

# SNAP-ACTION SWITCHES

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



# 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.

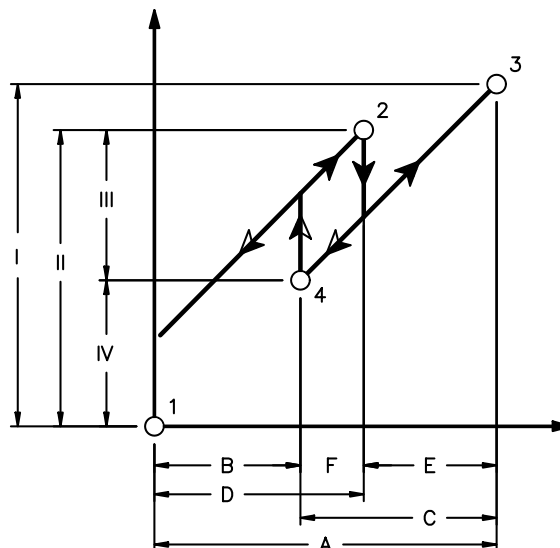
### Electrical life

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

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- 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**

# MB SERIES - SNAP-ACTION SWITCHES



## 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

<b>Contacts:</b>	Stationary: Nickel silver	Shorting: Beryllium copper
<b>Actuator:</b>	POM (UL94HB)	
<b>Case &amp; cover:</b>	PBT (UL94V-O)	
<b>Terminals:</b>	Silver plated copper/zinc	

## AGENCY RECOGNITION



## 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

# MB SERIES - SNAP-ACTION SWITCHES

## ORDER FORMAT

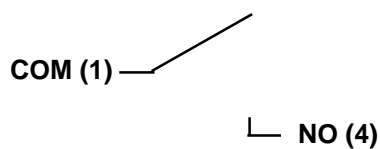
**M B D 5 B 1**

<b>Series</b>	<b>Circuit &amp; quick-connect terminals</b>	<b>Switch rating</b>	<b>Actuator style</b>	<b>Length</b>
<b>MB</b>	<b>D</b> Normally open (solder terminal) <b>E</b> Normally closed (solder terminal) <b>F</b> Change-over (solder terminal) <b>G</b> Normally open (p.c. terminal) <b>H</b> Normally closed (p.c. terminal) <b>J</b> Change-over (p.c. terminal)	<b>5</b> 10(1.5)A 250 VAC	<b>A</b> Pin actuator <b>B</b> Hinge actuator <b>C</b> Roller actuator	Actuator length and fixed position- (see table below)

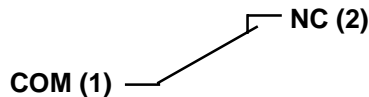
## STANDARD MODELS

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

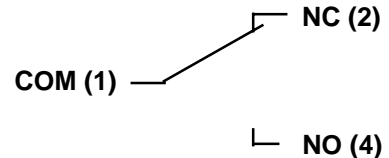
**NO = NORMALLY OPEN:**



**NC = NORMALLY CLOSED:**



**CO = CHANGE-OVER:**

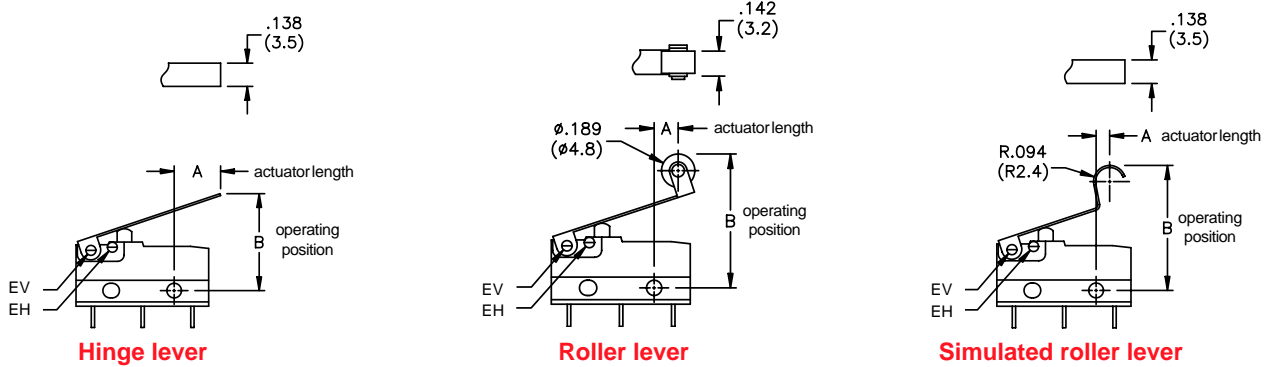


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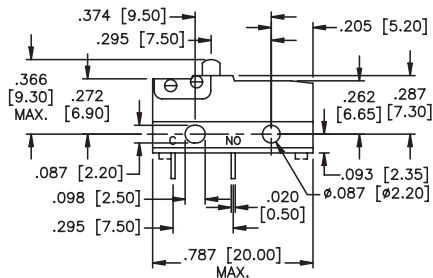
# MB SERIES - SNAP-ACTION SWITCHES

## ACTUATORS AND SPECIFICATIONS

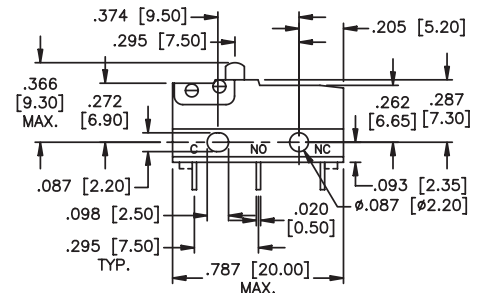


Actuator	Hinge lever				Roller lever				Simulated roller lever			
Actuator length, inches ±.031"	.189	.276	.276	.370	.098	.185	.185	.280	.098	.185	.185	.280
Dim 'A' ±0.8mm	4.8	7.0	7.0	9.4	2.5	4.7	4.7	7.1	2.5	4.7	4.7	7.1
Fixed position, EH=rear EV=front	EH	EV	EH	EV	EH	EV	EH	EV	EH	EV	EH	EV
Operating force, - 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

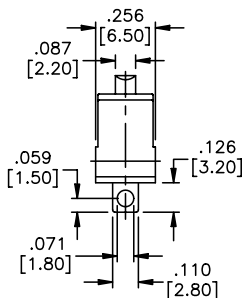
## MECHANICAL OUTLINES



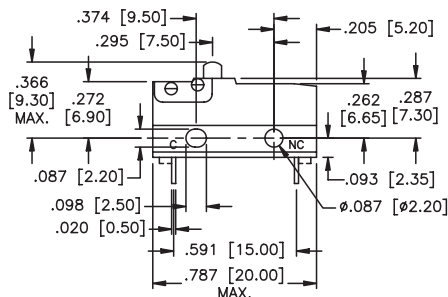
Normally open



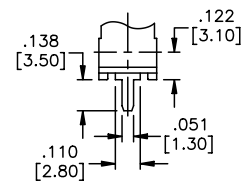
Change-over



Side view (w/solder terminal)



Normally closed



P.C. terminal

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