MICROPRECISION
electronics sa

Snap Action Switch Catalog

SWISS MADE

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If your application depends on it.

Index

Product Specifications

Design and specifications are subject to change for improvement without prior notice.

The Company

Microprecision Electronics SA is a company of Swiss origin. Founded in 1956 in the center of Europe, close to Lake Geneva, the company started as a supplier for the Swiss watch industry. Its competencies in the manufacturing of precision parts and components led to the development of snap action microswitches with a large selection of precise actuators. During the following years Microprecision increased its product range with safety switches.

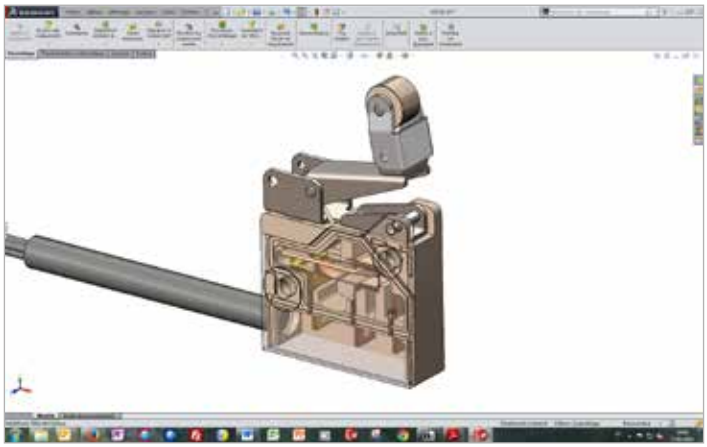
In 2008, Microprecision Electronics SA extended its presence in North America through the acquisition of Wilbrecht Electronics, a manufacturer of LED indicator lights and metal foil resistors, located in Minnesota.

Today, Microprecision Electronics SA manufactures at its locations in Switzerland and the United States. The product line consists of standard and customized microswitches, limit and safety switches as well as LED indicator lights. Products are sold through its distribution channel all over the world to customers in Europe, North America and Asia.

The Products

The microswitches and safety switches are manufactured under an ISO 9001 certified quality system and are also approved to follow the international standards under UL, ENEC and CSA. The products are specifically designed for a low differential travel, a precise actuating point, wide operating temperature range and sealing up to IP68.

For these reasons, our products are used in the most demanding industrial applications: light actuating force for pressure switch applications, small differential travel in electromagnetic break control and IP68 for underwater switching applications are just some examples.

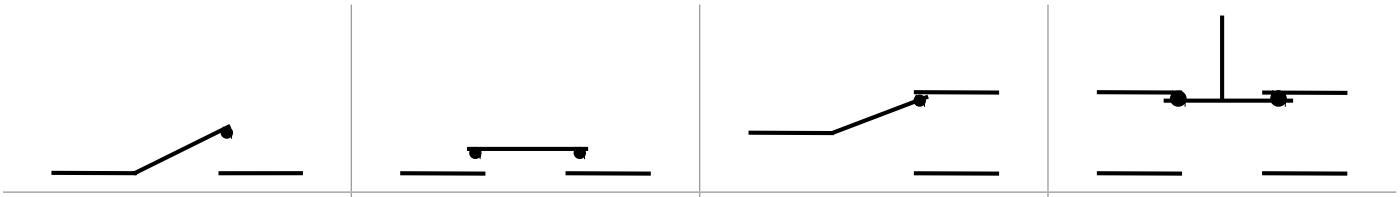


Since every company has needs that are specific to its own unique application, we offer our customers tailor-made products. Our experienced engineers use 3D design workstations and are able to make modifications to dimensions, choice of materials, switching parameters as well as design custom actuators.

In Microprecision Electronics SA you will find a partner to help solve your unique switch requirements from early design to final product.

