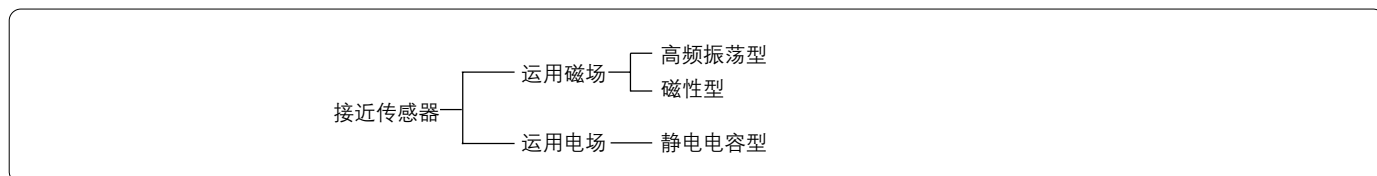


### 接近传感器概念

接近传感器是利用传感器对接近物体的敏感特性，达到非接触状态下，检测物体的接近，控制开关的目的。在常用的接近传感器中，根据感应发生的原理不同，可将接近传感器分为高频振荡型、磁感应型、静电电容型。

### 接近传感器类型



### 接近传感器型号说明

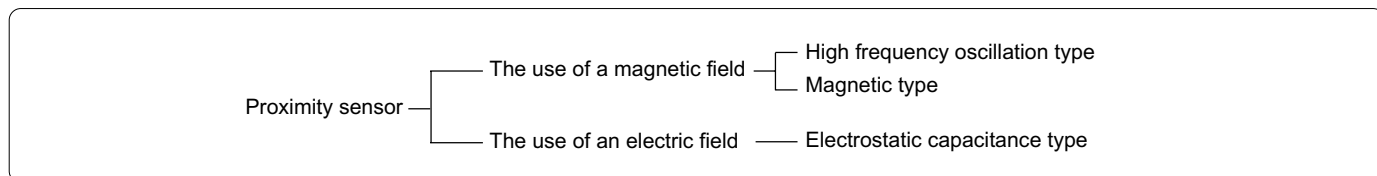
$\frac{1}{1}$   $\frac{M}{2}$   $\frac{12}{3}$  -  $\frac{D1}{4}$   $\frac{N}{5}$   $\frac{A}{6}$   $\frac{04}{7}$  -  $\frac{M1}{8}$  /  $\frac{\square}{9}$  -  $\frac{\square}{10}$

编号 N.o	构成 Composition	代码及含义 Code and definition
1	传感器种类 Sensor category	I:电感式 C:电容式 H:霍尔式 X:线性传感器 S:磁性式 U:超声波 A:本质安全式 I: Inductance type C: Capacitance type H: Hall type X: Linear sensor S: Reed type U: Ultrasonic A: Intrinsically safe type
2	外形代号 Outward appearance code	M:金属螺纹圆柱型 Q: 方形塑料 H:光滑圆柱形 M: Cylinder type Q: Plastic Square type H: Smooth cylindrical
3	尺寸代号 Size code	12:直径 mm
4	工作电压 Working voltage	D1:10-30VDC D2:5-24VDC D3:6-36VDC D4:10-60VDC D5:7.7-9VDC D6:15-30V D0:特殊直流电压: Special DC voltage A1:20-250VAC A2: 90-250VAC A3:380VAC U:24-240VDC/AC
5	输出形式 Output form	N: NPN 负逻辑输出 P: PNP 正逻辑输出 L: 直流二线制输出 J: 继电器触点输出 NP: NPN+PNP 双输出 PN: PNP+NPN 双输出 P1: PNP 可选(选通线) N1: NPN 可选(选通线) □: 交流二线制输出 N: NPN Output P: PNP Output L: DC two-wire output J: Relay contact output NP: NPN+PNP double output PN: PNP+NPN Double output P1: PNP Optinal(the strobe line) N1: NPN Optinal(the strobe line) □: AC two-wire output
6	输出状态 Output state	A:常开(NO) Normally open(NO) B: 常闭(NC) Normally close (NC) X: NPN NO+PNP NC Y: PNP NO+NPN NC MU:模拟电压 Mimic voltage MI: 模拟电流 Mimic current
7	检测距离 Detection distance	04:4mm 15:15mm
8	连接器 Connector	M1:M12x1 直公头 Socket M2:M8x1 直公头 Socket
9	特殊要求 Special requiremenes	H:耐高温 High temp resistance L:远距离 Long-distance
10	引线长度 Lead length	无:2m 5:5m 15:15m w:弯插引线 Bending-plug cable z:直插引线 Straight-plug cable

### PROXIMITY SENSOR CONCEPT

The proximity sensor is the sensor sensitivity characteristics of the proximity object, to achieve a non-contact state, to detect the approaching of the object, the purpose of controlling the switch. The proximity sensor, according to the principle of induction occurred, a proximity sensor is divided into a high-frequency oscillation type, a magnetic induction type, an electrostatic capacitance type.

### PROXIMITY SENSOR TYPE

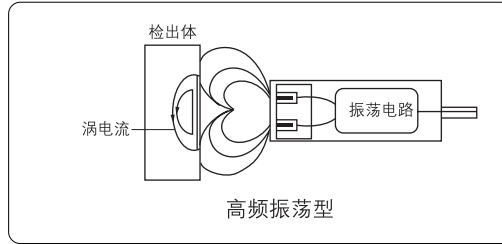


## 接近传感器特点

- 检测时无机构接触，不易损坏、无磨损、误差小
- 不受周围工作环境影响，恶劣环境下仍能正常发挥作用
- 检测的重复精度高，可准确进行物体定位
- 反应频率快速，适用快速移动物体的检测

## 电感式传感器基本概念

电感式传感器是利用金属导体和交变电磁场的互感原理。位于传感器前端的检测线圈产生高频磁场，当金属物体接近该磁场，金属物体内部产生涡电流，导致磁场能量衰减，当金属物体不断靠近传感器感应面，能量被吸收而导致衰减，当衰减达到一定程度时，触发传感器开关输出信号，从而达到非接触式之检测目的。



### 标准检测体:

接近传感器的感应距离因检测体的大小、材质的不同而不同，随着检测体形状的增大，感应距离加长。而当体积达到某一值时，感应距离不再随检测体形状增大而加长，成为一固定值。通常将达到定长感应距离的最小检测体称为标准检测体。

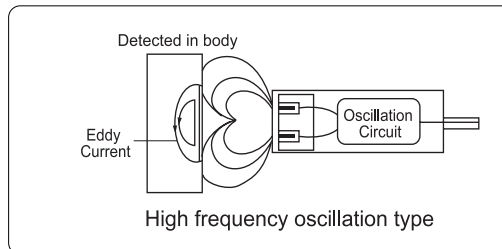
标准检测体一般是材料为铁(St37)，其厚度 1mm 的正方形，边长取感应面直径和 3 倍感应距离中的大者。

## PROXIMITY SENSOR CHARACTERISTICS

- Institutions contact detection, difficult to damage, wear, small errors
- Not influenced by ambient environment, Work normally under harsh environment
- High accuracy of repeated detection, accurate objects positioning
- Rapid reaction frequency, suitable for fast moving object detection

## BASIC CONCEPT OF INDUCTIVE SENSORS

The inductive sensor is the use of metallic conductors and the mutual inductance of the alternating electromagnetic field principle. At the front end of the sensor detection coil generates a high-frequency magnetic field, when metal objects are close to the magnetic field, eddy current metal objects internal product, leading to the decay of the magnetic field energy, energy is absorbed when the metal special body constantly gets close to the sensor sensing face and cause decay. when the attenuation reached a certain extent, the trigger sensor switches the output signal, so as to achieve the purpose of the non-contact type of detection.



### STANDARD SPECIMEN:

Sensing distance of the proximity sensor is decided by the size of the body, and different materials. With the increase of the detected shape, the sensing distance is lengthened. And when the volume reaches a certain value, the sensing distance is no longer increasing with the detected body and is lengthened into a fixed value. Generally, the minimum sized body with fixed sensing distance is called standard test body.

Of which, the material is iron (ST37), the thickness is 1mm, the sensing face diameter and 3 feel shall be located in the larger edge length taken.

**感应距离：**

传感器动作时标准检测体和感应面的距离，对于常开就是从断开到接通，常闭就是从接通到断开。

标准感应距离是不考虑公差，操作温度，供电电压等情况下传感器动作的标准检测体和感应面的距离，是一个理论值。

有效感应距离是单个接近开关在特定的安装环境、温度、电压下测得的感应距离，一般为额定工作电压及室温下(23 ± 5°C)测得。

实际感应距离是在特定温度和电压条件下，单个接近传感器的感应距离，一般是在允许的环境温度 -25°C~+70°C 内，输入电压在额定电压的 85% 到 110% 范围内测量得。

可靠感应距离是指在规定的条件确保时，接近开关正确动作后其动作点距其感应面的一段距离。

**感应距离的误差**

传感器的感应距离和标准感应距离之间的误差，一般为 ± 10%。

**衰减系数：**

检测体影响传感器感应距离的因素。检测体的材料的性质起了重要作用，这可以用衰减系数来描述。衰减系数是指某一种材料的动作距离相对于铁 (St37) 减少了多少。衰减系数越小，则对于某种特定材料的动作距离就越小。

对于电容传感器特征参数是相对介电常数。

材料	衰减因子
铁	1.0
铜	0.25~0.45
黄铜	0.35~0.50
铝	0.30~0.45
不锈钢	0.60~1.00
镍	0.65~0.75
铸铁	0.93~1.05

**SENSING DISTANCE:**

Sensing distance of the proximity sensor detects the size of the body, of different materials with different. With the increase of the detected shape, the sensing distance is lengthened. And when the volume reaches a certain value, the sensing distance is no longer increases with the detected body shape is lengthened into a fixed value. Usually known as the standard specimen will reach the minimum detection distance of the fixed-length induction.

The sensor operation when the distance of the standard sample and the sensing surface, for the normally open is from off to on, the normally closed is from ON to OFF.

Standard sensing distance is not the body and sensing face of the sensor operatively standard detection distance, consider the case of tolerance, operating temperature, supply voltage is a theoretical value.

Effective sensing distance a single proximity switches the measured specific installation environment, temperature, voltage sensing distance, not like for the rated working voltage and room temperature (23±5°C) measured.

The actual sensing distance under specific temperature and voltage conditions, a single sensing distance proximity sensor, generally is within the allowable ambient temperature -25°C~+70°C, the input voltage in the range of 85% to 110% of rated voltage measurement was.

The reliable sensing distance specified conditions to ensure the correct operation of the proximity switch sensing face of its action pitch some distance.

**Sensing Distance Error:**

Error between the sensing distance of the sensor and the standard sensing distance, is typically ±10%.

**Attenuation Coefficient:**

Detect body factors affect the sensing distance of the sensor. The nature of the material of the detecting body plays an important role, which can be described attenuation coefficient. Attenuation coefficient refers to a movement distance of a material with respect to reducing the number of iron (ST37). The attenuation coefficient is smaller, the smaller a distance for the operation of certain materials.

The characteristic parameters of the capacitive sensor is the relative permittivity.

Material	Attenuation factor
Iron	1.0
Copper	0.25~0.45
Brass	0.35~0.50
Aluminum	0.30~0.45
Stainless steel	0.60~1.00
Nickel	0.65~0.75
Cast iron	0.93~1.05

### 开关点偏移:

传感器实际动作位置与标准动作位置的偏差。

### 压降:

压降是指传感器接通时在传感器两端或者输出端测量得到的电压。

### 消耗电流:

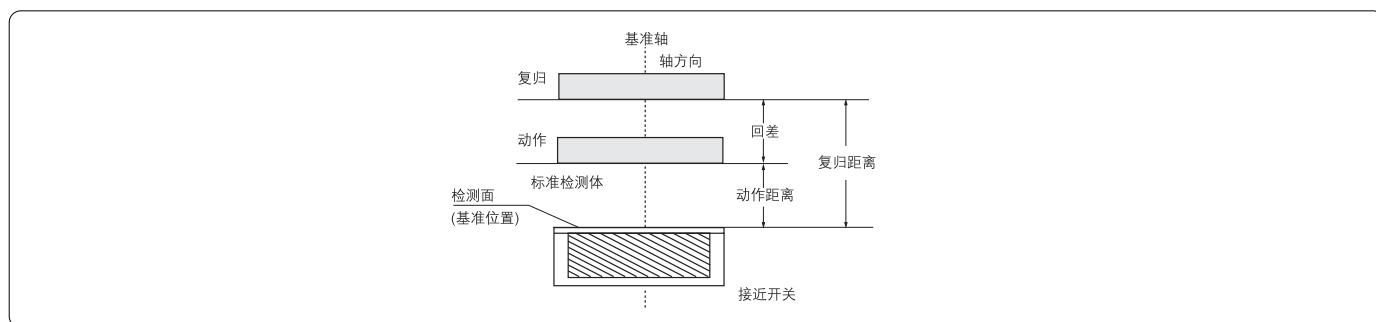
传感器工作状态下的所需的电流。

### 漏电流:

传感器没有接通时，在其负载中残留的电流，称作漏电流。

### 回差:

检测体接近传感器感应面，触发传感器动作的感应距离与检测体远离传感器时动作复归时的复归距离之差。



### 重复精度:

重复精度是指在外壳温度为 $(23 \pm 5^\circ\text{C})$ ，相对湿度为随机的，供电电压为额定测量电压 $\pm 5\%$ ，在8个小时的范围内进行所产生的有效作用距离的变化量。

### 开关频率:

开关频率是指每秒钟传感器动作的最大次数。

### Switch-Point Drift:

The position deviation of the actual movement of the sensor position and the standard action.

### Drop:

The pressure drop means when the sensor is switched on, the output voltage measured in both ends of the sensor.

