

PRA Series Cylindrical, Spatter-Resistance, Cable Type

Cylindrical, Spatter-Resistance, Cable Type Proximity Sensor

■ Features

- Prevent malfunction due to welding spatter with PTFE coating
- Improved the noise immunity with dedicated IC
- Built-in reverse polarity protection circuit (DC 3-wire type)
- Built-in surge protection circuit
- Built-in over-current protection circuit (DC type)
- IP67 protection structure (IEC standard)
- Replaceable for spatter-resistance type limit switches



⚠ Please read "Safety Considerations" in operation manual before using.



■ The Characteristic of Spatter-Resistance Type

The hot arc from arc welding machine is adhesive even with metals or plastics.

Therefore, normal proximity sensor might have malfunction even though there are no sensing object if the arcs are put on the sensing surface. The arcs are not adhered on the sensing part of the spatter-resistance type proximity sensor as the part is coated with PTFE against thermal resistance.

Also, the protection cover sold optionally has the same function.

■ Specifications

● DC 2-wire type

※When the □ model name is X, it is non-polarity model.

Model	PRAT12-2□□ PRAT12-2□C PRAT12-2DO-C PRAT12-2DC-V	PRAT18-5□□ PRAT18-5□C	PRAT30-10□□ PRAT30-10□C PRAT30-10DO-C PRAT30-10DC-V
Sensing distance	2mm	5mm	10mm
Hysteresis	Max. 10% of sensing distance		
Standard sensing target	12×12×1mm (iron)	18×18×1mm (iron)	30×30×1mm (iron)
Setting distance	0 to 1.4mm	0 to 3.5mm	0 to 7mm
Power supply (operating voltage)	12-24VDC= (10-30VDC=)		
Leakage current	Max. 0.6mA		
Response frequency※1	1.5kHz	500Hz	400Hz
Residual voltage※2	Max. 3.5V (non-polarity type is Max. 5V)		
Affection by Temp.	Max. ±10% for sensing distance at ambient temperature 20°C		
Control output	2 to 100mA		
Insulation resistance	Over 50MΩ (at 500VDC megger)		
Dielectric strength	1,500VAC 50/60Hz for 1 minute (between all terminals and case)		
Vibration	1mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours		
Shock	500m/s ² (approx. 50G) in each X, Y, Z directions for 3 times		
Indicator	Operation indicator: Red LED		
Environment	Ambient temperature	-25 to 70°C, storage: -30 to 80°C	
	Ambient humidity	35 to 95%RH, storage: 35 to 95%RH	
Protection circuit	Surge protection circuit, Over-current protection circuit		
Protection structure	IP67 (IEC standard)		
Cable	Ø4mm, 2-wire, 2m	Ø5mm, 2-wire, 2m	
	(AWG22, Core diameter: 0.8mm, Number of cores: 60, Insulator diameter: Ø1.25mm)		
Material	Case/Nut: PTFE coated brass, Washer: PTFE coated iron, Sensing surface: PTFE, Standard cable (black): Polyvinyl chloride (PVC)		
Approval	CE		
Weight※3	Approx. 84g (approx. 72g)	Approx. 122g (approx. 110g)	Approx. 207g (approx. 170g)

※1: The response frequency is the average value. The standard sensing target is used and the width is set as 2 times of the standard sensing target, 1/2 of the sensing distance for the distance.

※2: Before using non-polarity type, check the condition of connected device because residual voltage is 5V.

※3: The weight includes packaging. The weight in parenthesis in for unit only.

※Refer to the G-5 for IEC standard caonector cables and specifications.

※The □ of model name is for power type. 'D' is 12-24VDC, 'X' is non-polarity 12-24VDC.

※Environment resistance is rated at no freezing or condensation.

