

Autonics

INDUCTIVE PROXIMITY SENSOR (SPATTER RESISTANT TYPE) PRA SERIES

M A N U A L



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

Caution for your safety

*Please keep these instructions and review them before using this unit.

*Please observe the cautions that follow;

Warning Serious injury may result if instructions are not followed.

Caution Product may be damaged, or injury may result if instructions are not followed.

*The following is an explanation of the symbols used in the operation manual.

Caution: Injury or danger may occur under special conditions.

Warning

1. In case of using this unit with machineries(Nuclear power control, medical equipment vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information on type required.

It may result in serious damage, fire or human injury.

2. Do not connect power directly without load.

It may result in damage to inner components or burn them out.

Caution

1. Do not use this unit in place where there are flammable, explosive gas, chemical or strong alkalis, acids.

It may cause a fire or explosion.

2. Do not impact on this unit.

It may result in malfunction or damage to the product.

3. Do not apply AC power and observe specification rating.

It may result in serious damage to the product.

Ordering information

P R A W T 18 - 5 D O - I

Cable type	I	Standard cable
	I	Standard cable(IEC standards model)
Output type	DO	DC 2 wire Normally Open(N.O.)
	DC	DC 2 wire Normally Closed(N.C.)
	DN	NPN N.O.(Normally Open)
	DN2	NPN N.C.(Normally Closed)
	DP	PNP N.O.(Normally Open)
	DP2	PNP N.C.(Normally Closed)
	AO	AC Normally Open(N.O.)
	AC	AC Normally Closed(N.C.)
Standard sensing distance	Number	Unit: mm
Dimension	Number	Diameter of head(mm)
2wire/3wire	T	DC 3 wire
	T	DC 2 wire
Connection	W	Cable outgoing type
	W	cable outgoing connector type
Feature	A	Spatter resistance type
Shape	R	Cylindrical type
Item	P	Inductive proximity sensor

Dimensions

(Unit:mm)

Type	Cable outgoing type		Cable outgoing connector type		Nut, Washer
	PRA/PRAT(M12, M18, M30)	PRAWT(M12, M18, M30)			
Flush					

DC type	구분	A	B	C	D	E	F	G	H	J	K	
												Model
DC type	M12	PRA	M12×1	42.5	31.5	11	4	4	-	17	21	2,000
		PRAT	M12×1	42.5	31.5	11	4	4	-	17	21	2,000
		PRAWT	M12×1	42.5	31.5	11	4	4	43.5	-	17	21
	M18	PRA	M18×1	47	29	18	4	5	-	24	29	2,000
		PRAT	M18×1	47	29	18	4	5	-	24	29	2,000
		PRAWT	M18×1	47	29	18	4	5	43.5	-	24	29
M30	PRA	M30×1.5	58	38	20	5	5	-	35	42	2,000	
	PRAT	M30×1.5	58	38	20	5	5	-	35	42	2,000	
	PRAWT	M30×1.5	58	38	20	5	5	43.5	-	35	42	300
AC type	M12	PRA	M12×1	59.5	48.5	11	4	4	-	17	21	2,000
	M18	PRA	M18×1	53.3	35.3	18	4	5	-	24	29	2,000
	M30	PRA	M30×1.5	58	38	20	5	5	-	35	42	2,000

*K type standard: Cable outgoing type/2,000mm, Cable outgoing connector type/300mm

*F type: φ4, 2 cores/ φ4, 3 cores/ φ5, 2 cores(Conductor cross section: 0.3mm², Insulator diameter: φ1.25)