### Current Consumption:

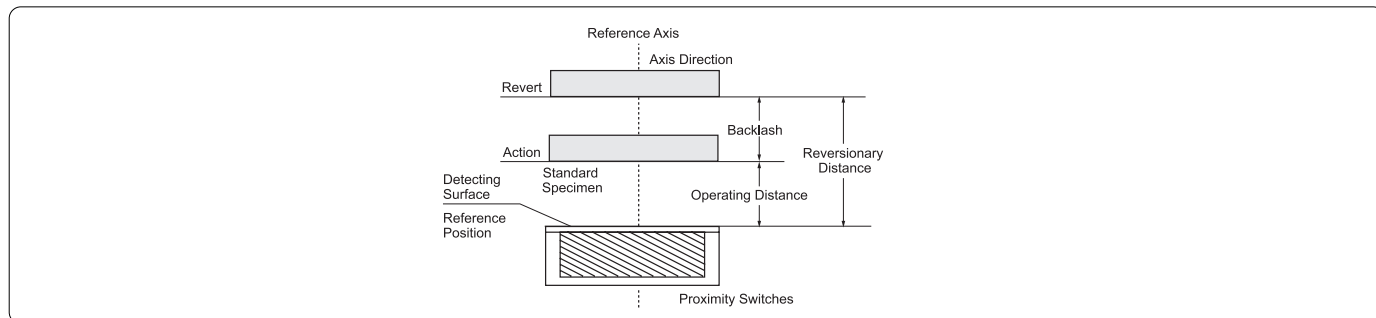
The actual current when the sensor is working.

### Leakage Current:

When the sensor is not turned on, the current remained is called leakage current.

### Backlash:

Detect body proximity sensor sensing surface, triggering the sensing distance of the sensor moves away from the sensor detects body movements reversion reversion distance related.



### Repeatability:

Repeat accuracy is in the housing temperature  $(23 \pm 5^\circ\text{C})$ , the relative humidity is random, the supply voltage for rated measuring voltage of  $\pm 5\%$  within 8 hours, the amount of change in the effective distance.

### Switching Frequency:

The switching frequency is the maximum times of actions of the sensor in one second.

### 极性保护:

直流传感器防止极性接反的保护功能。

### 浪涌保护:

浪涌主要指的是电路中超出正常工作电压的瞬间过电压,它很可能使电路在浪涌的一瞬间烧坏。浪涌保护装置可以有效地吸收或分流突发的巨大能量,以保护设备免于受损。

### 短路保护:

如果极限电流超过的话,输出会周期性地封闭和释放,直至短路状态解除。

### 延迟时间:

启动延迟时间是传感器接通电源的瞬间至其准备完毕且输出正常信号的时间间隔。响应延时是当传感器进入或离开感应区时的反应时间。

### 外壳材料

金属	铝(压铸铝合金): 标准的切割成形铝。可被阳极氧化。可用于外壳和紧固部分。 镍铜合金: 铜镍二元合金, 机械性能和耐蚀性好, 色泽美观。 不锈钢: 良好的抗化性和强度。
塑料	ABS 工程塑料(Acrylnitril-Butadien-Styrol): 抗震, 坚固, 有一定的抗化性。部分型号是阻燃的, 可用作外壳材料。 PA 6, PA 12(聚酰胺): 良好的机械强度和温度耐受能力。P12 允许在食品行业使用的。 PBT(Polybuteneterephthlate): 良好的机械强度和温度耐受能力。部分型号是阻燃的, 良好抗化性和耐油性。 PC(Polycarbonate): 透明的, 坚硬的, 有弹性的和耐冲击的, 良好的温度耐受性。一定抗化能力。 PMMA(Polymethylmetharcrylate): 透明、坚硬、不易刮花, 防 UV 射线, 可用作光学元件。 POM(Polyoxymethylene): 良好的耐冲击性, 良好的机械强度, 良好的抗化性。 PUR(Polyurethane): 有弹性的, 耐磨的, 耐冲击的。能耐受油, 油指、溶剂的腐蚀。 PVC(Polyvinylchloride): 良好的机械强度和抗化性能。

金属材料外壳牢固, 安装时紧固扭矩大。圆柱形产品安装螺纹精度高。

塑料材质外壳价格经济, 耐水性好, 圆柱形产品安装螺纹精度低, 紧固扭矩有限制。

### Polarity Protection:

DC sensors prevent polarity reverse protection function.

### Surge Protection:

Surge is transient overvoltage circuit in excess of the normal operating voltage, it is likely to make the circuit in the surge of the moment burned out. Surge protection device can effectively absorb or divert huge energy burst, in order to protect the equipment from damage.

### Short Circuit Protection:

If the current exceeds the limit, the output will be periodically closed and release until the short circuit condition is removed.

### Delay Time:

Turn on delay time is the time interval occurred between when the sensor is powered on to when it can output normal signal. The response delay time is the time of response from entering to leaving the sensing area.

### CASE MATERIAL

Metal	Aluminum (die-cast aluminum alloy): standard aluminum cut to shape. Which may be anodized. Can be used for housing and fastening parts. Binary alloy of nickel-copper alloys: copper-nickel, good mechanical properties and corrosion resistance, beautiful color. Stainless steel: good chemical resistance and strength.
Plastic	ABS plastic (Acrylnitril-Butadien-Styrol): seismic, sturdy, and chemical resistance. Part of the model is flame retardant and can be used as the shell material. PA 6, PA 12 (polyamide): a good mechanical strength and temperature tolerance. P12 allows for use in the food industry. PBT (Polybuteneterephthlate): a good mechanical strength and temperature tolerance. Part of the model is flame retardant, good chemical resistance and oil resistance. PC (Polycarbonate): a transparent, hard, resilient and impact resistance, and good temperature tolerance. Certain anti ability. PMMA (Polymethylmetharcrylate): transparent, hard, easy to scratch, anti-UV rays can be used as optical components. POM (Polyoxymethylene): a good impact resistance, good mechanical strength, good chemical resistance. PUR (Polyurethane): a flexible, abrasion-resistant, impact-resistant. Can withstand oils, oil refers to the corrosion of the solvent. PVC (Polyvinylchloride): good mechanical strength and chemical resistance properties.

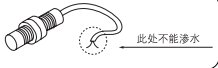
Solid metallic casing installation fastening twisted people moments big. The cylindrical products installed threaded accuracy.

Plastic housing affordable, good water resistance, the cylindrical threaded low precision, tightening torque limit product installation.

## 防护等级:

IP 防护等级系统是由 IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION) 所起草。将电器依其防尘防湿气之特性加以分级。这里所指的外物含工具，人的手指等均不可接触到电器内之带电部分，以免触电。IP 防护等级是由两个数字所组成。第 1 个数字表示产品防尘、防止外物侵入的等级，第 2 个数字表示产品防湿气、防水侵入的密闭程度，数字越大表示其防护等级越高。

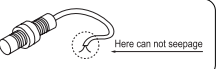
## IP 防护等级系统

术语	说明																			
保护构造	<p>免受水、人体和固体异物损害的保护程度。构造以 IEC (国际电子技术委员会) 的规格为标准。</p> <ul style="list-style-type: none"> <li>第一位数字表示的保护级别</li> </ul> <table border="1"> <thead> <tr> <th>第一位数字</th> <th>说明</th> </tr> </thead> <tbody> <tr><td>0</td><td>无保护</td></tr> <tr><td>1</td><td>防止人手接触内部的充电部分(ø50mm)</td></tr> <tr><td>2</td><td>防止人手接触内部的充电部分(ø12mm)</td></tr> <tr><td>3</td><td>防止厚度或直径大于 2.5mm 的固体物侵入内部充电部分</td></tr> <tr><td>4</td><td>防止厚度或直径大于 1.0mm 的固体物侵入内部充电部分</td></tr> <tr><td>5</td><td>防止影响操作的灰尘侵入</td></tr> <tr><td>6</td><td>完全防止灰尘侵入</td></tr> </tbody> </table> <p>注: IEC 规定有上述保护构造的测试方法, 产品规格指定的保护构造由这些测试决定。</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p><b>警告</b> 尽管保护构造是指传感器包括电缆, 但电缆末端不防水、并未由指定保护包住。因此, 确保水不会从电缆末端侵入。</p>  </div>	第一位数字	说明	0	无保护	1	防止人手接触内部的充电部分(ø50mm)	2	防止人手接触内部的充电部分(ø12mm)	3	防止厚度或直径大于 2.5mm 的固体物侵入内部充电部分	4	防止厚度或直径大于 1.0mm 的固体物侵入内部充电部分	5	防止影响操作的灰尘侵入	6	完全防止灰尘侵入			
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	<ul style="list-style-type: none"> <li>IEC 标准</li> </ul> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">IP</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">□ □</div> <div style="margin-left: 10px;"> <p>—— 第二位数字... 对水侵入的保护</p> <p>—— 第一位数字... 对人体及固体异物保护</p> </div> </div> <ul style="list-style-type: none"> <li>第二位数字表示的保护级别</li> </ul> <table border="1"> <thead> <tr> <th>第二位数字</th> <th>说明</th> </tr> </thead> <tbody> <tr><td>0</td><td>无保护</td></tr> <tr><td>1</td><td>使垂直下落水滴无有害影响</td></tr> <tr><td>2</td><td>使宽于垂直方向 15。下落水滴无有害影响</td></tr> <tr><td>3</td><td>使宽于垂直方向 60。下落水滴无有害影响</td></tr> <tr><td>4</td><td>使任何方向内飞溅的水滴无有害影响</td></tr> <tr><td>5</td><td>使任何方向内喷射的水无有害影响</td></tr> <tr><td>6</td><td>使任何方向内喷射的水无法侵入</td></tr> <tr><td>7</td><td>使在特定的条件下浸在水中无水侵入</td></tr> <tr><td>8</td><td>在特定的压力下浸在水中仍可使用</td></tr> </tbody> </table> <ul style="list-style-type: none"> <li>JEM 标准</li> </ul> <p>IP67g 除 IEC 标准的 IP67 保护构造之外的指定保护, 是指滴或气泡不可从任何方向进入。</p>	第二位数字	说明	0	无保护	1	使垂直下落水滴无有害影响	2	使宽于垂直方向 15。下落水滴无有害影响	3	使宽于垂直方向 60。下落水滴无有害影响	4	使任何方向内飞溅的水滴无有害影响	5	使任何方向内喷射的水无有害影响	6	使任何方向内喷射的水无法侵入	7	使在特定的条件下浸在水中无水侵入	8
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## Protection Class:

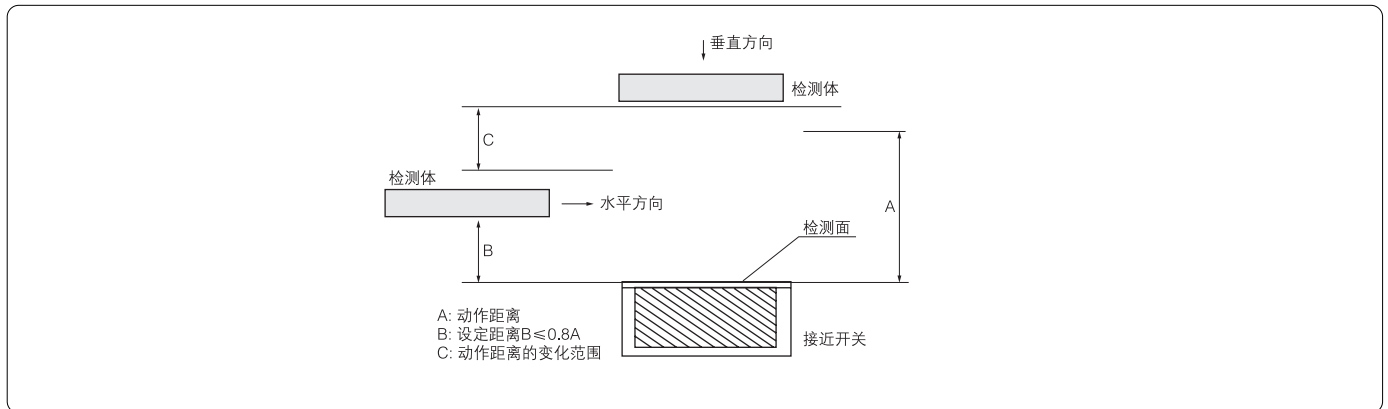
IP protection class system is drafted by the IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION). Appliances according to their dustproof anti-moisture characteristics to grade. Referred to foreign objects including tools, fingers, etc. Do not touch the live parts of the electrical appliances to avoid electric shock. IP protection class is composed by two figures. The first figure represents the grade of the protections in regarding to its dust proof and guarding against the intrusion of foreign objects. The second figure represents the airtight extent of the product to prevent moisturing and intrusion of water. The grade is higher with the increase of these two figures.