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels

(S) Field Network Devices

(T) Software

PRA Series

■ Specifications

● DC 3-wire type

Model	PRA12-2DN PRA12-2DP PRA12-2DN2 PRA12-2DP2	PRA18-5DN PRA18-5DP PRA18-5DN2 PRA18-5DP2	PRA30-10DN PRA30-10DP PRA30-10DN2 PRA30-10DP2
Sensing distance	2mm	5mm	10mm
Hysteresis	Max. 10% of sensing distance		
Standard sensing target	12×12×1mm (iron)	18×18×1mm (iron)	30×30×1mm (iron)
Setting distance	0 to 1.4mm	0 to 3.5mm	0 to 7mm
Power supply (operating voltage)	12-24VDC≐ (10-30VDC≐)		
Current consumption	Max. 10mA		
Response frequency※1	1.5kHz	500Hz	400Hz
Residual voltage	Max. 1.5V		
Affection by Temp.	Max. ±10% for sensing distance at ambient temperature 20°C		
Control output	Max. 200mA		
Insulation resistance	Over 50MΩ (at 500VDC megger)		
Dielectric strength	1,500VAC 50/60Hz for 1 minute		
Vibration	1mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours		
Shock	500m/s ² (approx. 50G) in each X, Y, Z direction for 3 times		
Indicator	Operation indicator: Red LED		
Environment	Ambient temperature: -25 to 70°C, storage: -30 to 80°C		
	Ambient humidity: 35 to 95%RH, storage: 35 to 95%RH		
Protection circuit	Surge protection circuit, Reverse polarity protection circuit, Over-current protection circuit		
Protection structure	IP67 (IEC standard)		
Cable	∅4mm, 3-wire, 2m	∅5mm, 2-wire, 2m	(AWG22, Core diameter: 0.8mm, Number of cores: 60, Insulator diameter: ∅1.25mm)
Material	Case/Nut: PTFE coated brass, Washer: PTFE coated iron, Sensing surface: PTFE, Standard cable (black): Polyvinyl chloride (PVC)		
Approval	CE		
Weight※2	Approx. 84g (approx. 72g)	Approx. 122g (approx. 110g)	Approx. 207g (approx. 170g)

● AC 2-wire type

Model	PRA12-2AO PRA12-2AC	PRA18-5AO PRA18-5AC	PRA30-10AO PRA30-10AC
Sensing distance	2mm	5mm	10mm
Hysteresis	Max. 10% of sensing distance		
Standard sensing target	12×12×1mm (iron)	18×18×1mm (iron)	30×30×1mm (iron)
Setting distance	0 to 1.4mm	0 to 3.5mm	0 to 7mm
Power supply (operating voltage)	100-240VAC~ (85-264VAC~)		
Leakage current	Max. 2.5mA		
Response frequency※1	20Hz		
Residual voltage	Max. 10V		
Affection by Temp.	Max. ±10% for sensing distance at ambient temperature 20°C		
Control output	5 to 150mA	5 to 200mA	
Insulation resistance	Over 50MΩ (at 500VDC megger)		
Dielectric strength	2,500VAC 50/60Hz for 1 minute		
Vibration	1mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours		
Shock	500m/s ² (approx. 50G) in each X, Y, Z direction for 3 times		
Indicator	Operation indicator: Red LED		
Environment	Ambient temperature: -25 to 70°C, storage: -30 to 80°C		
	Ambient humidity: 35 to 95%RH, storage: 35 to 95%RH		
Protection circuit	Surge protection circuit		
Protection structure	IP67 (IEC standard)		
Cable	∅4mm, 2-wire, 2m	∅5mm, 2-wire, 2m	(AWG22, Core diameter: 0.8mm, Number of cores: 60, Insulator diameter: ∅1.25mm)
Material	Case/Nut: PTFE coated brass, Washer: PTFE coated iron, Sensing surface: PTFE, Standard cable (black): Polyvinyl chloride (PVC)		
Insulation type	Double insulation or reinforced insulation (Mark: □, Dielectric strength between the measuring input part and the power part: 1.5kVAC)		
Approval	CE		
Weight※2	Approx. 78g (approx. 66g)	Approx. 118g (approx. 106g)	Approx. 207g (approx. 170g)

※1: The response frequency is the average value. The standard sensing target is used and the width is set as 2 times of the standard sensing target, 1/2 of the sensing distance for the distance.

※2: The weight includes packaging. The weight in parenthesis is for unit only.

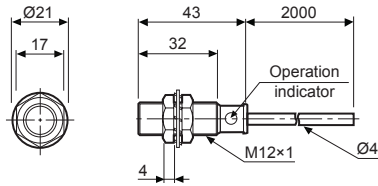
※Environment resistance is rated at no freezing or condensation.