Specifications

Model	PRAT12-2DO PRAT12-2DC PRAT12-2DC-I PRAT12-2DC-I	PRAT18-5DO PRAT18-5DC PRAT18-5DC-I PRAT18-5DC-I	PRAT30-10DO PRAT30-10DC PRAT30-10DC-I PRAT30-10DC-I	PRA12-2DN PRA12-2DP PRA12-2DN2 PRA12-2DP2	PRA18-5DN PRA18-5DP PRA18-5DN2 PRA18-5DP2	PRA30-10DN PRA30-10DP PRA30-10DN2 PRA30-10DP2	PRA12-2AO PRA12-2AC	PRA18-5AO PRA18-5AC	PRA30-10AO PRA30-10AC
Sensing distance	2mm	5mm	10mm	2mm	5mm	10mm	2mm	5mm	10mm
Hysteresis	Max. 10% of sensing distance								
Standard sensing target	12×12×1mm (Iron)	18×18×1mm (Iron)	30×30×1mm (Iron)	12×12×1mm (Iron)	18×18×1mm (Iron)	30×30×1mm (Iron)	12×12×1mm (Iron)	18×18×1mm (Iron)	30×30×1mm (Iron)
Setting distance	0~1.4mm	0~3.5mm	0~7mm	0~1.4mm	0~3.5mm	0~7mm	0~1.4mm	0~3.5mm	0~7mm
Power supply (Operating voltage)	12~24VDC (10~30VDC)			12~24VDC (10~30VDC)			100~240VAC 50/60Hz (85~264VAC)		
Current consumption	-			Max. 10mA			-		
Leakage current	Max. 0.6mA			-			Max. 2.5mA		
Response frequency	1.5kHz	500Hz	400Hz	1.5kHz	500Hz	400Hz	20Hz		
Residual voltage	Max. 3.5V			Max. 1.5V			Max. 10V		
Affection by Temp.	Within ±10% max. of sensing distance at 20°C in temperature range of -25 ~ 70°C								
Control output	2~100mA		200mA		5~150mA		5~200mA		
Insulation resistance	Min. 50MΩ (500VDC megger)								
Dielectric strength	1,500VAC 50/60Hz for 1 minute								
Vibration	1mm amplitude at frequency of 10 ~ 55Hz in each of X, Y, Z directions for 2 hours								
Shock	500ms(50G) X, Y, Z directions for 3 times								
Indicator	Operating indicator(Red LED)								
Environment	Ambient temperature: -25 ~ 70°C, Storage: -30 ~ 80°C								
	Ambient humidity: 35 ~ 95%RH, Storage: 35 ~ 95%RH								
Protection circuit	Surge protection circuit, Overcurrent protection			Surge protection circuit, Overcurrent protection, Reverse polarity protection circuit			Surge protection circuit		
Protection	IP67(IEC Standards)								
Materials	Case/Nut/Washer: Teflon coated brass, Sensing surface: Teflon, Standard cable(Black): Polyvinyl chloride(PVC)								
Insulation type(*1)	-								
Approval	CE								
Unit weight	PRAT: Approx. 63g PRAWT: Approx. 45g	PRAT: Approx. 122g PRAWT: Approx. 65g	PRAT: Approx. 181g PRAWT: Approx. 130g	Approx. 70g	Approx. 119g	Approx. 184g	Approx. 66g	Approx. 130g	Approx. 185g

*1: Mark indicated that equipment protected throughout by double insulation or reinforced insulation.

* Condition for use in Environment is no freezing or condensation.

Control output diagram & Load operating

DC 2wire	Main circuit	Sensing target	Normally Open	Normally Closed
			Presence Nothing	Presence Nothing
DC 2wire		Load	Operation Return	Operation Return
		Indicator (LED)	ON OFF	ON OFF
		Output voltage (Black-Blue)	H L	H L
DC 3wire NPN		Load (Brown-Black)	Operation Return	Operation Return
		Indicator (LED)	ON OFF	ON OFF
		Output voltage (Black-Blue)	H L	H L
DC 3wire PNP		Load (Black-Blue)	Operation Return	Operation Return
		Indicator (LED)	ON OFF	ON OFF
		Output voltage (Black-Blue)	H L	H L
AC 2wire		Sensing target	Presence Nothing	Presence Nothing
		Load	Operation Return	Operation Return
		Indicator (LED)	ON OFF	ON OFF

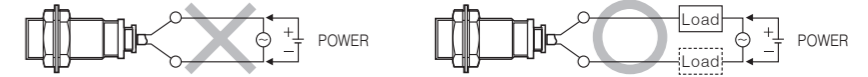
Connections

DC 2wire standard type / AC 2wire	Connector	Connector IEC Standards Model
Load can be wired to any cable.		
<DC 2wire type>	Brown → +24VDC Blue → Load → 0V	(a) N.O. (Normally Open) Type
<AC 2wire type>	Brown → Load → 100~240VAC 50/60Hz Blue → 0V	(b) N.C. (Normally Closed) Type

* The above specifications are subject to change without notice.

Connection of the power supply

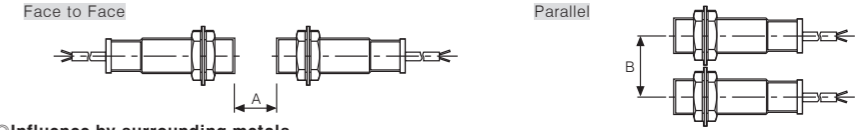
Be sure to connect the power after connecting the load, because direct connection of the proximity sensor may cause damage to the inner elements of this product.



Mutual-interference & Influence by surrounding metals

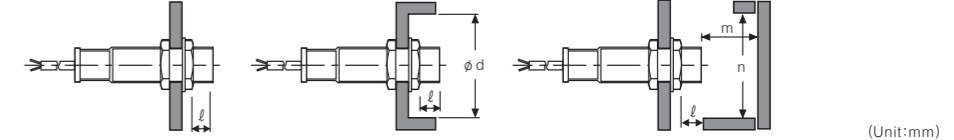
Mutual-interference

When several proximity sensors are mounted closely, malfunction of sensor may be caused due to mutual interference. Therefore, be sure to provide a minimum distance between the two sensors with referring to the chart below.