## IP PROTECTION CLASS SYSTEM

Term	Explain																																				
Protection structure	<p>From the water, the degree of protection of the human body and solid different special damages. Constructed to the specifications of the IEC (International Electrotechnical Commission) standards.</p> <ul style="list-style-type: none"> <li>The level of protection indicated by the first digit.</li> </ul> <table border="1"> <thead> <tr> <th>The first digit</th> <th>Explain</th> </tr> </thead> <tbody> <tr><td>0</td><td>Unprotected</td></tr> <tr><td>1</td><td>Prevent contact with human hands inside the charging part (ø50mm)</td></tr> <tr><td>2</td><td>To prevent contact with human hands the internal charging part (ø12mm)</td></tr> <tr><td>3</td><td>Inva de the internal charging portion to prevent the solid matter of the thickness or diameter greater than 2.5mm</td></tr> <tr><td>4</td><td>Prevent objects of which the thickness is over 1.0mm from intruding into the inner charging part of sensor</td></tr> <tr><td>5</td><td>Prevent the intrusion of dust which will affect the operation</td></tr> <tr><td>6</td><td>Completely prevent dust intrusion</td></tr> </tbody> </table> <p>Note: IEC provides test methods, product specifications specify the protection structure of the protective structure is determined by these tests.</p> <ul style="list-style-type: none"> <li>The level of protection indicated by the second digit.</li> </ul> <table border="1"> <thead> <tr> <th>The second digit</th> <th>Explain</th> </tr> </thead> <tbody> <tr><td>0</td><td>Unprotected</td></tr> <tr><td>1</td><td>Vertically falling water droplets no harmful effects</td></tr> <tr><td>2</td><td>So that the width in the vertical direction 15. The whereabouts of the water droplets no harmful effects</td></tr> <tr><td>3</td><td>So that the width in the vertical direction 60. The whereabouts of the water droplets no harmful effects</td></tr> <tr><td>4</td><td>To any direction splashing droplets no harmful effects</td></tr> <tr><td>5</td><td>So that the water sprayed in any direction to no adverse effect</td></tr> <tr><td>6</td><td>Any direction injection water can not invade</td></tr> <tr><td>7</td><td>No intrusion of water under certain condition when immersed in the water</td></tr> <tr><td>8</td><td>Immersed in the water, can still be used under the specific pressure</td></tr> </tbody> </table> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p><b>Warning:</b> Protection structure sensors including cables, but the end of the cable is not waterproof not specified.</p>  </div>	The first digit	Explain	0	Unprotected	1	Prevent contact with human hands inside the charging part (ø50mm)	2	To prevent contact with human hands the internal charging part (ø12mm)	3	Inva de the internal charging portion to prevent the solid matter of the thickness or diameter greater than 2.5mm	4	Prevent objects of which the thickness is over 1.0mm from intruding into the inner charging part of sensor	5	Prevent the intrusion of dust which will affect the operation	6	Completely prevent dust intrusion	The second digit	Explain	0	Unprotected	1	Vertically falling water droplets no harmful effects	2	So that the width in the vertical direction 15. The whereabouts of the water droplets no harmful effects	3	So that the width in the vertical direction 60. The whereabouts of the water droplets no harmful effects	4	To any direction splashing droplets no harmful effects	5	So that the water sprayed in any direction to no adverse effect	6	Any direction injection water can not invade	7	No intrusion of water under certain condition when immersed in the water	8	Immersed in the water, can still be used under the specific pressure
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## 检测体的位置设定

传感器的感应距离会因环境温度变化、电压变动等周围条件的稍有变动。因此，为使传感器稳定工作，检测体的最大接近位置需小于感应距离。使用标准检测时，设定实际感应距离应在动作距离的80%以下。此外，在检测体的形状小于标准检测体或使用铁以外的检测体时，因感应距离缩短，故设定实际感应距离也必须相应缩短。详细请参照说明书。



## 埋入式、准埋入式、非埋入式安装

接近传感器根据安装方法可分为埋入式和非埋入式。埋入式可埋入金属内使用。非埋入式则不可埋入金属内使用，但动作距离与埋入式相比，检测距离更长。

<p><b>埋入式安装的接近开关</b></p> <p>传感器安装时感应面可以和金属表面齐平。开关表面到其对面的金属物体的距离要 <math>\geq 3S_n</math>，邻近的两个开关间的距离必须 <math>\geq D</math>。</p>	
<p><b>准埋入式安装的接近开关</b></p> <p>感应表面到安装表面需要有一段距离是没有导磁材料的。满足这个条件时，其开关距离就是有效的，而且不受限制。尺寸“X”(见右图)指感应表面到其下面的导磁材料的最小距离。</p>	
<p><b>非埋入式安装的接近开关</b></p> <p>可以根据它们的头部来鉴别，非齐平式的感应表面周围的区域没有金属外壳。感应表面到金属安装介质的距离必须 <math>\geq 2S_n</math>。感应表面到对面的金属物体的距离必须 <math>\geq 3S_n</math>，另外两个邻近的接近开关距离必须 <math>\geq 2d</math>。</p>	

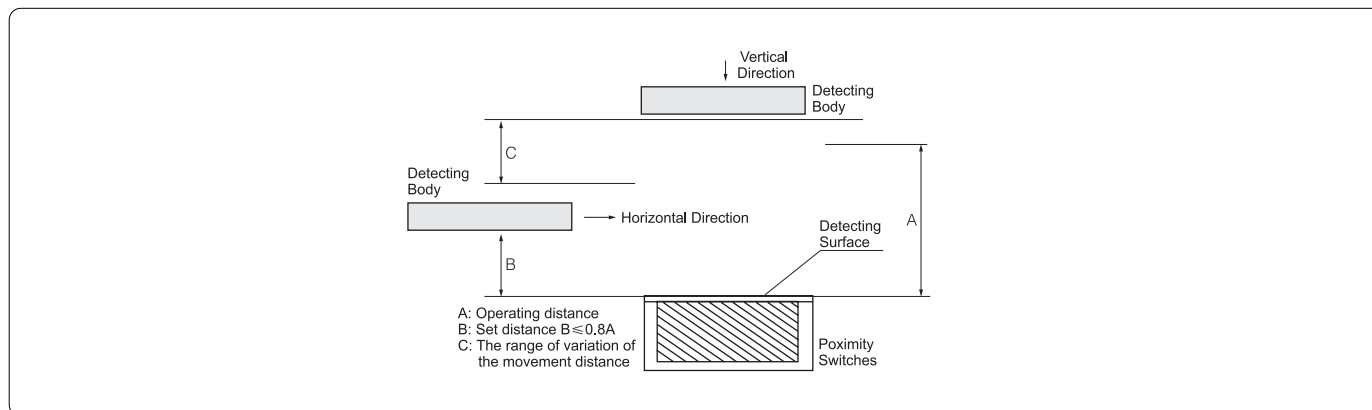
埋入式安装的电感传感器和电容传感器的优点为：它们有更好的机械保护性能，与非埋入式安装的传感器相比较，对于错误的电影响的灵敏度更低。

## 传感器连接方式

- 引线方式 —— 以电缆引线连接
- 端子方式 —— 以端子台连接
- 插座方式 —— 通过插座连接

## SETTING A POSITION OF THE DETECTING BODY

The sensing distance of the sensor will be changed slightly due to changes of ambient temperature, voltage changes surrounding conditions. Therefore, in order to make the sensor steady work, the maximum approach position of the detecting body is required to be less than the sensing distance. Using standard detection, the setting the actual sensor distance should be 80% of the operation distance or less of the distance. In addition, when the sample detecting the shape of the body is less than the standard sample or use detected body with other material, the sensing distance is shortened, the actual sensing distance is set must also be reduced accordingly. For details, please refer to the manual.



## BURIED, QUASI-SUBMERGED AND NON-SUBMERGED INSTALLATION

Proximity sensor installation methods can be divided into embedded and non-embedded. The difference is that the embedded can be used to sense inside the metal, and the non-embedded can't. But the sensing distance is longer when compared with the embedded.

<p><b>Flush-mounted proximity switches</b></p> <p>Sensing face when the sensor is installed and the metal surface is flush. Switching distance of the surface of the metal objects to its opposite <math>\geq 3S_n</math>, the distance between two adjacent switch must be <math>\geq D</math>.</p>	
<p><b>Quasi flush-mounted proximity switch</b></p> <p>There must be some area between the inductive surface and mounting surface in order to make its sensing distance effective and without limit.</p>	
<p><b>Non-submerged installation of proximity switch</b></p> <p>According to their head to identify non-flush sensing surface area around the metal casing. Sensing surface to metal mounting medium distance must be <math>\geq 2S_n</math>. The distance of the sensing surface to the opposite side of the metal objects must be <math>\geq 3S_n</math>, proximity switch two adjacent distance must be <math>\geq 2d</math>.</p>	

The advantages of flush-mounted inductive sensor and capacitive sensor: they have a better mechanical protection performance, compared with the non-flush-mounted sensor, the lower for the error sensitivity to the influence of power.

## SENSOR CONNECTION

- About way of leads —— Cable leads
- About way of terminals —— terminal block
- About connection —— connecting through socket



## 传感器连接注意事项

2 线式	
<p><b>连接</b></p> <p>请正确可靠的连接传感器的电缆，如有接线错误或接线不可靠，会损坏传感器及周边装置。接线方法请参照右图：</p>	

### 电缆连接

在进行传感器的电缆连接时，电缆要与动力线、高压线分开配线。请绝对避免使用同一配线槽、同一导线管配线，否则会造成误动作。如果电缆需加长，在 30m 以下时请选用截面 0.3mm 以上的电缆，在 30m 以上时，请选用导体阻抗在 100Ω/km 以下的电缆，另外，在高速响应时，电缆过长，会因导线间电容等因素，使输出波形产生失真，请特别注意。

### 传感器的逻辑与、逻辑或的连接

2 线式直流开关输出型传感器的 AND 或 OR 原则上不能连接。另外，与触点串联也是不可以的。

### 与可编程控制器的连接

可编程控制器的 DC 输入模块，可与直流开关输出型 2 线式传感器连接，但使用前要确认与 DC 输入模块在 ON、OFF 时的接合性。例：

- ON 时  
 $(\text{电源电压}) - (\text{输入模块的动作电压}) \geq (\text{传感器的饱和电压})$  或  $(\text{电源电压}) - (\text{输入模块的最小 ON 电流} \times \text{内部阻抗}) \geq (\text{传感器的饱和电压})$
- OFF 时  
 $(\text{输入模块最小 OFF 电流}) \geq (\text{传感器的漏电流})$

## SENSOR CONNECTION NOTE

2-Wire Type	
<p><b>Connection</b></p> <p>Please assure correct and reliable sensor cable connection, if any wrong or unreliable wiring, it will damage the sensors and peripheral devices. Wiring methods, refer to the illustrated picture on the right side.</p>	

### Cable connection

During sensor cable connection, the cable should be wired separately to power line and high-tension line. Please absolutely avoid using the same wiring duct, the same conduit wiring, otherwise, it will cause a malfunction. As to lengthening, please choose sectional area with over 3mm long for cables with length below 30m. If the length of cable reaches over 30m long, please choose conductor resistance under 100Ω per kilometer. Please also pay special attention that when the cables are too long, the output waveform would be distorted when rapid sensing, due to the capacitance among wires.

### Sensor logic, logic or connection

The 2-wire DC sensor should not be connected between its logic and & logic OR in principle. And the connection among its connectors is also inadvisable.

### Connection to the programmable controller

DC input module, the programmable controller can be connected to the two-wire sensor and the output type of the DC switch, Before using, Please confirm the zygoty of the DC input module when on and when OFF. Example:

- ON  
 $(\text{Power supply voltage}) \geq (\text{input modules operation voltage}) \geq (\text{the saturation voltage of the sensor})$ , or  $(\text{supply voltage}) - (\text{input module, the minimum internal impedance of the ON current} \times) \geq (\text{the saturation voltage of the sensor})$
- OFF  
 $\text{Minimum OFF current (input module)} \geq (\text{the leakage current of the sensor})$

## 3 线式 3-Wire Type

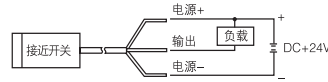
### 连接

3 线式直流开关输出型传感器可进行 AND 或 OR 连接。它的输出形式有 NPN 型和 PNP 型两种。可连接开关电力继电器、电磁铁、计数器等直流驱动负载。

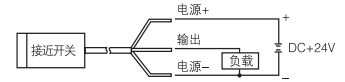
### Connection

3-Wire output type sensor supports connection between logic AND & logic OR. Its output form includes two types: NPN and PNP output. It also supports connections to switching power relays, solenoids, counters, etc.

NPN 输出的连接



PNP 输出的连接



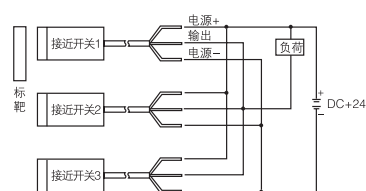
### OR 连接

当传感器 OR 连接，任意一个传感器动作就可驱动负载。传感器的数量取决于漏电流的和，只要它不影响负载动作，就可多个连接。NPN、PNP 型不可混杂使用。

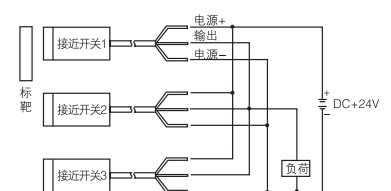
### OR connection

When sensor OR connection, any action can drive the load. The number of the sensors depends on the leakage current and, as long as it does not affect the load operation can be a plurality of connection. NPN, PNP type can not support mixed use.

NPN 输出的OR连接



PNP 输出的OR连接



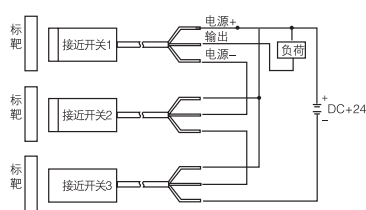
### AND 连接

当传感器 AND 连接时，全部的传感器动作时可驱动负载。传感器的数量取决于饱和电压的和，只要它不影响传感器的电源电压及负载驱动电压，就可多个连接。传感器的响应速度为各个传感器初始复位的累加。

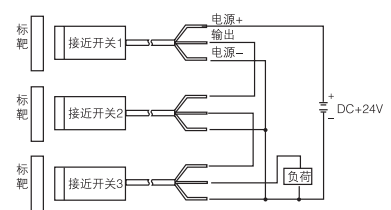
### AND connection

When AND connection, all of the sensor operation can drive the load. Depends on the saturation voltage of the number of sensors and, as long as it does not affect the power supply voltage of the sensor and the load drive voltage can be a plurality of connection. The response speed of the sensor for the initial reset is the accumulation of the respective sensors.

