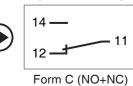


- Snap action contacts mechanism
- For aplications on security system
- Screw or quick connect (faston) terminals
- Increased contact gap
- In conformity with Low Voltage Directive 2006/95/EC
- IEC 60947-5-1 approved component

# Basic Switch with Positive Opening

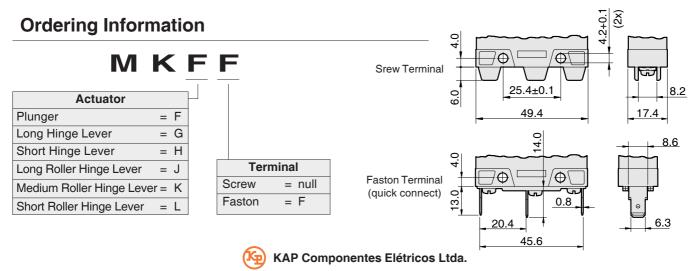


Circuitry (IEC 60947-5-1)



# **Specifications**

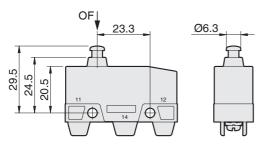
Utilization Category (IEC 60947-5-1)	AC-15		
Rated Operational Voltage (Ue)	240V		
Rated Operatinal Current (Ie)	3A		
Rated Insulation Voltage (Ui)	300V		
Conventional free air thermal current (Ith)	10A		
Contact Resistance	50mΩ maximum initial (at 1A 5Vcc)		
Ambient Temperature	+85°C maximum		
Degree 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		



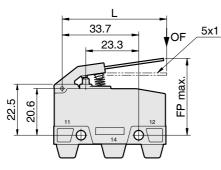


Actuators (dimensions in mm)

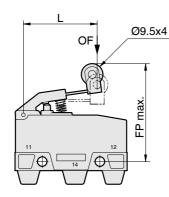
**Plunger Actuator** 



Hinge Lever Actuator



**Roller Hinge Lever Actuator** 



Code	L	FP max.	Travel Diagram	
MKJ	66,4	50	11 15,5 (⊕) 12 14	
MKJF	00,4	50	$\begin{array}{c c} 12 \\ 14 \\ 0 \\ \hline 5,8 \\ 17 \end{array}$	
МКК	54,4	47,8	9,2 12,6 ( <sup>(</sup> ))	
MKKF	0-1,-1	47,0	12 14 0 <u>4,7</u> 14,1	
MKL	32,5	44,2	5,9 7,6 (⊕) 12 14	
MKLF	52,5	44,2	12 14	

Λ

# **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 ( ).

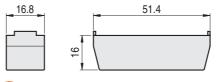
Code		OF max.①	PF min.②
		(kgf)	(kgf)
MKF	MKFF	0,50	4,40
MKG	MKGF	0,10	0,65
MKH	MKHF	0,15	1,00
MKJ	MKJF	0,10	0,68
МКК	MKKF	0,13	0,86
MKL	MKLF	0,21	1,39

2,8

# Accessory

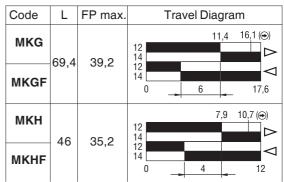
MK2

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



**Basic Switch with** 

**Positive Opening** 



8.8



# INSTALLATION INSTRUCTIONS

## **1- Positive Opening**

- The symbol O (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 OP.

- The connections of security circuits should be made only in NC contact and the auxiliary connections in NO contact.

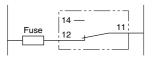
## **2- Electrical Connections**

2.1- Cable's cross section (flexible cables)

- minimum: 1 x 0,5 mm<sup>2</sup>
- maximum: 2 x 2,5 mm<sup>2</sup>
- 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



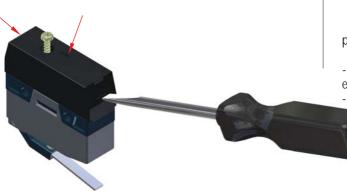
2.3- Switch MK with M33 terminal cover

- We recommend using M33 to protect people against access to dangerous parts.

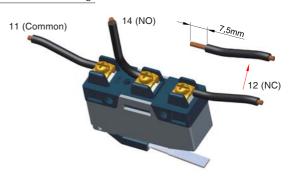
- The M33 is fixed to MK by self-tapping screw.
- Fixing torque: 0,2 until 0,5 Nm

- 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 membrene 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.

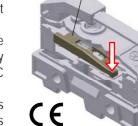
- To install the product, attempt to the specified limits to ensure a correct performance.

- 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.

