

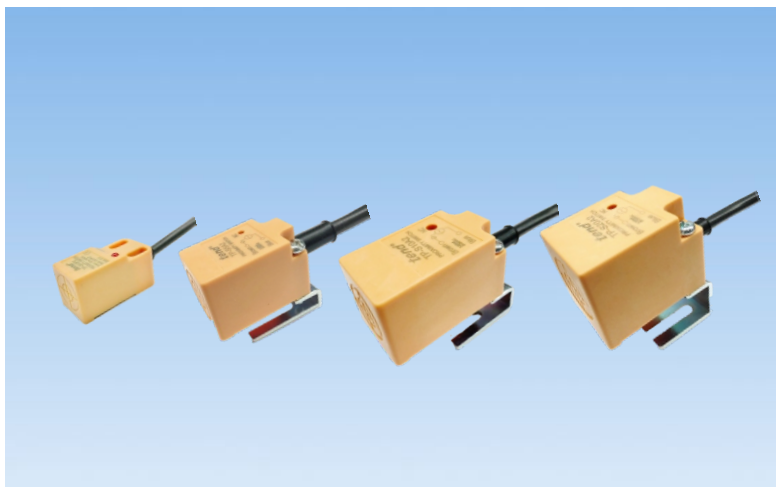
角柱型近接開關 SQUARE TYPE PROXIMITY SWITCH

特 徵

- 價格經濟。
- 廣闊之動作電壓。
- 3線10-30VDC和2線90-250VAC。
- 具動作指示燈。
- 可直流驅動200mA之負載。
- 直流型具逆極性之保護。
- 直流型S5,S10,S20具短路及過載保護。
- 出力電壓降最低。
- AC型為零點導通，SCR輸出，動作穩定。

FEATURES

- Economic price.
- Wide operating voltage range :
3 wire 10-30VDC and 2 wire 90-250 VAC.
- With operating indicator LED.
- May drive 200 mA loads directly.
- DC type with reverse-polarity proof.
- DC S5, S10, S20 type with short circuit and over load proof.
- The lowest residual voltage.
- AC types are O-cross SCR output, operating stable.



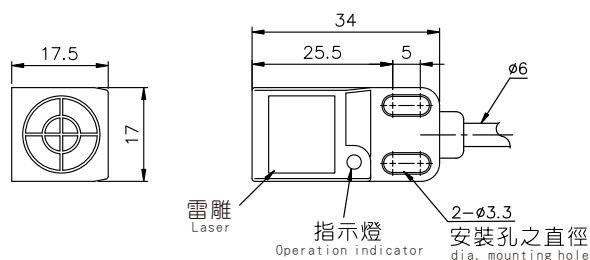
型式/規格 TYPE/SPECIFICATIONS

項目 Item			直 流 型 DC TYPE				交 流 型 AC TYPE		
型式 TYPE	常開	NPN	TP-SM5N1	TP-S5N1	TP-S10N1	TP-S20N1	TP-S5A1	TP-S10A1	TP-S20A1
		NO	PNP	TP-SM5P1	TP-S5P1	TP-S10P1	TP-S20P1	(SCR)	(SCR)
	常閉	NPN	TP-SM5N2	TP-S5N2	TP-S10N2	TP-S20N2	TP-S5A2	TP-S10A2	TP-S20A2
		NC	PNP	TP-SM5P2	TP-S5P2	TP-S10P2	TP-S20P2	(SCR)	(SCR)
檢出距離	Detecting distance		5 mm	7 mm	10 mm	20 mm	7 mm	10 mm	20 mm
標準檢出物	Standard detectable object (mm)		鐵 Iron 18*18*1t	鐵 Iron 25*25*1t	鐵 Iron 30*30*1t	鐵 Iron 40*40*1t	鐵 Iron 25*25*1t	鐵 Iron 30*30*1t	鐵 Iron 40*40*1t
反應頻率	Response frequency		1KHz	800Hz	500Hz	200Hz	20Hz		
工作電壓	Rated voltage		10 - 30 VDC				90 - 250 VAC		
消耗電流	Current consumption		15 mA max.				2 mA max.		
輸出電流	Load current		200 mA max.				3 -200 mA		
出力電壓降	Residual voltage		1.5V max.				7V max.		
操作溫度	Ambient temperature		動作時：-20至70°C				Operating: -20 to 70°C		
因電壓上下移動所引起之變動 The variation due to the variation of operating voltage			直流開閉型：±2.5 % 交流開閉型：±1 %				DC TYPE: ±2.5 % AC TYPE: ±1 %		
因溫度上下移動所引起之變動 The variation due to the variation of ambient temperature			在-20到70°C之間：±10 %				From -20 to 70°C ±10 %		
保護程度	Enclosure rating		IP 67						
電纜線長度	Cable length		2M						

