Microswitches of MK series have been developed in order to add new features to traditional and tested microswitches of Pizzato Elettrica (cross-reference at page 6/48). These new products have been designed with shapes and fixing perfectly interchangeable with the previous ones and with various additional functions useful to extend the application field.

The main innovation of this series is the tripping device modern and evolved, with qualitative features higher than solutions present on the market. The electrical contact on new microswitch has been realized with higher reliability technology, thanks to the double and redundant shape, and has the possibility to carry out operations with positive opening.

The housing of the new microswitch provides the possibility to seat gaskets in order to seal the device against fine dusts or liquids up to IP65 degree.

Fastening terminals of conductors are more practical and allow the fixing of different diameter cables or the possibility to choose different bends of faston contacts. For high quantity it’s possible to supply the microswitch only with the contact NO or NC, in order to minimize purchase costs.

### Contact block reliability

In the following table we refer to the typical microswitch contact structure (type A) normally used in the industry, compared with the innovative solution that Pizzato Elettrica uses in new MK series microswitches: movable contact with single interruption and double contacts (type B).

As you can see from the table below, this last structure (type B) offers half of the contact resistance ($R$) than the simple mobile contact (type A) and a lower probability of failure ($f_e$).

In fact, defined $x$ the probability of a commutation failure of a single interruption, it results that in the type A the failure probability $f_e=x$, in the type B the probability $f_e=x^2$. This means that if in a certain situation the failure probability $x$ is equal, for instance, to $1 \times 10^{-4}$ (1 failed interruption every 10,000), we will have:

- in type A one failed commutation every 10,000
- in type B one failed commutation every 100,000,000

<table>
<thead>
<tr>
<th>Type</th>
<th>Figure</th>
<th>Description</th>
<th>Contact resistance $R$</th>
<th>Probability of failure $f_e$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>NO</td>
<td>Contacts with single interruption</td>
<td>$R=Rc$</td>
<td>$f_e=x$</td>
</tr>
<tr>
<td>Common microswitch</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>NO</td>
<td>Contacts with single interruption and double contacts</td>
<td>$R=Rc/2$</td>
<td>$f_e=x^2$</td>
</tr>
<tr>
<td>Pizzato microswitch MK series</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Extended temperature range

-40°C

On request, on new MK series are available the versions with extended temperature range. Differently from standard MK microswitches with temperature range from +85°C to -25°C, these special versions can be used in places where the ambient temperature changes from +85°C to -40°C.

They can be installed inside cold stores, sterilizers or other equipment with very low ambient temperature. Special materials that have been used to realize these versions, maintain unchanged their features also in these conditions, widening the installation possibilities.

### Microswitches for safety applications

All microswitches that have the symbol ⚡ beside the code are with positive opening, therefore suitable for safety applications.

These microswitches are provided with a rigid connection between push button and NC contacts, which are opened by force through a strong/sturdy internal safety lever.

The positive opening has been realized in conformity with the standard IEC 60947-5-1, enclosure K, therefore these microswitches are suitable for the installation for people’s protection.
Protection degree IP65

By installing microswitches MK •••2••• with terminal covers VF MKC•22 or terminal covers VF MKC•23, it’s possible to obtain a microswitch fully dust proof and waterproof. Thanks to special rubber gaskets anti-oil, we achieve the protection degree IP65.

For application with high presence of dirtiness, are available also versions with double gasket in the push button (internal + external). ex. MK •••2•12 or MK •••2•13.

Clamping screw plates for different diameter cables (MK V+)

These clamping screw plates have a particular “roofing tile” structure and are connected loosely to the clamping screw. In this way, during the wires fixing, the clamping screw plate is able to suit to cables of different diameter (see picture) and tends to tighten the wires toward the screw instead of permitting them to escape towards the outside.

Terminal covers with wire trap cable gland side by side

New terminal covers supplied with wire trap cable gland are provided for the protection degree up to IP65. These terminal covers are snap-in assembled and they have small dimensions in the microswitch profile, it’s possible to install them also on microswitches fixed side by side. See page 2/136.