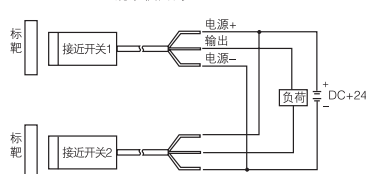
NPN 输出的AND连接



PNP 输出的AND连接



NPN,PNP 混杂使用的AND



传感器 1: PNP 输出

传感器 2: NPN 输出

优点: 传感器的饱和电压不影响传感器动作时的电压。传感器的动作取决于自身的响应速度。

Sensor 1: PNP output

Sensor 2: NPN output

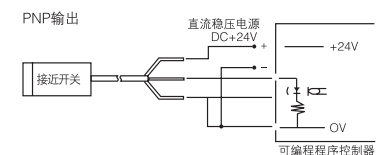
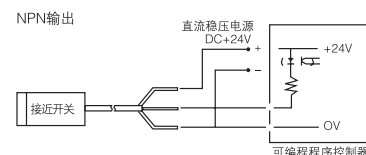
Advantages: the saturation voltage of the sensor does not

### 与可编程控制器连接

可编程控制器的 DC 输入模块可以直接与直流开关 3 线式 NPN 或 PNP 型输出连接，传感器的电源请使用 DC+24V 的直流稳压电源。

### Connection with the programmable controller

The DC output module can be connected directly to the DC switch with 3-wire type NPN or PNP output form, and please use power of the sensor with stabilized voltage for DC+24V.



### 电缆连接(与 2 线式的电缆连接相同)

Cable connection (2-wire cable to connect the same)

## 关于检测体的电镀

检测体的表面如作电镀处理，动作距离会发生变化。特别是铁作表面处理后，根据电镀种类不同动作距离会缩短 10-30%。

## 接通或断开电源时的注意事项

传感器在接通或断开电源时的输出状态，不管是检测，还是非检测都为 OFF 状态。特别是接通电源时，在一定时间内输出状态为 OFF 状态的动作，称为初始复位。但是在以下情况下，输出会有瞬间 ON(OFF)状态，这个时间与传感器的动作距离的长短成正比，约为 10—100ms 左右。将传感器与计数器、可编程控制器连接时，因计数器、可编程控制器内部带有初始复位电路，不会有问题。在其它场合，请注意避免发生以下情况。

1. 检测物体位于传感器的检测距离附近。
2. 对于直流电压型和直流开关型传感器，在其电源接通(断开)时，时间常数出现大幅上升(下降)的情况。
3. 交流开关型传感器，在其电源接通(断开)时，有自激、噪音的情况。

## 电容、灯负载

直流开关型和交流开关型传感器，不能把电容、白炽灯等作为与其直接连接的负载。请通过继电器连接或串联以限流电阻。

限流电阻 R 的峰值电流在传感器的负载电流以内:

$$\frac{\text{电源电压 } V}{\text{接近开关的最大负荷电流值 mA}} \leq R(\text{K}\Omega)$$

电容 R 的容许损失(W):

$$\frac{\text{电源电压 } V^2}{R(\Omega)} \times 2 \text{ 倍以上}$$

## 负载与电容、灯并联的情况下

$$\frac{\text{电源电压 } V}{\text{接近开关的最大负荷电流值 mA} - \text{负载电流值 mA}} \leq R(\text{K}\Omega)$$

电容 R 的容许损失(W):

$$\frac{\text{电源电压 } V^2}{R(\Omega)} \times 2 \text{ 倍以上}$$

## ELECTROPLATING ON THE SAMPLE

The surface of the detecting body, such as plating treatment, the movement distance will change. Especially iron after the surface treatment, according to the different types of plating, movement distance will be shortened to 10-30%.

## NOTE WHEN THE POWER IS TURNED ON OR OFF

The output state of the sensor when the power is turned on or off, whether it is to detect, or non-detection of the OFF state. Especially when the power is turned on, within a certain time output state to the OFF state operation, referred to as the initial reset. However, in the following cases, the output will be an instant ON (OFF) state, this time with the sensor operation distance is proportional to the length of approximately 10-100ms. Sensor counter, programmable logic controller, due to the counter inside the programmable controller with the initial reset circuit, there will be no problem. On other occasions, careful to avoid the following occurs.

1. Detect objects in sensor detection distance near.
2. For the DC voltage and DC switch type sensor, when its power is turned ON (OFF), the time constant of a significant increase (decrease) in the case of.
3. AC switch-type sensor, when its power is turned ON (OFF), a self-excited, the case of the noise.

## CAPACITOR, LAMP LOAD

DC switch and AC switch sensors, such as capacitors, incandescent as its directly connected load. By relay connection or a current limiting resistor in series.

The peak current of the current limiting resistor R is less than the load current of the sensor:

$$\frac{\text{Power supply voltage } V}{\text{The maximum load current value of the proximity switch mA}} \leq R(\text{K}\Omega)$$

Capacitance R permissible losses (W):

$$\frac{\text{Power supply voltage } V^2}{R(\Omega)} \times 2 \text{ times or more}$$

## THE CASE OF LOAD AND THE CAPACITOR, THE LAMP IN PARALLEL

$$\frac{\text{Power supply voltage } V}{\text{The maximum load current value of the proximity switch mA-load current value mA}} \leq R(\text{K}\Omega)$$

Capacitance R permissible losses (W):

$$\frac{\text{Power supply voltage } V^2}{R(\Omega)} \times 2 \text{ times or more}$$

## 负载短路保护电路

带有负载短路保护电路的产品，当由于传感器的误动作、负载破损等引起电流超出传感器最大负载电流的2倍以上时，负载短路保护电路将切断负载电流，保护传感器的输出。

## 检测配线注意事项

采用蜂鸣器、灯等实验检查传感器的配线，可能会产生高电压、大电流。因此请不要采用此类检查方法。

## LOAD SHORT-CIRCUIT PROTECTION CIRCUIT

With a load short-circuit protection circuit, when the load breakage caused by current exceeds the sensor maximum load current of more than 2 times, the load short circuit protection circuit will cut off the load current, protection of the sensor output due to the malfunction of the sensor.

## DETECT WIRING NOTE

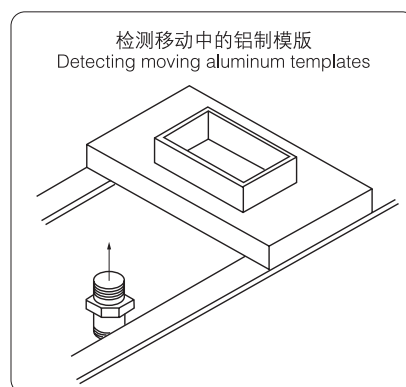
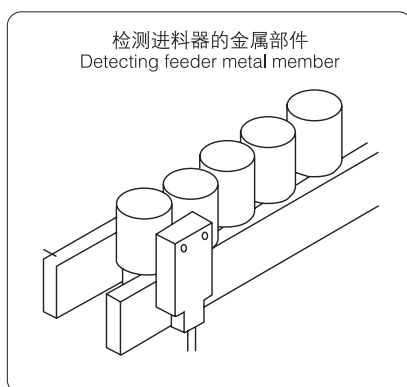
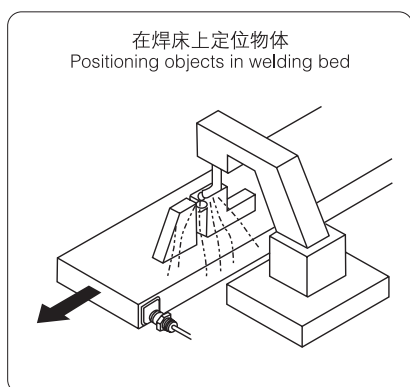
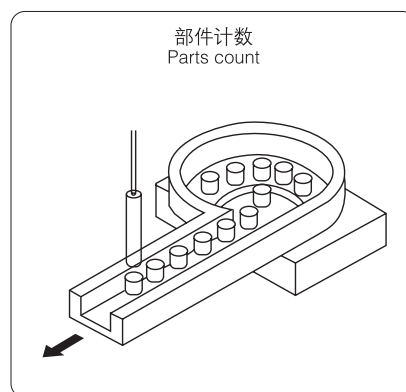
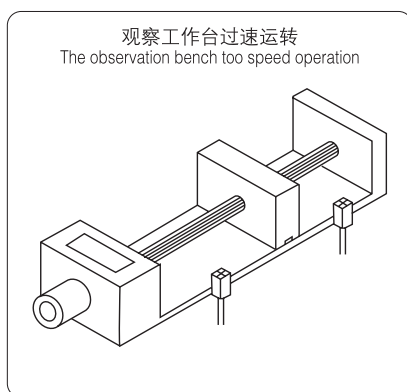
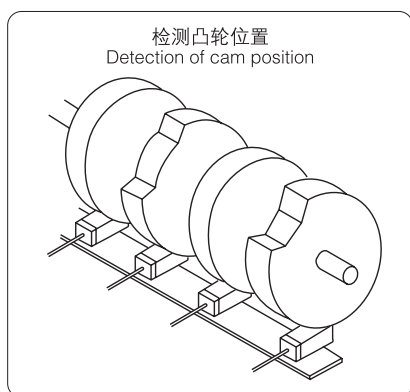
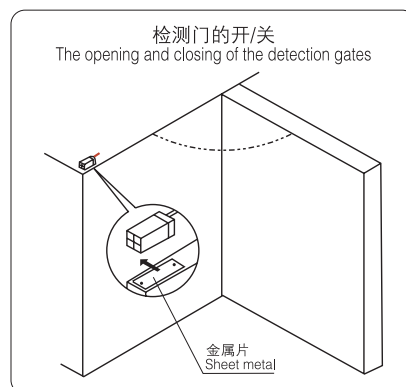
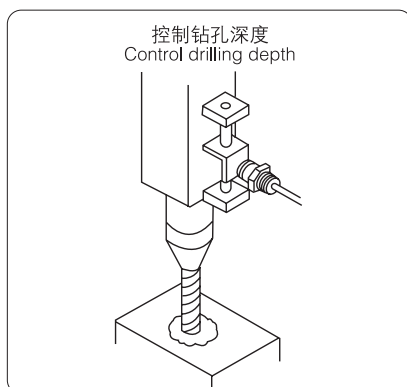
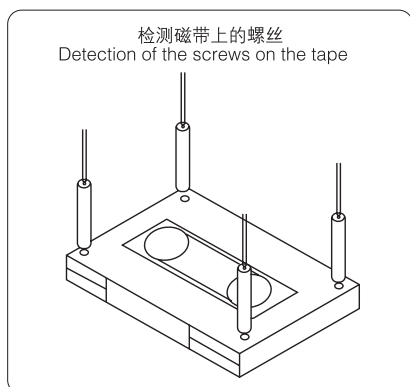
When detecting the wiring of sensors through buzzer, lights or other experimental methods, please be cautioned about the conditions of high voltage and high current. Suggest not using these methods.

## 应用实例

电感式传感器在航空、航天技术以及工业生产中都有广泛的应用。当被测对象是导电物体或可以固定在一块金属物上的物体时，一般都选用电感式传感器，因为它的响应频率高、抗环境干扰性能好、应用范围广、成本经济。

## APPLICATION EXAMPLES

Inductive sensors are widely used in aviation, aerospace, technology, and industrial production. When the measured object is conductive objects or can be fixed on a metal object objects generally use inductive sensors because of its high frequency response, anti-environmental interference performance, a wide range of applications, the cost economy.



## 产品接线图示

DC 2线 2-Wire Type	NO	NC	
引线式 Leaded			
M8 连接器 M8 Connector			
M12 连接器 M12 Connector			

DC 3线 3-Wire Type	NPN NO	NPN NC	PNP NO	PNP NC
引线式 Leaded				
M8 连接器 M8 Connector				
M12 连接器 M12 Connector				

DC 4线 4-Wire Type	NPX: NPN NO+PNP NC	PNY: PNP NO+NPN NC		
引线式 Leaded				
M12 连接器 M12 Connector				

AC 2线 2-Wire Type	SCR NO	SCR NC		
引线式 Leaded				
M12 连接器 M12 Connector				



结构分类: 圆柱型  
Structural category: Cylinder type

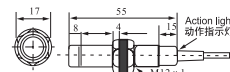
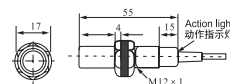
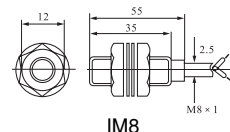
外形图例  
Outward appearance illustration

具有短路保护、极性保护、过流保护  
Short-circuit, polarity and over-current protections

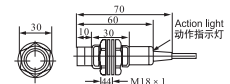
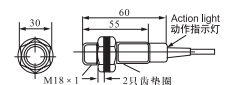
### 埋入式 / Flush

外形编号 Outward appearance code			IM8	IM12	IM18	IM30
检测距离 Detection distance			2mm	4mm	8mm	16mm
直流 DC10~30 VDC	NPN	NO	IM8-D1NA02-L	IM12-D1NA04-L	IM18-D1NA08-L	IM30-D1NA16-L
		NC				
		NO+NC				
	PNP	NO	IM8-D1PA02-L	IM12-D1PA04-L	IM18-D1PA08-L	IM30-D1PA16-L
		NC				
		NO+NC				
二线制 Two wire system		NO				
交流 AC90~250 VAC	SCR 可控硅 Control- lable silicon	NO				
		NC				
		NC				