tend 近接開關 PROXIMITY SWITCH

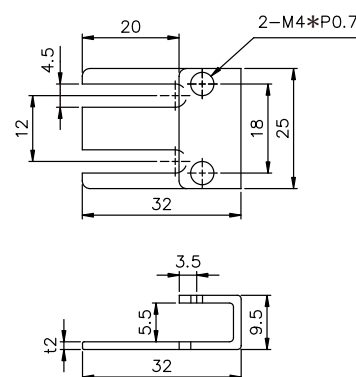
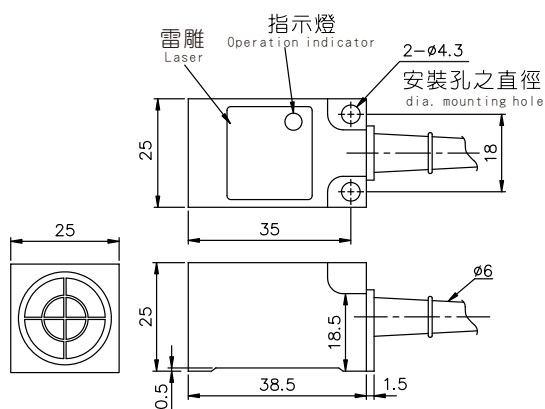
TP-S外觀尺寸 DIMENSIONS(mm)

TP-SM5N ☐
TP-SM5P ☐

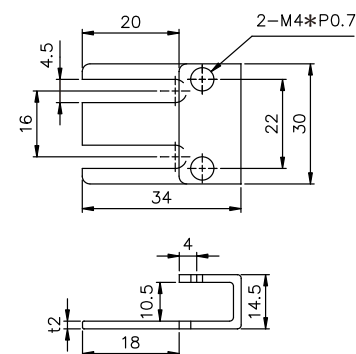
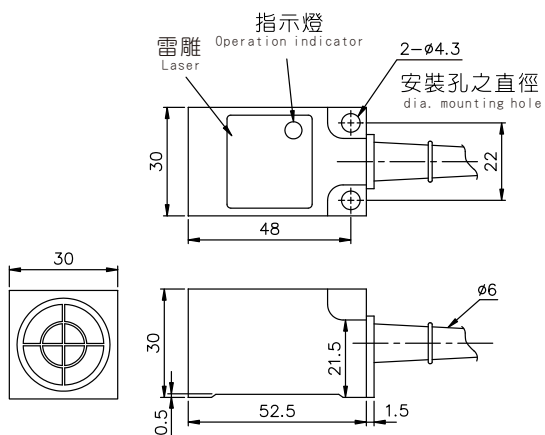


固定架FIX BRACKET(mm)

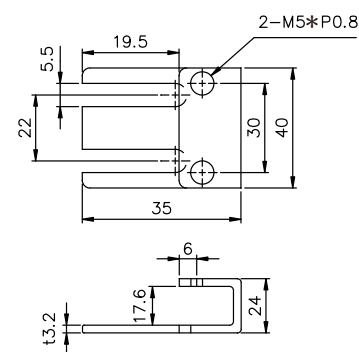
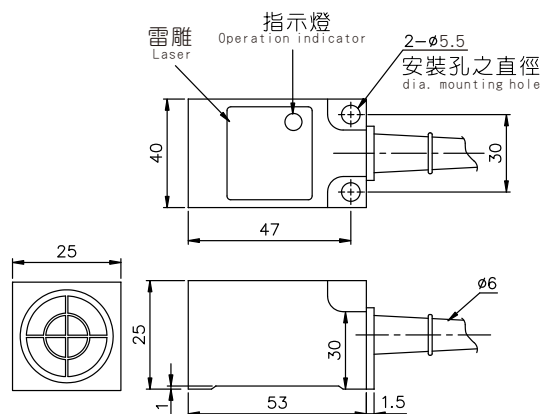
TP-S5N ☐
TP-S5P ☐
TP-S5A ☐



