Autonics

INDUCTIVE PROXIMITY SENSOR

CYLINDRICAL TYPE DC 3WIRE

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.

⚠Caution

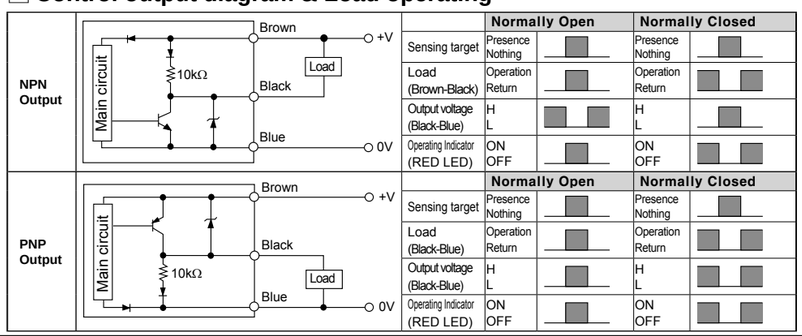
1. **Do not use this unit in place where there are flammable, explosive gas, chemical or strong alkalis, acids.**
   It may cause a fire or explosion.
2. **Do not impact on this unit.**
   It may result in malfunction or damage to the product.
3. **Do not apply AC power and observe the rated specification.**
   It may result in serious damage to the product.

■ Ordering information

P R W L 18 – 5 DN – V

Cable type	**No mark**	Standard cable
	V	Oil resistant cable
	S	Option
Output	**DN**	NPN N.O.(Normally Open)
	DN2	NPN N.C.(Normally Closed)
	DP	PNP N.O.(Normally Open)
	DP2	PNP N.C.(Normally Closed)
Sensing distance	**Number**	Standard sensing distance(Unit: mm)
Dimension	**Number**	Diameter of head(mm)
Body size	**No mark**	Standard
	S	Short body
	L	Long body
Connection	**No mark**	DC 3 wire, cable outgoing type
	W	DC 3 wire, cable outgoing connector type
Shape	**R**	Cylindrical type
Item	**P**	Inductive proximity sensor

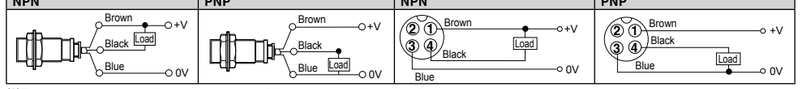
■ Control output diagram & Load operating



	Normally Open		Normally Closed	
Sensing target	Presence Nothing		Presence Nothing	
Load (Brown-Black)	Operation Return		Operation Return	
Output voltage (Black-Blue)	H L		H L	
Operating Indicator (RED LED)	ON OFF		ON OFF	