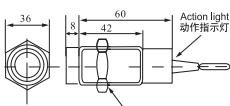
### 外形尺寸/Overall Dimensions



IM12



IM18



IM30

### 非埋入式 / Non-Flush

外形编号 Outward appearance code			IM8	IM12	IM18	IM30
检测距离 Detection distance			4mm	8mm	16mm	25mm
直流 DC10~30 VDC	NPN	NO	IM8-D1NA04-L	IM12-D1NA08-L	IM18-D1NA16-L	IM30-D1NA25-L
		NC				
		NO+NC				
	PNP	NO	IM8-D1PA04-L	IM12-D1PA08-L	IM18-D1PA16-L	IM30-D1PA25-L
		NC				
		NO+NC				
二线制 Two wire system		NO				
交流 AC90~250 VAC	SCR 可控硅 Control- lable silicon	NO				
		NC				
		NC				

### 产品规格 / Specifications

外形编号 Outward appearance code	IM8	IM12	IM18	IM30	
输出电流 DC Output current	≤ 200mA	≤ 200mA	≤ 200mA	≤ 200mA	
输出类型 SCR/继电器 Relay					
输出电压降 Output voltage drop DC/AC	直流(NPN PNP)型: 1.5V 以下; 二线型: 3.9V 以下;				
消耗电流 Consumption current	10mA 以下				
标准检测物体 Standard detected object	8 × 8 × 1(A3 铁 iron)	12 × 12 × 1(A3 铁 iron)	18 × 18 × 1(A3 铁 iron)	30 × 30 × 1(A3 铁 iron)	
重复精度 Repeated precision	0.01	0.01	0.01	0.05	
响应频率 DC/AC Response frequency	埋入式 Flush	2KHz	1KHz	500Hz	150Hz
	非埋入式 Non-flush	1KHz	500Hz	150Hz	100Hz
工作环境温度 Working environment temperature	-25°C~+75°C	-25°C~+75°C	-25°C~+75°C	-25°C~+75°C	
绝缘电阻 Insulation resistance	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω	
外壳材料 Shell material	金属 Metal	金属 Metal	金属 Metal	金属 Metal	
防护等级 Protection grade	IP67	IP67	IP67	IP67	
短路保护电流 Current short-circuit protection	220mA(不含 AC 产品 Excluding AC output product)				



结构分类: 圆柱型  
Structural category: Cylinder type

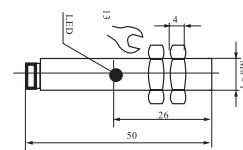
外形图例  
Outward appearance illustration

具有短路保护、极性保护、过流保护  
Short-circuit, polarity and over-current protections

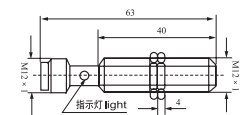
### 埋入式 / Flush

外形编号 Outward appearance code			IM8	IM12	IM18	IM30
检测距离 Detection distance			2mm	4mm	8mm	16mm
直流 DC10~30 VDC	NPN	NO	IM8-D1NA02-M2-L-W	IM12-D1NA04-M1-L-W	IM18-D1NA08-M1-L-W	IM30-D1NA16-M1-L-W
		NC				
		NO+NC				
	PNP	NO	IM8-D1PA02-M2-L-W	IM12-D1PA04-M1-L-W	IM18-D1PA08-M1-L-W	IM30-D1PA16-M1-L-W
		NC				
		NO+NC				
二线制 Two wire system		NO				
交流 AC90~250 VAC	SCR 可控硅 Control- lable silicon	NO				
		NC				

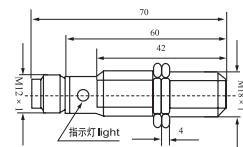
### 外形尺寸/Overall Dimensions



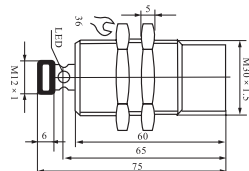
IM8



IM12



IM18



IM30

### 非埋入式 / Non-Flush

外形编号 Outward appearance code			IM8	IM12	IM18	IM30
检测距离 Detection distance			4mm	8mm	16mm	25mm
直流 DC10~30 VDC	NPN	NO	IM8-D1NA04-M2-L-W	IM12-D1NA08-M1-L-W	IM18-D1NA16-M1-L-W	IM30-D1NA25-M1-L-W
		NC				
		NO+NC				
	PNP	NO	IM8-D1PA04-M2-L-W	IM12-D1PA08-M1-L-W	IM18-D1PA16-M1-L-W	IM30-D1PA25-M1-L-W
		NC				
		NO+NC				
二线制 Two wire system		NO				
交流 AC90~250 VAC	SCR 可控硅 Control- lable silicon	NO				
		NC				

### 产品规格 / Specifications

外形编号 Outward appearance code		IM8	IM12	IM18	IM30
输出电流 DC Output current	DC	≤ 200mA	≤ 200mA	≤ 200mA	≤ 200mA
输出电压降 Output voltage drop	DC/AC	直流(NPN、PNP)型 3V 以下、二线型: 3.9V 以下、交流 AC 10V 以下 DC < 3V、AC < 10V			
消耗电流 Consumption current		直流(NPN、PNP)型 DC 12V 时 8mA、24V 时 15mA、交流 AC 10mA 以下 DC < 15mA、AC < 10mA 220mA			
标准检测物体 Standard detected object		8 × 8 × 1(A3 铁 iron)	12 × 12 × 1(A3 铁 iron)	18 × 18 × 1(A3 铁 iron)	30 × 30 × 1(A3 铁 iron)
重复精度 Repeated precision		0.1	0.1	0.1	0.1
响应频率 DC/AC Response frequency	埋入式 Flush	2KHz	1KHz	500Hz	150Hz
	非埋入式 Non-flush	1KHz	500Hz	150Hz	100Hz
工作环境温度 Working environment temperature		-25°C~+75°C	-25°C~+75°C	-25°C~+75°C	-25°C~+75°C
绝缘电阻 Insulation resistance		≥ 50M Ω	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω
外壳材料 Shell material		金属 Metal	金属 Metal	金属 Metal	金属 Metal
防护等级 Protection grade		IP67	IP67	IP67	IP67
短路保护电流 Current short-circuit protection		220mA(不含 AC 产品 Excluding AC output product)			



结构分类: 圆柱型  
Structural category: Cylinder type

外形图例  
Outward appearance illustration

具有短路保护、极性保护、过流保护  
Short-circuit, polarity and over-current protections

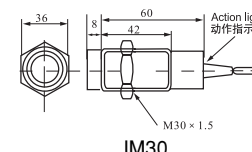
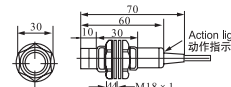
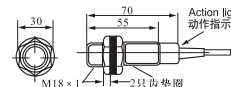
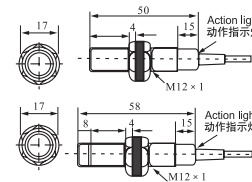
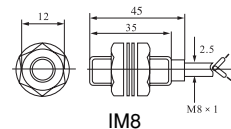
## 埋入式 / Flush

外形编号 Outward appearance code		IM8		IM12		IM18		IM30	
检测距离 Detection distance		1mm		2mm		5mm		10mm	
直流 DC10~30 VDC	NPN	NO	IM8-D1NA01	IM12-D1NA02	IM18-D1NA05	IM30-D1NA10			
		NC	IM8-D1NB01	IM12-D1NB02	IM18-D1NB05	IM30-D1NB10			
	NPN+PNP	NO+NC		IM12-D1NPX02	IM18-D1NPX05	IM30-D1NPX10			
		NO	IM8-D1PA01	IM12-D1PA02	IM18-D1PA05	IM30-D1PA10			
	PNP	NC	IM8-D1PB01	IM12-D1PB02	IM18-D1PB05	IM30-D1PB10			
		NO+NC		IM12-D1PNY02	IM18-D1PNY05	IM30-D1PNY10			
二线制 Two wire system	NO		IM12-D1LA02	IM18-D1LA05	IM30-D1LA10				
	NC		IM12-D1LB02	IM18-D1LB05	IM30-D1LB10				
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO		IM12-A1A02	IM18-A1A05	IM30-A1A10			
		NC		IM12-A1B02	IM18-A1B05	IM30-A1B10			

## 非埋入式 / Non-Flush

外形编号 Outward appearance code		IM8		IM12		IM18		IM30	
检测距离 Detection distance		2mm		4mm		8mm		15mm	
直流 DC10~30 VDC	NPN	NO	IM8-D1NA02	IM12-D1NA04	IM18-D1NA08	IM30-D1NA15			
		NC	IM8-D1NB02	IM12-D1NB04	IM18-D1NB08	IM30-D1NB15			
	NPN+PNP	NO+NC		IM12-D1NPX04	IM18-D1NPX08	IM30-D1NPX15			
		NO	IM8-D1PA02	IM12-D1PA04	IM18-D1PA08	IM30-D1PA15			
	PNP	NC	IM8-D1PB02	IM12-D1PB04	IM18-D1PB08	IM30-D1PB15			
		NO+NC		IM12-D1PNY04	IM18-D1PNY08	IM30-D1PNY08			
二线制 Two wire system	NO		IM12-D1LA04	IM18-D1LA08	IM30-D1LB15				
	NC		IM12-D1LB04	IM18-D1LB08	IM30-D1LB15				
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO		IM12-A1A04	IM18-A1A08	IM30-D1LB15			
		NC		IM12-A1B04	IM18-A1B08	IM30-A1A15			

## 外形尺寸 / Overall Dimensions



## 产品规格 / Specifications

外形编号 Outward appearance code	IM8	IM12	IM18	IM30
输出电流 DC Output current	≤ 150mA	≤ 150mA	≤ 200mA	≤ 200mA
SCR/继电器 Relay	≤ 100mA	≤ 200mA	≤ 300mA	≤ 300mA/1A
输出电压降 Output voltage drop DC/AC	直流(NPN、PNP)型 3V 以下、二线型: 3.9V 以下、交流 AC 10V 以下 DC < 3V、AC < 10V			
消耗电流 Consumption current	直流(NPN、PNP)型 DC 12V 时 8mA、24V 时 15mA、交流 AC 10mA 以下 DC < 15mA、AC < 10mA			
标准检测物体 Standard detected object	8 × 8 × 1(A3 铁 iron)	12 × 12 × 1(A3 铁 iron)	18 × 18 × 1(A3 铁 iron)	30 × 30 × 1(A3 铁 iron)
重复精度 Repeated precision	0.01	0.01	0.02	0.05
响应频率 DC/AC Response frequency	1KHz/25Hz	1KHz/25Hz	500Hz/20Hz	300Hz/10Hz
工作环境温度 Working environment temperature	-25°C ~ +75°C	-25°C ~ +75°C	-25°C ~ +75°C	-25°C ~ +75°C
绝缘电阻 Insulation resistance	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω
外壳材料 Shell material	金属 Metal	金属 Metal	金属 Metal	金属 Metal
防护等级 Protection grade	IP67	IP67	IP67	IP67
可替代国内型号 Alternative model at home and abroad	E2E-X1R5 □□	E2E-X5M □□	E2E-X10M □	E2E-X18M □
短路保护电流 Current short-circuit protection	220mA(不含 AC 产品 Excluding AC output product)			



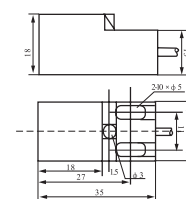


角柱型 Angular column type

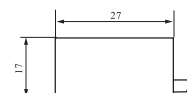
## 埋入式/Flush

外形编号 Outward appearance code			IQ1	IQ2	IQ3
检测距离 Detection distance			5mm	5mm	5mm
直流 DC10~30 VDC	NPN	NO	IQ1-D1NA05	IQ2-D1NA05	IQ3-D1NA05
		NC	IQ1-D1NB05	IQ2-D1NB05	IQ3-D1NB05
	PNP	NO	IQ1-D1PA05	IQ2-D1PA05	IQ3-D1PA05
		NC	IQ1-D1PB05	IQ2-D1PB05	IQ3-D1PB05
	二线制 Two wire system	NO	IQ1-D1LA05	IQ2-D1LA05	IQ3-D1LA05
		NC		IQ2-D1LB05	IQ3-D1LB05
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO			IQ3-A1A05
		NC			IQ3-A1B05

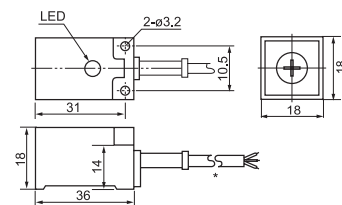
## 外形尺寸/Overall Dimensions



IQ1



IQ2



IQ3

## 产品规格/Specifications

外形编号 Outward appearance code	IQ1	IQ2	IQ3
输出电流 DC Output current SCR	≤ 200mA /	≤ 200mA /	≤ 200mA ≤ 200mA
输出电压降 Output voltage drop DC/AC	直流(NPN、PNP)型 3V 以下、二线型: 3.9V 以下、交流 AC 10V 以下 DC < 3V、AC < 10V		
消耗电流 Consumption current	直流(NPN、PNP)型 DC 12V 时 8mA、24V 时 15mA、交流 AC 10mA 以下 DC < 15mA、AC < 10mA		
标准检测物体 Standard detected object	20 × 20 × 1(A3 铁 iron)	20 × 20 × 1(A3 铁 iron)	20 × 20 × 1(A3 铁 iron)
重复精度 Repeated precision	0.02	0.02	0.05
响应频率 DC/AC Response frequency	1KHz	1KHz	1KHz/20Hz
工作环境温度 Working environment temperature	-25°C ~ +70°C	-25°C ~ +70°C	-25°C ~ +70°C
绝缘电阻 Insulation resistance	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω
外壳材料 Shell material	ABS 塑料 Plastic	ABS 塑料 Plastic	ABS 塑料 Plastic
防护等级 Protection grade	IP67	IP67	IP67
可替代国内型号 Alternative model at home and abroad	SN04-N	TL-Q5MC1	PL-05N PL-05P
短路保护电流 Current short-circuit protection	220mA(不含 AC 产品 Excluding AC output product)		



