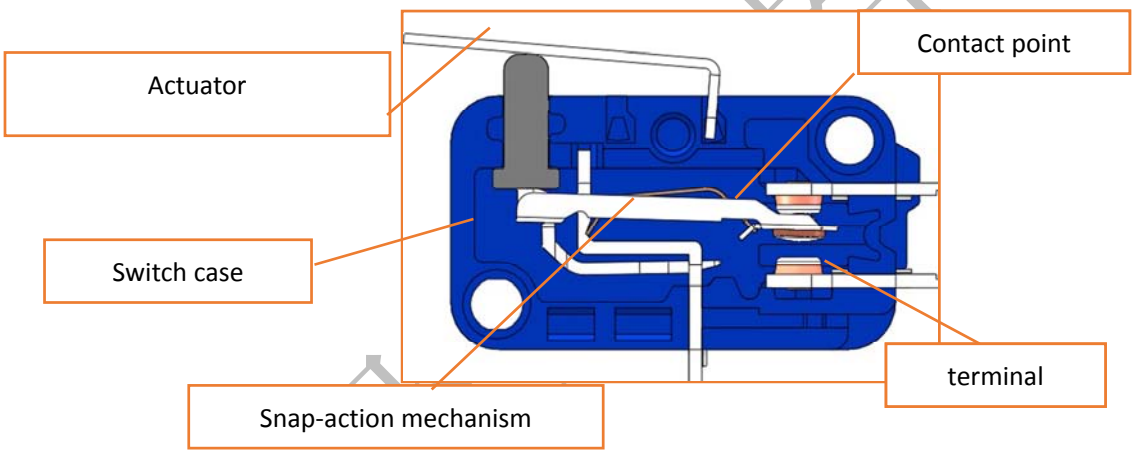
Shanghai Feili Electrical Apparatus Plan

Summary

I. Micro-switch definition

A small-size switch with a very small contact gap and snap-action mechanism and with a contact structure that switches by a specified movement and specified force enclosed in a case with an actuator provided on the exterior of the case.

Below picture is a typical sample for micro-switch, which is composed of 5 parts:



Actuator

A part of the switch and is a mechanism incorporating the pushbutton and lever. External force imposed on the actuator is relayed to the internal spring mechanism.

contact point

To turn the switch on or off

switch case

Elastic conductive material, perform a switching action

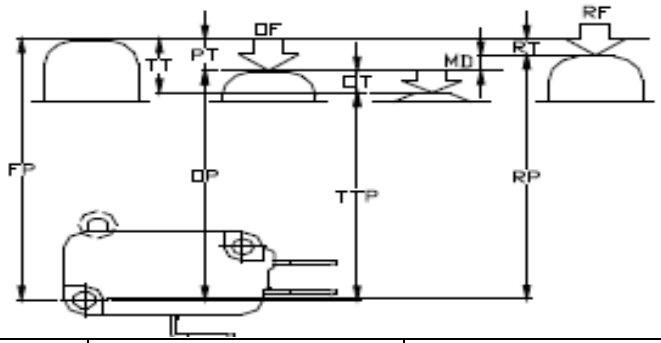
Snap-action mechanism

Protects the switch mechanism.

Terminal

Section where electrical wires are connected for input and output of the switch.

II. Professional terms about action



Force	OF	Moves from the free position to pull-up position must add to drive rod's strength
	RF	Moves from the overall traveling schedule position to the reset position must add to drive rod's strength
Travel	PT	To pull-up position's migration is away from or the motion angle from drive rod's free position
	OT	To the overall traveling schedule position's migration is away from or the motion angle from drive rod's pull-up position
	MD	To reset position's migration is away from or the motion angle from drive rod's pull-up position
	TT	To the overall traveling schedule position's migration is away from or the motion angle from drive rod's free position
	RT	The button from the returns to the displacement in position to be away From(angle)to the free position migration
Position	FP	Without when the rate of the hate movement drive rod's position
	OP	The drive rod receives the external force, the movable contact happen to start from the free position condition to reverse the time drive rod's position

	RP	Reduces on the drive rod's external force, the movable contact happen to start returns to when the free position condition drive rod's position from the pull-up position condition
	TTP	The drive rod arrives at when the transmission stop position drive rod's position

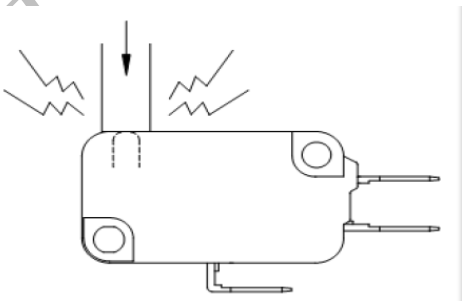
Common notice for micro-switch

I. Mechanical Conditions

Operating Stroke Setting:

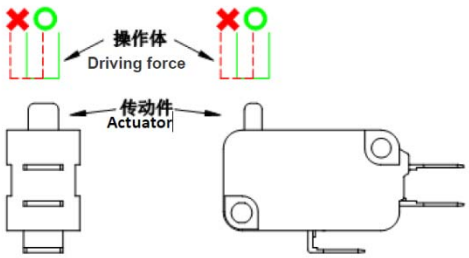
1. Make sure that the operating body is set so that the actuator should return to the free position when the operating body has moved if a switch is used to form a normally closed (NC) circuit.
2. If a switch is used to form a normally open (NO) circuit, the operating body must move the switch actuator to the distance of 70% to 100% of the rated over travel (OT) of the switch.
3. If stroke is set in the vicinity of the operating position (OP) or the releasing position (RP), contact force may become unstable. As a result, the switch cannot ensure high reliability. Furthermore, the switch may malfunction due to vibration or shock.
4. If stroke is set exceeding the total travel position (TTP), the operating body may damage the switch itself and the durability of the switch may be deteriorated

II. Operating method

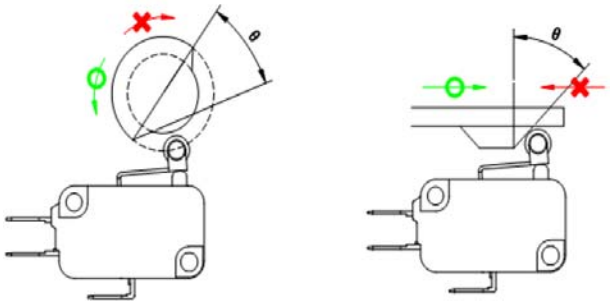


The operating method has a great influence on the performance of a switch. Consider the following before operating a switch.

1. Make sure that no improper force is applied to the actuator, otherwise the actuator may incur local abrasion. As a result, the actuator may become damaged or its durability may be deteriorated. . If the actuator is a pin plunger type, make sure that the operating body presses the pin plunger vertically.



2. Design the operating body (i.e., cam or dog) so that it will operate the actuator smoothly. If the actuator snaps backwards quickly or receives shock due to the shape of the operating body, its durability may be deteriorated.
3. Make sure that the operating body moves in a direction where the actuator moves, or the durability may be deteriorated.
4. Set the angle of the cam or dog (θ) for roller levers and similar actuators to the range between 30° and 45°. If the angle is too large, an abnormally large horizontal stress will be applied to the lever.



III. Terminal Connections

1. When soldering lead wires to a switch, make sure that the temperature of the iron tip is 380° C maximum. Complete soldering within 3 seconds at 380° C.
2. Use the specified receptacles to connect to quick-connect terminals. Do apply excessive force vertically to the terminals, otherwise the terminal may be deformed.(please contact our account manager if need)
3. When wiring a switch, screw torque refer to below table. GB14048.1 (IEC 60947-1)

diameter of thread(mm)		tightening torque(N·m)		
Metric standard values	Range of Diameter	I	II	III
2.5	Φ≤2.8	0.2	0.4	0.4
3.0	2.8≤Φ≤3.0	0.25	0.5	0.5
/	3.0≤Φ≤3.2	0.3	0.6	0.6
3.5	3.2≤Φ≤3.6	0.4	0.8	0.8