Terminology

Contact variations



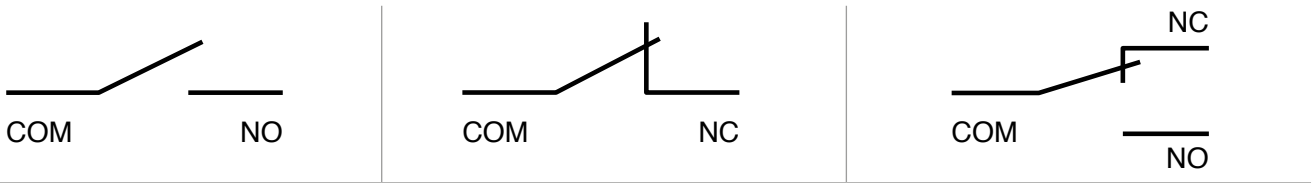
SPST Single-Pole Single-Throw Single-Break	**SPST** Single-Pole Single-Throw Double-Break	**SPDT** Single-Pole Double-Throw Single-Break	**SPDT** Single-Pole Double-Throw Double-Break

Contact materials

The spring blade is made of copper/beryllium with the moving contact made of silver. The fixed NC and NO contacts are produced of a silver-copper bi-metal band. Those materials are used for standard applications under standard power.

For low power switching below 100 mA/24V, we recommend gold contacts to prevent any contact corrosion.

Electrical function



Normally open NO (Normally Open) Contact open, force applied needs to be higher than he actuating force to close the contact	Normally closed NC (Normally Closed) contact closed without any force applied. Force applied needs to be higher than the actuating force to open.	Change-over Upon an applied force higher than the actuating force, the moving contact moves from NC to NO

Contact Gap

The air gap between two contacts of different polarity when the circuit is open. The breaking power of a switch depends to a great extent on the distance between contacts. For a higher power rating the air gap needs to be increased to prevent any formation of an electrical arc.

The air gap may vary between 0.2mm and 0.8mm depending on the models. This parameter has a direct impact on the differential travel.

Positions / Forces

COMMAND CHARACTERISTICS TERMINOLOGY

	ACTUATOR POSITIONS		ACTUATOR TRAVEL		ACTUATOR FORCES
Pr	**Free Position** Position of actuator when no external force is applied to it.	**sa**	**Pre-Travel** Distance between the free position and the operating position.	**Fa**	**Actuating Force** That force which must be applied to the actuator to cause it to move from the free position (Pr) to the actuating position (Pa). Indicated in our literature for all actuators and basic models.
Pa	**Operating Position** Position of the actuator at the instant when an increasing applied force has just caused the snap action mechanism to operate.	**sr**	**Over-Travel** Distance between the operating position and the total travel position.	**Fr**	**Release Force** The value to which the applied force must be reduced in order to permit the switch to return to its initial position after operation.
Pfc	**Total Travel Position** Position of the actuator when an increasing applied force has caused it to move to the actual limit of the permissible travel. To avoid damage, actuator must not be forced past this point.	**sd**	**Differential Movement** Distance between the operating position and the release position.	**Fd**	**Differential force** The difference between the actuating force and the release force.
Pdr	**Release Position** Position of the actuator at the instant when a decreasing applied force allows the snap action mechanism to return to its initial state.	**st**	**Total Travel** Distance which is the sum of the pre-travel and the over-travel. The distance between the free position and the total travel position at the actual limits of permissible travel.	**Fct**	**Total Over-Travel Force** Force necessary to move the actuator from the free position to the total travel position.

