

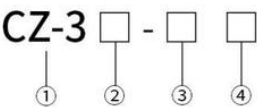


特点 Features

- 具有高机械强度的一体铸造铝合金外壳
- 具耐油，防水和防尘结构
- 引动器种类多，方便使用
- High mechanical strength, mainly consists of aluminum cast
- Water proof, oil proof and dust proof construction
- Various actuators for different applications



选型说明 Model Designation



序号 No	项目 Item	代号 Code	说明 Description
①	产品系列 Product series	CZ-3	设计代号 Design code
②	头部结构 Head structure	101	针状柱塞型 Needle plunger type
		102	横向滚轮柱塞型 Transverse roller plunger type
		103	竖向滚轮柱塞型 Vertical roller plunger type
		110	斜面柱塞型 Bevel plunger type
		111	密封柱塞型 Sealing plunger type
		112	密封横向滚轮柱塞型 Sealed transverse roller plunger type
		113	密封竖向滚轮柱塞型 Sealed vertical roller plunger type
		104	滚轮摆杆型 Roller rocker type
		108	可调摆杆滚轮型 Adjustable swing rod roller type
		107	可调棒式摆杆型 Adjustable rod swing rod type
		166	塑料触须型 Plastic tentacle type
		167	盘簧型 Coil spring type
		168	金属杆盘簧型 Metal rod coil spring type
③	电线类型 Wire type	无 None	PVC 线缆 PVC cable
		U	PUR 线缆 (耐油) PUR cable (oil resistant)
④	线缆长度 Cable length	L1~L5	带线型, (L1 表示 1 米线, 线长不仅限 L5) With line type, (L1 represents 1m line, and the line length is not limited to L5)

特性 Characteristics

操作速度 Operating speed	1mm~1m/s(摆杆型Swing rod type)
	0.1mm~0.5m/s(柱塞型 Plunger type)
接触电阻 Contact resistance	最大 250 mΩ(2m 电缆的初期值)，最大 300 mΩ(3m 电缆的初期值)，最大 400 mΩ(5m 电缆的初期值) Max. 250 mΩ (initial value of 2m cable), Max. 300 mΩ (initial value of 3m cable), Maximum 400 mΩ (initial value of 5m cable)
绝缘电阻 Insulation resistance	100MΩ 以上 (在 500VDC 以下) 100MΩ min.(at 500VDC)
最小使用负载 Minimum working load	DC24V 10mA 以上 Min DC24V 10mA
额定绝缘电压UI Rated insulation voltage	300V
额定冲击耐受电压Uimp Rated impulse withstand voltage	2.5kV
约定自由空气发热电流Ith Convention free air heating current	5A
电介强度 Dielectric strength	不连续端子间: 1000VAC, 50/60Hz, 持续1分钟 1000VAC, 50/60 Hz for 1 minute between terminals of the same polarity
	端子和接地之间: 1500VAC, 50/60Hz, 持续1分钟 1500VAC, 50/60 Hz for 1 minute between current-carrying and non-current-carrying metal parts
	端子和无载电流金属零件之间: 1500VAC, 50/60Hz, 持续1分钟 1500VAC, 50/60 Hz for 1 minute between each terminal and ground
振动 Vibration Frequency	10-55Hz, 1.5mm双振幅 10 to 55Hz,1.5mm double amplitude
冲击 Shock	机械耐久 : 1000mm/s2 以上 (约 100G 以上) 误动作耐久 : 500mm/s2 以上 (约 50G 以上) *1 Mechanical:Approx.1000m/s2 (Appprox.100G' S) Electrical:Approx.500m/s2 (Approx.50G' S)*1
使用温度 Ambienttemperature	-20~+70 °C (没有结冰) Using: -20~+70°C (With no icing)
湿度 Humidity	< 95% RH
电气寿命 Electrical life	20万次以上(AC240V/2A阻性负载) 200,000 operations/min(AC240V/2A resistive load)
防水等级 Protection level	IP67

注1. 上述值为初始值。
注2. 有些型号中可能与上述内容不同，请另外垂询。
*1.盘簧型除外
*2.该保护结构基于标准(EN69047-5-1)规定的测试方法，请根据使用环境、使用条件来事先确认密封性。
*3.寿命的条件为环境温度25~35℃、环境湿度40~70%RH时的数值。
Note 1. The above values are initial values.
Note 2. Values of some models may be different from the above, please contact us for details.
*1: Except coil spring type
*2.The protection structure is tested based on method predetermined by standard (EN69047-5-1), please confirm the sealing in advance according to the operating environment and conditions.
*3.The conditions of life are the values under the ambient temperature of 25~35℃ and humidity of 40 to 70% RH. For other detailed conditions, please contact us.