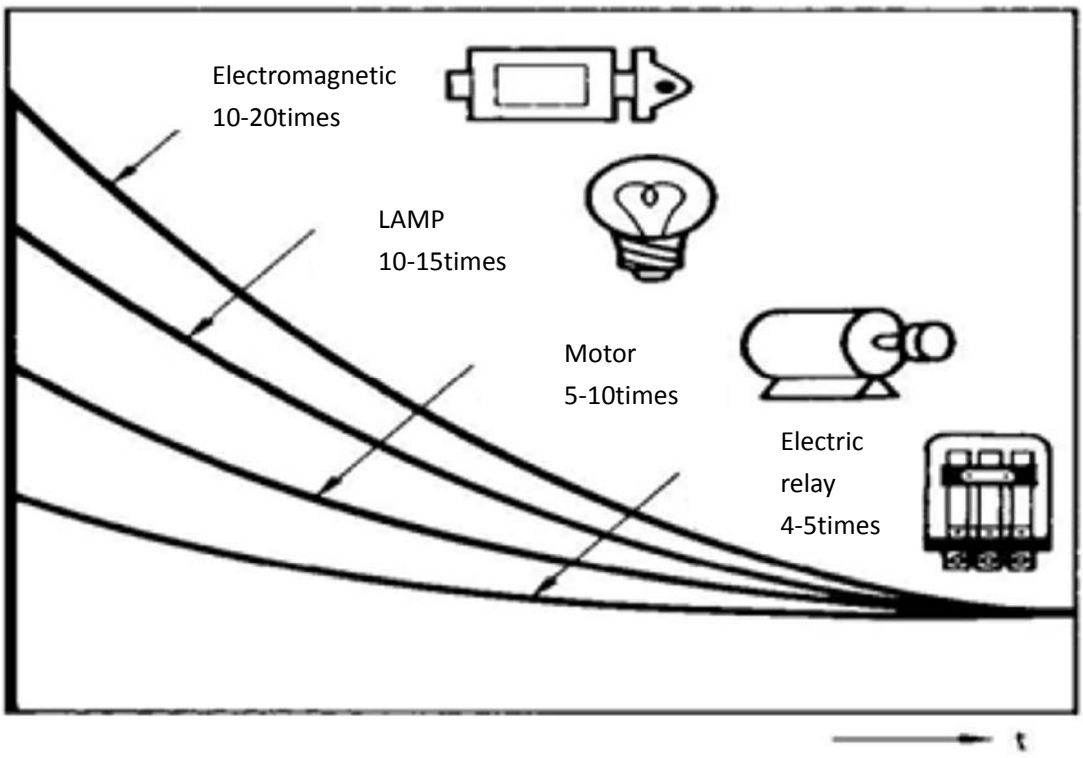
4	3.6≤ φ ≤4.1	0.7	1.2	1.2
4.5	4.1≤ φ ≤4.7	0.8	1.8	1.8
5.0	4.7≤ φ ≤5.3	0.8	2.0	2.0
1) Applies to screws without heads which, when tightened ,do not protrude from the hole and to other screws. Which can tightened by means of a screwdriver with a blade wider than the root diameter of the screw.				
2) Applies to nuts and screws which are tightened by means of a screwdriver.				
3) Applies to nuts and screws which can be tightened by means other than a screwdriver.				

4. Do not perform wiring when power is being supplied to a switch.

IV. Electrical Conditions

About load

1. Please consider carefully the actual load category and value before selection and test according to actual usage before mass usage.
2. Make sure to use a switch within the rated conditions. The higher the inrush current in the closed circuit is, the more the contact abrasion or shift there will be. Consequently, contact welding or shifting may occur, possibly resulting in short-circuits or burning.
3. It is not recommended to use a switch for a micro current to switch a large current, which may result in reducing switch durability. What's worse, it may result in the damage to electric equipment.
4. See below picture variety of load for inrush current Related load category and inrush current



●Note: load category

1) Inductive Load: A load having a minimum power factor of 0.4 (AC) or a maximum time constant of 7 ms (DC).

2) Lamp Load: A load having an inrush current ten times the steady-state current

3) Motor Load: A load having an inrush current six times the steady-state current.

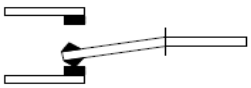
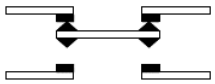
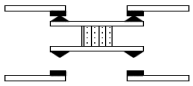
V. Utilization categories for switching elements (GB14048.5/IEC 60947-5-1)

Kind of current	category	Typical applications	Cosϕ (AC) To.95(DC)
Alternating current	AC-12	**Control of resistive loads and solid state loads with isolation by optocouplers**	0.9
	AC-13	**Control of solid state load with transformer isolation**	0.65
	AC-14	**Control of small electromagnetic loads (≤72 VA)**	0.3
	AC-15	**Control of electromagnetic loads (>72 VA)**	0.3
Direct	DC-12	**Control of resistive loads and solid state loads with isolation by**	1ms

current		optocouplers	
	DC-13	Control of electromagnets	300ms max
	DC-14	Control of electromagnetic loads having economy resistors in circuit	15ms

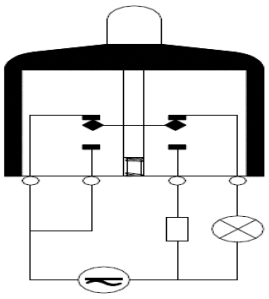
Time to reach 95 % of the steady-state current (ms)