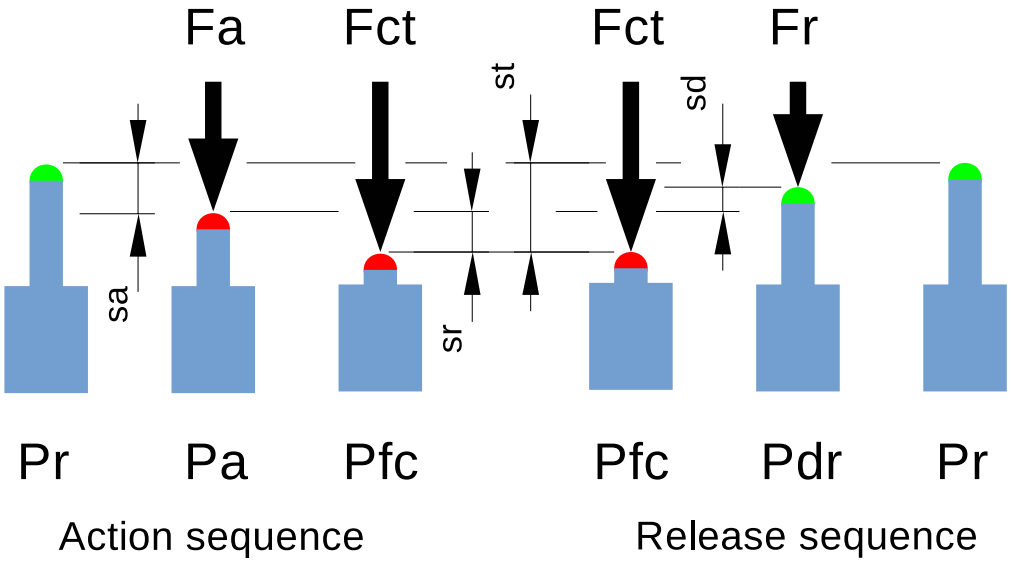


DIAGRAM APPLIED FORCE-TRAVEL

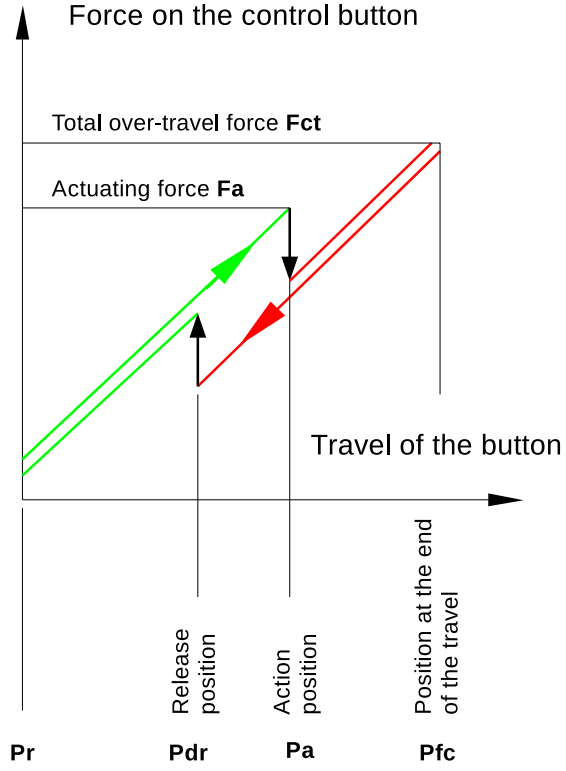
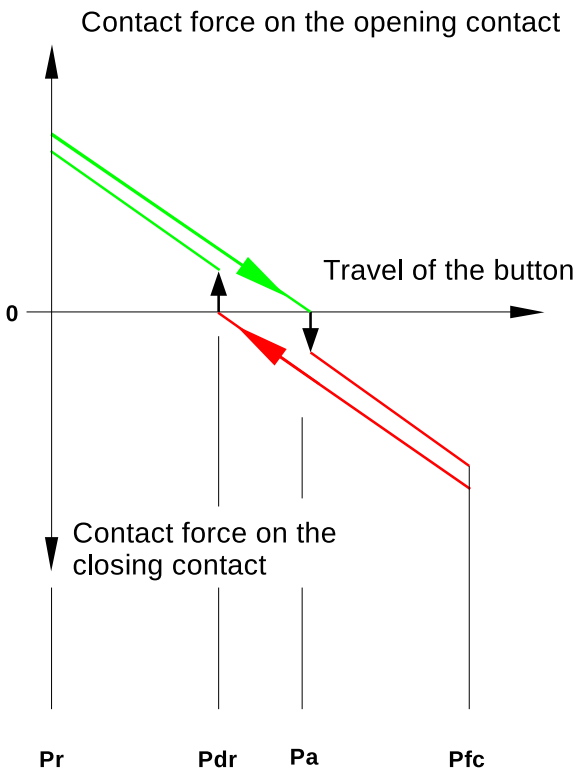