接点型式 Contact Form



国际认证规格 International Certification Specifications

认证规格 Certification specifications	规格 Specifications	文件No. Document
CCC	GB/T 14048.5	请咨询昌得代表处 Please consult the CNTD Representative Office
TUV	EN 60947-5-1	
CE		

安全标准认证额定规格 Safety Standard Certification Rated Specifications

TUV (EN 60947-5-1), CCC(GB/T 14048.5)

项目 Item	使用类型 Usage type	AC-15	DC-12
额定工作电流 Rated working current(Ie)		2A	2A
额定工作电压 Rated working voltage(Ue)		250V	30V

注：请使用符合IEC60269的gl或gG型10A保险丝作为短路保护装置。开关内未配保险丝。

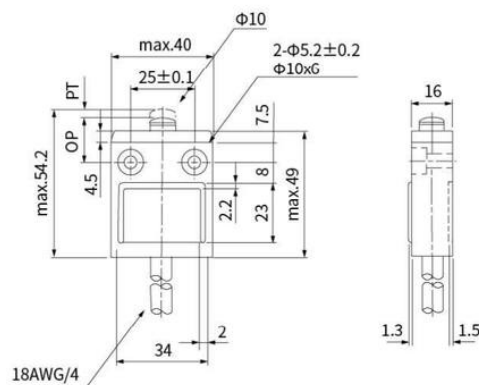
Note: Please use gl or gG 10A fuses that comply with IEC60269 as short-circuit protection devices. The switch is not equipped with a fuse.

外观和尺寸 Appearance and Dimension

CZ-3101-L□

顶部柱塞型

Top piston type



动作特性 Operating Characteristics	CZ-3101-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	15.7±1mm

注：开关动作参数特性在竖直加力方向测得；

*1 为参考值；

Note: The switch action parameter characteristics are measured in the vertical afterforce direction;

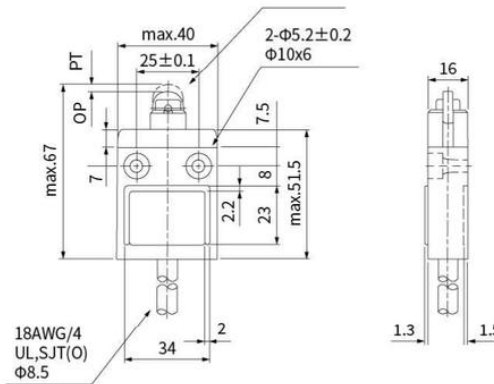
*1 is the reference value;

* □代表引线长度

CZ-3102-L□

横向滚轮柱塞型

Transverse roller plunger type



动作特性 Operating Characteristics	CZ-3102-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	28±1mm

注：开关动作参数特性在竖直加力方向测得；

*1 为参考值；

Note: The switch action parameter characteristics are measured in the vertical afterforce direction;

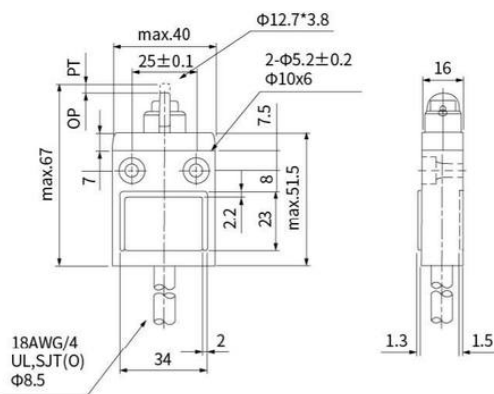
*1 is the reference value;

* □代表引线长度

CZ-3103-L□

竖向滚轮柱塞型

Vertical roller plunger type



动作特性 Operating Characteristics	CZ-3103-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	28±1mm

注：开关动作参数特性在竖直加力方向测得；

*1 为参考值；

Note: The switch action parameter characteristics are measured in the vertical afterforce direction;

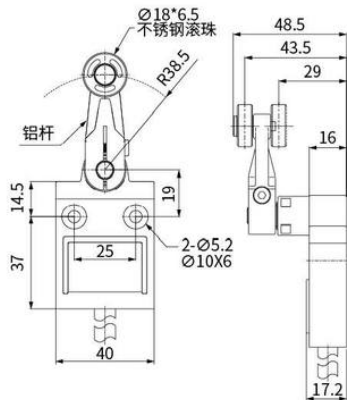
*1 is the reference value;