Rotating actuators

Thanks to the new lateral fixing system patented, it’s possible to rotate the roller of microswitches MK •••15 and MK •••17 in 90° steps. The lateral fixing allows to disconnect the actuator from the body also when the actuator is already fixed to the racket. The flexibility of the product allows also to unify items on stock for applications that require roller both longitudinal or transversal.
Microswitches MK series

WITH PLUNGER DIRECT ACTION
D01  D02  D03  D04  D05  D06  D08

WITH LEVER DIRECT ACTION
D30  D31  D32  D35  D37  D40  D42

WITH LEVER INVERTED ACTION
R30  R31  R32  R35  R40  R42

WITH LEVER BACK DIRECT ACTION
F30  F31  F32  F35  F40  F42

ACTUATORS
1  1NO+1NC snap action
2  1NO snap action (on request)
3  1NC snap action (on request)

TERMINALS
V  screw terminals with self-lifting plate
H  6.3 mm vertical faston
F  faston 6.3 mm right bending of 45°
G  faston 6.3 mm left bending of 45° (on request)
**Code structure**

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

**Article**

**MK V12D40-GR16T6**

**Options**

- **Ambient temperature**
  - -25°C ... +85°C (standard)
  - T6 -40°C ... +85°C

- **Suffix**
  - no suffix (standard)
  - R16 Ø 9,5x4 mm metal roller (for actuator 40, 42, 45, 47, 53, 59)
  - R10 Ø 9,8x8,4 mm polymer roller (for actuator 40, 42, 45, 53)

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

- **Actuator**
  - 01 with pin
  - 02 with pin
  - 03 with small push button

**Terminals type**

- V screw terminals with self-lifting late
- H vertical faston terminals
- F with faston, right bending of 45°
- G with faston, left bending of 45° (on request)

**Contact block**

- 1 1NO+1NC, snap action
- 2 1NO, snap action (on request)
- 3 1NC, snap action (on request)

**Max protection degree**

- 1 IP40 (with protection)
- 2 IP65 (with protection)

**Actuation type**

- D direct action
- R inverted action
- F back direct action

**Article options**

- D09 D10
  - external rubber gasket
- D12 D13
  - external rubber gasket
- D15 D17 D18 D19
- D45 D46 D47 D53 D59 D49
- R45 R46 R47 R53 R59 R60
- F45 F46 F47 F53 F59 F49
Technical data

Housing
Made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin.

Protection degree:
- IP20 (with protection VF C01 - VF C03)
- IP40 (with protection VF MKC•1 - VF C02)
- IP65 (with protection VF MKC•22 - VF MKC•23) according to EN 60529

General data
Ambient temperature: from -25°C to +85°C
Max operating frequency: 3600 operations cycles/hour
Mechanical endurance: 10 million operations cycles
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)
MK series:
- min. 1 x 0,34 mm² (1 x AWG 22)
- max 2 x 1,5 mm² (2 x AWG 16)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60529, EN 60529.

Approvals:
UL 508

In conformity with requirements requested by:

Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1, EN 60529, VDE 0660-206.

Installation for safety applications:
Use only switches marked with the symbol ☑. The safety circuit must always be connected with the NC contacts (normally closed contacts) as stated in the standard EN 60947-5-1, encl. K, par. 2. The switch must be actuated with at least up to the positive opening travel (FAP) near the code article. The switch must be actuated at least with the positive opening force (CAP), near the code article.