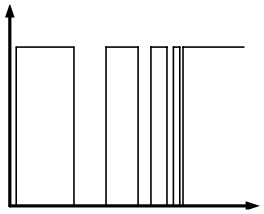
DIAGRAM CONTACT FORCE-TRAVEL

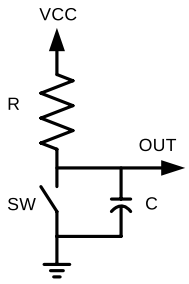


Bouncing

When closing a contact of a snap action switch, you may observe a bouncing of the mobile contact on the fixed contact before establishing a firm contact. These bounces may last between 0.2 and 4 ms depending on the type.

When used under low power, this bouncing may cause malfunctioning of the connected electronics. If this happens an added low-pass filter may eliminate/reduce this effect.





low pass filter

Swing over Time

This is the time taken by the mobile contact to move from one fixed contact to its rest position against the other fixed contact, including bounce time. The method of actuating, the type of microswitch and the actuator operating speed all affect this value which is generally less than 15 ms.

Electrical Life

The electrical life expectancy is the number of switching cycles a switch can operate under rated power. Our microswitches are tested under a resistive load.

The electrical life is reduced depending on the nature of the load, i.e. an inductive load (motor). A reduction of the switching power increases the electrical life of the switch.

The electrical life expectancy depends on a number of parameters: applied power, nature of the load, switching frequency, duty cycle, etc. We recommend that you run life tests on your specific application to establish the length of the electrical life with precision in your application.

Mechanical Life

The number of cycles a switch can achieve without any power applied is the observed mechanical life.

Contact Resistance

This is the sum of the resistances of the individual components which permit the flow of current when the contacts are closed. It is generally less than 60 milliohms.

In microswitches with a potted cable, the resistance of the cable has to be added.

Insulation Resistance

This is the resistance between the inside contacts and the external surface of the housing. For a new microswitch, this insulation resistance is superior than 10 MOhm.

Degree of Protection

The designation to indicate the degree of protection consists of the letters IP followed by two numerals. The first one indicating the protection of the housing against ingress of solid foreign bodies.

The second numeral indicates the protection against harmful intrusion of water as in the table indicated below.

1st numeral	Protection against solid objects	2nd numeral	Protection against water intrusion
0	Without protection	0	Without protection
1	Protection against solid objects > 50 mm	1	Protection against dripping water
2	Protection against solid objects > 12.5mm	2	Protection against dripping water when tilted up to 15°
3	Protection against solid objects > 2.5 mm	3	Protection against spraying water
4	Protection against solid objects > 1 mm	4	Protection against splashing water
5	Dust protected	5	Protection against water jets
6	Dust tight	6	Protection against powerful water jets
		7	Protection against temporary immersion
		8	Protection against continuous immersion

Approval and Marking

Our microswitches are tested and certified following international norms; the following norms are applied to our products:

UL	UL 61058		CSA	C22.2	
EN	EN 61058		ATEX	EN 60079	

REACH - RoHS

The products manufactured by Microprecision Electronics SA do not have to be registered or pre-registered under the REACH regulation. We have contacted all our suppliers to confirm that there are no substances of concern in the materials from where we receive them. To the best of our knowledge we do not use any substances in our products and they therefore conform to the REACH and RoHS regulations.