TP-S10N ☐
TP-S10P ☐
TP-S10A ☐



TP-S20N ☐
TP-S20P ☐
TP-S20A ☐



圓筒狀，具螺紋之感應式近接開關 CYLINDRICAL SPIRAL TYPE PROXIMITY SWITCH

特 徵

- 廣闊之動作電壓。
3線 10-30VDC 和 2線 90-250VAC。
- 具動作指示燈。
- 可直接驅動 200mA 之負載。
- 直流型具逆極性之保護。
- 直流型 R5, R10, RL8, RL15 具短路及過載保護。
- 出力電壓降最低。
- AC 型為零點導通，SCR 輸出，動作穩定。

FEATURES

- Wide operating voltage range :
3 wire 10-30VDC and 2 wire 90-250 VAC.
- With operating indicator LED.
- May drive 200 mA loads directly.
- DC type with reverse-polarity proof.
- DC R5, R10, RL8, RL15, type with short circuit and over load proof.
- The lowest residual voltage.
- AC types are O-cross SCR output, operating stable.



型 式 TYPE

直流型 DC TYPE

外徑 Outside diameter			M12		M18		M30	
型式 Type			隔離型 Shielded	非隔離型 Non- shielded	隔離型 Shielded	非隔離型 Non- shielded	隔離型 Shielded	非隔離型 Non- shielded
檢出距離 Detecting distance			2 mm	4 mm	5 mm	8 mm	10 mm	15 mm
型式 Type	常開	NPN	TP-R2N1	TP-RL4N1	TP-R5N1	TP-RL8N1	TP-R10N1	TP-RL15N1
		NO	PNP	TP-R2P1	TP-RL4P1	TP-R5P1	TP-RL8P1	TP-R10P1
	常閉	NPN	TP-R2N2	TP-RL4N2	TP-R5N2	TP-RL8N2	TP-R10N2	TP-RL15N2
		NC	PNP	TP-R2P2	TP-RL4P2	TP-R5P2	TP-RL8P2	TP-R10P2
標準檢出物 Standard detectable object (mm)			鐵 Iron 12*12*1t	鐵 Iron 18*18*1t	鐵 Iron 18*18*1t	鐵 Iron 30*30*1t	鐵 Iron 30*30*1t	鐵 Iron 54*54*1t
反應頻率 Response frequency			1.5KHz	400Hz	600Hz	200Hz	400Hz	100Hz

交流型 AC TYPE

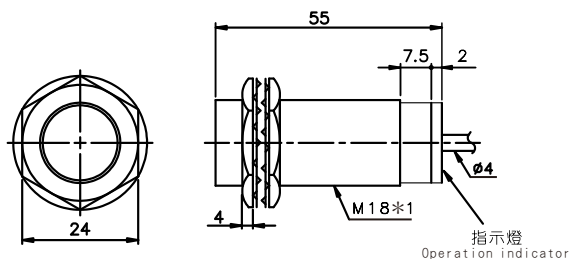
外徑 Outside diameter			M18		M30	
型式 Type			隔離型 Shielded	非隔離型 Non- shielded	隔離型 Shielded	非隔離型 Non- shielded
檢出距離 Detecting distance			5 mm	8 mm	10 mm	15 mm
型式 Type	SCR	常開 NO	TP-R5A1	TP-RL8A1	TP-R10A1	TP-RL15A1
		常閉 NC	TP-R5A2	TP-RL8A2	TP-R10A2	TP-RL15A2
標準檢出物 Standard detectable object (mm)			鐵 Iron 18*18*1t	鐵 Iron 30*30*1t	鐵 Iron 30*30*1t	鐵 Iron 54*54*1t
反應頻率 Response frequency			25 Hz			