* □代表引线长度

外观和尺寸 Appearance and Dimension

CZ-3104-L□

滚轮摆杆型
Roller rocker
type



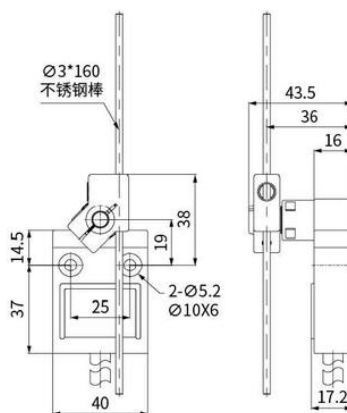
动作特性 Operating Characteristics	CZ-3104-L□
动作力 OF (最大Max.)	6N
释放力 RF (最小Min.)	1.5N
预行程 PT	25°±5°
运动差异 MD	3°±1°
过行程 OT (最大Max.)	35°
总行程 *1	(65°)
动作位置 OP	-

注: 开关动作参数特性在可调摆杆设定在 38.5mm 时测得;
*1 为参考值;
Note: The switch action parameter characteristics are measured when the adjustable pendulum rod is set at 38.5mm;
*1 is the reference value;

* □代表引线长度

CZ-3107-L□

可调棒式摆杆型
Adjustable rod swing
rod type



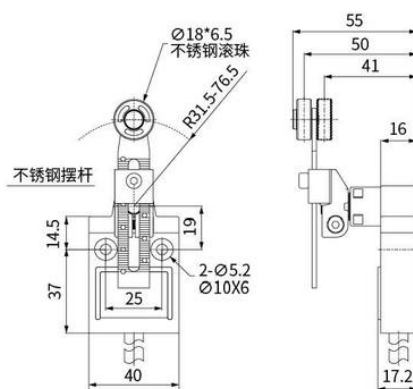
动作特性 Operating Characteristics	CZ-3107-L□
动作力 OF (最大Max.)	6N
释放力 RF (最小Min.)	1.5N
预行程 PT	25°±5°
运动差异 MD	3°±1°
过行程 OT (最大Max.)	35°
总行程 *1	(65°)
动作位置 OP	-

注: 开关动作参数特性在可调摆杆设定在 38.5mm 时测得;
*1 为参考值;
Note: The switch action parameter characteristics are measured when the adjustable pendulum rod is set at 38.5mm;
*1 is the reference value;

* □代表引线长度

CZ-3108-L□

可调摆杆滚轮型
Adjustable swing
rod roller type



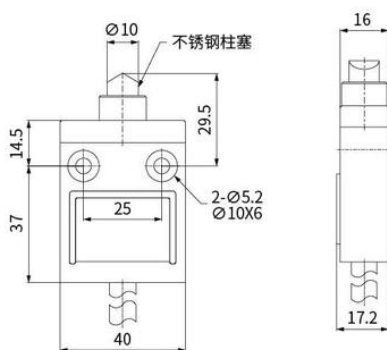
动作特性 Operating Characteristics	CZ-3108-L□
动作力 OF (最大Max.)	6N
释放力 RF (最小Min.)	1.5N
预行程 PT	25°±5°
运动差异 MD	3°±1°
过行程 OT (最大Max.)	35°
总行程 *1	(65°)
动作位置 OP	-

注: 开关动作参数特性在可调摆杆设定在 38.5mm 时测得;
*1 为参考值;
Note: The switch action parameter characteristics are measured when the adjustable pendulum rod is set at 38.5mm;
*1 is the reference value;

* □代表引线长度

CZ-3110-L□

斜面柱塞型
Bevel plunger
type



动作特性 Operating Characteristics	CZ-3110-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	27.7±1mm

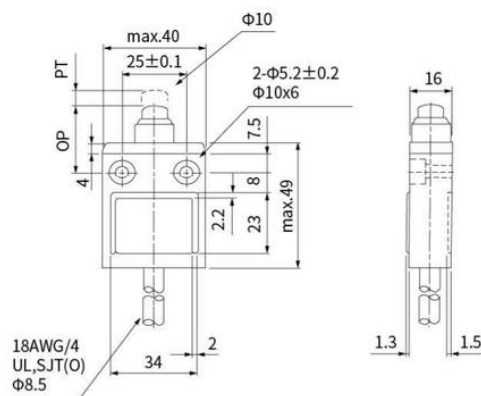
注: 开关动作参数特性在垂直加力方向测得;
*1 为参考值;
Note: The switch action parameter characteristics are measured in the vertical afterforce direction;
*1 is the reference value;

