)
E3  30 N

Actuators
without actuator (standard)
D  with straight actuator
D1  with right-angled actuator
D2  with jointed actuator
...

Preinstalled cable gland or connectors
K21  with assembled cable gland suitable for Ø 6 to Ø 12 mm cables range
K70  with 4 poles M12 plastic connector

Threaded conduit entry
PG 13,5 (standard) (only for FR-FX housing)
A  PG 11 (only for FR-FX housing)
M1  M16x1,5
M2  M20x1,5

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

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

FR 693-E3D1XGM2K70

FK 3393-E3D1XGM1K22
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 according to EN 60529 (electrical contacts)

General data
Safety parameters: see page 6/32
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 cycles¹
Max actuating speed: 0,5 m/s
Min. actuating speed: 1 mm/s
Actuator extraction force 10 N (30 N -E3 version)
Driving torque for installation: see pages 6/1-6/10
¹ One operation cycle means two movements, one to close and one to open contacts, as foreseen by EN 60947-5-1 standard.

Cross section of the conductors (flexible copper wire)
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)

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.

Markings and quality marks:
Approval IMQ: EG610
Approval UL: E131787
Approval CCC: 2007010305230013 (FR-FX-FK series)
Approval EZU: 1010151

Electrical data

<table>
<thead>
<tr>
<th>Thermal current (Ith):</th>
<th>10 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage (Uij):</td>
<td></td>
</tr>
<tr>
<td>500 Vac 600 Vdc</td>
<td></td>
</tr>
<tr>
<td>400 Vac 500 Vdc</td>
<td></td>
</tr>
<tr>
<td>Conditional shot circuit current:</td>
<td></td>
</tr>
<tr>
<td>Protection against short circuits:</td>
<td></td>
</tr>
<tr>
<td>Pollution degree:</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Utilization categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate current: AC15 (50...60 Hz)</td>
<td></td>
</tr>
<tr>
<td>Ue (V)</td>
<td>250</td>
</tr>
<tr>
<td>le (A)</td>
<td>6</td>
</tr>
<tr>
<td>Direct current: DC13</td>
<td></td>
</tr>
<tr>
<td>Ue (V)</td>
<td>24</td>
</tr>
<tr>
<td>le (A)</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermal current (Ith):</th>
<th>4 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage (Uij):</td>
<td></td>
</tr>
<tr>
<td>250 Vac 300 Vdc</td>
<td></td>
</tr>
<tr>
<td>fuse 4 A 500 V type gG</td>
<td></td>
</tr>
<tr>
<td>Pollution degree:</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Utilization categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate current: AC15 (50...60 Hz)</td>
<td></td>
</tr>
<tr>
<td>Ue (V)</td>
<td>24</td>
</tr>
<tr>
<td>le (A)</td>
<td>4</td>
</tr>
<tr>
<td>Direct current: DC13</td>
<td></td>
</tr>
<tr>
<td>Ue (V)</td>
<td>24</td>
</tr>
<tr>
<td>le (A)</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermal current (Ith):</th>
<th>2 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage (Uij):</td>
<td></td>
</tr>
<tr>
<td>30 Vac 36 Vdc</td>
<td></td>
</tr>
<tr>
<td>fuse 2 A  500 V type gG</td>
<td></td>
</tr>
<tr>
<td>Pollution degree:</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Utilization categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate current: AC15 (50...60 Hz)</td>
<td></td>
</tr>
<tr>
<td>Ue (V)</td>
<td>24</td>
</tr>
<tr>
<td>le (A)</td>
<td>2</td>
</tr>
<tr>
<td>Direct current: DC13</td>
<td></td>
</tr>
<tr>
<td>Ue (V)</td>
<td>24</td>
</tr>
<tr>
<td>le (A)</td>
<td>2</td>
</tr>
</tbody>
</table>

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 6/10.

Electrical data

**Main data**
- 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

**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 according to EN 60529

Thermal current (Ith): 4 A
Rated insulation voltage (Ui): 250 Vac 300 Vdc
Protection against short circuits: fuse 4 A 500 V type gG
Pollution degree: 3

With 4 poles
M12 connector

With 8 poles
M12 connector

**Cross section of the conductors (flexible copper wire)**
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)

**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.

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 6/10.
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

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

Limits of utilization
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
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+Y+Y, Y+X+X
Positive opening of contacts on contact block 5, 6, 7, 8, 9, 20, 21, 22, 33, 34
In conformity with standards: EN 60947-1, EN 60947-5-1 and subsequent modifications and completions, fundamental requirements of the Low-Voltage Directive 2004/96/CE 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
For all contact blocks use 60 or 75 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 21 lb·in (0.8 Nm).
In conformity with standard: UL 508

Please contact our technical service for the list of approved products.
### Safety switches with separate actuator

#### 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Switch without actuator</td>
<td>Switch without actuator</td>
<td>Switch without actuator</td>
<td>Switch without actuator</td>
</tr>
<tr>
<td>snap action</td>
<td>R</td>
<td>L</td>
<td>LO</td>
<td>R</td>
</tr>
<tr>
<td>slow action</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>overlapped</td>
<td>LO</td>
<td>LO</td>
<td>LO</td>
<td>LO</td>
</tr>
</tbody>
</table>

#### Contact blocks

<table>
<thead>
<tr>
<th></th>
<th>FR 593</th>
<th>FX 593</th>
<th>FW 592-M2</th>
<th>FR 593-E3</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Min. force

- 10 N (18 N)
- 30 N (38 N)

#### Accessories

- See page 5/1

### How to read travel diagrams

**Example diagram**

**NC opening**

- Max travel: 11-12
- Closed contact: 12-23
- Open contact: 24-35

**NO closing**

- Positive opening travel: 23-24

**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.
# Actuators stainless steel

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

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF KEYD</td>
<td>Straight actuator</td>
</tr>
<tr>
<td>VF KEYD2</td>
<td>Jointed actuator</td>
</tr>
<tr>
<td>VF KEYD3</td>
<td>Jointed actuator adjustable in two directions</td>
</tr>
<tr>
<td>VF KEYD5</td>
<td>Long actuator</td>
</tr>
<tr>
<td>VF KEYD7</td>
<td>Jointed actuator adjustable in one direction</td>
</tr>
<tr>
<td>VF KEYD10</td>
<td>Shaped actuator</td>
</tr>
<tr>
<td>VF KEYD11</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.

Jointed and two directions adjustable actuator for doors with reduced dimensions. The actuator has two couples of fixing holes and it is possible to rotate the actuator-working plan (see picture).