Specifications

Utilization Category (IEC 60947-5-1) | AC-15
---|---
Rated Operational Voltage (Ue) | 240V
Rated Operational Current (Ie) | 3A
Rated Insulation Voltage (Ui) | 300V
Conventional free air thermal current (Ith) | 10A
Contact Resistance | 50mΩ maximum initial (at 1A 5Vcc)
Ambient Temperature | +85°C maximum
Degree of Protection | IP20 (with assembled M33 terminal cover) (IEC 60529)
Operating Speed | 0.5mm/s minimum until 1m/s maximum (at pin plunger)
Mechanical Life Expectancy | 1,000,000 cycles at 90 cycles/min max.
Electrical Life Expectancy | 10,000 cycles at 6 cycles/min max.
Materials
- Enclosure: Polyester reinforced
- Pin Plunger: Polyamide reinforced
- Moving Blade: Copper Alloy
- Contacts: Silver alloy
- Actuators: Lever actuator: Lever: Stainless steel
- Roller: Polyamide reinforced
- Plunger actuator: Actuator: Nickel plated brass

Ordering Information

MKKFF

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plunger</td>
<td>Screw = null</td>
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<tr>
<td>Long Hinge Lever</td>
<td>Faston = F</td>
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<tr>
<td>Short Hinge Lever</td>
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<tr>
<td>Long Roller Hinge Lever</td>
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<tr>
<td>Medium Roller Hinge Lever</td>
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<tr>
<td>Short Roller Hinge Lever</td>
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</tbody>
</table>

Circuitry (IEC 60947-5-1)

Form C (NO+NC)

KAP Componentes Elétricos Ltda.

K1
Plunger Actuator

Hinge Lever Actuator

Roller Hinge Lever Actuator

Positive Opening Operation on NC Contact

1. OF is the necessary force to operate the product in normal use conditions.
2. To ensure the positive opening, the external actuator element will provide a force PF on switch's actuator, greater than OF and in the same position.

Diagrams represents the operational contacts travels based on actuators position. Note that to ensure the positive opening, the actuator should be moved at least to the indicated travel ( ).

Accessory

M33 - Terminal cover (to be screw fixed in the bottom side of the base)
MK Series

INSTALLATION INSTRUCTIONS

1- Positive Opening

- The symbol (IEC 60947-5-1 Annex K) identifies a positive opening in the normally closed contact (NC).
- A switch has positive opening when all NC contact elements can be certainly led to opennes position. There is no elastic connection between the mobile contact and the actuator element where the force is applied.
- With the positive opening system, even with a internal malfunction of the switch, for example welding of contacts, the opening of the NC contact and "shutdown" of the circuit controlled by this switch is guaranteed, provided the "union" strength between the mobile contact and NC contact, does not exceed 10 N (according to item K8.3.7 of IEC 60947-5-1 standard).
- To ensure positive opening, the external actuator element will provide a force on the actuator’s switch greater than the necessary force to operate the product in normal use conditions. This force will be applied in the same position of CP.
- The connections of security circuits should be made only in NC contact and the auxiliary connections in NO contact.

2- Electrical Connections

2.1- Cable’s cross section (flexible cables)
- minimum: 1 x 0,5 mm²
- maximum: 2 x 2,5 mm²
- Fixing torque: 0,3 until 0,7 Nm

2.2- Circuitry (with protection fuse)
- Circuit: IEC 60947-5-1 form C
- Marking: IEC 60947-1

2.3- Switch MK with M33 terminal cover
- We recommend using M33 to protect people against access to dangerous parts.
- The M33 is fixed to MK by self-tapping screw.
- Fixing torque: 0,2 until 0,5 Nm
- Triple cables output options: the first one is indicated by screwdriver and the others by arrows (see figure below)
- To create the cable outline, use screw diver to break the membrane of the choosen output.

2.4- Cables Fixing

2.5- Short-circuit protective device
- 10A fuse type gG connected in series with the security circuit.

3- Housing Fixing
- Use M4 screws with flat washer.
- Fixing torque: 0,4 until 0,7Nm

4- Additional Cares
- Avoid environments where:
  . temperature changes cause condensation.
  . occur excessive vibration and shock and may damage the proper functioning of the switch.
  . there is explosive or flammable gas.
- To install the product, attempt to the specified limits to ensure a correct performance.
- Positive Opening ( ): attention to the values specified in the catalog to the necessary travel and force to ensure a perfect operation of positive opening system.
- Do not use these products as a mechanical stop.
- Do not use these products as safety or emergency stop devices or in any other application where the failure of the product could result in personal injury.
INSTALLATION INSTRUCTIONS - Continuation

- Turn off the power to make electrical connections or before any maintenance on the switch or equipment where it is applied. Electric shock will result in death or serious injury.
- Installation and maintenance services for electrical equipment should be executed only by qualified personnel.
- Read these instructions carefully. Retain instructions for future reference.
- Inappropriate use of the product could result in personal injury and/or property.
- Additional information: export@kap.com.br

5- Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Utilization Category</td>
<td>AC-15</td>
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<tr>
<td>Rated Operational Voltage (Ue)</td>
<td>250 V</td>
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<tr>
<td>Rated Operational Current (Ie)</td>
<td>3 A</td>
</tr>
<tr>
<td>Rated Insulation Voltage (Ui)</td>
<td>300 V</td>
</tr>
<tr>
<td>Conventional Free Air Thermal Current (Ith)</td>
<td>10 A</td>
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<tr>
<td>Rated Frequency</td>
<td>50/60 Hz</td>
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<tr>
<td>Contact Resistance</td>
<td>50 mΩ maximum initial (at 1 A, 5 Vdc)</td>
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<tr>
<td>Rated Conditional Short-circuit Current</td>
<td>100 A</td>
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<tr>
<td>Degree of Protection</td>
<td>IP20 (IEC 60529) with M33 terminal cover assembled</td>
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<tr>
<td>Ambient Temperature</td>
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<tr>
<td>Mechanical Durability</td>
<td>1,000,000 cycles until 90 cycles/min max.</td>
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<td>Electrical Durability</td>
<td>10,000 cycles until 6 cycles/min max.</td>
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<td>Operating Speed</td>
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<tr>
<td>Pollution Degree</td>
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<tr>
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<tr>
<td>Immunity: equipment not incorporating electronic circuits</td>
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<tr>
<td>Emission: electromagnetic disturbances can only be generated by equipment during occasional switching operations and the duration of the disturbances is of the order of milliseconds</td>
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<tr>
<td>Material Housing</td>
<td>Glass-reinforced polymer</td>
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6- Operation Recommendations

The correct way to operate the switch may affect significantly their durability. Check below some examples of actuators and their directions of operation.

7- Travels

Terminology:
- OF......Operation force
- PF......Positive opening force
- RF......Release force
- DT......Differential travel
- PT......Pre travel
- PP......Free position
- OP......Operating position
- PP......Positive opening travel
- OT......Overtravel

KAP COMPONENTES ELÉTRICOS Ltda.

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Rev. 04
MK Series

- Slow action contacts mechanism
- 2 NC contacts with positive opening (IEC 60947-5-1)
- For applications on security system
- Ideal for applications where redundancy is needed
- Glass-reinforced polyamide V-0 enclosure
- Increased contact gap
- Screw terminals
- In conformity with Low Voltage Directive 2006/95/EC

Specifications

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<tr>
<th>Parameter</th>
<th>AC-15</th>
<th>DC-13</th>
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<tr>
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<tr>
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<td>125 V</td>
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<tr>
<td>Rated Operational Current (Ie)</td>
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<tr>
<td>Rated Insulation Voltage (Ui)</td>
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<tr>
<td>Conventional Free Air Thermal Current (Ith)</td>
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<tr>
<td>Rated Impulse Withstand Voltage (Uimp)</td>
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<td>Electrical Life Expectancy</td>
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<td>Moving Blade</td>
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<td>Roller</td>
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<td>Plunger actuator</td>
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Ordering Information

MK2A

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<tr>
<td>Plunger</td>
<td>= F</td>
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<tr>
<td>Hinge Lever</td>
<td>= H</td>
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<tr>
<td>Roller Hinge Lever</td>
<td>= L</td>
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</table>

KAP Componentes Elétricos Ltda.

Rev. 02  R. Camo do Rio Verde, 78  S. Paulo - SP  04729-010  Phone: (+5511) 5645-4444  Fax: (+5511) 5644-1486  e-mail: export@kap.com.br  MK21
Actuators (dimensions in mm)

Pin Plunger Actuator

Plunger Actuator

Hinge Lever Actuator

Roller Hinge Lever Actuator

Positive Opening Operation on NC Contact

OF is the necessary force to operate the product in normal use conditions. 
To ensure the positive opening, the external actuator element will provide a force PF on switch’s actuator, greater than OF and in the same position.

Diagrams represents the operational contacts travels based on actuators position. Note that to ensure the positive opening, the actuator should be moved at least to the indicated travel ( ).

Accessory

MK23 - Terminal cover (to be screw fixed in the bottom side of the base )
MK Series

Basic Switch 2NC with Positive Opening

INSTALLATION INSTRUCTIONS

1- Positive Opening

- The symbol \( \text{IEC 60947-5-1 Annex K} \) identifies a positive opening in the normally closed contacts (NC).
- A switch has positive opening when all NC contact elements can be certainly led to openness position. There is no elastic connection between the mobile contact and the actuator element where the force is applied.
- With the positive opening system, even with an internal malfunction of the switch, for example welding of contacts, the opening of the NC contact and “shutdown” of the circuit controlled by this switch is guaranteed, provided the “union” strength between the mobile contact and NC contact, does not exceed 10 N (according to item K8.3.7 of IEC 60947-5-1 standard).
- To ensure positive opening, the external actuator element will provide a force on the actuator’s switch greater than the necessary force to operate the product in normal use conditions. This force will be applied in the same position of OP.
- The connections of security circuits should be made only in NC contact and the auxiliary connections in NO contact.

