

Cylindrical Inductive Long-Distance Proximity Sensors

PRD Series (DC 2-wire)

INSTRUCTION MANUAL

TCD210246AC

Autonics

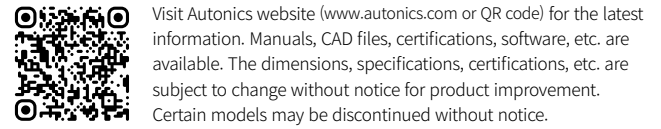
Thank you for choosing our Autonics product.

Read and understand the instruction manual and manual thoroughly before using the product.

For your safety, read and follow the below safety considerations before using.

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

Keep this instruction manual in a place where you can find easily.



Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ **Warning**

Failure to follow instructions may result in serious injury or death.

01. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
- Failure to follow this instruction may result in personal injury, economic loss or fire.
02. **Do not use or store the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.**
- Failure to follow this instruction may result in explosion or fire.
03. **Do not disassemble or modify the unit.**
- Failure to follow this instruction may result in fire.
04. **Do not connect, repair, or inspect the unit while connected to a power source.**
- Failure to follow this instruction may result in fire.
05. **Check 'Connections' before wiring.**
- Failure to follow this instruction may result in fire.

⚠ **Caution**

Failure to follow instructions may result in injury or product damage.

01. **Use the unit within the rated specifications.**
- Failure to follow this instruction may result in fire or product damage.
02. **Use a dry cloth to clean the unit, and do not use water or organic solvent.**
- Failure to follow this instruction may result in fire.
03. **Do not supply power without load.**
- Failure to follow this instruction may result in fire or product damage.

- Cautions during Use
- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
 - 12 - 24 VDC≡ power supply should be insulated and limited voltage / current or Class 2, SELV power supply device.
 - Use the product, after 0.8 sec of supplying power.
 - Wire as short as possible and keep away from high voltage lines or power lines, to prevent surge and inductive noise.
Do not use near the equipment which generates strong magnetic force or high frequency noise (transceiver, etc.).
In case installing the product near the equipment which generates strong surge (motor, welding machine, etc.), use diode or varistor to remove surge.
 - If the surface is rubbed with a hard object, PTFE coating can be worn out.
 - This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude max. 2,000 m
 - Pollution degree 2
 - Installation category II

Cautions for Installation

- Install the unit correctly with the usage environment, location, and the designated specifications.
 - The waterproof function may be damaged if the product is subjected to impact from a hard object or bent excessively or repeatedly.
 - Do NOT pull the Ø 3.5 mm cable with a tensile strength of 25 N, the Ø 4 mm cable with a tensile strength of 30 N or over and the Ø 5 mm cable with a tensile strength of 50 N or over. It may result in fire due to the broken wire.
 - When extending wire, use AWG 22 cable or over within 200 m.

Ordering Information									
This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.									
PRD	①	②	③	④	⑤	-	⑥	⑦	⑧ - ⑨
① Characteristic No mark: General type A: Spatter-resistant type					⑥ Sensing distance Number: Sensing distance (unit: mm)				
② Connection No mark: Cable type W: Cable connector type CM: Connector type					⑦ Power supply D: 12 - 24 VDC X: 12 - 24 VDC (non-polarity)				
③ Body length No mark: Normal L: Long					⑧ Control output O: Normally open C: Normally closed				
④ Wire connection T: DC 2-wire					⑨ Cable No mark: Standard type I: Standard type (IEC standards) V: Oil resistant cable type IV: Oil resistant cable type (IEC standards)				
⑤ DIA. of sensing side Number: DIA. of sensing side (unit: mm)									

Product Components

- Product × 1
- Instruction manual × 1
- Nut × 2
- Washer × 1

Sold Separately

- M12 Connector cable:
C□D(H)2-C (C□D(H)2-C-I)
- Spatter protection cover: P90-M□
- Fixing bracket: P90-R□

Connections

- LOAD can be wired to any direction.
- Connect LOAD before supplying the power.
- No need to consider polarity for non-polarity type of power supply.