⚠ 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

<table>
<thead>
<tr>
<th>Thermal current (Ith):</th>
<th>16 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage (Uil):</td>
<td>250 Vac 300 Vdc</td>
</tr>
<tr>
<td>Conditional shot circuit current:</td>
<td>1000 A according to EN 60947-5-1</td>
</tr>
<tr>
<td>Protection against short circuits:</td>
<td>fuse 10 A 500 V type gG</td>
</tr>
<tr>
<td>Pollution degree:</td>
<td>3</td>
</tr>
<tr>
<td>Dielectric strength:</td>
<td>2000 Vac/min.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Utilization categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate current: AC15 (50 ... 60 Hz)</td>
</tr>
<tr>
<td>Ue (V): 250 120</td>
</tr>
<tr>
<td>le (A): 6 6</td>
</tr>
<tr>
<td>Direct current: DC13</td>
</tr>
<tr>
<td>Ue (V): 24 125 250</td>
</tr>
<tr>
<td>le (A): 5 0,6 0,3</td>
</tr>
</tbody>
</table>

Data type approved by UL

<table>
<thead>
<tr>
<th>Utilization categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q300 (69 VA, 125-250 Vdc)</td>
</tr>
<tr>
<td>A300 (720 VA, 120-300 Vdc)</td>
</tr>
</tbody>
</table>

In conformity with standard: UL 508

Please contact our technical service for the list of approved products.
### Terminals outline dimension

- **Screw terminals V** with plate
- **Vertical faston H** terminals
- **faston terminals F**, right bending
- **faston terminals G**, left bending (on request)

Note: H vertical faston terminals can be bent according to one's installation requirements. We recommend to bend the faston with an angle not higher than 45° and to carry out this operation no more than 5 times.

### Wire diagram

- Contacts with single interruption and double contacts

**Legend**
- **CD**: differential travel
- **PC**: pretravel
- **OC**: over-travel
- **CAP**: positive opening travel
- **FS**: operating force
- **FR**: releasing force
- **FAP**: positive opening force

### Microswitches with direct action

<table>
<thead>
<tr>
<th>Microswitch</th>
<th>Code</th>
<th>Description</th>
<th>Dimensions</th>
<th>Force (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MK V11D01</td>
<td>1NO+1NC</td>
<td>Direct action</td>
<td>0.5 mm PC, 1.5 mm OC</td>
<td>FS 4 N, FR 3 N</td>
</tr>
<tr>
<td>MK V11D02</td>
<td>1NO+1NC</td>
<td>Direct action</td>
<td>0.5 mm PC, 2 mm OC</td>
<td>FS 4 N, FR 3 N</td>
</tr>
<tr>
<td>MK V11D03</td>
<td>1NO+1NC</td>
<td>Direct action</td>
<td>0.5 mm PC, 0.05 mm CD</td>
<td>FS 4 N, FR 3 N</td>
</tr>
<tr>
<td>MK V11D04</td>
<td>1NO+1NC</td>
<td>Direct action</td>
<td>0.5 mm PC, 0.05 mm CD</td>
<td>FS 4 N, FR 3 N</td>
</tr>
</tbody>
</table>

Max and min. speed page 6/8 - type 1

---

All measures in the drawings are in mm.
MK V11D19 1NO+1NC PC 0,5 mm OC 6,5 mm CD 0,06 mm CAP 2,2 mm
FS 4 N
Max and min. speed page 6/8 - type 2

MK V11D30 1NO+1NC PC 9 mm OC 6,5 mm CD 1,1 mm
FS 0,65 N
Max and min. speed page 6/8 - type 3

MK V11D31 1NO+1NC PC 4,54 mm OC 3,86 mm CD 0,42 mm
FS 1,66 N
Max and min. speed page 6/8 - type 3

MK V11D32 1NO+1NC PC 7,7 mm OC 8,3 mm CD 0,9 mm
FS 0,76 N
Max and min. speed page 6/8 - type 3

MK V11D35 1NO+1NC PC 19 mm OC 16,7 mm CD 2,5 mm
FS 0,28 N
Max and min. speed page 6/8 - type 3

MK V11D37 1NO+1NC PC 19 mm OC 9,5 mm CD 2,3 mm
FS 0,08 N
Max and min. speed page 6/8 - type 3

MK V11D40 1NO+1NC PC 6,7 mm OC 28 mm CD 0,8 mm
FS 0,86 N
Max and min. speed page 6/8 - type 6