■ Connections

Cable outgoing type		Cable outgoing connector type	
NPN	PNP	NPN	PNP



※**The above specifications are subject to change without notice.**

■ Specifications

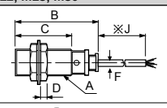
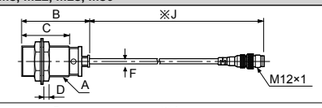
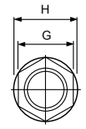
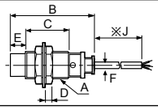
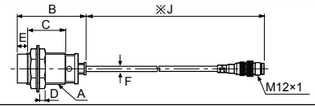
Model	PR08-1.5DN PR08-1.5DP PR08-1.5DN2 PR08-1.5DP2 PRL08-1.5DN PRL08-1.5DP PRL08-1.5DN2 PRL08-1.5DP2 PRW08-1.5DN PRW08-1.5DP PRW08-1.5DN2 PRW08-1.5DP2 PRW08-1.5DN-V PRW08-1.5DP-V PRWL08-1.5DN PRWL08-1.5DP PRWL08-1.5DN2 PRWL08-1.5DP2	PR08-2DN PR08-2DP PR08-2DN2 PR08-2DP2 PRL08-2DN PRL08-2DP PRL08-2DN2 PRL08-2DP2 PRW08-2DN PRW08-2DP PRW08-2DN2 PRW08-2DP2 PRW08-2DN-V PRW08-2DP-V PRWL08-2DN PRWL08-2DP PRWL08-2DN2 PRWL08-2DP2	PR12-2DN PR12-2DP PR12-2DN2 PR12-2DP2 PRS12-2DN PRS12-2DP PRS12-2DN2 PRS12-2DP2 PRW12-2DN PRW12-2DP PRW12-2DN2 PRW12-2DP2 PRL12-2DN PRL12-2DP	PR12-4DN PR12-4DP PR12-4DN2 PR12-4DP2 PRS12-4DN PRS12-4DP PRS12-4DN2 PRS12-4DP2 PRW12-4DN PRW12-4DP PRW12-4DN2 PRW12-4DP2 PRL12-4DN PRL12-4DP	PR18-5DN PR18-5DP PR18-5DN2 PR18-5DP2 PRL18-5DN PRL18-5DP PRL18-5DN2 PRL18-5DP2 PRW18-5DN PRW18-5DP PRW18-5DN2 PRW18-5DP2 PRWL18-5DN PRWL18-5DP PRWL18-5DN2 PRWL18-5DP2	PR18-8DN PR18-8DP PR18-8DN2 PR18-8DP2 PRL18-8DN PRL18-8DP PRL18-8DN2 PRL18-8DP2 PRW18-8DN PRW18-8DP PRW18-8DN2 PRW18-8DP2 PRWL18-8DN PRWL18-8DP PRWL18-8DN2 PRWL18-8DP2	PR30-10DN PR30-10DP PR30-10DN2 PR30-10DP2 PRL30-10DN PRL30-10DP PRL30-10DN2 PRL30-10DP2 PRW30-10DN PRW30-10DP PRW30-10DN2 PRW30-10DP2 PRW30-10DN-V PRW30-10DP-V PRWL30-10DN PRWL30-10DP PRWL30-10DN2 PRWL30-10DP2	PR30-15DN PR30-15DP PR30-15DN2 PR30-15DP2 PRL30-15DN PRL30-15DP PRL30-15DN2 PRL30-15DP2 PRW30-15DN PRW30-15DP PRW30-15DN2 PRW30-15DP2 PRW30-15DN-V PRW30-15DP-V PRWL30-15DN PRWL30-15DP PRWL30-15DN2 PRWL30-15DP2
Sensing distance	1.5mm	2mm	2mm	4mm	5mm	8mm	10mm	15mm
Hysteresis	Max. 10% of sensing distance							
Standard sensing target	8×8×1mm(Iron)		12×12×1mm(Iron)		18×18×1mm(Iron)	25×25×1mm(Iron)	30×30×1mm(Iron)	45×45×1mm(Iron)
Setting distance	0 to 1.05mm	0 to 1.4mm		0 to 2.8mm	0 to 3.5mm	0 to 5.6mm	0 to 7mm	0 to 10.5mm
Power supply (Operating voltage)	12-24VDC (10-30VDC)							
Current consumption	Max. 10mA							
Response frequency※1	1.5kHz	1kHz	1.5kHz	500Hz	500Hz	350Hz	400Hz	200Hz
Residual voltage	Max. 2.0V		Max. 1.5V					
Affection by Temp.	Within ±10℃ max. of sensing distance at 20℃ in temperature range of -25 ~70℃(PR□08 Series: Max. ±20%)							
Control output	Max. 200mA							
Insulation resistance	Min. 50MΩ(at 500VDC megger)							
Dielectric strength	1,500VAC 50/60Hz for 1minute							
Vibration	1mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours							
Shock	500m/s²(50G) X, Y, Z directions for 3 times							
Indicator	Operating indicator(Red LED)							
Environment: Ambient temperature	-25 to 70℃, Storage: -30 to 80℃							
Environment: Ambient humidity	35 to 95%RH, Storage: 35 to 95%RH							
Protection circuit	Surge protection, Reverse polarity proteciton, Overload & short circuit protection							
Protection	IP67(IEC Standards)							
Cable: PR, PRL	Ø3.5, 3-wire, 2m (AWG24, Core diameter: 0.08mm, Number of cores: 40, Insulator diameter: Ø1mm)		Ø4, 3-wire, 2m (AWG22, Core diameter: 0.08mm, Number of cores: 60, Insulator diameter: Ø1.25mm)		Ø5, 3-wire, 2m			
Cable: PRW, PRWL	Ø4, 3-wire, 300mm, M12 Connector				Ø5, 3-wire, 300mm, M12 Connector			
Materials	Case/Nut: Nikel plated Brass, Washer: Nikel plated Iron, Sensing surface: PBT, Standard cable(Black): Polyvinyl chloride(PVC), Oil resistant cable(Gray): Oil resistant Polyvinyl chloride(PVC)							
Approval	CE							
Unit weight※2	PR: Approx. 64g(Approx. 52g) PRL: Approx. 66g(Approx. 54g) PRW: Approx. 44g(Approx. 32g) PRWL: Approx. 46g(Approx. 34g)		PR: Approx. 84g(Approx. 72g) PRS: Approx. 82g(Approx. 70g) PRW: Approx. 54g(Approx. 42g) PRL: Approx. 88g(Approx. 76g)		PR: Approx. 122g(Approx. 110g) PRL: Approx. 142g(Approx. 130g) PRW: Approx. 70g(Approx. 58g) PRWL: Approx. 90g(Approx. 78g)		PR: Approx. 207g(Approx. 170g) PRL: Approx. 247g(Approx. 210g) PRW: Approx. 134g(Approx. 122g) PRWL: Approx 195g(Approx. 158g)	