* □代表引线长度

外观和尺寸 Appearance and Dimension

CZ-3111-L□

密封柱塞型
Sealing
plunger type



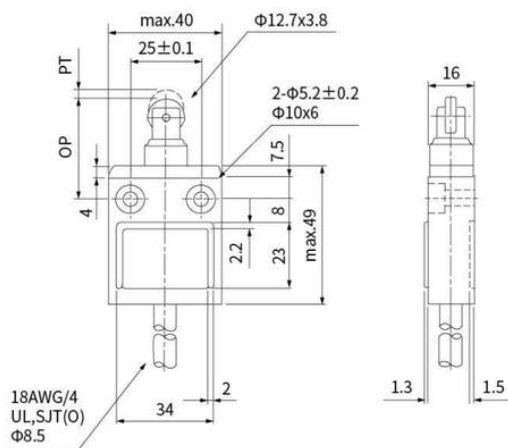
动作特性 Operating Characteristics	CZ-3111-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	23.7±1mm

注：开关动作参数特性在垂直加力方向测得；
*1 为参考值；
Note: The switch action parameter characteristics are measured in the vertical afterforce direction;
*1 is the reference value;

* □代表引线长度

CZ-3112-L□

密封横向滚轮柱塞型
Sealed transverse roller
plunger type



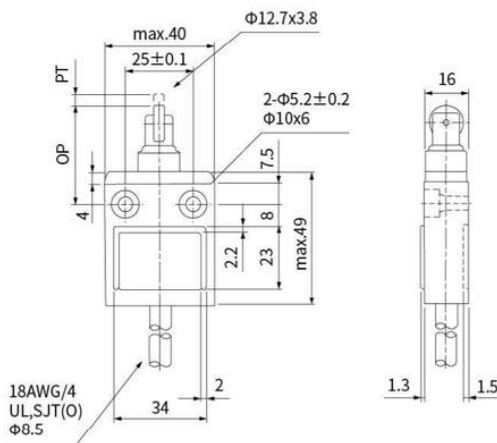
动作特性 Operating Characteristics	CZ-3112-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	33.5±1mm

注：开关动作参数特性在垂直加力方向测得；
*1 为参考值；
Note: The switch action parameter characteristics are measured in the vertical afterforce direction;
*1 is the reference value;

* □代表引线长度

CZ-3113-L□

密封竖向滚轮柱塞型
Sealed vertical roller
plunger type



动作特性 Operating Characteristics	CZ-3113-L□
动作力 OF (最大Max.)	12N
释放力 RF (最小Min.)	4.5N
预行程 PT	1.5±0.3mm
运动差异 MD	0.2±0.1mm
过行程 OT (最大Max.)	3.2mm
总行程 *1	(5mm)
动作位置 OP	33.5±1mm

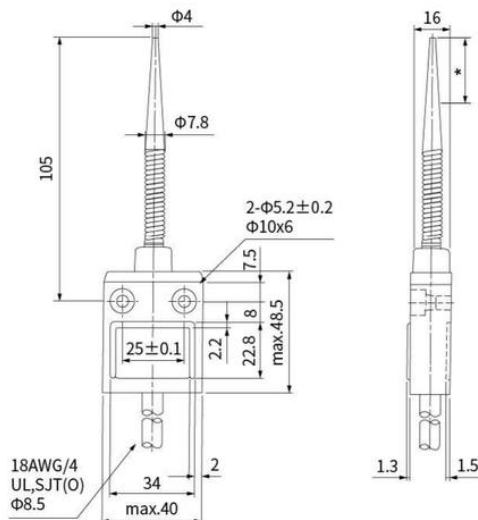
注：开关动作参数特性在垂直加力方向测得；
*1 为参考值；
Note: The switch action parameter characteristics are measured in the vertical afterforce direction;
*1 is the reference value;

* □代表引线长度

外观和尺寸 Appearance and Dimension

CZ-3166-L□

塑料触须型
Plastic tentacle
type



动作特性 Operating Characteristics	CZ-3166-L□
动作力 OF (最大Max.)	2N
释放力 RF (最小Min.)	-
预行程 PT	$10^\circ \pm 5^\circ$
运动差异 MD	-
过行程 OT (最大Max.)	-
总行程 *1	-
动作位置 OP	-

