Selection diagram

Safety switches with lock and separate actuator

CONTACT BLOCKS

18 1NO+1NC slow action
19 1NO+2NC slow action
20 3NC slow action
21 2NO+1NC slow action
22 3NC slow action
23 1NO+1NC slow action
24 2NC slow action

ACTUATORS

FD  VF KEYF  VF KEYF1  VF KEYF2  VF KEYF3  VF KEYF7  VF KEYF8  FP

CONDUIT ENTRY

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

product option
accessory sold separately
**Working cycle (FP 2899-F1)**

The switch is fixed 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, it is necessary to unlock the key locking device rotating the key (C). When the actuator is removed, the key cannot be put in the starting position anymore.

In the example is pointed out how it is possible to have contacts moved by the key lock or by the actuator and how it is possible to install the switch inside the machine, keeping externally visible only the release device.

![Diagram of switch and actuator](image_url)

**Code structure**

<table>
<thead>
<tr>
<th>Housing</th>
<th>Contact blocks</th>
<th>Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD</td>
<td>18 1NO+1NC</td>
<td>without actuator (standard)</td>
</tr>
<tr>
<td>FP</td>
<td>20 1NO+2NC</td>
<td>F with straight actuator</td>
</tr>
<tr>
<td></td>
<td>21 3NC</td>
<td>F1 with right-angled actuator</td>
</tr>
<tr>
<td></td>
<td>22 2NO+1NC</td>
<td>F2 with jointed actuator</td>
</tr>
<tr>
<td></td>
<td>28 1NO+1NC 1NC</td>
<td>F3 with jointed actuator adjustable in two directions</td>
</tr>
<tr>
<td></td>
<td>29 2NC</td>
<td>F7 with jointed actuator adjustable in one direction</td>
</tr>
<tr>
<td></td>
<td>30 1NC</td>
<td>F8 with universal actuator</td>
</tr>
<tr>
<td></td>
<td>33 1NO+1NC</td>
<td>G silver contacts gold plated 1 µm</td>
</tr>
<tr>
<td></td>
<td>34 2NC</td>
<td></td>
</tr>
</tbody>
</table>

**Attention!** The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

**article**  **options**

<table>
<thead>
<tr>
<th>Code structure</th>
<th>Preinstalled cable gland or connectors</th>
<th>Threaded conduit entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD 1899-F1GM2K50</td>
<td>no cable gland or connector (standard)</td>
<td>PG 13,5 (standard)</td>
</tr>
<tr>
<td></td>
<td>K21 with assembled cable gland suitable for Ø 6 to Ø 12 mm cables range</td>
<td>M2 M20x1,5</td>
</tr>
<tr>
<td></td>
<td>K50 with 5 poles M12 metal connector</td>
<td></td>
</tr>
</tbody>
</table>

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

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**Technical data**

**Housing**

Housing type FP made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin and with double insulation.

Housing type FD made of metal, coated with baked epoxy powder.

FD and FP series one conduit entry

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

Max operating frequency: 3600 operations cycles/hour

Mechanical endurance: 500.000 operations cycles

Max actuating speed: 0,5 m/s

Min. actuating speed: 1 mm/s

Max holding force: 1000 N

Actuator backlash of the actuator: 4,5 mm

Actuator extraction force: 30 N

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.

**Main data**

- Metal housing or polymer housing, one conduit entry
- Protection degree IP67
- 9 contact blocks available
- 6 stainless steel actuators available
- M12 assembled connector versions
- Silver contacts gold plated versions
- Strong actuator locking (1000 N)
- Manual actuator unlocking

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

- Contact blocks 20, 21, 22, 28, 29, 30: min. 1 x 0,34 mm² (1 x AWG 22)
  max. 2 x 1,5 mm² (2 x AWG 16)
- Contact blocks 18: 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.

**Utilization categories**

- Utilization categories
  - AC15 (50...60 Hz)
  - DC13

- Thermal current (Ith): 10 A
  - Alternating current: 6 A
  - DC: 4 A
- Rated insulation voltage (Ui): 500 Vac 600 Vdc
  - AC: 400 Vac 500 Vdc
  - DC: 250 Vac 300 Vdc
- Conditional short circuit current: fuse 10 A 500 V type aM
  - AC: 1000 A according to EN 60947-5-1
  - DC: 1000 A according to EN 60947-5-1
- Pollution degree: 3
- Protection against short circuits: according to EN 60079-0 (for contact blocks 20, 21, 22, 28, 29, 30, 33, 34)