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

■ Dimensions

(Unit: mm)

Type	Cable outgoing type M8, M12, M18, M30	Cable outgoing connector type M8, M12, M18, M30	Nut & Washer
Flush			
Non-flush			

Type			A	B	C	D	E	F	G	H	J
Flush	M8	PR	M8×1	30	30	4	–	3.5	13	15	2,000
		PRL	M8×1	40	40	4	–	3.5	13	15	2,000
		PRW	M8×1	30	30	4	–	4	13	15	300
		PRWL	M8×1	40	40	4	–	4	13	15	300
	M12	PR	M12×1	46	31.5	4	–	4	17	21	2,000
		PRS	M12×1	39	24.5	4	–	4	17	21	2,000
		PRW	M12×1	46	31.5	4	–	4	17	21	300
		PRL	M12×1	74.5	60	4	–	4	17	21	2,000
	M18	PR	M18×1	47.5	29.5	4	–	5	24	29	2,000
		PRL	M18×1	80.5	62.5	4	–	5	24	29	2,000
		PRW	M18×1	47.5	29.5	4	–	5	24	29	300
		PRWL	M18×1	80.5	62.5	4	–	5	24	29	300
	M30	PR	M30×1.5	58	38	5	–	5	35	42	2,000
		PRL	M30×1.5	80	60	5	–	5	35	42	2,000
		PRW	M30×1.5	58	38	5	–	5	35	42	300
		PRWL	M30×1.5	80	60	5	–	5	35	42	300
Non-flush	M8	PR	M8×1	30	30	4	4	3.5	13	15	2,000
		PRL	M8×1	40	40	4	4	3.5	13	15	2,000
		PRW	M8×1	30	30	4	4	4	13	15	300
		PRWL	M8×1	40	40	4	4	4	13	15	300
	M12	PR	M12×1	46	24.5	4	7	4	17	21	2,000
		PRS	M12×1	39	17.5	4	7	4	17	21	2,000
		PRW	M12×1	46	24.5	4	7	4	17	21	300
		PRL	M12×1	58.5	37	4	7	4	17	21	2,000
	M18	PR	M18×1	47	19	4	10	5	24	29	2,000
		PRL	M18×1	80.5	62.5	4	10	5	24	29	2,000
		PRW	M18×1	47	19	4	10	5	24	29	300
		PRWL	M18×1	80.5	62.5	4	10	5	24	29	300
	M30	PR	M30×1.5	58	28	5	10	5	35	42	2,000
		PRL	M30×1.5	80	50	5	10	5	35	42	2,000
		PRW	M30×1.5	58	28	5	10	5	35	42	300
		PRWL	M30×1.5	80	50	5	10	5	35	42	300

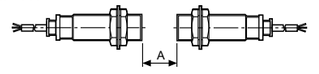
※J' type standard: Cable outgoing type/2,000mm, Cable outgoing connector type/300mm

■ Mutual-interference & Influence by surrounding metals

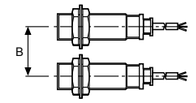
◎Mutual-interference

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.