注 开关动作参数特性在头弹簧 2/3 处时测得 (头弹簧无弯曲)
*1 为参考值;

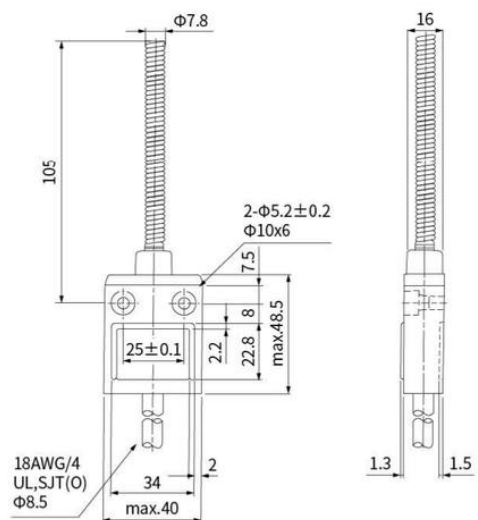
Note: Switch action parameter characteristics are measured at 2/3 of the head spring (head spring is not bent)

*1 is the reference value;

* □代表引线长度

CZ-3167-L□

盘簧型
Coil spring type



动作特性 Operating Characteristics	CZ-3167-L□
动作力 OF (最大Max.)	2N
释放力 RF (最小Min.)	-
预行程 PT	$10^\circ \pm 5^\circ$
运动差异 MD	-
过行程 OT (最大Max.)	-
总行程 *1	-
动作位置 OP	-

注 开关动作参数特性在头弹簧 2/3 处时测得 (头弹簧无弯曲)
*1 为参考值;

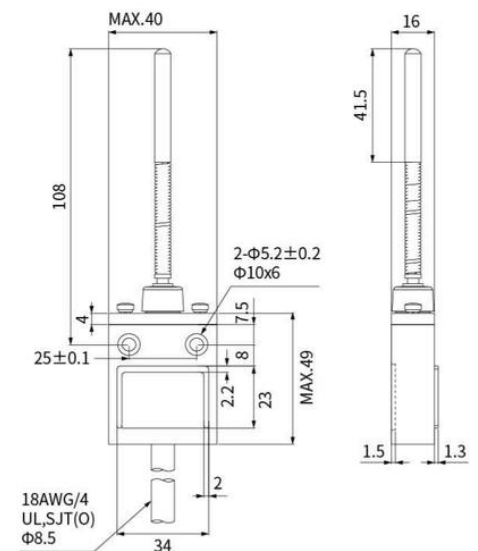
Note: Switch action parameter characteristics are measured at 2/3 of the head spring (head spring is not bent)

*1 is the reference value;

* □代表引线长度

CZ-3168-L□

金属杆盘簧型
Metal rod coil
spring type



动作特性 Operating Characteristics	CZ-3168-L□
动作力 OF (最大Max.)	2N
释放力 RF (最小Min.)	-
预行程 PT	$10^\circ \pm 5^\circ$
运动差异 MD	-
过行程 OT (最大Max.)	-
总行程 *1	-
动作位置 OP	-

注 开关动作参数特性在头弹簧 2/3 处时测得 (头弹簧无弯曲)
*1 为参考值;

Note: Switch action parameter characteristics are measured at 2/3 of the head spring (head spring is not bent)

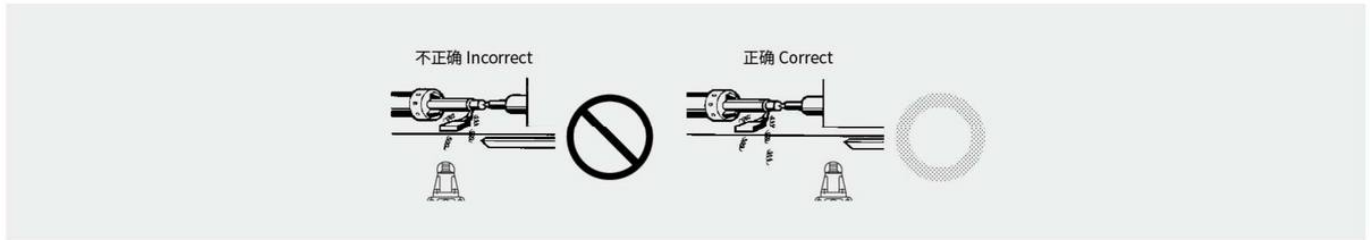
*1 is the reference value;

