# SNAP-ACTION SWITCHES

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE







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# SNAP-ACTION SWITCHES

**Micro-limit pushbutton switches** are used in many applications including microwave ovens, vending machines, copy and fax machines, medical and security equipment, computer peripherals and many others. They are characterized by close tolerance precision switching positions and long service life. APEM micro-limit switches are 100% electronic tested prior to shipment to insure proper operation and conformance with specifications.

## DEFINITIONS OF TERMS

**Free position**
Position of the switch actuator when no force is applied.

**Operating position**
The position of the actuator when the contact snaps.

**Overtravel position**
The final position of the actuator.

**Release position**
The position of the actuator when the contact snaps back from the operating position to original position.

**Contact opening gap**
The distance between the open contact pair.

**Pretravel**
The distance between free and operating positions.

**Overtravel**
The distance the actuator travels after the contact actuates.

**Movement differential**
The distance from the operating to release position of the actuator.

**Free travel**
The distance between the release and free positions.

**Back travel**
The distance between the overtravel and release positions.

**Total travel**
The sum of pretravel and overtravel.

**Operating force**
The force required to cause snap action of contact.

**End operating force**
The force to be applied to keep the actuator in the allowed final position.

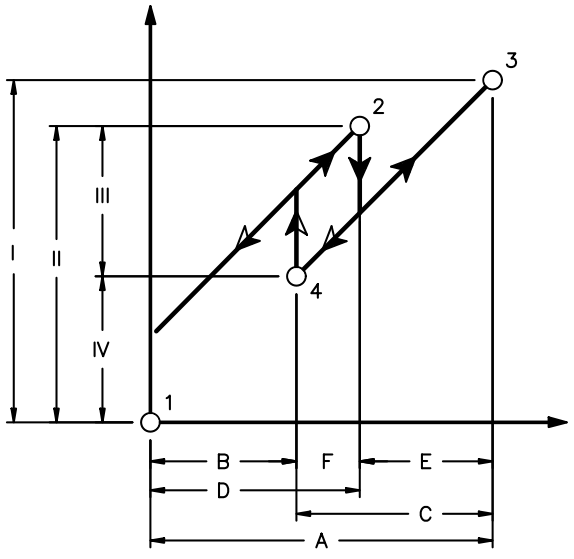
**Release force**
The force applied to the actuator at the moment the contact snaps back from the operating position.

**Differential force**
The difference between the operating force and the release force.

**Mechanical life**
The minimum number of actuations with no load on the switch.

**Electrical life**
The minimum number of actuations at rated voltage, rated current and resistive load at 20°C ambient temperature.

| | |
|---|---|
| 1 | free position |
| 2 | operating position |
| 3 | overtravel position |
| 4 | release position |
| A | total travel |
| B | free travel |
| C | back travel |
| D | pretravel |
| E | overtravel |
| F | movement differential |
| I | total force |
| II | operating force |
| III | differential force |
| IV | release force |




**FORCE vs. TRAVEL DIAGRAM**

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# MB SERIES - SNAP-ACTION SWITCHES



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## FEATURES

- **Ratings: 10 Amps 250 VAC (resistive load). 1.5 Amps 250 VAC (motor load).**
- **Single pole CO (change-over or alternate action), NC (normally closed momentary) and NO (normally open momentary) configurations.**
- **Close tolerance switching action with long life (10,000,000 mechanical cycles min.).**
- **Pin plunger, hinge lever or roller lever actuator options.**

## MATERIALS

| | |
|---|---|
| **Contacts:** | Stationary: Nickel silver Shorting: Beryllium copper |
| **Actuator:** | POM (UL94HB) |
| **Case & cover:** | PBT (UL94V-O) |
| **Terminals:** | Silver plated copper/zinc |

## AGENCY RECOGNITION

NRTL

## SPECIFICATIONS

| | |
|---|---|
| Operating force: | - 10 oz. (274 grams) approx. |
| Pretravel: | - .039" (1mm) |
| Overtravel: | • .024" (0.6mm) |
| Movement differential: | - .005" (0.13mm) |
| Free position: | - .366" (9.3mm) |
| Operating position: | .331" ± .012" (8.4mm ± (0.3mm) |
| Operating temperature: | -40°C to +85°C |
| Contact gap: | < .118" (3mm) |
| Tracking resistance: | >PTI 175 |

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# MB SERIES - SNAP-ACTION SWITCHES

## ORDER FORMAT

**M B D 5 B 1**

**Series**
MB

**Circuit & quick-connect terminals**
- D Normally open (solder terminal)
- E Normally closed (solder terminal)
- F Change-over (solder terminal)
- G Normally open (p.c. terminal)
- H Normally closed (p.c. terminal)
- J Change-over (p.c. terminal)