ISO9001

The norm ISO9001:2008 specifies a quality management system. A company has to show its capability to manufacture in a consistent manner product which fulfill customer requirement as well as legal and regulatory requirement.

On a regular basis, an external auditing body verifies that Microprecision Electronics SA is complying with the requirements of that norm. The actual certification body is AFAQ.

Installation Recommendations

Mounting

The microswitches have to be fixed on a smooth, flat surface using the recommended screw size. Do not tighten the screw more than indicated as the switch could be damaged. For increased security use an epoxy resin to glue the microswitch in place.

Do not exceed the recommended tightening torque for the screws:

Screw size	M2	M3	M3.5	M4
Tightening torque in Nm	0.3	0.5	0.8	1.2

Position and use

For the most reliable function of the microswitch, extend over actuating point by 50% of the available over travel. When releasing the switch and moving back in its free position, make sure there is no pre-loading force applied to ensure stable free position.

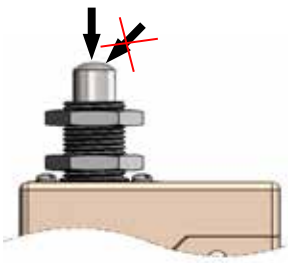
The microswitch should not be used as a mechanical stop by fully taking up the over travel. A strong impact on the housing could damage the switch or affect its life span.

Telescopic Plunger

A telescopic plunger allows to increase the available over travel. Whenever possible the mounting should be done using the threaded collar and tightening the nuts provided for that purpose. The length of the threaded collar can easily be custom modified to adapt to your mounting requirements.

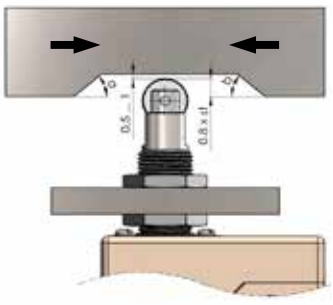
Domed Plunger

The telescopic plunger has to be pressed axially. The deviation from the plunger axis should not exceed 5°. The plunger can be supplied with a protective sleeve to prevent foreign bodies from penetrating between the actuator button and the collar.



Roller Plunger

The roller plunger can be actuated by means of a rotating or sliding cam. The strike angle and position must be calculated in such a way to avoid a sudden shock on the roller. The roller plunger must not be struck by a cam with an attack angle exceeding 40° and a speed higher than 2m/s. For a speed up to 3 m/s, the angle has to be lower than 30°.



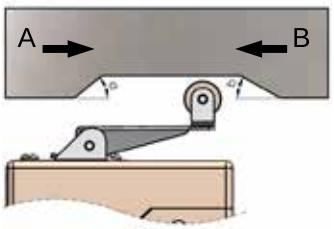
Indirect Action Levers

Simple Lever

The straight levers are the most robust and reliable of the lever actuators. The small switch plunger button is protected against sudden impact and an excessive force. In the initial position, the lever is pressing down the plunger button. Activating the lever releases the plunger.

These levers can easily be modified by extending the lever or adding rollers or floaters.

Indirect Roller Lever

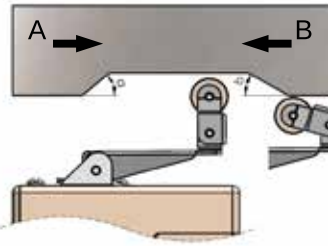


This auxiliary actuator is recommended for rapid movements while sharp striking angles and shocks to the roller should be avoided. The cam must ease the lever back to the initial free position.

Please observe the following maximum angles for speeds up to 2 m/s.

Approach from A: max 45°
Approach from B: max 30°

Lever with Bending Roller



The actuator is operated only by travel from A. The actuator is not operated on the return travel of a rotating or sliding cam.

The limitations on the striking angles are the same as for an indirect roller lever, with a limitation on speed of 2 m/s.