MK V11D42 1NO+1NC PC 5,3 mm OC 5,7 mm CD 0,6 mm
FS 1,09 N
Max and min. speed page 6/8 - type 6

MK V11D45 1NO+1NC PC 3,5 mm OC 4,5 mm CD 0,4 mm
FS 1,66 N
Max and min. speed page 6/8 - type 6

MK V11D46 1NO+1NC PC 3,5 mm OC 4,5 mm CD 0,4 mm
FS 1,66 N
Max and min. speed page 6/8 - type 6

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

MK V11D47 1NO+1NC PC 3.5 mm OC 4 mm CD 0.4 mm FS 1,66 N FR 1,28 N

MK V11D49 1NO+1NC Hand operated

Max and min. speed page 6/8 - type 6

MK V11D53 1NO+1NC PC 7.7 mm OC 9.9 mm CD 0.9 mm FS 0,76 N FR 0,58 N

MK V11D59 1NO+1NC PC 2.5 mm OC 4.5 mm CD 0.2 mm FS 2,3 N FR 1,77 N

Max and min. speed page 6/8 - type 6

Microswitches with inverted action

MK V11R30 1NO+1NC PC 4.4 mm OC 14 mm CD 1 mm FS 0,6 N FR 0,4 N

MK V11R31 1NO+1NC PC 0.7 mm OC 6.01 mm CD 0.23 mm FS 1,47 N FR 0,72 N

Max and min. speed page 6/8 - type 4

MK V11R32 1NO+1NC PC 3.7 mm OC 11.8 mm CD 0.8 mm FS 0,7 N FR 0,5 N

MK V11R35 1NO+1NC PC 14.3 mm OC 25.7 mm CD 3.2 mm FS 0.3 N FR 0,2 N

Max and min. speed page 6/8 - type 7

MK V11R40 1NO+1NC PC 3.4 mm OC 10.3 mm CD 0.7 mm FS 0,8 N FR 0,5 N

MK V11R42 1NO+1NC PC 2.7 mm OC 0.5 mm CD 0.5 mm FS 1.2 N FR 1,7 N

Max and min. speed page 6/8 - type 7
Microswitches with back direct action

MK V11R45 1NO+1NC PC 1,5 mm FS 1,7 N OC 5,5 mm FR 1 N CD 0,3 mm

MK V11R46 1NO+1NC PC 3,5 mm FS 1,5 N OC 5,4 mm FR 1,45 N CD 0,2 mm

MK V11R47 1NO+1NC PC 1,7 mm FS 1,7 N OC 5,3 mm FR 1 N CD 0,3 mm

MK V11R53 1NO+1NC PC 4,3 mm FS 0,8 N OC 11,8 mm FR 0,4 N CD 0,8 mm

MK V11R59 1NO+1NC PC 1,5 mm FS 2,4 N OC 3,9 mm FR 1,3 N CD 0,3 mm

MK V11R60 1NO+1NC PC 2,7 mm FS 1,2 N OC 9,2 mm FR 0,6 N CD 0,5 mm

MK V11F30 1NO+1NC PC 2,7 mm FS 0,6 N OC 12,9 mm FR 0,5 N CD 0,35 mm

MK V11F31 1NO+1NC PC 1,63 mm FS 1,76 N OC 4,54 mm FR 1,08 N CD 0,17 mm FAP 5,78 N CAP 5,72 mm

MK V11F32 1NO+1NC PC 2,5 mm FS 0,7 N OC 11,5 mm FR 0,6 N CD 0,3 mm

MK V11F35 1NO+1NC PC 75 mm FS 0,25 N OC 25,9 mm FR 0,2 N CD 1,3 mm
Microswitches MK series

MK V11F40 1NO+1NC PC 2,4 mm FS 0,85 N OC 10,4 mm FR 0,65 N CD 0,25 mm

MK V11F42 1NO+1NC PC 1,6 mm FS 1 N OC 8,4 mm FR 0,7 N CD 0,2 mm FAP 4,9 N CAP 9 mm