* □代表引线长度

关于使用环境 Regarding the Usage Environment

在户外环境或存在特殊切削油、化学溶剂、药品等条件下，密封件的性能可能会下降。在使用前，务必根据具体的使用环境来评估维护和更换的需求。安装开关时，选择一个避免直接暴露于切削屑或粉尘的位置至关重要。同时，需定期检查并清除驱动杆和开关表面的任何切削残留物和类似泥土的物质，以保证开关正常工作。

In outdoor settings or areas exposed to specific cutting fluids, chemical solvents, or pharmaceuticals, the performance of sealing components can be compromised. Prior to use, it's essential to assess the need for maintenance and replacement based on the specific operational environment. When installing the switch, it's crucial to position it away from direct exposure to cutting debris or dust. Regular inspection and cleaning of any residues or mud-like substances on the drive rod and the body of the switch are necessary to maintain its proper functioning.



在环境中频繁振动或受到冲击的情况下，开关可能会出现由于摩擦而产生的微粒，这些微粒可引起接触问题和性能退化，例如接触不良和响应不稳定。在剧烈振动或强烈冲击的情况下，触点可能会出现错误动作或遭受损害。为此，应避免在易受振动和冲击影响的地点安装开关，尤其是那些可能导致共振的位置。开关使用的物理接点在特定条件下可能受到环境中的硅气体影响。当电弧发生时，这些硅气体可能与之反应，在触点处形成氧化硅沉积，导致接触困难。如果开关附近有使用硅基材料（如硅油、硅胶、硅质电缆等），则应考虑采用接点保护电路来减少电弧产生，并消除硅气体的释放。

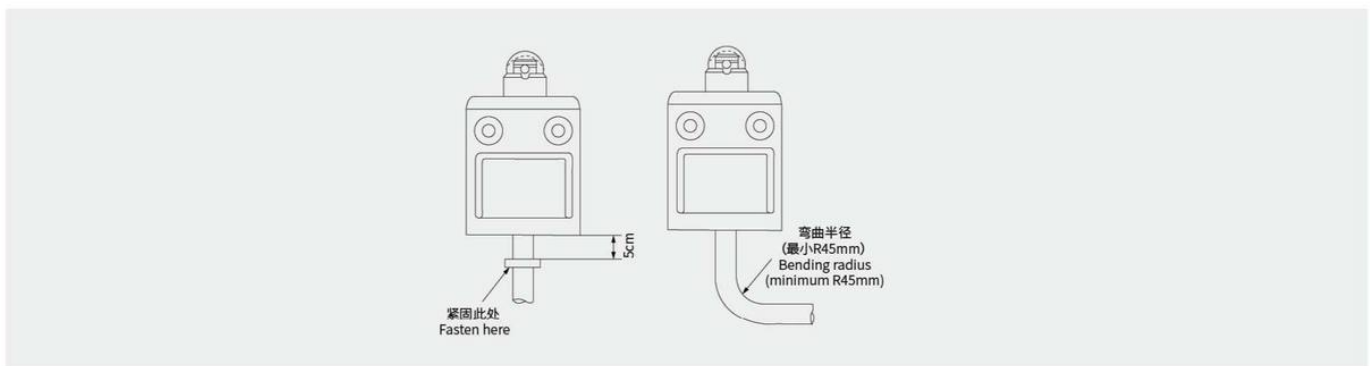
In environments with frequent vibration or impact, switches may produce friction-generated particles, leading to contact issues and performance degradation, such as poor contact and unstable response. Extreme vibration or strong impacts can cause incorrect switch operations or damage. Therefore, avoid installing switches in vibration-prone or impact-prone areas, especially where resonance might occur. The physical contacts in switches can be affected by environmental silicon gases under certain conditions. When arcing occurs, these gases may react and form silica deposits at the contact points, causing contact difficulties. If silicone-based materials (like silicone oil, silicone rubber, silicon cables, etc.) are used near the switch, consider using contact protection circuits to reduce arcing and eliminate the release of silicon gases.

操作 Operate

电缆出口处开关的底部为树脂模压的。在距离开关底部5 cm点处固定电缆，以防止在电缆上施加过度的力。在弯曲电缆时，提供最小45mm的弯曲半径，以便不会损坏电缆绝缘性或外皮。过度弯曲可能导致烧坏或漏电流。

The bottom of the switch at the cable outlet is resin molded. Secure the cable at a point 5 cm from the bottom of the switch to prevent excessive force from being applied to the cable.

When bending cables, provide a minimum bending radius of 45mm so as not to damage the insulation or sheath of the cable. Excessive bending may cause burning or leakage of current.