Approach from A: max 45°
Approach from B: max 30°

IMPORTANT: This form of actuator must be very accurately installed in order that the roller stirrup may tip back without forcing or actuating the microswitch. Too low a striking point will cause the stirrup to wrench from the lever.

Direct Action Levers

The lever acts directly on the pin plunger with an actuating force at the end of the lever arm reduced by its length. The application conditions remain the same as for the indirect levers.

The lever can easily be adapted to your requirements by extending or bending the lever arm or by adding rollers or floaters.

Soldering

Prevent any overheating of the contacts when soldering. Using excessive heat can displace the contacts and damage the microswitch. Do not apply force to the contacts immediately after soldering.

Cable Cross Section

The cable cross section has to be adapted to the rated power used as per the table below. If an application is requiring a cross section lower than the section recommended, Microprecision Electronics SA will print on the switch the rated power corresponding to the used cable.

Standard Series	Cross Section (mm^2)	Power Rating
MP400-500	0.25	250VAC 2A
MP400-500	0.50	250VAC 5A
MP300	0.75	250VAC 6A
MP220-225	1.00	250VAC 10A
MP40-90-110-210-215	1.00	400VAC 10A
MP40-90-110-210	1.50	250VAC 15A

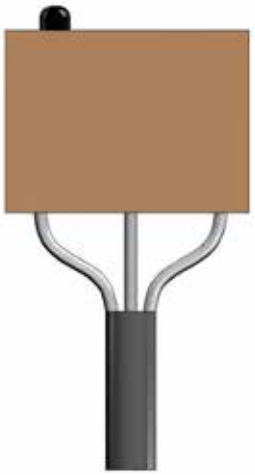
Cable Exit Option

Depending on your application Microprecision Electronics SA may propose different cable or wires, these options also include the possibility to have them exit the switch on the left, right or below.

Standard

Opposite

Underside



Cable Material

The cable standard is PVC - Polyvinyl Chloride for normal applications. The temperature range is normally between -20° C and +105°C, and may vary depending on the manufacturer and product.

For special applications other cable materials are also available:

PUR - Polyurethane: Excellent wear-and-tear resistance and resists most oils

SI - Silicone: Ideal for high temperature

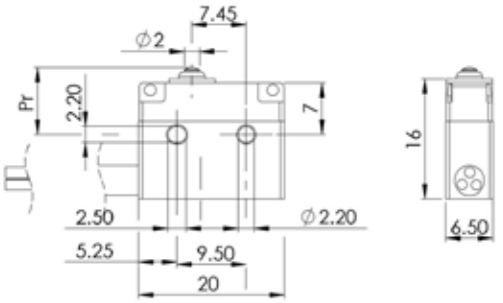
See microswitch family for the specific options on the cable. The specifications of a cable may vary.

Microswitch - SERIES MP400

MP400

Small standardized subminiature microswitch. The MP400 Series offers various possibilities of customization in the area of levers and cable choices. The switch is ideal for numerous applications with its small size, combined with high precision and small differential travel.

Description

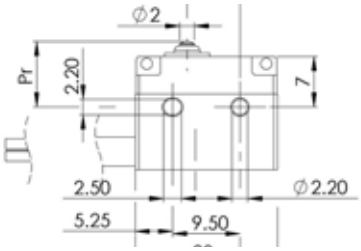


MP400

Approval	EN 61058-1 250VAC/5A 25'000 cycles EN 61058-1 250VAC/2A 50'000 cycles UL 61058-1 250VAC/5A 25'000 cycles UL 61058-1 250VAC/2A 50'000 cycles Resistive load
Housing	Plastic reinforced with glass fiber (PA 6T/66)
Pin Button	PES
Membrane	Fluorosilicone
Switching Circuit	Change over - snap action with blade spring in copper/beryllium and stainless steel spring
Contact	Silver - optional gold
Connection	Cable Various cable exit option: Standard - Opposite - Underside PVC -20°C to +70°C PVCU -20°C to +70°C (Approval UL) PUR -40°C to +90°C SI -40°C to +105°C Other material optional
Actuator	Stainless steel
Degree of Protection	Housing IP67 Connection IP67
Class of Protection	II
Micro-switching	µ
Distance between Contacts	0.40 mm
Dimensions	DIN 41 635, form B 20 x 16 x 6.5 mm
Actuation Force	1.0 to 2.5 N, depending on the lever
Differential Travel	0.05 mm - Optional 0.02 mm
Temperature Range	EN 61058-1 -40°C to +105°C UL 61058-1 -40°C to +105°C Cable selection may reduce temperature range
Mechanical Life	10 x 10^6 cycles