### 😟 KAP COMPONENTES ELÉTRICOS Ltda.



Switch operated and with the

security element actived

Positive Opening

Security element

Basic Switch with



Rev. 04

### A 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 informations: export@kap.com.br

## 5- Technical Data

<ul> <li>Utilization Category</li> <li>Rated Operational Current (le)</li> <li>Rated Operational Current (le)</li> <li>Rated Operational Current (le)</li> <li>A ated Frequency</li> <li>Conventional Free Air Thermal Current (th)</li> <li>Rated Conditional Short-circuit Current</li> <li>Degree of Protection</li> <li>Ambient Temperature</li> <li>Ambient Temperature</li> <li>Ambient Temperature</li> <li>Operating Speed</li> <li>Operation Speed</li> <li>Pollution Degree</li> <li>Contact Resistance</li> <li>Ambient Temperature</li> <li>Machanical Durability</li> <li>Electrical Durability</li> <li>Electromagnetic Compatibility (EMC)</li> <li>Electromagnetic Compatibility (EMC)</li> <li>Material Housing</li> <li>Correct way to operate the switch may affect significantly their durability. Check below some examples of actuators and their directions of operation.</li> <li>Material Housing</li> <li>Correct way to operate the switch may affect significantly their durability. Check below some examples of actuators and their directions of operation.</li> <li>Actuator H</li> <li>Actuator H</li> <li>Actuator H</li> <li>Actuator H</li> </ul>		
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7- Travels Actuator H Actuator H Actuator H Actuator H Actuator H Actuator L Actuator L Actuator L Actuator L Actuator L Actuator L Actuator L Actuator L Performance Positive opening travel (PP) NC opening and NO closing (OP) Numbers of Contacts NC Preformance	↓	12 4,1 7,6 (e)
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7- Travels     Actuator H       Actuator H     Actuator L       Operation force     PF       PF     Positive opening travel (PP)       Numbers of Contacts NC     1,7     2,6 (e)       Image: Notice opening force     Numbers of Contacts NC     1,2       Image: Notice opening force     1,7     2,6 (e)		
Terminology:       Operation force         OF Operation force       Presitive opening travel (PP)         NC opening and NO closing (OP)       Pushing the switch         Numbers of Contacts NC       1,7       2,6 (G)         12       14       14	Travele Actuator H	
Terminology:       NC opening and NO closing (OP)       Pushing the switch         OF Operation force       Numbers of Contacts NC       1,7       2,6 (c)         PFRelease force       12       14       12		
Terminology:       NC opening and NO closing (OP)       Pushing the switch         OF Operation force       Numbers of Contacts NC       1,7       2,6 (c)         PFRelease force       12       14       14		
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Terminology:       NC opening and NO closing (OP)       Pushing the switch         OF Operation force       PFPositive opening force       1,7       2,6 (c)         RFRelease force       12       14       14		
OF Operation force PF Positive opening force RFRelease force	rminologu	
PFPositive opening force RFRelease force	Operation force	
RFRelease force		
PT Pre travel	Due tracial	
ED From position		
OD Operating position		
PPPositive opening travel	Positive opening travel	
OT Overtravel		
KAP COMPONENTES ELÉTRICOS Ltda.		COMPONENTES ELÉTRICOS Ltda.
FP Free position OP Operating position PPPositive opening travel	Differential travel Pre travel N Free position Operating position Positive opening travel Overtravel	Iumbers of Contacts NO Free position (FP) Differential travel (DT)

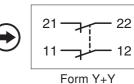


- Slow action contacts mechanism
- 2 NC contacts with positive opening (IEC 60947-5-1)
- For aplications on security system
- Ideal for applications where redundancy is needed
- Glass-reiforcced polyamide V-0 enclosure
- Increased contact gap
- Screw terminals
- In conformity with Low Voltage Directive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

# Basic Switch 2NC with Positive Opening



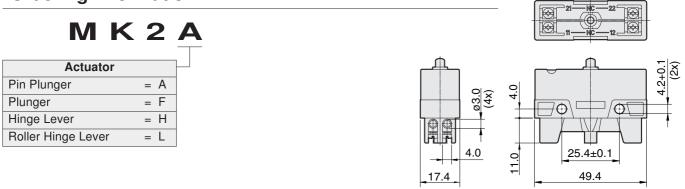
Circuitry (IEC 60947-5-1)



# Specifications

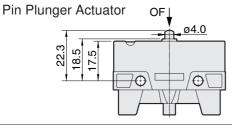
Utilization Category (IEC 60947-5-1)	AC-15	DC-13		
Rated Operational Voltage (Ue)	240 V	125 V		
Rated Operatinal Current (Ie)	3 A	0,22 A		
Rated Insulation Voltage (Ui)	300 V			
Conventional Free Air Thermal Current (Ith)	10 A			
Rated Impulse Withstand Voltage (Uimp)	1500 V			
Contact Resistance	50 m $\Omega$ maxim	num initial (at 1A 5V	′cc)	
Ambient Temperature	+85°C maxim	um		
Degree of Protection	IP20 (with ass	embled MK23 termin	al cover) (	IEC 60529)
Operating Speed	8 mm/s minimum until 1 m/s maximum (at pin plunger)			
Mechanical Life Expectancy	1.000.000 cyc	les at 90 cycles/min	max.	
Electrical Life Expectancy	10.000 cyc	les at 6 cycles/min m	iax.	
Materials	Enclosure:	Polyamide reinforce	ed	
	Pin Plunger:	Polyamide reinforce	ed	
	Moving Blade	: Copper Alloy		
	Contacts:	Silver alloy		
	Actuators:	Lever actuator:	Lever:	Stainless steel
			Roller:	Polyamide reinforced
		Plunger actuator:	Actuator	Nickel plated brass

# **Ordering Information**



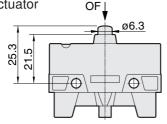
#### KAP Componentes Elétricos Ltda.