**Switch rating**
5 10(1.5)A 250 VAC

**Actuator style**
- A Pin actuator
- B Hinge actuator
- C Roller actuator

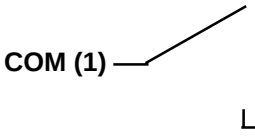
**Length**
Actuator length and fixed position- (see table below)

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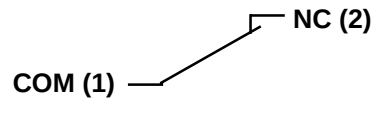
## STANDARD MODELS

| Circuit | | | Normally open | | Normally closed | | Change-over | |
|---|---|---|---|---|---|---|---|---|
| Terminals | | | Solder | P.C. | Solder | P.C. | Solder | P.C |
| Pin plunger with radius<br>Pin plunger, spherical form | | | MBD5A<br>MBD5D | MBG5A<br>MBG5D | MBE5A<br>MBE5D | MBH5A<br>MBH5D | MBF5A<br>MBF5D | MBJ5A<br>MBJ5D |
| Lever type | Fix | Act. length | | | | | | |
| Hinge lever | EH | .189" (4.8mm) | MBD5B | MBG5B | MBE5B | MBH5B | MBF5B | MBJ5B |
| | EV | .276" (7.0mm) | MBD5B2 | MBG5B2 | MBE5B2 | MBH5B2 | MBF5B2 | MBJ5B2 |
| | EH | .276" (7.0mm) | MBD5B1 | MBG5B1 | MBE5B1 | MBH5B1 | MBF5B1 | MBJ5B1 |
| | EV | .370" (9.4mm) | MBD5B3 | MBG5B3 | MBE5B3 | MBH5B3 | MBF5B3 | MBJ5B3 |
| **Roller lever** | EH | .098" (2.5mm) | MBD5C | MBG5C | MBE5C | MBH5C | MBF5C | MBJ5C |
| | EV | .185" (4.7mm) | MBD5C2 | MBG5C2 | MBE5C2 | MBH5C2 | MBF5C2 | MBJ5C2 |
| | EH | .185" (4.7mm) | MBD5C1 | MBG5C1 | MBE5C1 | MBH5C1 | MBF5C1 | MBJ5C1 |
| | EV | .280" (7.1mm) | MBD5C3 | MBG5C3 | MBE5C3 | MBH5C3 | MBF5C3 | MBJ5C3 |
| **Simulated roller lever** | EH | .098" (2.5mm) | MBD5E | MBG5E | MBE5E | MBH5E | MBF5E | MBJ5E |
| | EV | .185" (4.7mm) | MBD5E2 | MBG5E2 | MBE5E2 | MBH5E2 | MBF5E2 | MBJ5E2 |
| | EH | .185" (4.7mm) | MBD5E1 | MBG5E1 | MBE5E1 | MBH5E1 | MBF5E1 | MBJ5E1 |
| | EV | .280" (7.1mm) | MBD5E3 | MBG5E3 | MBE5E3 | MBH5E3 | MBF5E3 | MBJ5E3 |

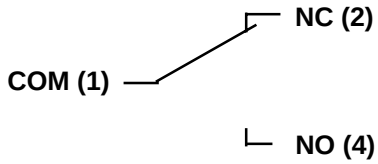
**NO = NORMALLY OPEN:**




**NC = NORMALLY CLOSED:**




**CO = CHANGE-OVER:**

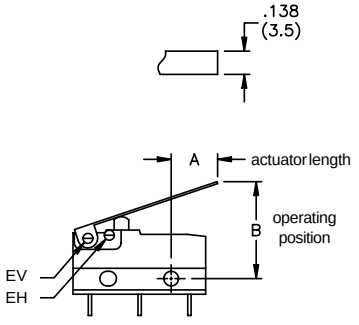



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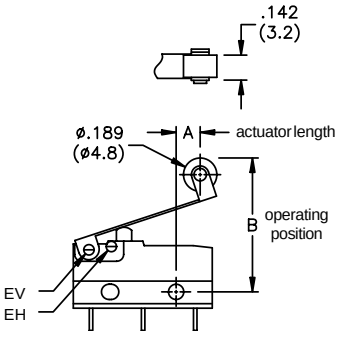

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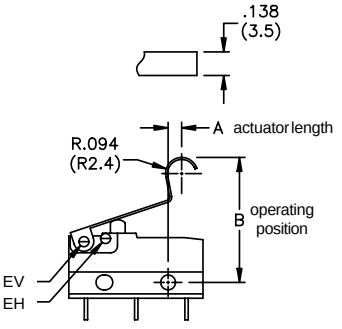
## ACTUATORS AND SPECIFICATIONS