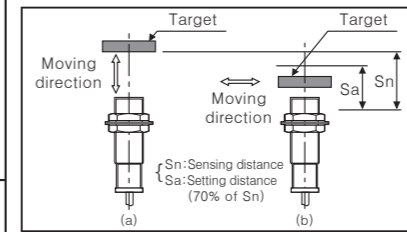
Influence by surrounding metals

When sensors are mounted on metallic panel, it is required to protect the sensors from being affected by any metallic object except target. Therefore, be sure to provide a minimum distance as below chart.



PRA□12-2□□				PRA□18-5□□				PRA□30-10□□			
A	B	φd	m	A	B	φd	m	A	B	φd	m
12	24	6	12	30	36	6	15	60	60	6	30
0	0	n	18	0	0	n	27	0	0	n	45

Setting distance

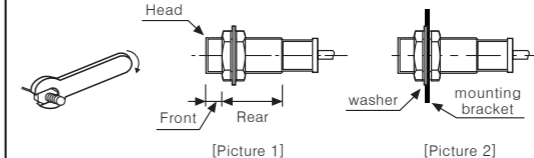


Sensing distance can be changed by the shape, size or material of the target. Therefore please check the sensing distance like (a), then pass the target within range of setting distance(Sa).

Setting distance(Sa) = Sensing distance(Sn) × 70%
Ex) PRA30-10DN
Setting distance(Sa) = 10mm × 0.7 = 7mm

Caution for using

- This equipment shall not be used outdoors or beyond specified temperature range.
- Do not apply over tensile strength of cord. (φ4: 30N max., φ5: 50N max.)
- Do not use the same conduit with cord of this unit and electric power line or power line.
- Do not put overload to tighten nut, please use the supplied washer for tightening.



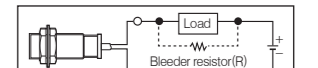
Note1) Allowable tightening torque of a nut may be different by the distance from the head. For allowable tightening torque and the range of front and rear parts, refer to [Table 1] and above [Picture 1] respectively. The rear part includes a nut on the front side (see above [Picture 1]). Please apply a tightening torque of the front part when the nut on the front is located in the front part.

Note2) The allowable tightening torque denotes a torque value when using a provided washer as above [Picture 2].

- Please check the voltage changes of power source in order not to exceed rating power input.
- Do not use this unit during transient time(80ms) after apply power.
- It might result in damage to this product, if use automatic transformer. So please use insulated transformer.
- Please make wire as short as possible in order to avoid noise.
- Be sure to use cable as indicated specification on this product. If wrong cable or bended cable is used, it shall not maintain the water-proof.
- It is possible to extend cable with over 0.3mm² and max. 200m.
- If the target is plated, the operating distance can be changed by the plating material.
- It may result in malfunction by metal particle on product.
- If there are machines(motor, welding etc), which occurs big surge around this unit, please install the varistor or absorber to source of surge, even though there is built-in surge absorber in this unit.
- If connecting the load with big inrush current(DC type bulb) to this unit, the big inrush current will flow since the initial resistance is low. If the current flows, the resistance of load will be bigger, then it will return to standard current. In this case, proximity sensor might be damaged by inrush current. If you use DC type bulb, please connect extra relay or resistance in order to protect proximity sensor from.
- If making a transceiver close to proximity sensor or wire connection, it may cause malfunction.
- In case of the load current is small(AC type): When the load current is under 5mA, make the residual voltage is less than return voltage to connect the bleeder resistor to load in parallel. (*110VAC 50/60Hz: 20kΩ, Min. 3W, 220VAC 50/60Hz: 39kΩ, Min. 5W)
- In case of the load current is small(DC 2wire): Make the residual current is less than return current to connect the bleeder resistor to load in parallel.

$$V_s: \text{Power supply, } I_o: \text{Min. operating current for proximity sensor, } I_{off}: \text{Return current of load, } P: \text{Resistance W of Bleeder resistor}$$

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



*It may cause malfunction if above instructions are not followed.

Major products

- Proximity sensors
- Area sensors
- Photoelectric sensors
- Fiber optic sensors
- Door/Door side sensors
- Sensor controllers
- Graphic/Logic panels
- Temperature controllers
- Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Switching power supplies
- Stepping motors/drivers/motion controllers
- Field network devices
- Laser marking system(CO₂, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Display units
- Panel meters
- Pressure sensors
- Rotary encoders
- Power controllers

Autonics Corporation
http://www.autonics.com

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■ HEAD QUARTERS :
41-5, Yongdang-dong, Yangsan-si, Gyeongnam, 626-847, Korea

■ OVERSEAS SALES :
Bldg. 402 3rd FL., Bucheon Techno Park, 193, Yakdae-dong, Wornmi-gu, Bucheon-si, Gyeonggi-do, 420-734, Korea
TEL : 82-32-610-2730 / FAX : 82-32-329-0726

■ E-mail : sales@autonics.com

The proposal of a product improvement and development : product@autonics.com