结构分类: 接插件型  
Structural category: Connector type

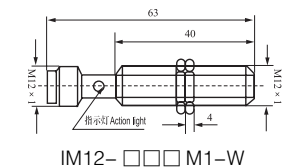
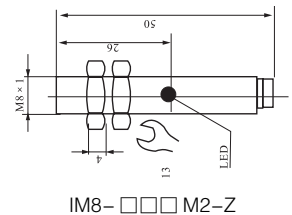
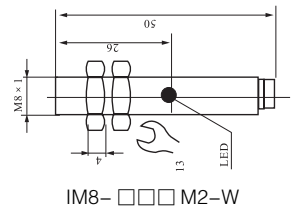
外形图例  
Outward appearance illustration

具有短路保护、极性保护、过流保护  
Short-circuit, polarity and over-current protections

### 埋入式 / Flush

外形编号 Outward appearance code			IM8-□□□M2-W	IM8-□□□M2-Z	IM12-□□□M1-W
检测距离 Detection distance			1mm	1mm	2mm
直流 DC10~30 VDC	NPN	NO	IM8-D1NA01-M2-W	IM8-D1NA01-M2-Z	IM12-D1NA02-M1-W
		NC	IM8-D1NB01-M2-W	IM8-D1NB01-M2-Z	IM12-D1NB02-M1-W
	NPN+PNP	NO+NC			IM12-D1NPX02-M1-W
	PNP	NO	IM8-D1PA01-M2-W	IM8-D1PA01-M2-Z	IM12-D1PA02-M1-W
		NC	IM8-D1PB01-M2-W	IM8-D1PB01-M2-Z	IM12-D1PB02-M1-W
PNP+PNP	NO+NC			IM12-D1PNY02-M1-W	
二线制 Two wire system	NO	IM8-D1LA01-M2-W	IM8-D1LA01-M2-Z	IM12-D1LA02-M1-W	
	NC			IM12-D1LB02-M1-W	
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO			IM12-A1A02-M1-W
		NC			IM12-A1B02-M1-W

### 外形尺寸/Overall Dimensions



### 非埋入式 / Non-Flush

外形编号 Outward appearance code			IM8-□□□M2-W	IM8-□□□M2-Z	IM12-□□□M1-W
检测距离 Detection distance			2mm	2mm	4mm
直流 DC10~30 VDC	NPN	NO	IM8-D1NA02-M2-W	IM8-D1NA02-M2-Z	IM12-D1NA04-M1-W
		NC	IM8-D1NB02-M2-W	IM8-D1NB02-M2-Z	IM12-D1NB04-M1-W
	NPN+PNP	NO+NC			IM12-D1NPX04-M1-W
	PNP	NO	IM8-D1PA02-M2-W	IM8-D1PA02-M2-Z	IM12-D1PA04-M1-W
		NC	IM8-D1PB02-M2-W	IM8-D1PB02-M2-Z	IM12-D1PB04-M1-W
NPN+PNP	NO+NC			IM12-D1PNY04-M1-W	
二线制 Two wire system	NO	IM8-D1LA02-M2-W	IM8-D1LA02-M2-Z	IM12-D1LA04-M1-W	
	NC			IM12-D1LB04-M1-W	
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO	IM8-A1A02-M2-W	IM8-A1A02-M2-Z	IM12-A1A04-M1-W
		NC			IM12-A1B04-M1-W

### 产品规格 / Specifications

外形编号 Outward appearance code	IM8-□□□M2-W	IM8-□□□M2-Z	IM12-□□□M1-W
输出电流 DC	150mA	150mA	200mA
Output current SCR/继电器 Relay	-	-	≤ 200mA
输出电压降 Output voltage drop DC/AC	直流(NPN、PNP)型 3V 以下、二线型: 3.9V 以下、交流 AC 10V 以下 DC < 3V、AC < 10V		
消耗电流 Consumption current	直流(NPN、PNP)型 DC 12V 时 8mA、24V 时 15mA、交流 AC 10mA 以下 DC < 15mA、AC < 10mA		
标准检测物体 Standard detected object	8 × 8 × 1(A3 铁 iron)	8 × 8 × 1(A3 铁 iron)	12 × 12 × 1(A3 铁 iron)
重复精度 Repeated precision	0.01	0.01	0.01
响应频率 DC/AC Response frequency	1KHz/10Hz	1KHz/10Hz	500Hz/10Hz
工作环境温度 Working environment temperature	-25°C ~ +75°C	-25°C ~ +75°C	-25°C ~ +75°C
绝缘电阻 Insulation resistance	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω
外壳材料 Shell material	金属 Metal	金属 Metal	金属 Metal
防护等级 Protection grade	IP67	IP67	IP67
可替代国内型号 Alternative model at home and abroad	E2E-X1R5-M1	E2E-X2ME1-M1	E2E-X2E1-M1
短路保护电流 Current short-circuit protection	220mA(不含 AC 产品 Excluding AC output product)		



结构分类: 接插件型  
Structural category: Connector type

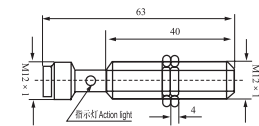
外形图例  
Outward appearance illustration

具有短路保护、极性保护、过流保护  
Short-circuit, polarity and over-current protections

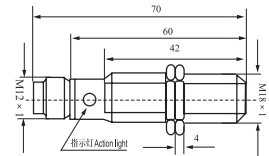
### 埋入式 /Flush

外形编号 Outward appearance code			IM12- □□□ -M1-Z	IM18- □□□ -M1-W	IM18- □□□ -M1-Z
检测距离 Detection distance			2mm	5mm	5mm
直流 DC10~30 VDC	NPN	NO	IM12-D1NA02-M1-Z	IM18-D1NA05-M1-W	IM18-D1NA05-M1-Z
		NC	IM12-D1NB02-M1-Z	IM18-D1NB05-M1-W	IM18-D1NB05-M1-Z
	NPN+PNP	NO+NC	IM12-D1NPX02-M1-Z	IM18-D1NPX05-M1-W	IM18-D1NPX05-M1-Z
		NO	IM12-D1PA02-M1-Z	IM18-D1PA05-M1-W	IM18-D1PA05-M1-Z
	PNP	NC	IM12-D1PB02-M1-Z	IM18-D1PB05-M1-W	IM18-D1PB05-M1-Z
		NO+NC	IM12-D1PNY02-M1-Z	IM18-D1PNY05-M1-W	IM18-D1PNY05-M1-Z
二线制 Two wire system	NO	IM12-D1LA02-M1-Z	IM18-D1LA05-M1-W	IM18-D1LA05-M1-Z	
	NC	IM12-D1LB02-M1-Z	IM18-D1LB05-M1-W	IM18-D1LB05-M1-Z	
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO	IM12-A1A02-M1-Z	IM18-A1A05-M1-W	IM18-A1A05-M1-Z
		NC	IM12-A1B02-M1-Z	IM18-A1B05-M1-W	IM18-A1B05-M1-Z

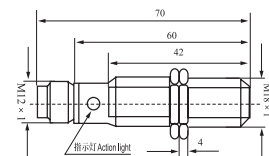
### 外形尺寸/Overall Dimensions



IM12- □□□ -M1-Z



IM18- □□□ -M1-W



IM18- □□□ -M1-Z

### 非埋入式 /Non-Flush

外形编号 Outward appearance code			IM12- □□□ -M1-Z	IM18- □□□ -M1-W	IM18- □□□ -M1-Z
检测距离 Detection distance			4mm	8mm	8mm
直流 DC10~30 VDC	NPN	NO	IM12-D1NA04-M1-Z	IM18-D1NA08-M1-W	IM18-D1NA08-M1-Z
		NC	IM12-D1NB04-M1-Z	IM18-D1NB08-M1-W	IM18-D1NB08-M1-Z
	NPN+PNP	NO+NC	IM12-D1NPX04-M1-Z	IM18-D1PX08-M1-W	IM18-D1PX08-M1-Z
		NO	IM12-D1PA04-M1-Z	IM18-D1PA08-M1-W	IM18-D1PA08-M1-Z
	PNP	NC	IM12-D1PB04-M1-Z	IM18-D1PB08-M1-W	IM18-D1PB08-M1-Z
		NO+NC	IM12-D1PNY04-M1-Z	IM18-D1PNY08-M1-W	IM18-D1PNY08-M1-Z
二线制 Two wire system	NO	IM12-D1LA04-M1-Z	IM18-D1LA08-M1-W	IM18-D1LA08-M1-Z	
	NC	IM12-D1LB04-M1-Z	IM18-D1LB08-M1-W	IM18-D1LB08-M1-Z	
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO	IM12-A1A04-M1-Z	IM18-A1A08-M1-W	IM18-A1A08-M1-Z
		NC	IM12-A1B04-M1-Z	IM18-A1B08-M1-W	IM18-A1B08-M1-Z

### 产品规格 /Specifications

外形编号 Outward appearance code	IM12- □□□ -M1-Z	IM18- □□□ -M1-W	IM18- □□□ -M1-Z
输出电流 DC Output current SCR	≤ 200mA ≤ 200mA	≤ 200mA ≤ 300mA	≤ 200mA ≤ 300mA
输出电压降 Output voltage drop DC/AC	直流(NPN、PNP)型 3V 以下、二线型: 3.9V 以下、交流 AC 10V 以下 DC < 3V、AC < 10V		
消耗电流 Consumption current	直流(NPN、PNP)型 DC 12V 时 8mA、24V 时 15mA、交流 AC 10mA 以下 DC < 15mA、AC < 10mA		
标准检测物体 Standard detected object	12 × 12 × 1(A3 铁 iron)	18 × 18 × 1(A3 铁 iron)	18 × 18 × 1(A3 铁 iron)
重复精度 Repeated precision	0.01	0.02	0.02
响应频率 DC/AC Response frequency	500Hz/20Hz	500Hz/20Hz	500Hz/20Hz
工作环境温度 Working environment temperature	-25°C ~ +65°C	-25°C ~ +65°C	-25°C ~ +65°C
绝缘电阻 Insulation resistance	≥ 50M Ω	≥ 50M Ω	≥ 50M Ω
外壳材料 Shell material	金属 Metal	金属 Metal	金属 Metal
防护等级 Protection grade	IP67	IP67	IP67
可替代国内型号 Alternative model at home and abroad	E2E-X5ME1-M1	E2E-X5E1-M1	E2E-X10ME1-M1
短路保护电流 Current short-circuit protection	220mA(不含 AC 产品 Excluding AC output product)		



结构分类: 接插件型  
Structural category: Connector type

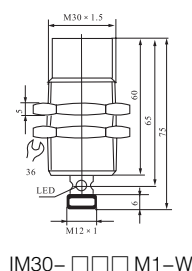
外形图例  
Outward appearance illustration

具有短路保护、极性保护、过流保护  
Short-circuit, polarity and over-current protections

### 埋入式 / Flush

外形编号 Outward appearance code			IM30-□□□M1-W	IM30-□□□M1-Z
检测距离 Detection distance			10mm	10mm
直流 DC10~30 VDC	NPN	NO	IM30-D1NA10-M1-W	IM30-D1NA10-M1-Z
		NC	IM30-D1NB10-M1-W	IM30-D1NB10-M1-Z
	NPN+PNP	NO+NC	IM30-D1NPX10-M1-W	IM30-D1NPX10-M1-Z
		NO	IM30-D1PA10-M1-W	IM30-D1PA10-M1-Z
	PNP	NC	IM30-D1PB10-M1-W	IM30-D1PB10-M1-Z
		NO+NC	IM30-D1PNY10-M1-W	IM30-D1PNY10-M1-Z
二线制 Two wire system	NO	IM30-D1LA10-M1-W	IM30-D1LA10-M1-Z	
	NC	IM30-D1LB10-M1-W	IM30-D1LB10-M1-Z	
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO	IM30-A1A10-M1-W	IM30-A1A10-M1-Z
		NC	IM30-A1B10-M1-W	IM30-A1B10-M1-Z

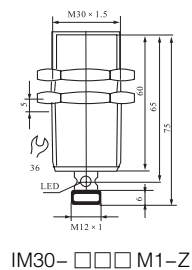
### 外形尺寸/Overall Dimensions



IM30-□□□M1-W

### 非埋入式 / Non-Flush

外形编号 Outward appearance code			IM30-□□□M1-W	IM30-□□□M1-Z
检测距离 Detection distance			15mm	15mm
直流 DC10~30 VDC	NPN	NO	IM30-D1NA15-M1-W	IM30-D1NA15-M1-Z
		NC	IM30-D1NB15-M1-W	IM30-D1NB15-M1-Z
	NPN+PNP	NO+NC	IM30-D1NX15-M1-W	IM30-D1NX15-M1-Z
		NO	IM30-D1PA15-M1-W	IM30-D1PA15-M1-Z
	PNP	NC	IM30-D1PB15-M1-W	IM30-D1PB15-M1-Z
		NO+NC	IM30-D1PY15-M1-W	IM30-D1PY15-M1-Z
二线制 Two wire system	NO	IM30-D1LA15-M1-W	IM30-D1LA15-M1-Z	
	NC	IM30-D1LB15-M1-W	IM30-D1LB15-M1-Z	
交流 AC20~250 VAC	SCR 可控硅 Control- lable silicon	NO	IM30-A1A15-M1-W	IM30-A1A15-M1-Z
		NC	IM30-A1B15-M1-W	IM30-A1B15-M1-Z