Cylindrical, Spatter-Resistance, Cable Type

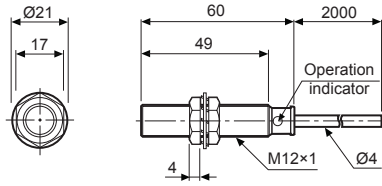
■ Dimensions

(unit: mm)

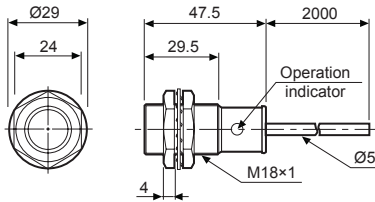
● PRA12-2D□ / PRAT12-2D□



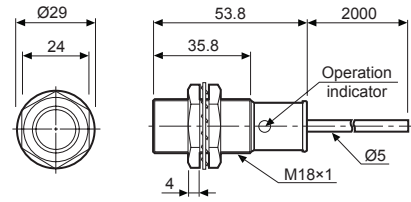
● PRA12-2A□



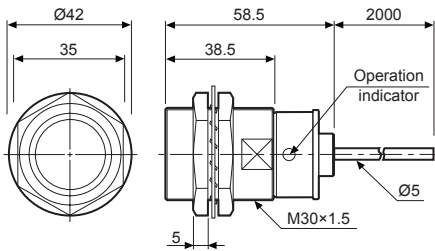
● PRA18-5D□ / PRAT18-5D□



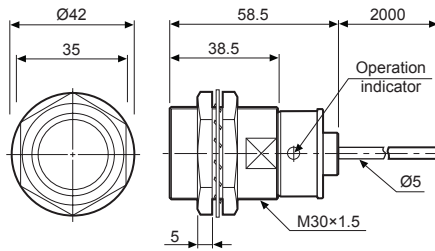
● PRA18-5A□



● PRA30-10D□ / PRAT30-10D□

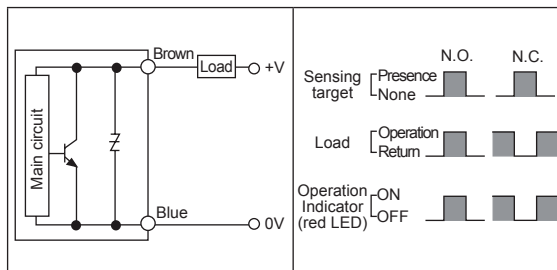


● PRA 30-10A□

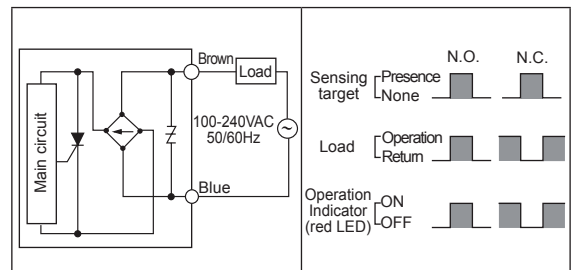


■ Control Output Diagram and Load Operation

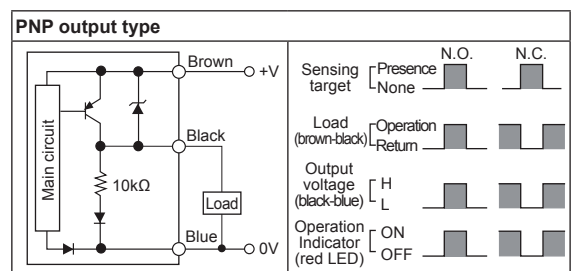
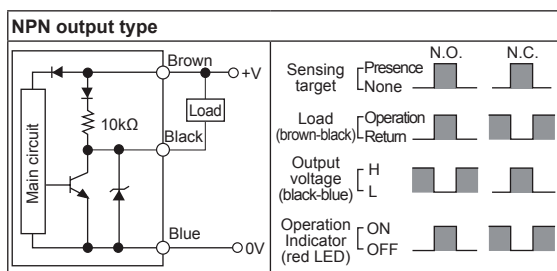
◎ DC 2-wire type



◎ AC 2-wire type



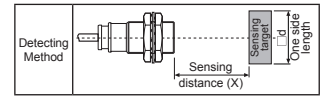
◎ DC 3-wire type



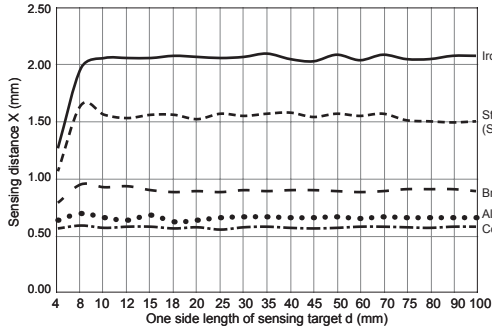
- (A) Photoelectric Sensors
- (B) Fiber Optic Sensors
- (C) Door/Area Sensors
- (D) Proximity Sensors
- (E) Pressure Sensors
- (F) Rotary Encoders
- (G) Connectors/ Connector Cables/ Sensor Distribution Boxes/ Sockets
- (H) Temperature Controllers
- (I) SSRs / Power Controllers
- (J) Counters
- (K) Timers
- (L) Panel Meters
- (M) Tacho / Speed / Pulse Meters
- (N) Display Units
- (O) Sensor Controllers
- (P) Switching Mode Power Supplies
- (Q) Stepper Motors & Drivers & Controllers
- (R) Graphic/ Logic Panels
- (S) Field Network Devices
- (T) Software

