

# Safety switches with manual mechanical delay and separate actuator



Pat. pending

## Description and technical data

These switches are used on machines where the hazardous conditions continuous for a while, even after switch off the machine (i.e. mechanical inertia of pulleys, disk saws, mills, etc...). This switch has its ideal application where the guard is not open frequently and the installation of a switch with solenoid would be too expensive.

### Housing

FP series made of polymer glass-reinforced, self-extinguishing, shock proof thermoplastic resin and with double insulation  $\square$

FD series made of metal, coated with baked epoxy powder

FD and FP series one conduit entry

Protection degree: IP66 (electrical contacts)

### Markings and quality marks:



Approval IMQ: EG605 (FD series)  
EG606 (FP series)  
Approval UL: E131787  
Approval EZU: 1010151

### General data

Ambient temperature: from -25°C to +80°C  
Max operating frequency: 360 operations cycles<sup>1</sup>/hour  
Mechanical endurance: 500.000 operations cycles<sup>1</sup>  
Max actuating speed: 0,5 m/s  
Min. actuating speed: 1 mm/s  
Max holding force : 800 N for FP series  
1000 N for FD series

Max. backlash of the actuator: 4 mm  
(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by IEC 947-5-1 standard.

### Complying with the requirements

**requested by:** Low Voltage Directive 73/23/EEC and subsequent modifications and completions, Machinery Directive 98/37/EEC, Electromagnetic Compatibility 89/336/EEC and subsequent modifications and completions.

**Positive contact opening complying with the standards:** IEC 947-5-1, EN 60947-5-1, CEI EN 60947-5-1, VDE 0660-206.

### Cross section of the conductors (flexible lead wire)

Contact blocks 20, 21, 22, 33, 34: min. 1 x 0,34 mm<sup>2</sup> (1 x AWG 22)  
max. 2 x 1,5 mm<sup>2</sup> (2 x AWG 16)  
Contact blocks 6, 7, 9: min. 1 x 0,5 mm<sup>2</sup> (1 x AWG 20)  
max. 2 x 2,5 mm<sup>2</sup> (2 x AWG 14)

### Conforms to the standards:

IEC 947-5-1, IEC 337-1, EN 60947-5-1, CEI EN 60947-5-1, CEI 17-45, IEC 204-1, EN 60204-1, CEI 44-5, EN 1088, EN 292, IEC 529, EN 60529, CEI 70-1, NFC 63-140, VDE 0660-200, VDE 0113, CENELEC EN 50013, BG-GS-ET-15.

### Approvals:

IEC 947-5-1, UL 508.

### Electrical data

without connectors  
Thermal current (I<sub>th</sub>): 10 A  
Rated insulation voltage (U<sub>i</sub>): 500 VAC 600 VDC  
400 VAC for contact block 20, 21, 22, 33, 34  
Protection against short circuits: fuse 10 A 500V type aM  
Pollution degree: 3

with 4 - 5 poles  
M12 connectors  
Thermal current (I<sub>th</sub>): 4 A  
Rated insulation voltage (U<sub>i</sub>): 250 VAC 300 VDC  
Protection against short circuits: fuse 4 A 500 V type Gg  
Pollution degree: 3

with 8 poles  
M12 connectors  
Thermal current (I<sub>th</sub>): 2 A  
Rated insulation voltage (U<sub>i</sub>): 30 VAC 36 VDC  
Protection against short circuits: fuse 2 A 500 V type Gg  
Pollution degree: 3

### Utilization categories

Alternate current: AC15 (50÷60 Hz)  
U<sub>e</sub> (V) 250 400 500  
I<sub>e</sub> (A) 6 4 1  
Direct current: DC13  
U<sub>e</sub> (V) 24 125 250  
I<sub>e</sub> (A) 6 1,1 0,4

Alternate current: AC15 (50÷60 Hz)  
U<sub>e</sub> (V) 24 120 250  
I<sub>e</sub> (A) 4 4 4  
Direct current: DC13  
U<sub>e</sub> (V) 24 125 250  
I<sub>e</sub> (A) 4 1,1 0,4