- Utilization categories
  - AC15 (50...60 Hz)
  - DC13

- Thermal current (Ith): 4 A
  - Alternating current: 4 A
  - DC: 4 A
- Rated insulation voltage (Ui): 250 Vac 300 Vdc
  - AC: 250 Vac 300 Vdc
  - DC: 250 Vac 300 Vdc
- Conditional short circuit current: fuse 4 A 500 V type gG
  - AC: 1000 A according to EN 60947-5-1
  - DC: 1000 A according to EN 60947-5-1
- Pollution degree: 3
- Protection against short circuits: according to EN 60079-0 (for contact blocks 20, 21, 22, 28, 29, 30, 33, 34)

- Utilization categories
  - AC15 (50...60 Hz)
  - DC13

- Thermal current (Ith): 2 A
  - Alternating current: 2 A
  - DC: 2 A
- Rated insulation voltage (Ui): 30 Vac 36 Vdc
  - AC: 30 Vac 36 Vdc
  - DC: 30 Vac 36 Vdc
- Conditional short circuit current: fuse 2 A 600 V type gG
  - AC: 1000 A according to EN 60947-5-1
  - DC: 1000 A according to EN 60947-5-1
- Pollution degree: 3
- Protection against short circuits: according to EN 60079-0 (for contact blocks 20, 21, 22, 28, 29, 30, 33, 34)
Example of working cycle steps with FD 2899-F1

This type of switches is applied on fences or protections where entrance is allowed to authorized personnel only. They have been studied to control large protected areas where operators may physically enter. Supplied with a strong lock (up to 1000 N), the actuator can be removed from the head only after a complete rotation (180°) of the locking key. During the key rotation, electrical contacts are switched, and the actuator is released only after NC contacts are positively opened. Contacts actuated by the key locking device to the initial position only with inserted actuator and with locking key device rotated in locked position.

It is impossible to rotate the key when the key locking device is unlocked and the actuator is removed (C state). Contacts actuated by key locking or by actuator are available.

Rotating head and release device

The head can be quickly rotated on each of the 4 sides of the switch by unfastening the two fixing screws. The release device can be rotated in 90° steps as well. This enables the switch to assume 32 different configurations.

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.

Use Atex products in environments with explosion hazard (see page 2/137)

Data type approved by IMQ, CCC and EZU

Rated insulation voltage (Ui): 500 Vac
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+X, Y+Y+Y+X
Positive opening of contacts on contact block 18, 20, 21, 22, 28, 29, 30
In conformity with standards: EN 60947-1, EN 60947-5-1 and subsequent modifications and completions, fundamental requirements of the Low Voltage Directive 2006/95/CE and subsequent modifications and completions.

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

Data type approved by UL

Utilization categories Q300 (60 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 78 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 7.1 lb in (0.8 Nm).

In conformity with standard: UL 508
Please contact our technical service for the list of approved products.
### How to read travel diagrams

**Example diagram**

**NC opening**

- NC contacts (Example) has to be considered with inserted and blocked actuator in the key lock. **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.

- **Max lock travel**
- **Max actuator travel**
- **Closed contact**
- **Open contact**
- **Positive opening travel**

**Contacts controlled by the lock**

**Contacts controlled by the actuator**

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**Contacts type:**

- **L** = slow action

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**All measures in the diagrams are in mm or in degrees**

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**How to read travel diagrams**

**All measures in the drawings are in mm**

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**Accessories**

See page 5/1

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**Min. force:**

- **30 N (40 N)**
Stainless steel actuators

**IMPORTANT:** These actuators must be used with FD, FP, FL, FC or FS series only (e.g. FD 1899)

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF KEYF</td>
<td>Straight actuator</td>
</tr>
<tr>
<td>VF KEYF1</td>
<td>Right-angled actuator</td>
</tr>
<tr>
<td>VF KEYF2</td>
<td>Jointed actuator</td>
</tr>
<tr>
<td>VF KEYF3</td>
<td>Jointed actuator adjustable in two directions</td>
</tr>
<tr>
<td>VF KEYF7</td>
<td>Jointed actuator adjustable in one direction</td>
</tr>
<tr>
<td>VF KEYF8</td>
<td>Universal 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.

 Joined 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).

**Accessories**

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF KB1</td>
<td>Actuator entry locking device</td>
</tr>
<tr>
<td>VF KLA371</td>
<td>Set of 2 locking keys</td>
</tr>
</tbody>
</table>

Padlockable device to lock the actuator entry in order to prevent from the accidental closing of the door behind operators while they are inside the machine. To be used only with FD, FL, FC and FS series with metal heads.

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

Items with code on the green background are available in stock.