規格 SPECIFICATIONS

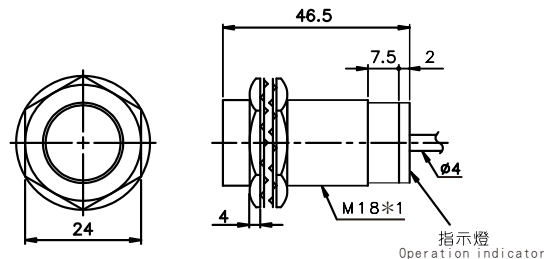
型式	TYPE	直 流 型 DC TYPE	交 流 型 AC TYPE
工作電壓	Rated voltage	10 - 30 VDC	90 - 250 VAC
消耗電流	Current consumption	15 mA max.	2 mA max.
輸出電流	Load current	200 mA max.	3 - 200 mA
出力電壓降	Residual voltage	1.5V max.	7V max.
操作溫度	Ambient temperature	動作時：-20到70°C Operating: -20 to 70°C	
因電壓上下移動所引起之變動 The variation due to the variation of operating voltage		直流開閉型：±2.5 % 交流開閉型：±1 %	DC TYPE: ±2.5 % AC TYPE: ±1 %
因溫度上下移動所引起之變動 The variation due to the variation of ambient temperature		在 -20 到 70 °C 之間：TP-R TYPE ±10%. From -20 to 70°C : TP-R TYPE ±10%.	TP-RL TYPE ±20% TP-RL TYPE ±20%
保護程度	Enclosure rating	IP 67	
電纜線長度	Cable length	2 M	

TP-R TP-RL外觀尺寸 DIMENSIONS(mm)