VI. Contact element forms (GB14048.5/IEC 60947-5-1)

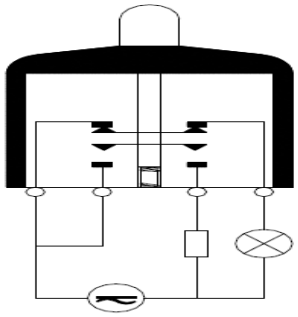
Forms	Symbols	Figure	Description
A			single gap contact element with two terminals
B			
X			Double gap contact element with two terminals
Y			
C			change-over, single gap, contact element with three terminals
ZA			change-over, single gap ,contact element with four terminals **Note: The contacts are of same polarity**
ZB			change-over, double gap, contact element with four terminals **Note: the two moving contacts are electrically separated**

VII. Contact wiring:

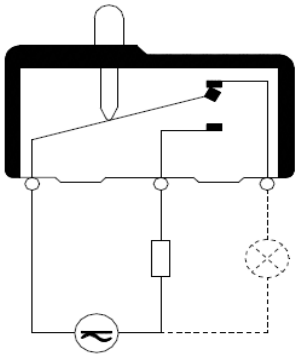
Contact type: C 、Za、Zb
same polarity circuit



Forms Za



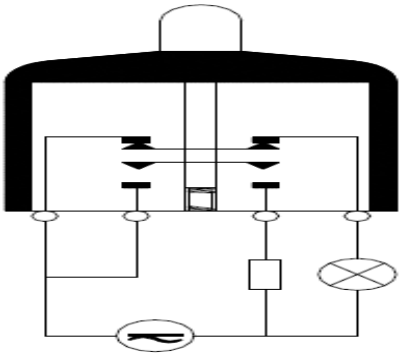
Forms Zb



Forms C

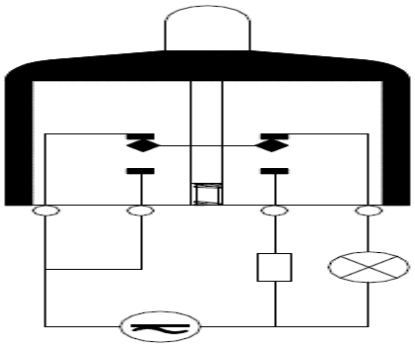
Max voltage

Only suit for forms Zb



Alternating movement

Only suit for forms Za



VIII. Operation and Storage Environment

1. Handling

Do not apply oil, grease, or other lubricants to the sliding parts of a switch. The intrusion of oil, grease, or other lubricants into the internal part may cause operating failure or contact failure.

2. Operating Environment

1) Unless otherwise specified, ratings and performances given in this catalogue are for standard test conditions (i.e., 5 to 35℃,45% to 85% humidity, and 86 to 106 kPa atmospheric pressure).When performing testing in the actual application, always use the same conditions as will be used in actual usage conditions for both the load and the operating environment.

2) Unless otherwise specified, a general switch is none-sealed structure. Protect the switch appropriately when using the switch in places with water or oil spray.

3) Do not use a switch under the condition where vibration or shock is continuously applied to the switch. If continuous vibration or shock is applied to a switch, contact failure, malfunction, or decrease in durability may be caused by abrasive powder generated from the internal parts. If excessive vibration or shock is applied to a switch, the contacts may malfunction, stick, or be damaged.

4) Do not use the switch alone in atmospheres such as flammable or explosive gases. Arcing and heat generation associated with switching may cause fires or explosions.

5) Do not use the switch in harmful gases, such as sulfide gas (H_2S, SO_2), ammonia gas (NH_3), nitric acid gas (HNO_3), or chlorine gas (Cl_2), also do not use the switch in an atmosphere with silicon gas, arc energy may cause silicon oxide (SiO_2) to accumulate on the contacts and result in contact failure Doing so may impair functionality, such as with damage due to contacting faults or corrosion.

3. Storage Environment

1) When storing a switch, consider countermeasures (e.g., storing in a PE bag) to prevent discoloration resulting from sulfidization of silver-plated terminals.
2) Make sure the location is free of corrosive gas and chemicals, airflow must be not restricted. Do not place the switch on the ground directly.
3) Storage temperature range: -25℃ ~ +40℃; Humidity: <90% (+25℃)

IX. Warranty

1) Products will be free from defects in materials and workmanship for a period of one year from the date of sale according to relevant State regulations.
2) **(Friendly reminder: This warranty shall not apply to any defect, failure or damage caused by improper use or self-modify and natural disaster.)**