IM30-□□□M1-Z

### 产品规格 / Specifications

外形编号 Outward appearance code	IM30-□□□M1-W	IM30-□□□M1-Z
输出电流 DC Output current	≤ 200mA	≤ 200mA
SCR/继电器 Relay	≤ 300mA	≤ 300mA
输出电压降 Output voltage drop DC/AC	直流(NPN、PNP)型 3V 以下、二线型: 3.9V 以下、交流 AC 10V 以下 DC < 3V、AC < 10V	
消耗电流 Consumption current	直流(NPN、PNP)型 DC 12V 时 8mA、24V 时 15mA、交流 AC 10mA 以下 DC < 15mA、AC < 10mA	
标准检测物体 Standard detected object	30 x 30 x 1(A3 铁 Iron)	30 x 30 x 1(A3 铁 Iron)
重复精度 Repeated precision	0.05	0.05
响应频率 DC/AC Response frequency	300Hz/15Hz	300Hz/15Hz
工作环境温度 Working environment temperature	-25°C ~ +65°C	-25°C ~ +65°C
绝缘电阻 Insulation resistance	≥ 50M Ω	≥ 50M Ω
外壳材料 Shell material	金属 Metal	金属 Metal
防护等级 Protection grade	IP67	IP67
可替代国内型号 Alternative model at home and abroad	E2E-X18ME1-M1	E2E-X18ME1-M1
短路保护电流 Current short-circuit protection	220mA(不含 AC 产品 Excluding AC output product)	



类型  
Structural category

外形图例  
Outward appearance illustration

规格齐全、输出形式多、防尘、防震、  
使用方便、节省劳动成本  
Complete specifications, output form, dust-  
proof, shock-proof, easy to use, saving labor costs

## 外形尺寸/Overall Dimensions

外形编号 Outward appearance code	PK01-Z-2	PK01-Z-3	PK01-W-2	PK01-W-3	PK01-W-2-4	PK01-W-3-4	PK02-Z-2
外形尺寸 Overall Dimensions							
	直形孔座接插电缆接插件 M8 x 1 Straigh type connector with cables M8 x 1	直形孔座接插电缆接插件 M8 x 1 Straigh type connector with cables M8 x 1	弯形孔座接插电缆接插件 M8 x 1 Bent type connector with cables M8 x 1	弯形孔座接插电缆接插件 M8 x 1 Bent type connector with cables M8 x 1	弯形孔座接插电缆接插件 M8 x 1 Bent type connector with cables M8 x 1	弯形孔座接插电缆接插件 M8 x 1 Bent type connector with cables M8 x 1	直形孔座接插电缆接插件 M8 x 1 Straight type connector with cables M8 x 1
接插外形 Contact view							
应用 Application	DC 二线 AC 二线 NO/NC	NPN/PNP NO/NC	DC 二线 AC 二线 NO/NC	NPN/PNP NO/NC	DC 二线 AC 二线 NO/NC	NPN/PNP NO/NC	DC 二线 AC 二线 NO/NC

## 产品规格 /Specifications

接插件 Connector	黑 black							
外套颜色 cable serving color	Cu/Zn/Nickel plated							
连接螺母材料	4.0							
接触负载 过流值 [A]	250							
额定电压 [V]	2m							
电缆 Wire 长度 Length	PVC							
电缆外皮材料 insulator color								
输出显示 [LED]	black							
通电指示 [LED]								
一般数据 common data								
绝缘电阻								
环境温度范围：接插件 [° C]								
环境温度范围：电缆 [° C]								
防护等级 (DIN 40 050) protection level								
电容量(VDE 0110b) Capacitance								
	bn,bu,bk 3 × 0.5	bn,bu 2 × 0.5	bn,bu 2 × 0.5	bn,bu,bk,wh 4 × 0.34				
	1							
	-							
	-							
	≥ 10 <sup>9</sup> Ω							
	-25...+80							
	-25...+80							
	IP67							
	250VAC/300VDC, Gr.C							



类型  
Structural category

外形图例  
Outward appearance illustration

规格齐全、输出形式多、防尘、防震、使用方便、节省劳动成本  
Complete specifications, output form, dust-proof, shock-proof, easy to use, saving labor costs

## 外形尺寸/Overall Dimensions

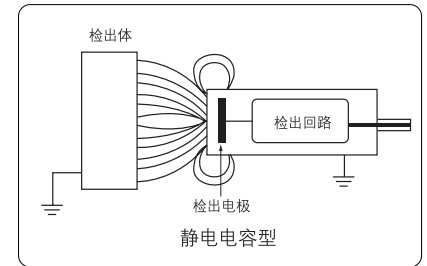
外形编号 Outward appearance code	PK02-Z-3	PK02-Z-4	PK02-W-2	PK02-W-3-N	PK01-W-3-P	PK02-W-4-N	PK02-W-4-P	PK03-3	PK03-4
外形尺寸 Overall Dimensions	<p>直形孔座接插电缆接插件 M12 x 1 Straight type connector with cables M12 x 1</p>		<p>弯形孔座接插电缆接插件 M12 x 1 Bent type connector with cables M12 x 1</p>				<p>弯形孔座接插电缆接插件 M12 x 1 Bent type connector with cables M12 x 1</p>		
接插外形 Contact view									
应用 Application	NPN/PNP NO/NC	NPN/PNP NO+NC	DC 二线 AC 二线 NO/NC	NPN NO/NC	PNP NO/NC	NPN NO+NC	PNP NO/NC	NPN/PNP NO+NC	NPN/PNP NO+NC

## 产品规格 /Specifications

接插件 Connector									
外套颜色 连接螺母材料	黑 black								
接触负载 过流值 [A] 额定电压 [V]	Cu/Zn/Nickel plated								
电缆 Wire 长度 Length	4.0								
电缆外皮材料 cable serving color	250								
绝缘体颜色 insulator color	2m PVC								
输出显示 [LED] output display									
通电指示 [LED] power indicator	bn, bu, bk 3 × 0.5	bn, bu, bk, wh 4 × 0.34	YES	YES	YES	YES	YES	YES	YES
一般数据 common data									
绝缘电阻	-								
环境温度范围: 接插件 [° C] environment temperature scope	-								
环境温度范围: 电缆 [° C] environment temperature scope	≥ 10 <sup>9</sup> Ω								
防护等级 (DIN 40 050) protection level	-25...+80								
电容量 (VDE 0110b) Capacitance	IP67 250VAC/300VDC, Gr.C								

### 电容式传感器基本概念

电容式传感器的感应面由两个同轴金属电极构成，该两个电极构成一个电容，串接在RC振荡回路中。电源接通时，RC振荡器不振荡，当一目标朝着传感器感应面靠近时，电容量增加，振荡器开始振荡。通过后级电路的处理转换成开关信号，从而起到了检测有无物体存在的目的。电容式传感器能检测金属物体，也能检测非金属物体，对金属物体可以获得最大的动作距离，对非金属物体动作距离决定于材料的介电常数，材料的介电常数越大，可获得的动作距离越大。



### 相对介电常数

对于电容传感器特征参数是相对介电常数。

相对介电常数，表征介质材料的介电性质或极化性质的物理参数。其值等于以被测物为介质与以真空为介质制成的同尺寸电容器电容量之比，该值也是材料贮电能力的表征。也称为相对电容率。

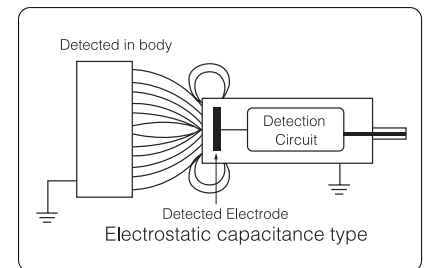
对于电容式传感器而言，不同介电常数的被检测物，感应距离和感应灵敏度不同，材料的介电常数越大，可获得的感应距离就越大。

常用材料介电常数表:

材料	介电常数	材料	介电常数	材料	介电常数	材料	介电常数
空气	1	聚乙烯	2.3	有机玻璃	3.2	硬纸	4.5
特氟龙	2	聚丙烯	2.9	环氧树脂粘合剂	3.6	石英砂	4.5
木材	2.7	电缆胶皮化合物	2.5	电木	3.6	玻璃	5
石蜡	2.2	软橡胶	2.5	石英玻璃	3.7	聚酰胺	5
汽油	2.2	硅	2.8	硬橡胶	4	云母	6
松节油	2.2	聚氯乙烯	2.9	油纸	4	大理石	8
变压器油	2.2	聚苯乙烯	3	纸板压制的碎屑	4	酒精	25.8
纸	2.3	赛璐络	3	陶瓷	4.4	水	80

### BASIC CONCEPT OF INDUCTIVE SENSORS

The sensing surface of the capacitive sensor is constituted by two coaxial metal electrode, the two electrodes form a capacitor, in series with the RC oscillation circuit. When the power is turned on, the RC oscillator does not oscillate, when a target is closer toward the sensor sensing surface, the increase in capacitance, and the oscillator starts to oscillate. Is converted into a switching signal by the processing of the post-stage circuit, and thus play the purpose of detecting the presence of the object exists. Capacitive sensors can detect metal objects, can also detect non-metallic objects, metal objects can get maximum distance of the action, and non-metallic objects action distance determines the dielectric constant of the material, the larger the dielectric constant of the material, available action the greater the distance.



### RELATIVE DIELECTRIC CONSTANT:

The characteristic parameters of the capacitive sensor is the relative permittivity.

The relative permittivity, Characterization of the dielectric properties of the dielectric material or the polarization properties of the physical parameters. Its value is equal to measured Chek medium and in a vacuum as a medium made ??of the same size the ratio of the capacitor capacity, this value is also the material characterization of the electrical storage capacity. Also known as the relative permittivity.

For capacitive sensors, The detected objects with different dielectric constants, the sensing distance and the sensitivity is different. When the dielectric constant is larger, the sensing distance would be longer.

Commonly used material permittivity table:

Material	Permittivity	Material	Permittivity	Material	Permittivity	Material	Permittivity
Air	1	Polyethylene	2.3	Plexiglass	3.2	Cardboard	4.5
Teflon	2	Polypropylene	2.9	Epoxy resin adhesive	3.6	Quartz sand	4.5
Timber	2.7	A cable Jiaopi compound	2.5	Bakelite	3.6	Glass	5
Paraffin	2.2	Soft rubber	2.5	Quartz glass	3.7	Polyamide	5
Gasoline	2.2	Silicon	2.8	Hard rubber	4	Mica	6
Turpentine	2.2	Polyvinylidene fluoride	2.9	Oil paper	4	Marble	8
Transformer oil	2.2	Polystyrene	3	Cardboard to suppress the debris	4	Alcohol	25.8
Paper	2.3	Celluloid network	3	Ceramics	4.4	Water	80

### 能被感应的典型材料：

固体：木材、陶瓷、玻璃、纸张、塑料、石块、橡胶、冰、非铁材料和植物材料。

液体：水、油、胶水和油漆。

粒状物体：塑料粒子，种子，饲料和盐。

粉状物体：染料、皂粉，沙子，水泥，肥料，糖，面粉和咖啡。

### Typical materials that can be induced in:

Solid: wood, ceramics, glass, paper, plastic, stone, rubber, ice, a non-ferrous material and plant material.

Liquids: water, oil, glue and paint.

Granular objects: plastic particles, seed, feed and salt.

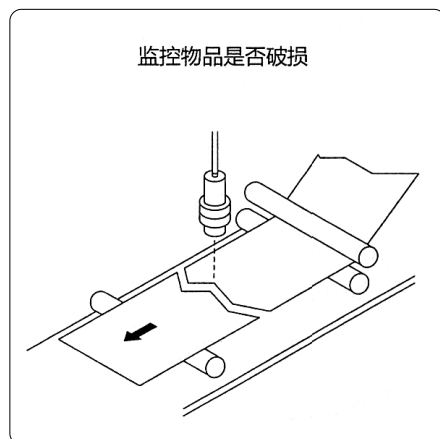
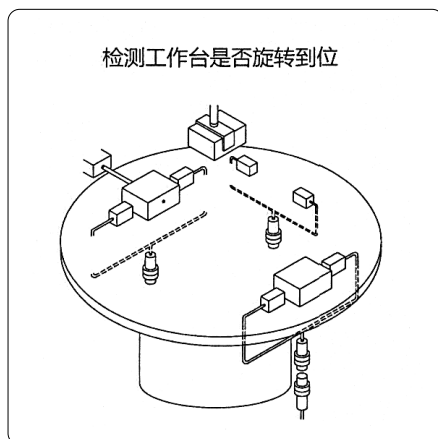
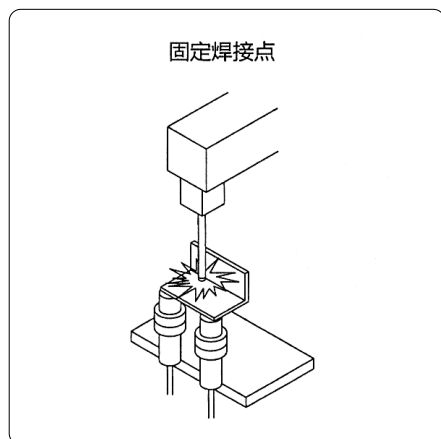
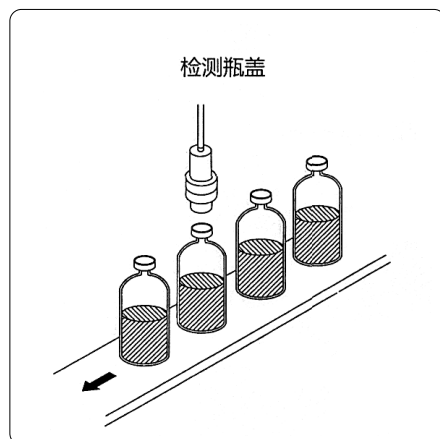
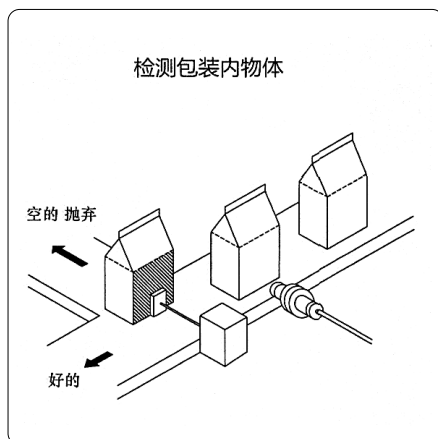
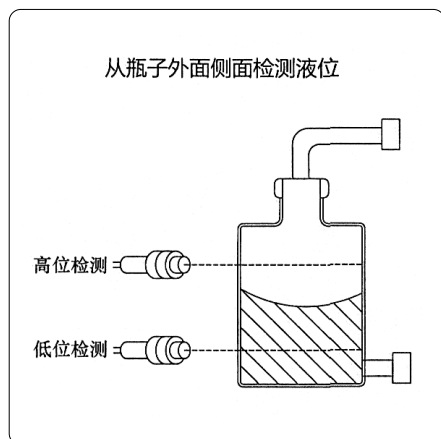
Powdery objects: dye, soap powder, sand, cement, fertilizer, sugar, flour and coffee.