PRA Series

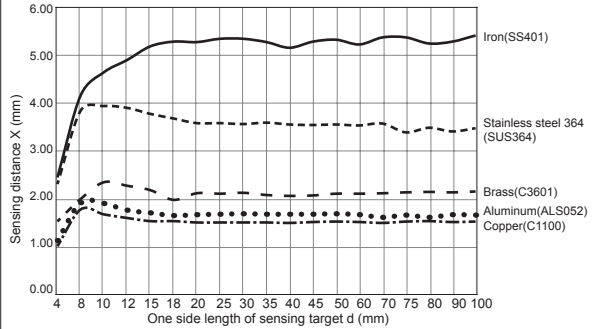
■ Sensing Distance Feature Data by Target Material and Size



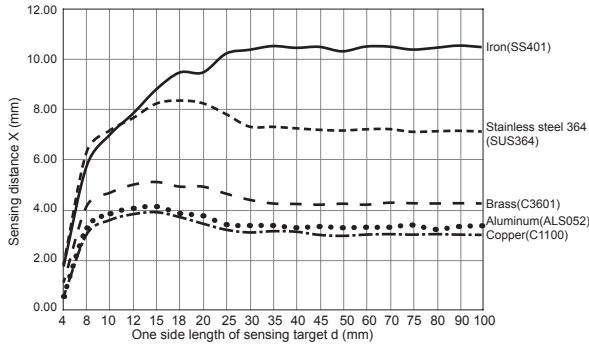
● PRAT12-2D □, PRA12-2A □



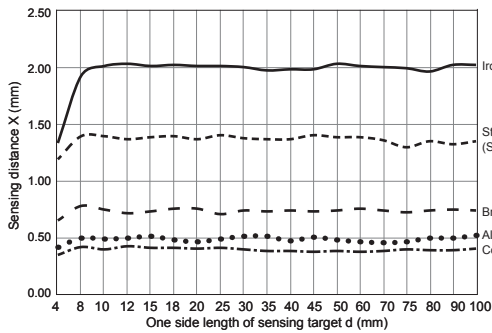
● PRAT18-5D □, PRA18-5A □



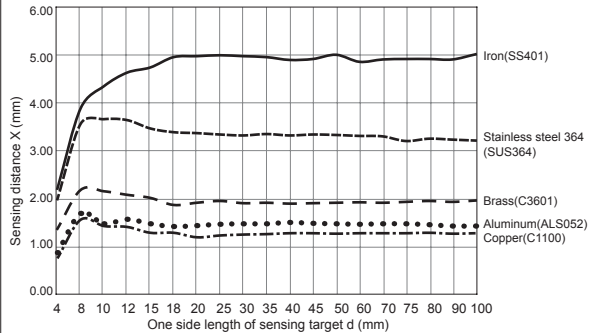
● PRAT30-10D □, PRA30-10A □



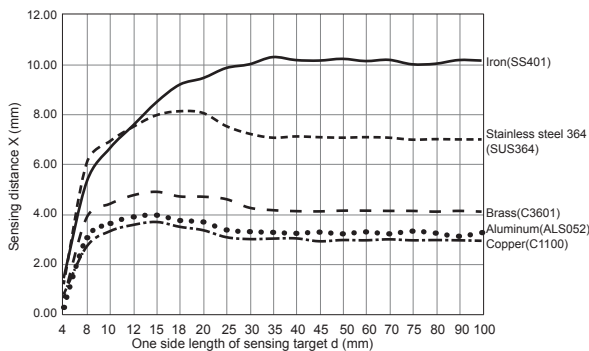
● PRA12-2D □



● PRA18-5D □

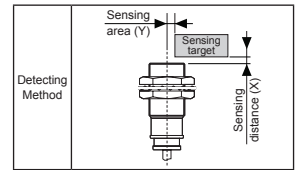


● PRA30-10D □

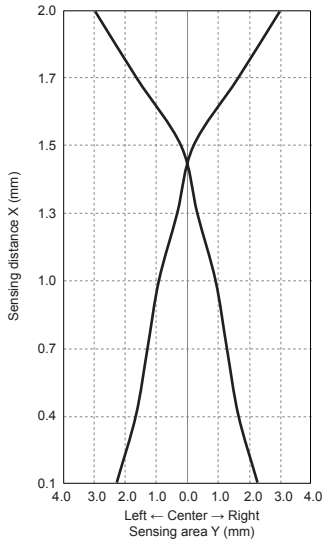


Cylindrical, Spatter-Resistance, Cable Type

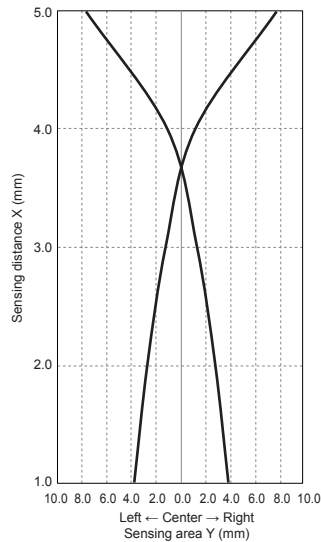