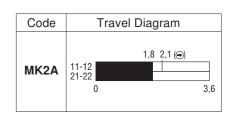


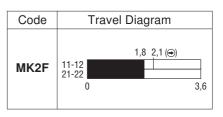
Plunger Actuator

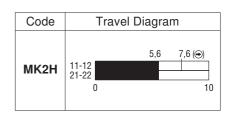
Hinge Lever Actuator







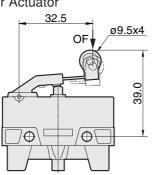




Roller Hinge Lever Actuator

19.5

17.6



46.0

 $\oplus$ 

29.9

'⊕

5x1

OF

Ņ

20

Code	Travel Diagram		
MK2L	4,1 4,8 (⊕) 11-12 21-22 0	7,5	

# **Positive Opening Operation on NC Contact**

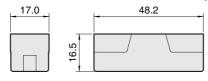
1 OF is the necessary force to operate the product in normal use conditions. 2 To ensure the positive opening, the external actuator element will provide a force PF on switch's actuator, greater than OF and in the same position.

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 (  $\bigcirc$  ).

Code	OF máx.①	PF mín.②
	(kgf)	(kgf)
MK2A	0,90	3,50
MK2F	0,90	3,50
MK2H	0,31	1,50
MK2L	0,50	2,00

# Accessory

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







# INSTALLATION INSTRUCTIONS

### 1- Positive Opening

- The symbol 🕞 (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 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 OP.

- The connections of security circuits should be made only in NC contact and the auxiliary connections in NO contact.

## 2- Electrical Connections

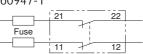
2.1- Cable's cross section (flexible cables)

- minimum: 1 x 0.5 mm<sup>2</sup>
- maximum: 1 x 2,5 mm<sup>2</sup>
- 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

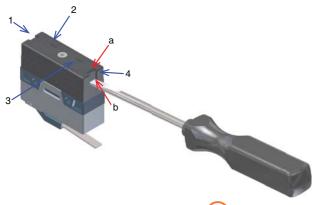
- Option 4 outputs for cables (see figure, identificacion 1 until

4). To create an output, it break with a screwdriver the

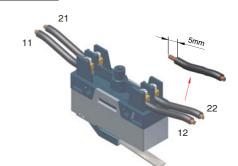
membrane that cover the chosen output.

- 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



#### 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 🔿 : attention to the values specified in the catalog to the necessary travel and force to ensure a perfect operation of positive opening system.

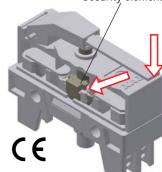
- Do not use these products as a mechanical stop.

- 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.

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Switch operated and with the

security element actived



Subject to change without prior notice

Security element

# **Basic Switch 2NC with Positive Opening**



# **INSTALLATION INSTRUCTIONS - Continuation**

### **A** WARNING

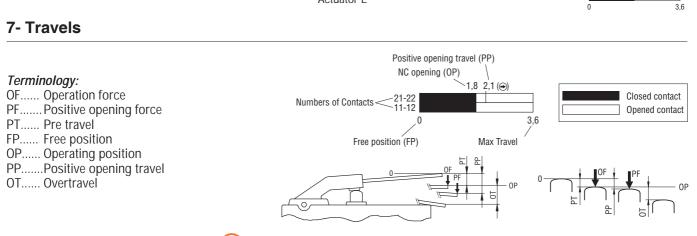
- Turn off the power to make electrical connections or before any maintenance on the switch or equipment where it is applied. Electric shock will result in death or serious injury.
- Installation and maintenance services for electrical equipment should be executed only by gualified personnel.
- Read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

### 5- Technical Data

- In conformity with standards IEC 60947-5-1 / EN 60947-5-1 / IEC 60947-1 / EN60947-1 / IEC 60529 / EN 60529 / Directive 2006/95/EC - Utilization Category DC-13 AC-15 - 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 m $\Omega$  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. 0,8 mm/s minimum until 1 m/s maximum (at pin plunger) - Operating Speed - Pollution Degree 2 (IEC 60947-1) - Electromagnetic Compatibility (EMC) not applicable (IEC 60947-1) - Immunity: equipment not incorporating electronic circuits electromagnetic disturbances can only be generated by equipment - Emission: during occasional switching operations and the duration of the disturbances is of the order of milliseconds - Material Housing Glass-reinforced polymer Actuator A 6- Operation Recomendations 1,8 2,1 () The correct way to operate the switch may affect significantly their durability. Check below some examples of actuators and their directions of operation. Actuator F 11-12 21-22 11-12 21-22 1,8 2,1 () Actuator H Actuator L 3.6 7- Travels



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