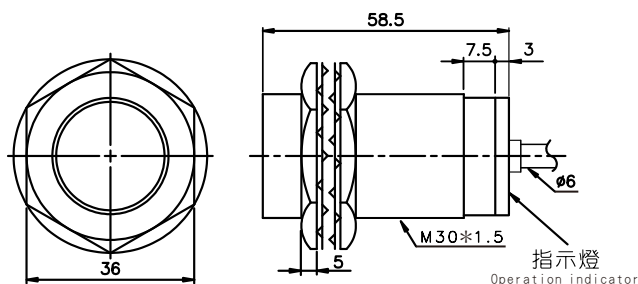
TP-R5A□



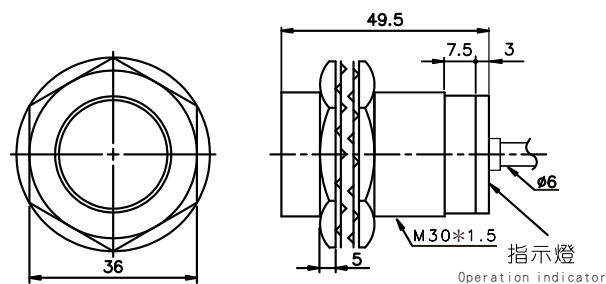
TP-S5N□
TP-S5P□



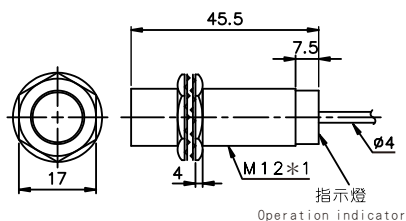
TP-R10A□



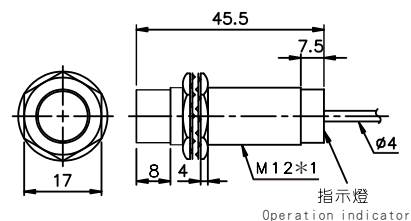
TP-R10N□
TP-R10P□



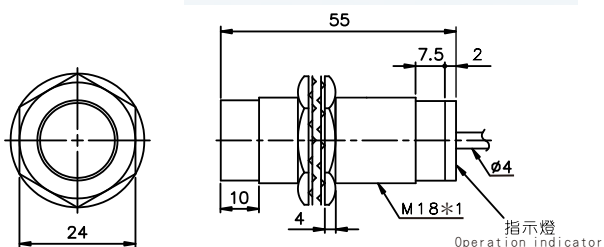
TP-R2N□
TP-R2P□



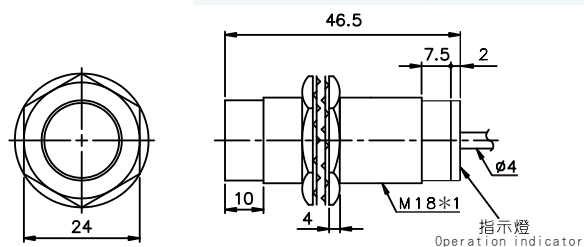
TP-RL4N□
TP-RL4P□



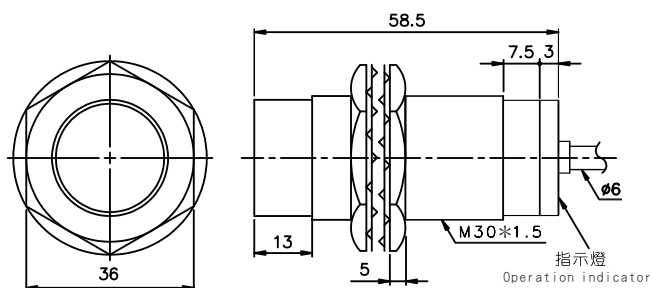
TP-RL8A□



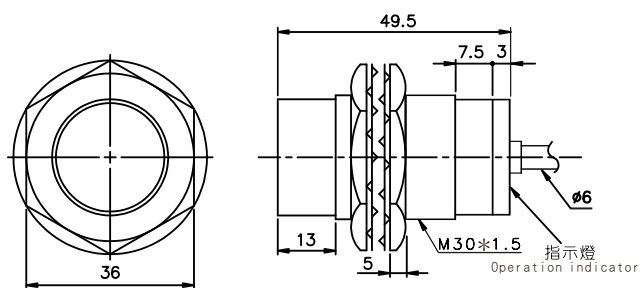
TP-RL8N□
TP-RL8P□



TP-RL15A□

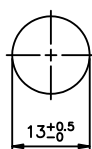


TP-RL15N□
TP-RL15P□

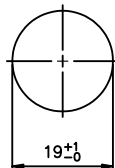


■ 安裝孔 MOUNTING HOLES(mm)