Hinge lever



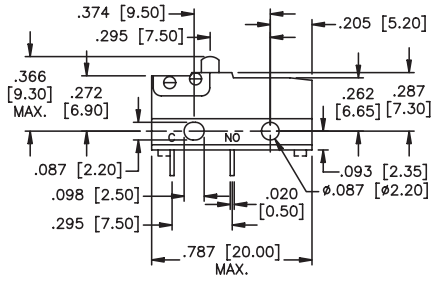

Roller lever



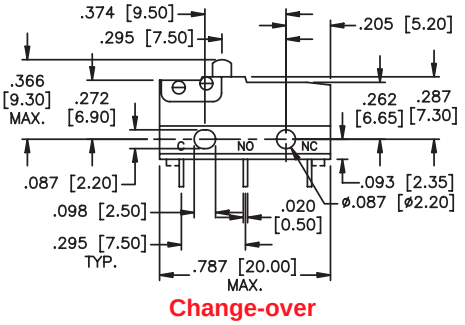

Simulated roller lever

| Actuator | Hinge lever | | | | Roller lever | | | | Simulated roller lever | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Actuator length, inches ±.031" | .189 | .276 | .276 | .370 | .098 | .185 | .185 | .280 | .098 | .185 | .185 | .280 |
| Dim 'A' ±0.8mm | 4.8 | 7.0 | 7.0 | 9.4 | 2.5 | 4.7 | 4.7 | 7.1 | 2.5 | 2.7 | 4.7 | 7.1 |
| Fixed position, EH=rear EV=front | EH | EV | EH | EV | EH | EV | EH | EV | EH | EV | EH | EV |
| Operating force, - grams | 100 | 45 | 85 | 40 | 110 | 50 | 95 | 40 | 115 | 60 | 95 | 50 |
| Pre-travel, - inches | .177 | .354 | .197 | .394 | .177 | .354 | .197 | .394 | .177 | .354 | .197 | .394 |
| - mm | 4.5 | 9 | 5 | 10 | 4.5 | 9 | 5 | 10 | 4.5 | 9 | 5 | 10 |
| Overtravel, min. inches | .030 | .049 | .030 | .059 | .030 | .049 | .030 | .059 | .030 | .049 | .030 | .059 |
| min. mm | 0.75 | 1.25 | 0.75 | 1.5 | 0.75 | 1.25 | 0.75 | 1.5 | 0.75 | 1.25 | 0.75 | 1.5 |
| Overtravel, max. inches | .059 | .098 | .059 | .118 | .059 | .098 | .059 | .118 | .059 | .098 | .059 | .118 |
| max.mm | 1.5 | 2.5 | 1.5 | 3 | 1.5 | 2.5 | 1.5 | 3 | 1.5 | 2.5 | 1.5 | 3 |
| Movement diff.- inches | .035 | .059 | .047 | .071 | .028 | .059 | .039 | .071 | .028 | .059 | .039 | .071 |
| - mm | 0.9 | 1.5 | 1.2 | 1.8 | 0.7 | 1.5 | 1 | 1.8 | 0.7 | 1.5 | 1 | 1.8 |
| Free position, - inches | .551 | .709 | .591 | .787 | .748 | .866 | .787 | .945 | .748 | .866 | .787 | .945 |
| - mm | 14 | 18 | 15 | 20 | 19 | 22 | 20 | 24 | 19 | 22 | 20 | 24 |
| Operating position, Dim 'B', inches | .421 | .472 | .437 | .492 | .622 | .669 | .638 | .689 | .630 | .677 | .646 | .697 |
| Tolerance inches ± | .063 | .118 | .071 | .138 | .063 | .118 | .071 | .138 | .063 | .118 | .071 | .138 |
| Operating position, Dim 'B', mm | 10.7 | 12 | 11.1 | 12.5 | 15.8 | 17 | 16.2 | 17.5 | 16 | 17.2 | 16.4 | 17.7 |
| Tolerance mm ± | 1.6 | 3 | 1.8 | 3.5 | 1.6 | 3 | 1.8 | 3.5 | 1.6 | 3 | 1.8 | 3.5 |
| Order code | B | B2 | B1 | B3 | C | C2 | C1 | C3 | E | E2 | E1 | E3 |

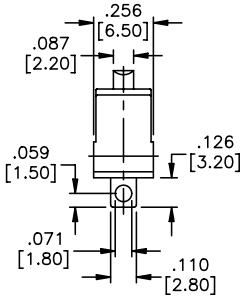
## MECHANICAL OUTLINES



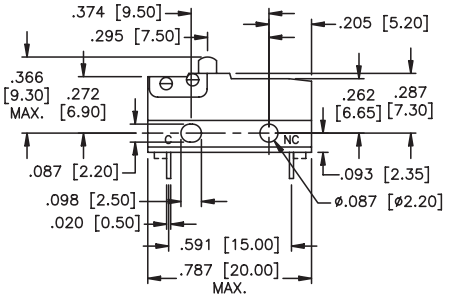

Normally open



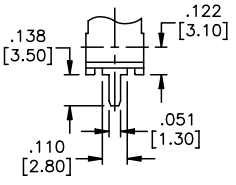

Change-over




Side view (w/solder terminal)




Normally closed




P.C. terminal

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