### 应用实例

电容式传感器可感应固体或液体形式的导体或非导体材料，它有许多种应用，包括容器中的液位控制。如检测灌装机械的容器的容量。其它应用包括定位，输送设备和储备系统中的材料的计数。

### APPLICATION EXAMPLES

The capacitance type sensor can sense a conductor or non-conductor material of the solid or liquid form, it has a variety of applications, including the control of the liquid level in the container. Such as the detection capacity of the container filling and delicate machinery. Other applications include the count of the material in the positioning, conveying equipment and reserve system.



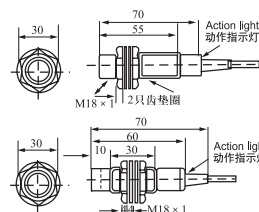




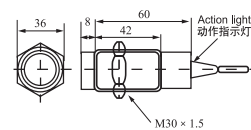
### 埋入式/Flush

外形编号 Outward appearance code			CM18	CM30
检测距离 Detection distance			0-5mm	0-10mm
直流 DC10~30 VDC	NPN	NO	CM18-D1NA05	CM30-D1NA10
		NC	CM18-D1NB05	CM30-D1NB10
		NO+NC	CM18-D1NC05	CM30-D1NC10
	PNP	NO	CM18-D1PA05	CM30-D1PA10
		NC	CM18-D1PB05	CM30-D1PB10
		NO+NC	CM18-D1PC05	CM30-D1PC10
交流 AC90~250 VAC	SCR 可控硅 Control- lable silicon	NO	CM18-A2A05	CM30-A2A10
		NC	CM18-A2B05	CM30-A2B10

### 外形尺寸/Overall Dimensions



CM18



CM30

### 非埋入式/Non-Flush

外形编号 Outward appearance code			CM18	CM30
检测距离 Detection distance			0-8mm	0-15mm
直流 DC10~30 VDC	NPN	NO	CM18-D1NA08	CM30-D1NA15
		NC	CM18-D1NB08	CM30-D1NB15
		NO+NC	CM18-D1NC08	CM30-D1NC15
	PNP	NO	CM18-D1PA08	CM30-D1PA15
		NC	CM18-D1PB08	CM30-D1PB15
		NO+NC	CM18-D1PC08	CM30-D1PC15
交流 AC90~250 VAC	SCR 可控硅 Control- lable silicon	NO	CM18-A2A08	CM30-A2A15
		NC	CM18-A2B08	CM30-A2B15

### 产品规格/Specifications

外形编号 Outward appearance code	CM18	CM30
可检测体 Detectable object	导体及电介质 Conductor and dielectric body	
消耗电流 Consumption current	直流(NPN, PNP)型 DC12V时 8mA, 24V时 15mA, 交流型: 10mA以下、DC < 15mA、AC < 10mA	
输出电流 Output current	直流: ≤ 200mA, 交流型: ≤ 200mA、	
输出电压降 Output voltage drop DC/AC	直流(NPN, PNP) 3V以下, 交流型: 7V以下、DC < 3V、AC < 7V	
响应频率 DC/AC Response frequency	直流 50Hz, 交流型: 10Hz	
外壳材料 Shell material	ABS树脂/金属 Resin, Metal	ABS树脂/金属 Resin, Metal
工作环境温度 Working environment temperature	-25°C~70°C	
绝缘电阻 Insulation resistance	≥ 50M Ω	
防护等级 Protection grade	IEC 标准 IP65 IEC standard IP65	
可替代国内型号 Alternative model at home and abroad	LJC18A3- □□	E2K-X15M □

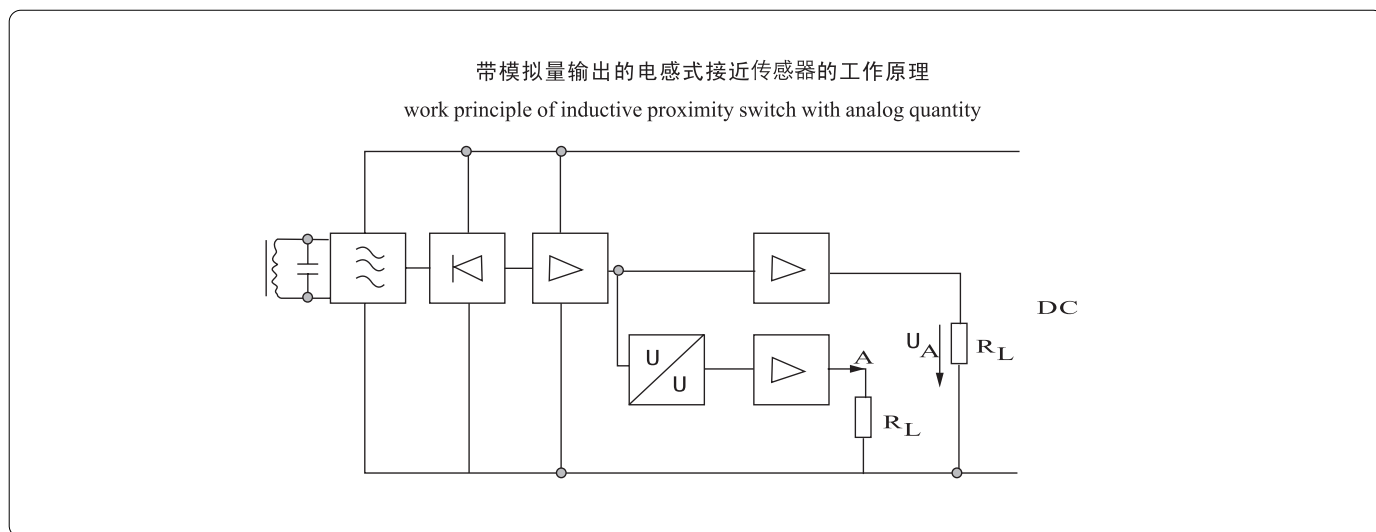
## 工作原理

带模拟量输出的电感式接近传感器与普通电感式接近传感器的工作原理相同，当一个金属物体靠近传感器的感应面时，振荡器系统的能量减小，能量减小的程度是物体和传感器之间距离的尺寸标志，在一个附加电器中能量损耗被转换成测量信号，经线性化处理后被放大。(图5) 在输出端提供一个标准模拟信号(0...5V 或 4-20mA...)

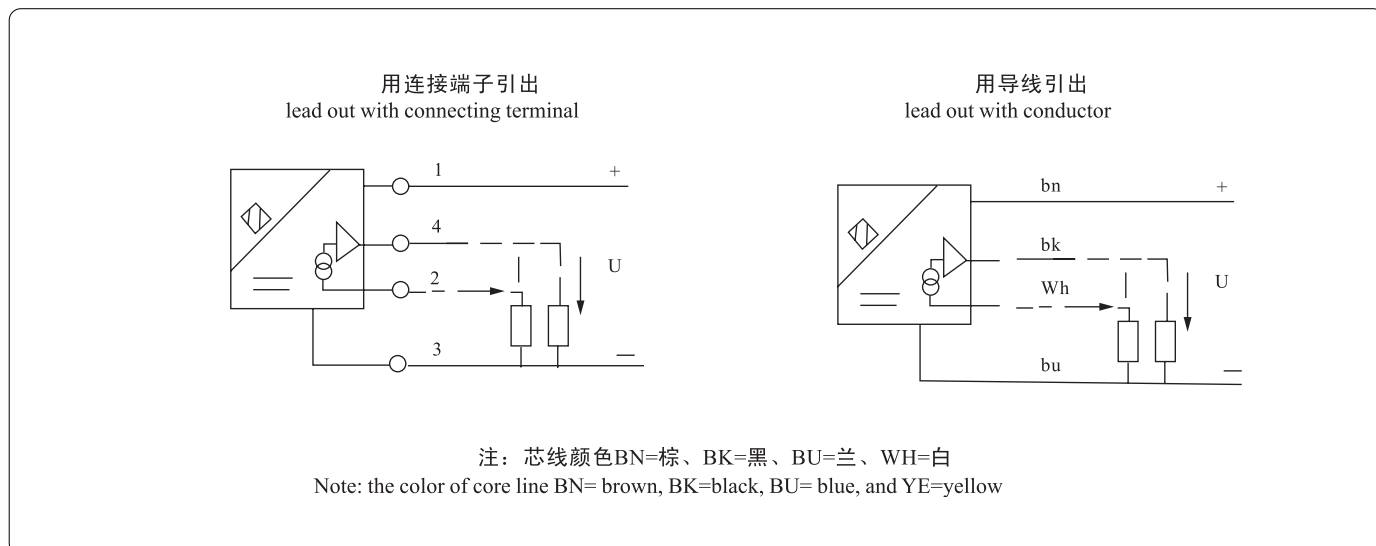
## WORK PRINCIPLE

Inductive proximity switch with analog quantity output has the similar work principle with general inductive proximity switch. The energy of oscillator system decreases when a metal object approaches the inductive side. The energy decrease degree indicates the distance between the metal object and the sensor.

The energy consumption is transformed into measuring signal in an additional device and magnified through linear treatment. (Fig. 5) Provide a standard analog signal at output terminal (0-5V or 4-20mA)



## 接线示意图 /Installation and connection



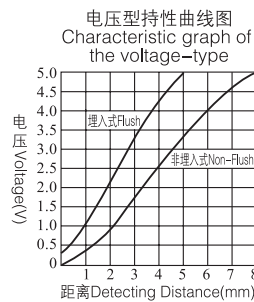
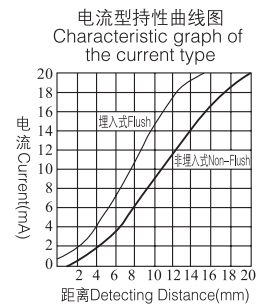
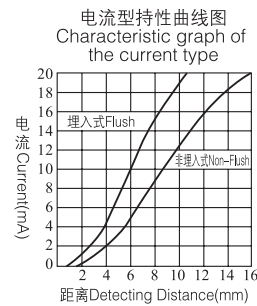
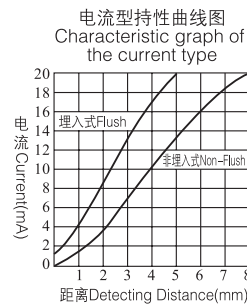


分类: 电感式位移量线性传感器  
Category: Inductive displacement linear sensor

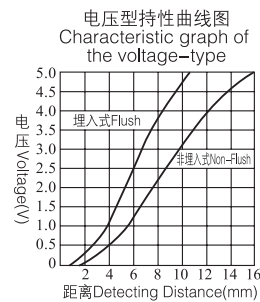
## 产品规格 / Specifications

外形编号 Outward appearance code	XM18		XM24		XM30	
可检测物体 Detectable object	金属 Metal					
检测距离 Detection distance	埋入式: 5mm Flush type: 5mm	非埋入式: 8mm Non-flush: 8mm	埋入式: 8mm Flush type: 8mm	非埋入式: 10mm Non-flush: 10mm	埋入式: 10mm Flush type: 10mm	非埋入式: 15mm Non-flush: 15mm
具备型号 Available Models	电流型 Current type XM18-D6PMI05	电压型 Voltage type XM18-D6PMI08	电流型 Current type XM24-D6PMI08	电压型 Voltage type XM24-D6PMI10	电流型 Current type XM30-D6PMI10	电压型 Voltage type XM30-D6PMI15
电压范围 Voltage range	15~30VDC					
功耗 Consumption	检测时 At the time of detection $\leq 200\text{mA} \cdots < 4\text{mA}$ 无检测时 At the time of non-detection $\leq 20\text{mA}$					
负载电阻 Consumption	电流型 Current type $0 \sim 300 \Omega$ 电压型 Voltage type $\geq 2.2\text{k} \Omega$					
输出 Output	电流型 Current type $4 \sim 20\text{mA}$ 电压型 Voltage type $0 \sim 5\text{V} / 0 \sim 10\text{V}$					
允许电压波动 Allowable voltage undulation	$\leq 5\%$					
输出信号 Output signal	PNP 模拟 PNP Simulation					
线性误差 Linear error	$\pm 5\%$					
环境温度 Ambient temperature	$-10^\circ\text{C} \sim +70^\circ\text{C}$					
外壳材料 Shell material	塑料、金属 Plastic, Metal					
防护等级 Protection grade	IP65					

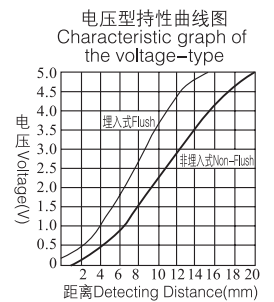
## 输出特性图 / Output characteristic diagram



XM18



XM24



XM30