Alternate current: AC15 (50÷60 Hz)  
U<sub>e</sub> (V) 24  
I<sub>e</sub> (A) 2  
Direct current: DC13  
U<sub>e</sub> (V) 24  
I<sub>e</sub> (A) 2

## Data type approved by IMQ and EZU

Rated insulation voltage (Ui): 500 VAC  
400 VAC for contact block 20, 21, 22, 33, 34

Thermal current (Ith): 10 A

Protection against short circuits: fuse 10 A 500 V type aM

Protection degree of the housing: IP66

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: Za, Zb, Za+Za, Y+Y, X+X, Y+Y+X, Y+Y+Y, Y+X+X

Positive opening of contacts on contact block 5, 6, 7, 9, 11, 14, 16, 20, 21, 22, 33, 34

Conforms to the standards: EN60947-1, EN 60947-1 A11, EN60947-5-1 and fundamental requirements of the Low Voltage Directive 73/23 EEC and 93/68 EEC.

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

## 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

Conforms to the standard: UL 508

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

## How to order

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

# FD 6R2-L10F1GM2K50

### Housing

<b>FD</b>	metal housing, one conduit entry
<b>FP</b>	polymer housing, one conduit entry

### Contact blocks

<b>6</b>	1NO+1NC, slow action	
<b>7</b>	1NO+1NC, slow action	Overlapped Contacts
<b>9</b>	2NC, slow action	
<b>20</b>	2NC+1NO, slow action	
<b>21</b>	3NC, slow action	
<b>22</b>	1NC+2NO, slow action	
<b>33</b>	1NO+1NC, slow action	
<b>34</b>	2NC, slow action	

### Mechanical delay

	short knob 20 sec. (standard)
<b>C10</b>	short knob 10 sec.
<b>L10</b>	long knob 10 sec.
<b>L20</b>	long knob 20 sec.

### M12 assembled connectors (see chapter 17)

	no connector (standard)
<b>K40</b>	8 poles, metal body, bottom output (only for contact blocks 20, 21, 22)
<b>K50</b>	5 poles, metal body, bottom output (only for FD housing)
<b>K70</b>	4 poles, plastic body, bottom output (only for FP housing)

### Threaded conduit entry

	PG 13,5 (standard)
<b>M2</b>	M20x1,5

### Type of contacts

	silver contacts (standard)
<b>G</b>	silver contacts gold plated (1 µm) (only contact block 5, 6, 7, 16)

### Actuators

	without actuator
<b>F</b>	with straight actuator
<b>F1</b>	with right-angled actuator
<b>F2</b>	with jointed actuator
<b>F3</b>	with adjustable jointed actuator
<b>F7</b>	with adjustable jointed actuator

# Safety switches with manual mechanical delay and separate actuator

## Accessories

Further accessories: **signal lamps, cable glands, adapters, connectors and protection caps**, please see chapter 16