2- Electrical Connections

2.1- Cable’s cross section (flexible cables)
- minimum: 1 x 0.5 mm²
- maximum: 1 x 2.5 mm²
- Fixing torque: 0.2 until 0.3 Nm

2.2- Circuitry (with protection fuse)
- Circuit: IEC 60947-5-1 form Y+Y
- Marking: IEC 60947-1

2.3- Switch MK with Mk23 terminal cover
- We recommend using Mk23 to protect people against access to dangerous parts.
- The MK23 is fixed to MK by self-tapping screw.
- Fixing torque: 0.2 until 0.3 Nm
- Option 4 outputs for cables (see figure, identificacion 1 until 4). To create an output, it break with a screwdriver the membrane that cover the chosen output.
- Outputs 1 and 4: arrows a and b indicate the locations and the appropriate position of the screwdriver to start up breaking the side membrane.
- Outputs 2 and 3: position the screwdriver in the contours of the output and break the membrane.

2.4- Cables Fixing

- Use M4 screws with flat washer.
- Fixing torque: 0.4 until 0.7Nm

2.5- Short-circuit protective device
- 10A fuse type gG connected in series with the security circuit.

3- Housing Fixing

- Use M4 screws with flat washer.
- Fixing torque: 0.4 until 0.7Nm

4- Additional Cares

- Avoid environments where:
  - temperature changes cause condensation.
  - occur excessive vibration and shock and may damage the proper functioning of the switch.
  - there is explosive or inflammable gas.
- To install the product, attempt to the specified limits to ensure a correct performance.
- Positive Opening \( \text{IEC 60947-5-1 Annex K} \): attention to the values specified in the catalog to the necessary travel and force to ensure a perfect operation of positive opening system.
- Do not use these products as a mechanical stop.
- Do not use these products as safety or emergency stop devices or in any other application where the failure of the product could result in personal injury.
MK Series

Basic Switch 2NC with Positive Opening

INSTALLATION INSTRUCTIONS - Continuation

⚠️ WARNING

- Turn off the power to make electrical connections or before any maintenance on the switch or equipment where it is applied. Electric shock will result in death or serious injury.
- Installation and maintenance services for electrical equipment should be executed only by qualified personnel.
- Read these instructions carefully. Retain instructions for future reference.
- Inappropriate use of the product could result in personal injury and/or property.
- Additional information: export@kap.com.br

5- Technical Data

- Utilization Category: AC-15 DC-13
- Rated Operational Voltage (Ue): 240 V 125 V
- Rated Operational Current (Ie): 3 A 0,22 A
- Rated Insulation Voltage (Ui): 300 V
- Conventional Free Air Thermal Current (Ith): 10 A
- Rated Impulse Withstand Voltage (Uimp): 1500 A
- Rated Frequency: 50/60 Hz
- Contact Resistance: 50 mΩ maximum initial (at 1 A, 5 Vdc)
- Rated Conditional Short-circuit current: 100 A
- Degree of Protection: IP20 (IEC 60529) with MK23 terminal cover assembled
- Equipment Protection: without protection against ingress of water and protection against access to hazardous parts ingress of solid objects up to ø12,5mm
- People Protection: protection against accidental touch by persons fingers
- Ambient Temperature: +85°C maximum
- Mechanical Durability: 1,000,000 cycles until 90 cycles/min max.
- Electrical Durability: 10,000 cycles until 6 cycles/min max.
- Operating Speed: 0,8 mm/s minimum until 1 m/s maximum (at pin plunger)
- Pollution Degree: 2 (IEC 60947-1)
- Electromagnetic Compatibility (EMC): not applicable (IEC 60947-1)
- Immunity: equipment not incorporating electronic circuits
- Emission: electromagnetic disturbances can only be generated by equipment during occasional switching operations and the duration of the disturbances is of the order of milliseconds
- Material Housing: Glass-reinforced polymer

6- Operation Recommendations

The correct way to operate the switch may affect significantly their durability. Check below some examples of actuators and their directions of operation.

7- Travels

Terminology:
CF...... Operation force
PF...... Positive opening force
PT...... Pre travel
FP...... Free position
OP...... Operating position
PP...... Positive opening travel
OT...... Overtravel

Numbers of Contacts: 2NC

Positive opening travel (PP)
NC opening (OP)
Free position (FP)
Max Travel
Closed contact
Opened contact

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