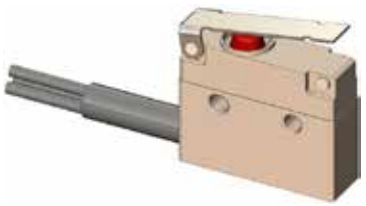
Actuator

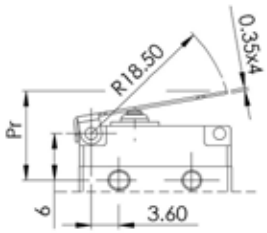
Type **0** : Basic switch - Pin Button



Actuating Force Fa max. (N)	2.5
Release Force Fr min. (N)	0.5
Free Position Pr (mm)	9.3 ± 0.2
Operating Position Pa (mm)	9.0 ± 0.2
Over-Travel sr min. (mm)	0.6
Differential Travel sd max. (mm)	0.05

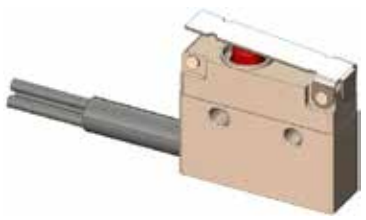
Type **7JA** : Simple Lever - position A

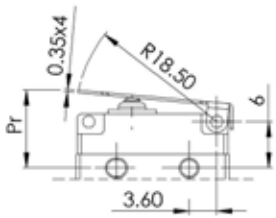




Actuating Force Fa max. (N)	1.0
Release Force Fr min. (N)	0.15
Free Position Pr (mm)	12.0 ± 0.4
Operating Position Pa (mm)	10.6 ± 0.4
Over-Travel sr min. (mm)	1.2
Differential Travel sd max. (mm)	0.40

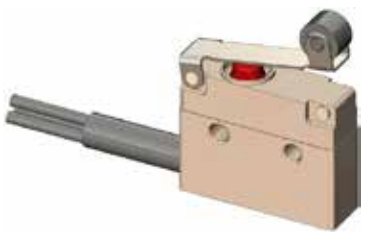
Type **7JB-** : Simple Lever - position B

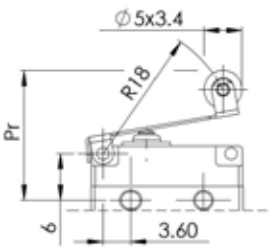




Actuating Force Fa max. (N)	2.0
Release Force Fr min. (N)	0.3
Free Position Pr (mm)	10.3 ± 0.4
Operating Position Pa (mm)	9.7 ± 0.4
Over-Travel sr min. (mm)	0.6
Differential Travel sd max. (mm)	0.30

Type **8JAL** : Simple Lever with Roller - position A

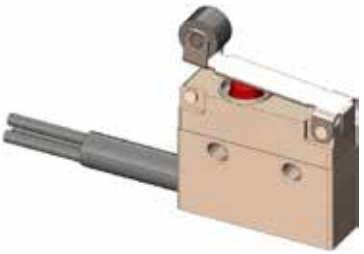


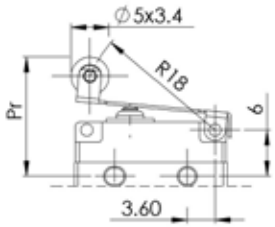


Actuating Force Fa max. (N)	1.0
Release Force Fr min. (N)	0.15
Free Position Pr (mm)	17.2 ± 0.4
Operating Position Pa (mm)	16.0 ± 0.4
Over-Travel sr min. (mm)	1.2
Differential Travel sd max. (mm)	0.40