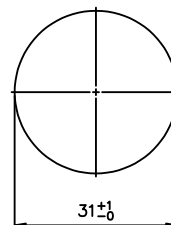
TP-R2 □□
TP-RL4 □□



TP-R5 □□
TP-RL8 □□

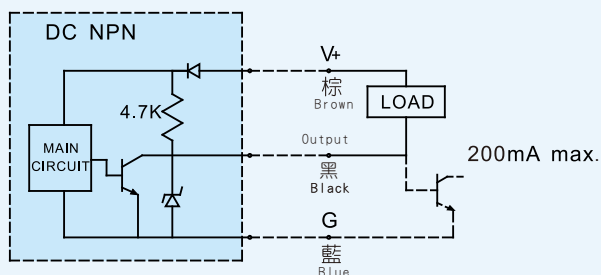


TP-R10 □□
TP-RL15 □□

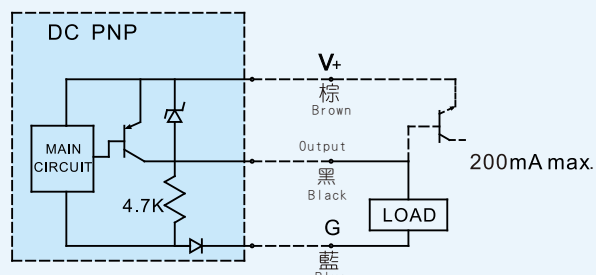


輸出迴路圖 OUTPUT STAGE CIRCUIT DIAGRAMS

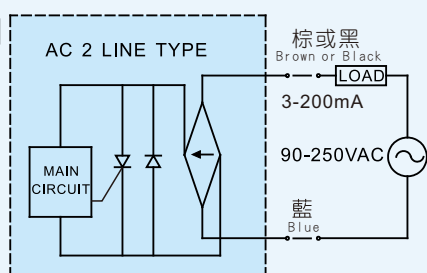
TP-S□□N□ TP-R□□N□
TP-S□□N□ TP-RL□□N□



TP-S□□P□ TP-R□□P□
TP-S□□P□ TP-RL□□P□



TP-S□□A□
TP-R□□A□
TP-RL□□A□



當負載為電晶體迴路時以虛線部份表示。

The dashed line express transistor load.
型號規格及相關情況說明：

TP-S U_i :250V U_{imp} :2.5kv

AC-140 U_e :AC90-250V I_e :0.2A

DC-13 U_e :DC10-30V I_e :0.2A

動作距離:Sn:5 . 7 . 10 . 20mm

動作頻率:AC:20Hz DC:200Hz; 500Hz; 800Hz; 1kHz

外殼防護等級:IP67

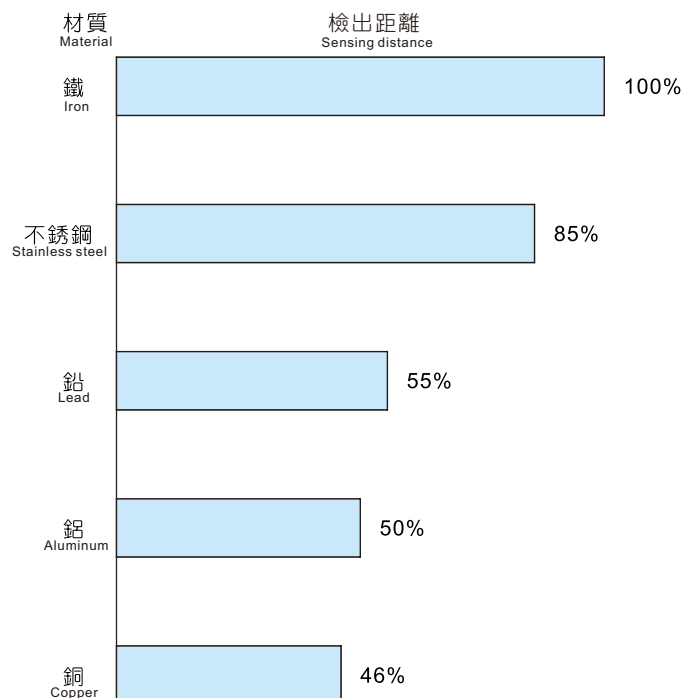
近接開關之一般特性 THE GENERAL CHARACTERISTICS OF PROXIMITY SWITCH

•修正係數 Correction Coefficient

非鐵金屬感應距離修正參考圖表。

(但是修正係數並非絕對值)

The correction chart of pick-up distance for non-iron metal.(But the correction factor has no an absolute value.



•電鍍之影響(參考值)

與未電鍍目標物之檢出距離之%。

The effect of the electric plating (reference data)
The percentage of sensing distance of plating and unplating sensing objects.

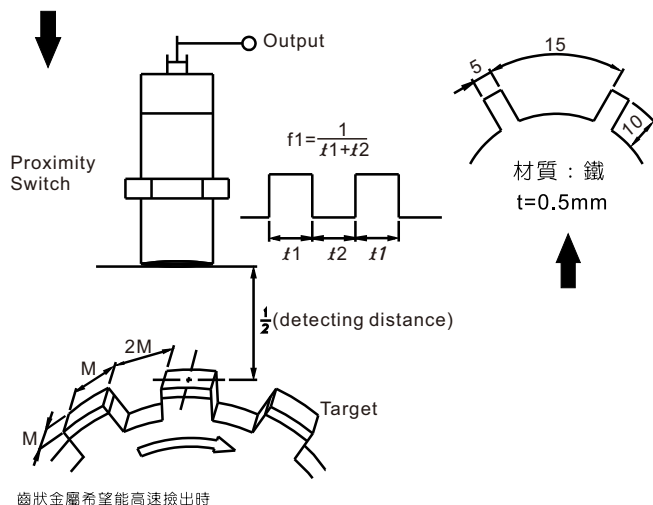
基本材質 Basic material	鐵 Iron	青銅 Bronze
電鍍之種類 The type of plating		
未電鍍 un plating	100	100
鋅 Zn 5至15μ	90至120	95至105
鎳 Cd 5至15μ	100至110	95至105
銀 Ag 5至15μ	60至90	85至100
銅 CU 5至15μ	70至95	95至105
銅 CU 10至15μ	—	95至105
銅 Cu (5至10μ)+ 鎳 Ni (10至20μ)	75至95	—
銅 Cu(5至10μ)+ 鎳 Ni(10μ)+ 鉻 Cr(0.3μ)	75至95	—

● 反應頻率 Response Frequency

“反應頻率”係指當每一可檢出物體移向近接開關時，此一開關每秒內可反應之輸出頻率。

測量方法如下圖所示。

“Response frequency” refers to the frequency of outputs from the proximity switch per second in response to the movement of each target when brought closer to the switch. The method of measurement is outlined below.



