

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 machinery(Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.

It may cause a fire, human injury or damage to property.

2. Do not connect power directly without load.

It may cause 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 cause malfunction or damage to the product.

3. Do not apply AC power and observe the rated specifications.

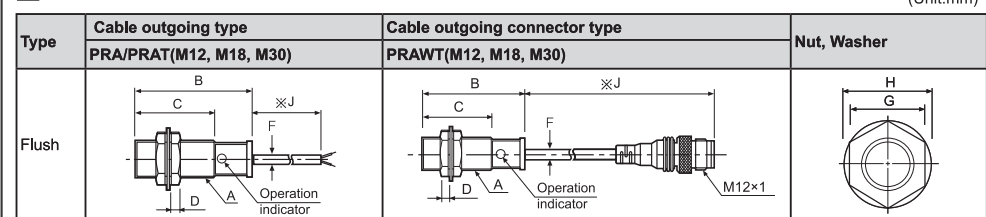
It may cause serious damage to the product.

Ordering information

P R A W T 18 - 5 DO - I

Cable type	No mark	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 Normally Open(N.O.)
	DN2	NPN Normally Closed(N.C.)
	DP	PNP Normally Open(N.O.)
	DP2	PNP Normally Closed(N.C.)
	AO	AC Normally Open(N.O.)
	AC	AC Normally Closed(N.C.)
	XO	DC 2-wire Non-polarity type Normally Open(N.O.)
	XC	DC 2-wire Non-polarity type Normally Closed(N.C.)
Sensing distance	Number	Standard sensing distance(Unit: mm)
	Number	Diameter of head(mm)
Dimension	No mark	DC 3-wire
	T	DC 2-wire
Connection	No mark	Cable outgoing type
	W	cable outgoing connector type
Feature	A	Spatter resistance type
	R	Cylindrical type
	P	Inductive proximity sensor

Dimensions



Type	Cable outgoing type		Cable outgoing connector type				Nut, Washer			
	PRA/PRAT(M12, M18, M30)	PRAWT(M12, M18, M30)	A	B	C	D	F	G	H	J
DC type	M12	PRA	M12×1	43	32	4	4	17	21	2,000
		PRAT	M12×1	43	32	4	4	17	21	2,000
		PRAWT	M12×1	43	32	4	4	17	21	300
	M18	PRA	M18×1	47.5	29.5	4	5	24	29	2,000
		PRAT	M18×1	47.5	29.5	4	5	24	29	2,000
		PRAWT	M18×1	47.5	29.5	4	5	24	29	300
M30	PRA	M30×1.5	58.5	38.5	5	5	35	42	2,000	
	PRAT	M30×1.5	58.5	38.5	5	5	35	42	2,000	
	PRAWT	M30×1.5	58.5	38.5	5	5	35	42	300	
AC type	M12	PRA	M12×1	60	49	4	4	17	21	2,000
	M18	PRA	M18×1	53.8	35.8	4	5	24	29	2,000
	M30	PRA	M30×1.5	58.5	38.5	5	5	35	42	2,000

※"J" type standard: Cable outgoing type/2,000mm, Cable outgoing connector type/300mm

※The above specifications are subject to change and some models may be discontinued without notice.

Specifications

Model	PRAT12-2_O PRAT12-2_C PRAW12-2_O PRAW12-2_C PRAW12-2_O-I PRAW12-2_C-I	PRAT18-5_O PRAT18-5_C PRAW18-5_O PRAW18-5_C PRAW18-5_O-I PRAW18-5_C-I	PRAT30-10_O PRAT30-10_C PRAW30-10_O PRAW30-10_C PRAW30-10_O-I PRAW30-10_C-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 to 1.4mm	0 to 3.5mm	0 to 7mm	0 to 1.4mm	0 to 3.5mm	0 to 7mm	0 to 1.4mm	0 to 3.5mm	0 to 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(Non-polarity type is Max. 5V)			Max. 1.5V			Max. 10V				
Affection by Temp.	Max. ±10% for sensing distance at ambient temperature 20°C										
Control output	2 to 100mA			200mA			5 to 150mA 5 to 200mA				
Insulation resistance	Min. 50MΩ (at 50VDC megger)										
Dielectric strength	1,500VAC 50/60Hz for 1minute(between all terminals and case)										
Vibration	1mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours										
Shock	500m/s ² (50G) X, Y, Z directions for 3 times										
Indicator	Operating 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, Overload & Short protection circuit			Surge protection circuit, Overload & Short protection circuit Reverse polarity protection circuit			Surge protection circuit				
Protection	IP67(IEC Standards)			IP67(IEC Standards)			IP67(IEC Standards)				
Cable	PRA(T) Ø4, 2-wire, 2m Ø5, 2-wire, 2m Ø4, 3-wire, 2m Ø5, 3-wire, 2m Ø4, 2-wire, 2m Ø5, 2-wire, 2m			PRAWT Ø4, 2-wire, 300mm M12 connector Ø5, 2-wire, 300mm, M12 connector			-				
	PRAWT Ø4, 2-wire, 300mm M12 connector			-			-				
Materials	Case/Nut: Teflon coated Brass, Washer: Teflon coated Iron, Sensing surface: Teflon, 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										
Unit weight	PRAT: Approx. 84g (Approx. 72g)	PRAT: Approx. 122g (Approx. 110g)	PRAT: Approx. 207g (Approx. 170g)	Approx. 84g (Approx. 72g)	Approx. 122g (Approx. 110g)	Approx. 207g (Approx. 170g)	Approx. 78g (Approx. 66g)	Approx. 118g (Approx. 106g)	Approx. 207g (Approx. 170g)		
	PRAWT: Approx. 54g (Approx. 42g)	PRAWT: Approx. 70g (Approx. 58g)	PRAWT: Approx. 134g (Approx. 122g)								