连接 Connect

为防止电路短路而损坏限位开关，务必在限位开关上串联连接大于额定电流1.5到2倍的切断电流值的保险丝。

To prevent damage to the limit switch due to circuit short circuits, it is necessary to connect a fuse in series with a cutoff current value greater than 1.5 to 2 times the rated current on the limit switch.

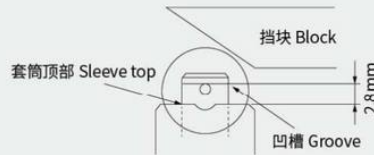
操作 Operate

操作方法、凸轮或挡块的形状、操作频率和超程都会显著影响使用寿命以及限位开关的精度。由于此原因，挡块角度必须在 30° 以下，挡块的表面粗糙度必须为6.3 S以上，且硬度必须为Hv 400到500。

为使柱塞型驱动杆正确移动，请调节挡块和凸轮到正确的设置位置。正确位置是柱塞凹槽与套筒顶部匹配的位置。

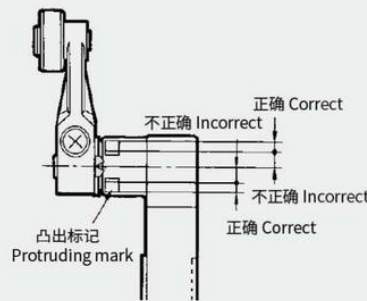
The operating method, shape of the cam or stop, operating frequency, and overtravel all significantly affect the service life and the accuracy of the limit switch. Due to this reason, the angle of the stop must be below 30° , the surface roughness of the stop must be above 6.3 S, and the hardness must be Hv 400 to 500.

To ensure the correct movement of the plunger type drive rod, adjust the stop and cam to the correct setting position. The correct position is the position where the plunger groove matches the top of the sleeve.



为允许滚珠摆杆型驱动杆正确移动，请调节挡块和凸轮，以便箭头位于两个凸出标记之间，如下所示。

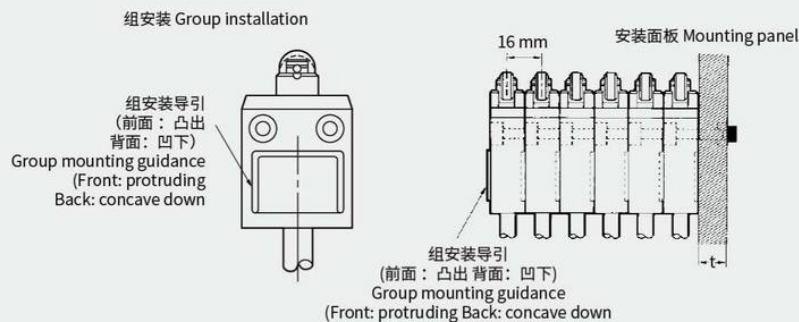
To allow the ball swing rod type drive rod to move correctly, adjust the stop and cam so that the arrow is positioned between the two protruding marks, as shown below.



安装 Install

最多可以成组安装6个开关。在此情况下，注意安装方向，以便一个开关上的组安装导引突出部拟合其它开关上导引凹下部，如下图所示。对于组安装，安装面板必须具有最小6 mm的厚度(t)。

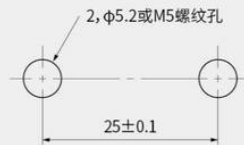
Up to 6 switches can be installed in groups. In this case, pay attention to the installation direction so that the protruding part of the group installation guide on one switch fits the lower part of the guide concave on other switches, as shown in the following figure. For group installation, the installation panel must have a minimum thickness of 6 mm (t).



如果安装面板歪斜或具有凸部，则可能导致出现故障。确保安装面板不歪斜且具有平坦的表面。

If the installation panel is skewed or has protrusions, it may cause malfunctions. Ensure that the installation panel is not tilted and has a flat surface.

安装孔 Mounting Hole



柱塞型可能会受恶劣环境的影响产生故障，诸如灰尘或切削屑引起复位不良。这种情况下请使用带橡胶帽的型号。
不要接触超过70°C的水或在蒸汽下使用。

Plunger type may malfunction due to harsh environments, such as dust or cutting debris causing poor reset. In this case, please use a model with a rubber cap.

Do not come into contact with water exceeding 70°C or use under steam.

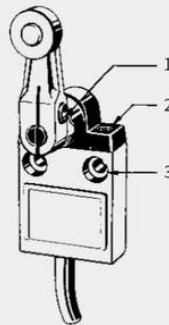
根据下表将每个螺钉拧紧至相应转矩。

Tighten each screw to the corresponding torque according to the table below.