## On request

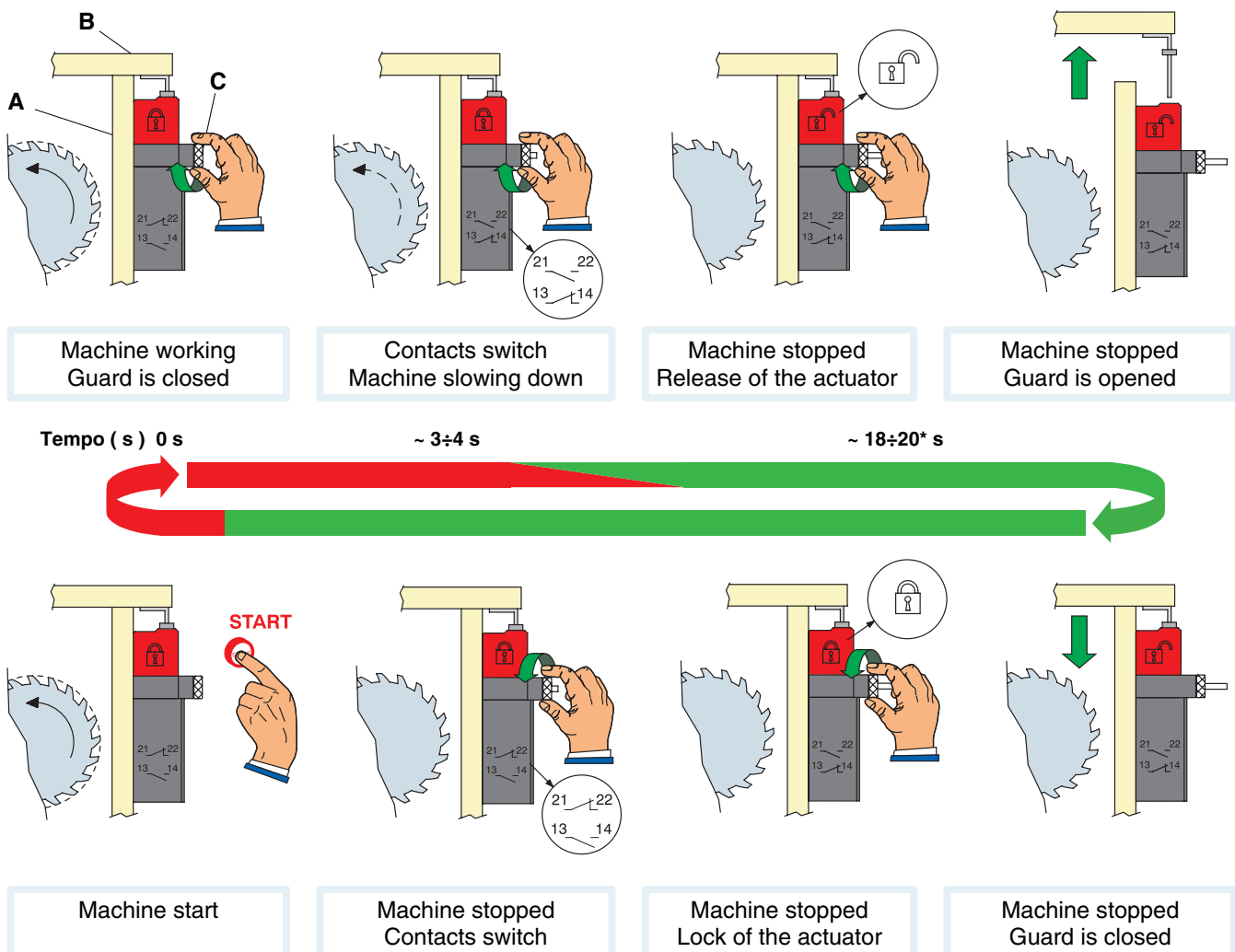
- Special versions with head oriented to the left, to the right or to the rear.
- Special versions for -40 °C use.
- Custom-made special versions.

## Working cycle (FP 6R2-F1)

The switch is fastened to the body of the machine (A), while the stainless steel actuator is fastened to the guard (B). Once installed, the actuator is locked firmly by the switch. In order to remove the actuator, the knob (C) has to be rotated. On the first turns the electrical contacts will positively open, then after about 20 seconds (or 10 seconds depending on the knob version), the actuator will be released. In order to close the guard, the knob must be rotated in the opposite direction (see the working cycle).

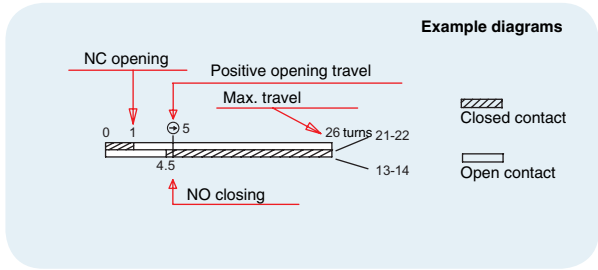
If compared with solenoid safety switches, this switch doesn't need power supply or timer and can be installed in old machines without important changes in their electrical circuit.

Really versatile, this switch is provided with a head having two actuator inputs and a release knob, both independently orientable in 90° steps. This allows the switch to assume 32 different configurations. The knob (C) may be supplied in a short (standard) or in a long version.