※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 with packaging and the weight in parentheses is only unit weight. ※Environment resistance is rated at no freezing or condensation.

Control output diagram & Load operation

DC-2-wire	DC-3-wire NPN	DC-3-wire PNP	AC-2-wire																																																						
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Connections

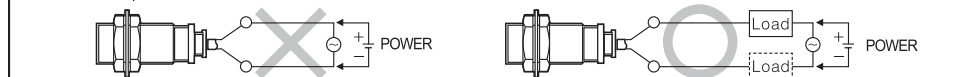
DC 2-wire standard type / AC 2-wire	Connector connection for standard type model	Connector connection for IEC standards model
<p><DC 2-wire type> Brown → Load → +V, Blue → 0V</p> <p><AC 2-wire type> Brown → Load → 100-240VAC 50/60Hz, Blue → 0V</p>		

※Load can be wired to any direction.

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

Power supply connection

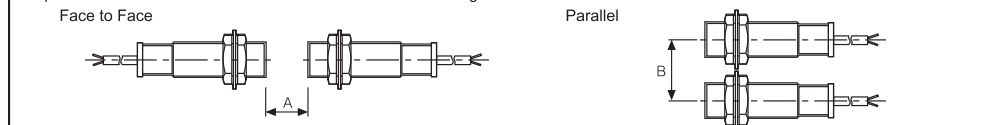
Be sure to connect the power after connecting the load, because direct connection of the proximity sensor may cause damage to the inner elements of this product.



Mutual-interference & Influence by surrounding metals

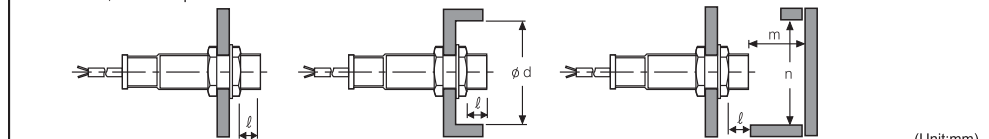
Mutual-interference

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.



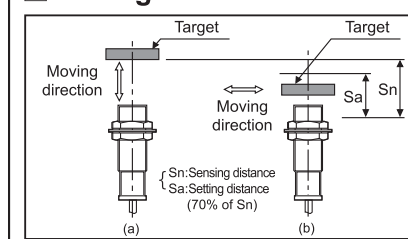
Influence by surrounding metals

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 12	A 30	A 60
B 24	B 36	B 60
ℓ 0	ℓ 0	ℓ 0
∅d 12	∅d 18	∅d 30
m 6	m 15	m 30
n 18	n 27	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. (∅4: 30N max., ∅5: 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 [Figure 1] respectively. The rear part includes a nut on the head side(see above [Figure 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 [Figure 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 may 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 banded 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 sensing 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 2-wire): Make the residual current is less than return current to connect the bleeder resistor to load in parallel.

V_s : Power supply, I_o : Min. operating current for proximity sensor, I_{off} : Return current of load, P : Resistance W of Bleeder resistor
 $R \geq \frac{V_s}{I_o - I_{off}}$ (kΩ) $P > \frac{V_s^2}{R}$ (mW)

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

Major products

- Photoelectric sensors
- Fiber optic sensors
- Door sensors
- Door side sensors
- Area sensors
- Proximity sensors
- Pressure sensors
- Rotary encoders
- Connector/Sockets
- Temperature controllers
- Temperature/Humidity transducers
- SSR/Power controllers
- Counters
- Timers
- Panel meters
- Tachometer/Pulse(Rate) meters
- Display units
- Sensor controllers
- Switching mode power supplies
- Control switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper motors/drivers/motion controllers
- Graphic/Logic panels
- Field network devices
- Laser marking system(Fiber, CO₂, Nd:YAG)
- Laser welding/soldering system

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