- 齒狀金屬希望能高速檢出時，則可檢出物體之大小需較標準可檢出物體為大，並且在二齒之間保存一足夠間隔，如上圖所示之齒狀結構。如果此一齒狀結構之齒面寬度減少，齒底長度變狹，而將其小型化，則反應頻率將會降低。

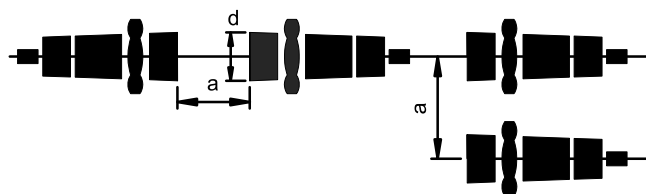
To increase sensing speed of the metal object with gear shape, the size of the sensing object should be bigger than standard object. In the meantime, there should have enough space between two gears (as shown in above figure). The response frequency will be reduced. If the width of gear face was decreased and the length of gear was narrowed.

● 互相干擾 Mutual Interference

按裝兩個同型感應式近接開關面對面或並排時，請保持大於近接開關直徑的3倍距離，以避免誤動作。

To prevent mutual interference, be sure to space the two switches at a distance greater than that shown in the table below.

d = 外徑	d=diameter
a = 間隔	a=gap
$a \geq 3d$ 裝設間隔	$a \geq 3d$



- 當近接開關與接點型開關並聯或串聯連接時，亦會發生問題。整個系統之反應時間會變慢，並且近接開關，因為沒有足夠電壓，因此不會正常動作，我們亦不建議使用此一組合。

In connecting the proximity switch with contact-type switch in series or in parallel. The trouble will be the response time will get slow down and the proximity switch may run out of order due to insufficient voltage. That's why we do not recommend the way.

● 負載含大量切入電流 Loads with high current

過大之負載電流如燈泡、馬達等，會導致近接開關內元件之破壞或損害。當切入或切斷此類超過所列容量之負載時，使用近接開關要注意經由繼電器。

Loads with high current such as lamps, motors etc., cause damage to the switching element of a proximity switch. When making or breaking such a load which exceeds the capacity of the switches, be sure to use the proximity switch through a relay.

● 突波保護 Surge protection

建議加接突波吸收器於近接開關兩端，防止外來突波破壞開關。

It is recommended to insert a surge suppressor, as a varistor, into two sides of proximity switch to protect any large surge source.

● 金屬導線管之使用 Use of metallic conduit

倘有高壓或電力線行經近接開關電纜，應將此電纜穿入導線管以避免開關受到損害。

If a high voltage or power line runs near the proximity switch cable, be sure to wire the switch cable through a metallic conduit to prevent the switch from malfunction or damage.

● 電纜長度的影響 Effect of Cable Length

當所用的電纜很長時，近接開關的操作特性不受影響，但仍需考慮其壓降。

The operating characteristics of the proximity switches do not vary when a longer cable is used. However, taking into account the voltage drop.

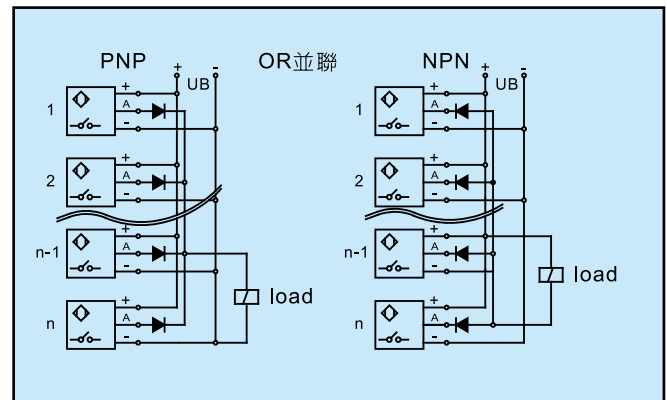
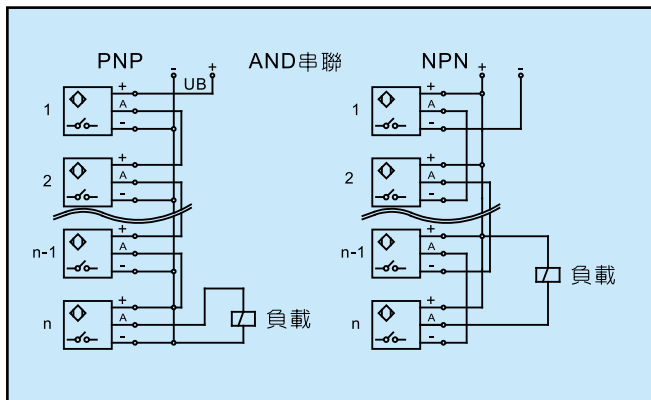
● 接通電源動作 Connect power line action

當將電源送入近接開關時，則需要最少100ms左右近接開關迴路才能到達其穩定狀態。

因此，送上電源之後，需要約100ms之時間，近接開關才能開始操作，請在經過此時間以後才將目標移向或移離近接開關。

When power on the proximity switch, it will require 100ms to get stable. So, when power on, please to operate after 100ms, to move target toward or away the proximity switch after the time.