\* available with delay time of 10 seconds

## How to read travel diagrams (all measure are in turns of knob)



### IMPORTANT:

The contact **NC** is close with actuator inserted. In **safety applications** it is necessary to activate the switch **till the positive opening point**, indicated in the diagrams with the symbol  $\oplus$ . Operate the switch **with the positive opening force**, indicated between brackets, below each article, near to the value of minimum forces.

		Polymer housing Switch without actuator	Metal housing Switch without actuator	Metal housing Switch without actuator long knob version
6		<b>FP 6R2</b> $\oplus$ 1NO+1NC 	<b>FD 6R2</b> $\oplus$ 1NO+1NC 	<b>FD 6R2-L10</b> $\oplus$ 1NO+1NC 
7		<b>FP 7R2</b> $\oplus$ 1NO+1NC Overlapped Contacts 	<b>FD 7R2</b> $\oplus$ 1NO+1NC Overlapped Contacts 	<b>FD 7R2-L10</b> $\oplus$ 1NO+1NC Overlapped Cont. 
9		<b>FP 9R2</b> $\oplus$ 2NC 	<b>FD 9R2</b> $\oplus$ 2NC 	<b>FD 9R2-L10</b> $\oplus$ 2NC 
20		<b>FP 20R2</b> $\oplus$ 2NC+1NO 	<b>FD 20R2</b> $\oplus$ 2NC+1NO 	<b>FD 20R2-L10</b> $\oplus$ 2NC+1NO 
21		<b>FP 21R2</b> $\oplus$ 3NC 	<b>FD 21R2</b> $\oplus$ 3NC 	<b>FD 21R2-L10</b> $\oplus$ 3NC 
22		<b>FP 22R2</b> $\oplus$ 2NO+1NC 	<b>FD 22R2</b> $\oplus$ 2NO+1NC 	<b>FD 22R2-L10</b> $\oplus$ 2NO+1NC 
33		<b>FP 33R2</b> $\oplus$ 1NO+1NC 	<b>FD 33R2</b> $\oplus$ 1NO+1NC 	<b>FD 33R2-L10</b> $\oplus$ 1NO+1NC 
34		<b>FP 34R2</b> $\oplus$ 2NC 	<b>FD 34R2</b> $\oplus$ 2NC 	<b>FD 34R2-L10</b> $\oplus$ 2NC 
<b>Min force</b>		<b>10 N (18 N)</b>	<b>10 N (18 N)</b>	<b>10 N (18 N)</b>

Contact blocks

6		<b>FP 6R2</b> $\oplus$ 1NO+1NC 	<b>FD 6R2</b> $\oplus$ 1NO+1NC 	<b>FD 6R2-L10</b> $\oplus$ 1NO+1NC 
7		<b>FP 7R2</b> $\oplus$ 1NO+1NC Overlapped Contacts 	<b>FD 7R2</b> $\oplus$ 1NO+1NC Overlapped Contacts 	<b>FD 7R2-L10</b> $\oplus$ 1NO+1NC Overlapped Cont. 
9		<b>FP 9R2</b> $\oplus$ 2NC 	<b>FD 9R2</b> $\oplus$ 2NC 	<b>FD 9R2-L10</b> $\oplus$ 2NC 
20		<b>FP 20R2</b> $\oplus$ 2NC+1NO 	<b>FD 20R2</b> $\oplus$ 2NC+1NO 	<b>FD 20R2-L10</b> $\oplus$ 2NC+1NO 
21		<b>FP 21R2</b> $\oplus$ 3NC 	<b>FD 21R2</b> $\oplus$ 3NC 	<b>FD 21R2-L10</b> $\oplus$ 3NC 
22		<b>FP 22R2</b> $\oplus$ 2NO+1NC 	<b>FD 22R2</b> $\oplus$ 2NO+1NC 	<b>FD 22R2-L10</b> $\oplus$ 2NO+1NC 
33		<b>FP 33R2</b> $\oplus$ 1NO+1NC 	<b>FD 33R2</b> $\oplus$ 1NO+1NC 	<b>FD 33R2-L10</b> $\oplus$ 1NO+1NC 
34		<b>FP 34R2</b> $\oplus$ 2NC 	<b>FD 34R2</b> $\oplus$ 2NC 	<b>FD 34R2-L10</b> $\oplus$ 2NC 
<b>Min force</b>		<b>10 N (18 N)</b>	<b>10 N (18 N)</b>	<b>10 N (18 N)</b>

Items with code on the **grey** background are available in stock.