MK V11F45 1NO+1NC PC 1,1 mm FS 1,3 N OC 6,6 mm FR 0,9 N CD 0,1 mm FAP 6,9 N CAP 6,3 mm

MK V11F46 1NO+1NC PC 1,1 mm FS 1,3 N OC 6,6 mm FR 0,9 N CD 0,1 mm FAP 6,9 N CAP 6,3 mm

MK V11F47 1NO+1NC PC 1,5 mm FS 1 N OC 7,5 mm FR 0,7 N CD 0,2 mm FAP 4,8 N CAP 9 mm

MK V11F49 1NO+1NC PC 1,5 mm FS 1 N OC 7,5 mm FR 0,7 N CD 0,2 mm FAP 4,8 N CAP 9 mm

MK V11F53 1NO+1NC PC 2,5 mm FS 0,7 N OC 11,5 mm FR 0,6 N CD 0,3 mm

MK V11F59 1NO+1NC PC 0,8 mm FS 1,7 N OC 5,2 mm FR 1,3 N CD 0,9 mm FAP 8,9 N CAP 4,9 mm

Max and min. speed page 6/8 - type 8
Max and min. speed page 6/8 - type 8
Max and min. speed page 6/8 - type 8
Max and min. speed page 6/8 - type 8
Max and min. speed page 6/8 - type 8
Max and min. speed page 6/8 - type 8
**Protections (terminals covers)**

Protection terminal cover for screw terminals snap-in assembled and with wire trap cable gland. It allows the installation of more switches side by side.

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
<th>Protection degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF MKCV11</td>
<td>Protection terminal cover without gasket for multipolar cables from Ø 5 to Ø 75 mm</td>
<td>IP40</td>
</tr>
<tr>
<td>VF MKCV12</td>
<td>Protection terminal cover without gasket for multipolar cables from Ø 4 to Ø 75 mm</td>
<td>IP40</td>
</tr>
<tr>
<td>VF MKCV13</td>
<td>Protection terminal cover without gasket for multipolar cables from Ø 2 to Ø 5 mm</td>
<td>IP40</td>
</tr>
<tr>
<td>VF MKCV22</td>
<td>Protection terminal cover with gasket for multipolar cables from Ø 4 to Ø 75 mm</td>
<td>IP65</td>
</tr>
<tr>
<td>VF MKCV23</td>
<td>Protection terminal cover with gasket for multipolar cables from Ø 2 to Ø 5 mm</td>
<td>IP65</td>
</tr>
</tbody>
</table>

Protection terminal cover for vertical faston terminals snap-in assembled and with wire trap cable gland. It allows the installation of more switches side by side.

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
<th>Protection degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF MKCH11</td>
<td>Protection terminal cover without gasket for multipolar cables from Ø 5 to Ø 75 mm</td>
<td>IP40</td>
</tr>
<tr>
<td>VF MKCH12</td>
<td>Protection terminal cover without gasket for multipolar cables from Ø 4 to Ø 75 mm</td>
<td>IP40</td>
</tr>
<tr>
<td>VF MKCH13</td>
<td>Protection terminal cover without gasket for multipolar cables from Ø 2 to Ø 5 mm</td>
<td>IP40</td>
</tr>
<tr>
<td>VF MKCH22</td>
<td>Protection terminal cover with gasket for multipolar cables from Ø 4 to Ø 75 mm</td>
<td>IP65</td>
</tr>
<tr>
<td>VF MKCH23</td>
<td>Protection terminal cover with gasket for multipolar cables from Ø 2 to Ø 5 mm</td>
<td>IP65</td>
</tr>
</tbody>
</table>

**Accessories**

Hexagonal threaded nut M10 x 0.75 for microswitches

<table>
<thead>
<tr>
<th>Article</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF AC83</td>
<td>Hexagonal threaded nut M10 x 0.75 for microswitches</td>
</tr>
</tbody>
</table>