DC型串聯及並聯接線法 DC type connecting method of AND & OR



交流開關型正確使用之指導 Correct operation directions for AC type

● 電源之連接 Connection to power source

需確定近接開關先經負載再接至電源，若直接將開關接至電源會使開關內部元件受損。

Be sure to connect the proximity switch to the power source through a load. Direct connection of the switch may cause damage to the internal elements of the switch.

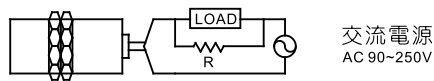


● 當負載電流小於3mA時，則會產生假動作。

這是正常現象，如果與負載並聯一分歧電阻，使負載達到3mA以上，即可消除此一現象，並聯電阻(R)及消耗功率(W)之計算方式如下：

There will have a false motion. Whenever the load current is under 3mA.

This is a normal phenomenon. This phenomenon can be avoided, if another resistor is connected in parallel, to increase the load current over 3mA. The parallel resistance(R) and consumption power(W) can be calculated as following:



$$R \leq \frac{V_s}{3-C} \quad (K\Omega) \quad P: \text{分歧電阻之消耗功率}$$

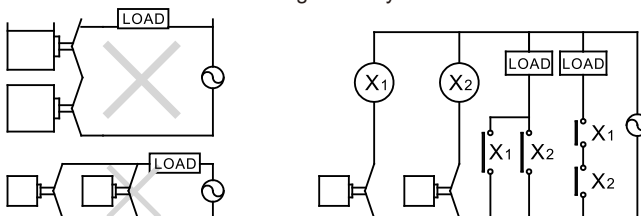
C: 負載電流(mA)

$$P > \frac{V_s^2}{R} \quad (mw) \quad V_s: \text{供應電壓(V)}$$

● 串聯 Series connection

近接開關通常不能用於串聯。倘需要如此連接，建議經由繼電器串聯至負載。

The proximity switches cannot normally be connected in series. If such an arrangement is necessary, it is recommended to connect switch in series through a relay.



● 並聯 Parallel Connection

一般而言，兩只或三只以上之並聯近接開關不能用於OR迴路。

In general, two or more parallel-connected proximity switches cannot be used in an OR circuit.

上例中之近接開關A及B僅可在A及B不同時操作負載且不需被維持時才可並聯，在此情形下，無論如何，需注意漏電流之增加係比例於近接開關連接的數目。當近接開關A及B需同時負載時，不能並聯連接。因當A與B同時負載時，一旦打開開關A，在開關A(B)兩端之電壓即降至約10V，且負載電流流經開關A。當目標移至開關B時，由於其兩端之電壓為10V 開關B無法打開，開關A(B)兩端之電壓又上升至供電電壓，開關B可在此刻打開。同時，當開關A及B 關掉的瞬間(約10ms)負載又立即被重覆，因此，近接開關用來持住所連接之負載需經由繼電器。

Proximity switches A and B in the above example can be used in a parallel connection only when they are not required to operate simultaneously and the load is not required to be hold. In this case, however, note that the leakage current increases in proportion to the number of proximity switches connected.

Proximity switches

A and B can not be used in a parallel connection when they are required to operate simultaneously to hold the load. Namely, when holding the load by operating switches A and B simultaneously, upon turning on switch A, the voltage at both ends of the switch A(B) drops to about 10V and the load current flows through the switch A. When the target accesses to switch B, since the voltage of both ends of the switch B is 10V, the switching elements of switch B may fail to operate due to insufficient voltage. Upon turning off switch A, since the voltage at both ends of the switch A(B) rises to the supply voltage, switch B turns on at this moment. At this time, there is a moment when both switches A and B turn off (approximately 10ms) and the load is reset momentarily. For this reason, the proximity switches are required to be used through relays to hold the load connected.