• Face to Face

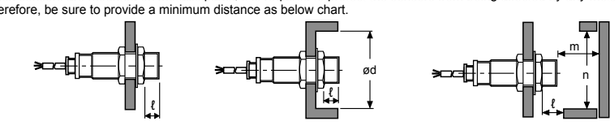


• Parallel



◎Influence by surrounding metals

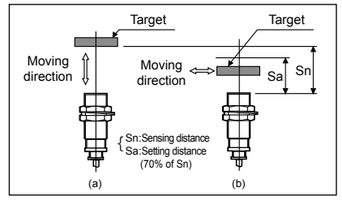
When sensors are mounted on metallic panel, it is required to protect the sensors from being affected by any metallic object except target. Therefore, be sure to provide a minimum distance as below chart.



(Unit: mm)

Item \ Model	PR□08-1.5D□	PR□08-2D□	PR□12-2D□	PR□12-4D□	PR□18-5D□ PRW□18-5D□	PR□18-8D□ PRW□18-8D□	PR□30-10D□ PRW□30-10D□	PR□30-15D□ PRW□30-15D□
A	9	12	12	24	30	48	60	90
B	16	24	24	36	36	54	60	90
ℓ	0	8	0	11	0	14	0	15
ød	8	24	12	36	18	54	30	90
m	4.5	6	6	12	15	24	30	45
n	12	24	18	36	27	54	45	90

■ Setting distance

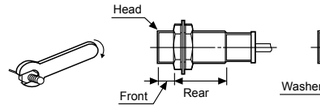


• Sensing distance can be changed by the shape, size or material of the target. Therefore please check the sensing distance like (a), then pass the target within range of setting distance(Sa).

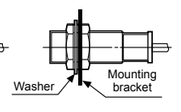
• Setting distance(Sa)
= Sensing distance(Sn) × 70%
Ex)PR30-10DN(See ordering information)
Setting distance(Sa) = 10mm × 0.7 = 7mm

■ Caution for using

1. This equipment shall not be used outdoors or beyond specified temperature range.
2. Do not apply over tensile strength of cord. (ø3.5: 25N max. ø4: 30N max., ø5: 50N max.)
3. Do not use the same conduit with cord of this unit and electric power line or power line.
4. Do not put overload to tighten nut, please use the supplied washer for tightening.



[Picture 1]



[Picture 2]

Model \ Strength		Front Size	Front Torque	Rear Torque
PR08 Series	Flush	7mm	40kgf·cm (3.92N·m)	90kgf·cm (8.82N·m)
	Non-flush	5mm		
PR12 Series	Flush	13mm	65kgf·cm (6.37N·m)	120kgf·cm (11.76N·m)
	Non-flush	7mm		
PR18 Series	Flush	-	150kgf·cm (14.7N·m)	
	Non-flush	-		
PR30 Series	Flush	26mm	500kgf·cm (49N·m)	800kgf·cm (78.4N·m)
	Non-flush	12mm		

[Table 1]

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 head 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].

5. Please check the voltage changes of power source in order not to excess the rated power input.
6. Do not use this unit during transient time(80ms) after apply power.
7. It might result in damage to this product, if use automatic transformer. So please use insulated transformer.
8. Please make wire as short as possible in order to avoid noise.
9. 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.
10. It is possible to extend cable with over 0.3mm² and max. 200m.
11. If the target is plated, the operating distance can be changed by the plating material.
12. It may result in malfunction by metal particle on product.
13. 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.
14. If connecting the load with big inrush current(DC type bulb) to this unit, the big inrush current will flow because 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.
15. If making a transceiver close to proximity sensor or wire connection, it may cause malfunction.

※**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(CO_2, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Display units
- Panel meters
- Pressure sensors
- Rotary encoders
- Power controllers

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TEL : 82-32-610-2730 / FAX : 82-32-329-0728

■ **E-mail :** sales@autonics.com

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

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