Actuator

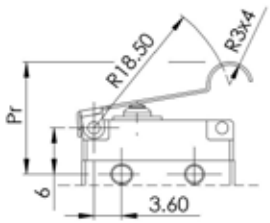
Type **8JBL:** Simple Lever with Roller - position B





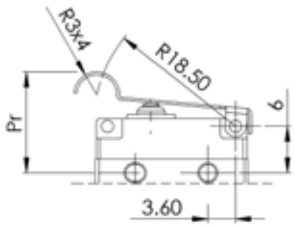
Actuating Force Fa max. (N)	2.0
Release Force Fr min. (N)	0.3
Free Position Pr (mm)	15.7 ± 0.4
Operating Position Pa (mm)	15.1 ± 0.4
Over-Travel sr min. (mm)	0.6
Differential Travel sd max. (mm)	0.30

Type **8JAGS:** Simple Lever with Simulated Roller - position A



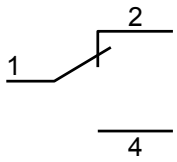
Actuating Force Fa max. (N)	1.0
Release Force Fr min. (N)	0.15
Free Position Pr (mm)	14.7 ± 0.4
Operating Position Pa (mm)	13.5 ± 0.4
Over-Travel sr min. (mm)	1.2
Differential Travel sd max. (mm)	0.40

Type **8JBGS:** Simple Lever with Simulated Roller - position B

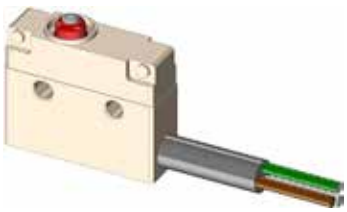
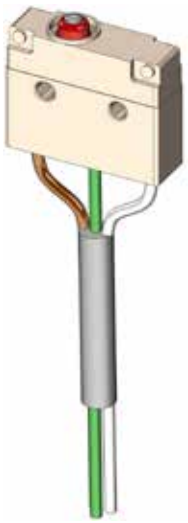


Actuating Force Fa max. (N)	2.0
Release Force Fr min. (N)	0.3
Free Position Pr (mm)	13.2 ± 0.4
Operating Position Pa (mm)	12.6 ± 0.4
Over-Travel sr min. (mm)	0.6
Differential Travel sd max. (mm)	0.30

Electrical Circuit

Actuator Code	Circuit	Color
0 7JA / 7JB 8JAL / 8JBL 8JAGS / 8JBGS		1 : Brown 2 : White 4 : Green

Optional cable and wire exit

Standard exit	Opposite exit “S”	Underside exit “C“
		

Ordering Information

	MP43	0	-	7JA	/	3	25	/	100	PVC

Contact

0: Silver Contact

1: Gold Contact

Actuator

0: Basic switch - Pin Button

7JA: Simple Lever - position A

7JB: Simple Lever - position B

8JAL: Simple Lever with Roller - position A

8JBL: Simple Lever with Roller - position B

8JAGS: Simple Lever with simulated Roller - position A

8JBGS: Simple Lever with simulated Roller - position B

Number of conductors

3: Change over

Cross section

25: 0.25mm^2, 250VAC / 2A

50: 0.50mm^2, 250VAC / 5A (PVC only)

Cable lenght in centimeters (cm)

Cable material

PVC: Polyvinyl Chloride -20°C to +70°C

PVCU: Polyvinyl Chloride -20°C to +70°C (Approval UL)

PUR: Polyurethane -40°C to +90°C

SI: Silicone -40°C to +105°C

Optional cable and wire exit

Standard exit - without code

S: Opposite exit

C: Underside exit