编号 Number	类型 Types of	正确紧固转矩* Correct tightening torque*
1	M5内六角螺栓 M5 hexagonal socket bolt	4.90~5.88N·m
2	M3.5头部安装螺钉 M3.5 head mounting screws	0.78~0.88N·m
3	M5内六角螺栓 M5 hexagonal socket bolt	4.90~5.88N·m

*通过从头部卸下两个螺钉，可将头部方向旋转180°。在更改头部方向之后，再拧紧到上面指定的转矩。要注意不能让任何杂质进入开关。

*By removing two screws from the head, the head direction can be rotated 180°. When changing the direction of the head Then tighten to the torque specified above. Be careful not to allow any impurities to enter the switch.



微小负载型的使用 Applications Under Minimal Load

开关接点可用于一般负载或微小负载。但是，已经连接过一般负载的接点，就不能用于连接更小容量的负载。否则，可能导致接触面的糙化，而且可能失去接触可靠性。

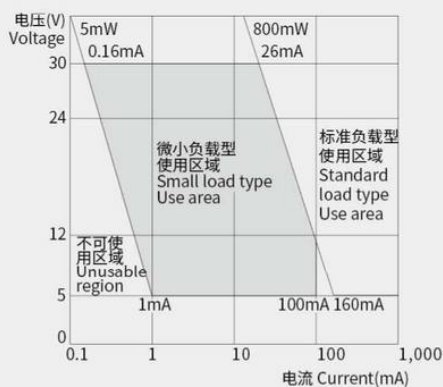
如果在开关微小负载电路时使用一般负载用开关，可能会引起接触不良。下图为开关负载区域范围定义。本目录册内产品适用于 DC24V 10mA 以上范围，当使用负载小于 DC24V 10mA 以下时，可能存在由于电流过小无法击破触点表面氧化膜或硫化膜的现象，从而导致开关接触不良。所以当使用负载小于 DC24V 10mA 以下时，请咨询昌得电气科技有限公司进行产品定制。

请设置 CR 电路等吸收电路，防止震荡和抖动所导致的噪声和脉冲缺失，对于开关时会产生冲击电流的负载，请插入接点保护电路，以免导致耐久性降低。

Switch contacts can be used for general loads or small loads. However, contacts that have already been connected to general loads cannot be used to connect smaller capacity loads. Otherwise, it may lead to roughness of the contact surface and loss of contact reliability.

If a general load switch is used when switching a small load circuit, poor contact may be caused. The following diagram shows the switching load area range definition. The products in this catalog are suitable for DC24V 10mA or above. When the load is less than DC24V 10mA or below, the oxidized film or vulcanized film on the contact surface may be unable to be broken due to too small current, resulting in poor switch contact. Therefore, when the load is less than DC24V 10mA, please consult CNTD Electrical Technology Co., Ltd. for product customization.

Please set the absorption circuit such as CR circuit to prevent noise and pulse loss caused by shock and jitter, for the load that will produce impulse current on the switch, please insert the contact protection circuit to avoid reducing durability.



使用注意事项 Using Precautions

本公司产品是作为工业产品而设计生产，严格遵守工业产品标准。我司明确声明，除非经过特殊设计并得到我司明确书面确认，我司产品不适用于以下应用场合：

- 要求极高可靠性的应用场合，包括核能、燃气、电力等要求长期稳定运行的系统。
- 要求极高安全性的应用场合，涉及人身安全与财产的情况。
- 苛刻条件、严酷环境的应用场合，包括室外、存在化学污染、电磁、振动或冲击影响的环境。
- 有火灾或爆炸风险的应用场合，包括存在易燃易爆性气体、强酸强碱化学品等物质的环境。
- 涉及军工用途、航天航空项目的应用场合。

The company's products are designed and produced as industrial products, in strict compliance with industrial product standards. We expressly declare that, unless specifically designed and expressly confirmed by us in writing, our products are not intended for the following applications:

- Applications that require high reliability, including nuclear, gas, electric and other systems that require long-term stable operation.
- Applications requiring very high security, situations involving personal safety and property.
- Applications in harsh conditions, harsh environments, including outdoor, chemical contamination, electromagnetic, vibration or shock effects.
- Applications where there is a risk of fire or explosion, including environments where flammable and explosive gases, strong acids and alkali chemicals are present.
- Applications involving military use and aerospace projects.