# Safety switches with manual mechanical delay and separate actuator

## Stainless steel actuators

📦 10 pcs packs

**Attention!** These actuators (black colour) can be used only with products which code start by "FD", "FP", "FL", "FC" or "FS" (e.g. FD 6R2)



Article  
**VF KEYF**  
Straight actuator



Article  
**VF KEYF1**  
Right-angled actuator



Article  
**VF KEYF2**  
The actuator can flex in four directions for applications where the door alignment is not precise.



Article  
**VF KEYF3**  
Two directions adjustable actuator for reduced dimensions doors.

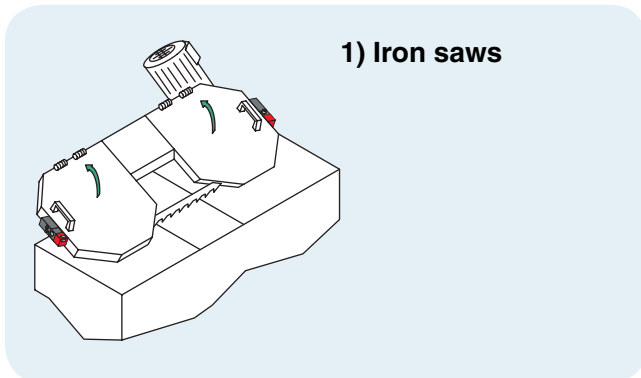


Article  
**VF KEYF7**  
One direction adjustable actuator for reduced dimensions doors.

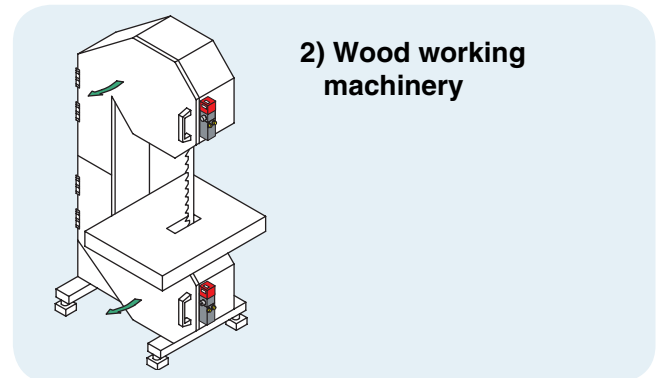
For dimensional drawings see chapter 18

Items with code on **grey** background are available in stock. The quantities near the symbol 📦 indicate the number of pieces in each pack. Only orders for quantities multiple of the packs are accepted.