■ Sensing Distance Feature Data by Parallel (Left/Right) Movement



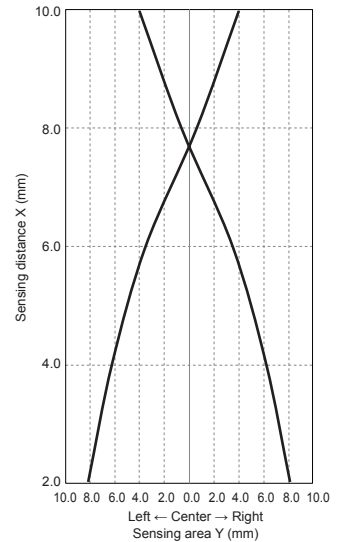
● PRAT12-2D □, PRA12-2A □



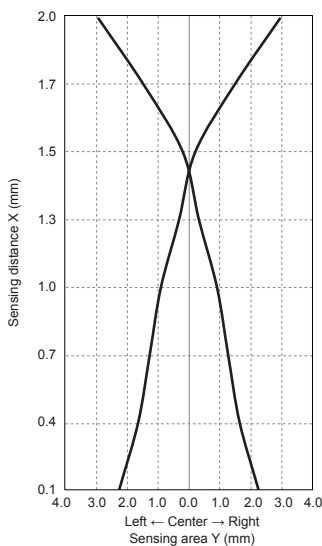
● PRAT18-5D □, PRA18-5A □



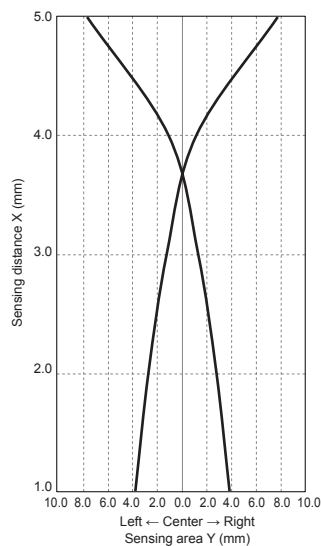
● PRAT30-10D □, PRA30-10A □



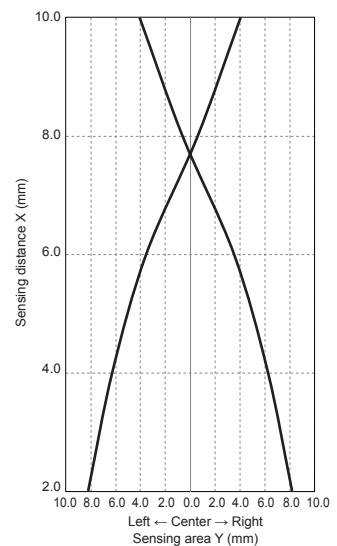
● PRA12-2D □



● PRA18-5D □



● PRA30-10D □



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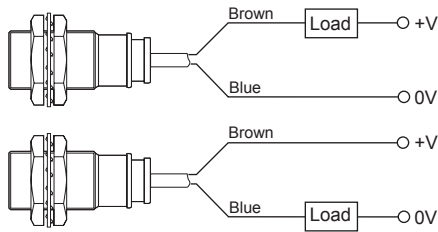
(S) Field Network Devices

(T) Software

PRA Series

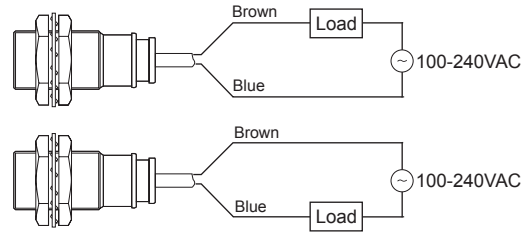
■ Connections

◎ DC 2-wire type



※The load can be connected to either wire.

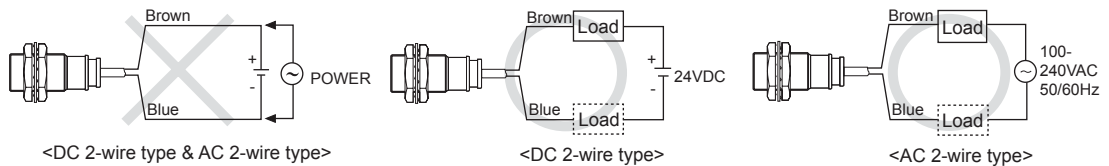
◎ AC 2-wire type



※No need to consider polarity for non-polarity type of power supply.

■ Proper Usage

◎ Load connections



<DC 2-wire type & AC 2-wire type>

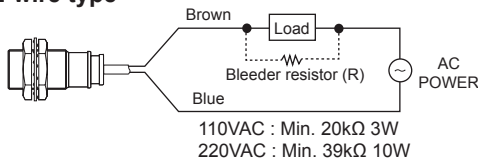
<DC 2-wire type>

<AC 2-wire type>

When using DC or AC 2-wire type proximity sensor, the load must be connected otherwise internal components may be damaged. The load can be connected to either wire.

◎ In case of the load current is small

● AC 2-wire type



If the load current is under 5mA, please make sure the residual voltage is less than the return voltage of the load by connecting a bleeder resistor in parallel with the load as shown in the diagram.

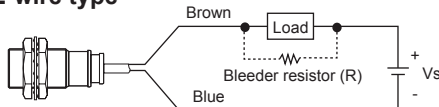
$$R \leq \frac{V_s}{I} \text{ (k}\Omega\text{)} \quad P > \frac{V_s^2}{R} \text{ (W)}$$

[I: Action current of load, R: Bleeder resistance, P: Permissible power]

Please make the current on proximity sensor smaller than the return current of load by connecting a bleeder resistor in parallel.

※W value of Bleeder resistor should be bigger for proper heat.

● DC 2-wire type

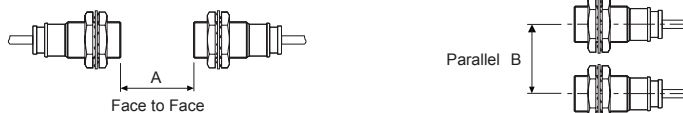


$$R \leq \frac{V_s}{I_o - I_{off}} \text{ (k}\Omega\text{)} \quad P > \frac{V_s^2}{R} \text{ (W)}$$

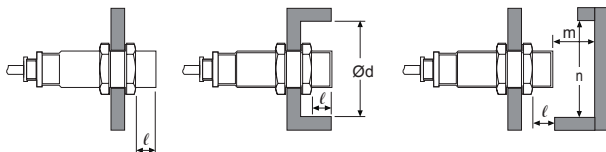
[Vs: Power supply, I_o: Min. action current of proximity sensor
I_{off}: Return current of load, P: Number of Bleeder resistance watt]

◎ Mutual-interference & Influence by surrounding metals

When several proximity sensors are mounted close to one another a malfunction of them may be caused due to mutual interference. Therefore, be sure to provide a minimum distance between the two sensors as below chart indicates.



When sensors are mounted on metallic panel, you must prevent the sensors from being affected by any metallic object except target. Therefore, be sure to provide a minimum distance as below chart indicates. (unit: mm)



Model	PRAT12-2D□	PRAT18-5D□	PRAT30-10D□
Item	PRAT12-2D□ PRAT12-2A□	PRAT18-5D□ PRAT18-5A□	PRAT30-10D□ PRAT30-10A□
A	12	30	60
B	24	36	60
ℓ	0	0	0
Ød	12	18	30
m	6	15	30
n	18	27	45