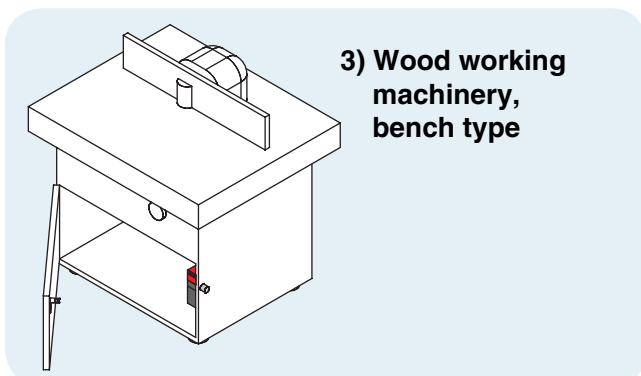
## Application examples



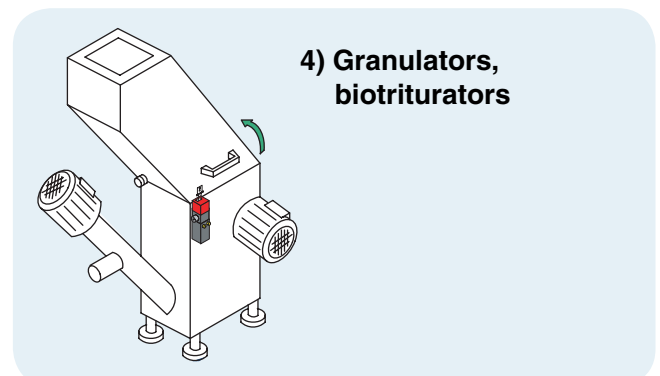
1) Iron saws



2) Wood working machinery



3) Wood working machinery, bench type



4) Granulators, biotriturators

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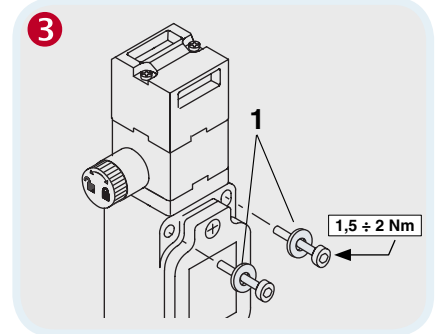
## Assembling instructions



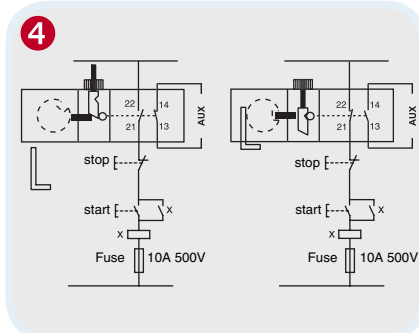
To rotate the head, unscrew the 2 screws as shown above.



The head can be rotated on the four sides of the switch.



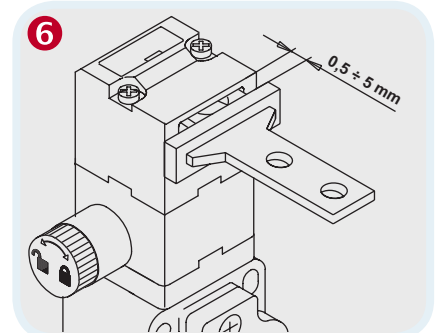
Fix the switch by interposing a washer (1) under the heads of the fastening screws (only series FP)



The safety circuit must be connected to the NC contacts (11-12, 21-22, 31-32) with actuator inserted and locked with the knob turned anti-clockwise to end of the stroke. The auxiliary contacts (13-14, 23-24, 33-34) are for signalling purposes.



Fasten the actuator to the door of the machine with rivets or one way screws (2).



With closed door, check that the actuator is in the adjustment zone (0,5...5 mm).

### Attention!

Check from time to time the correct operation of the switch, by ensuring that it is impossible to open the machine guard whilst the machine is running. Before you start the machine, check that the time taken by the operator to open the protection is longer period than the time taken by the hazardous parts to stop.

## Instructions

**A) Do not use in the following environments:** 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.

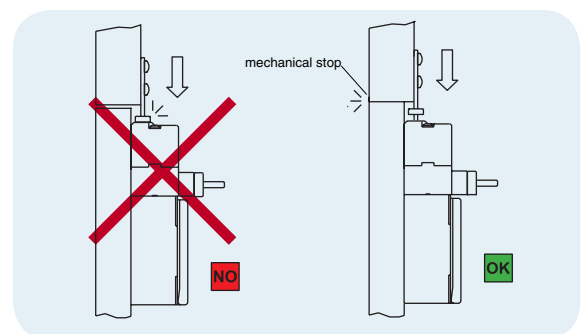
**B) Mechanical stop:** do not use the switch as a mechanical stop. The actuator should not knock straight against the head of the switch (see figure on the side).

**C) Care during the installation and after:** Always insert the plug in the slot not used for protection against dust.

**D) Care in the use of the actuators:**

- Attach the actuators with rivets or one way screws.
- Take care to use only the actuator supplied with the switch or to use one of the following loose actuator:

VF KEYF1, VF KEYF2, VF KEYF3, VF KEYF7. If you use any other actuator, the safety of the system is not guaranteed.



13.5