■ Cable type

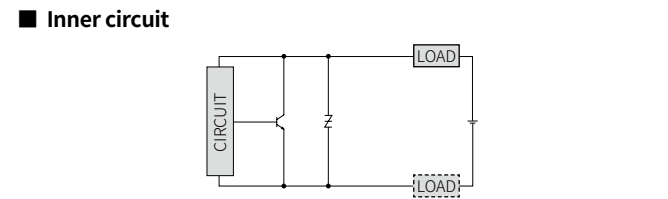
■ Cable connector type / Connector type

- For LOAD connection, follow the cable type connection.
- Fasten the connector not to shown the thread. (0.39 to 0.49 N m)
- Fasten the vibration part with PTFE tape.



Standard type		
Pin	Color	Func.
①	-	-
②	-	-
③	Blue	0 V
④	Brown	+V

IEC standards					
Pin	Normally open		Normally close		
	Color	Func.	Color	Func.	
①	Brown	+V	Brown	+V	
②	-	-	Blue	0 V	
③	-	-	-	-	
④	Blue	0 V	-	-	



Operation Timing Chart		
	Normally open	Normally closed
Sensing target	Presence	Presence
	Nothing	Nothing
Load	Operation	Operation
	Return	Return
Operation indicator (red)	ON	ON
	OFF	OFF

Specifications					
Installation	Flush type				
General	PRD□T08-2□	PRD□T12-4□	PRD□T18-7□	PRD□T30-15□	
Spatter-resistant	-	PRDA□T12-4□	PRDA□T18-7□	PRDA□T30-15□	
DIA. of sensing side	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm	
Sensing distance	2 mm	4 mm	7 mm	15 mm	
Setting distance	0 to 1.4 mm	0 to 2.8 mm	0 to 4.9 mm	0 to 10.5 mm	
Hysteresis	≤ 15 % of sensing distance	≤ 10 % of sensing distance			
Standard sensing target: iron	8 × 8 × 1 mm	12 × 12 × 1 mm	20 × 20 × 1 mm	45 × 45 × 1 mm	
Response frequency ⁰¹⁾	1 kHz	450 Hz	250 Hz	100 Hz	
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C (DIA. of sensing side Ø 8 mm: ≤ ± 15 %)				
Indicator	Operation indicator (red)				
Certification	CE	CE	CE	CE	
Installation	Non-flush type				
General	PRD□T08-4□	PRD□T12-8□	PRD□T18-14□	PRD□T30-25□	
DIA. of sensing side	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm	
Sensing distance	4 mm	8 mm	14 mm	25 mm	
Setting distance	0 to 2.8 mm	0 to 5.6 mm	0 to 9.8 mm	0 to 17.5 mm	
Hysteresis	≤ 15 % of sensing distance	≤ 10 % of sensing distance			
Standard sensing target: iron	12 × 12 × 1 mm	25 × 25 × 1 mm	40 × 40 × 1 mm	75 × 75 × 1 mm	
Response frequency ⁰¹⁾	800 Hz	400 Hz	200 Hz	100 Hz	
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C (DIA. of sensing side Ø 8 mm: ≤ ± 15 %)				
Indicator	Operation indicator (red)				
Certification	CE	CE	CE	CE	
01) 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.					
Unit weight (package) ⁰¹⁾		Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm
Cable	Normal	≈ 43 g (≈ 63 g)	≈ 62 g (≈ 74 g)	≈ 97 g (≈ 115 g)	≈ 143 g (≈ 180 g)
	Long	-	≈ 72 g (≈ 84 g)	≈ 122 g (≈ 134 g)	≈ 221 g (≈ 184 g)
Cable connector	Normal	≈ 25 g (≈ 45 g)	≈ 32 g (≈ 55 g)	≈ 62 g (≈ 80 g)	≈ 130 g (≈ 145 g)
	Long	-	≈ 42 g (≈ 54 g)	≈ 65 g (≈ 77 g)	≈ 143 g (≈ 155 g)
Connector	Normal	≈ 10 g (≈ 32 g)	≈ 20g (≈ 50 g)	≈ 42 g (≈ 60 g)	≈ 110 g (≈ 150 g)
	Long	-	≈ 26g (≈ 38 g)	≈ 49g (≈ 61 g)	≈ 134 g (≈ 146 g)
		-	-	≈ 60 g (≈ 78 g)	≈ 150 g (≈ 190 g)
01) In case of normal body length, it is written in $\frac{\text{General type}}{\text{Spatter-resistant type}}$ order. In case of long body length, it is only available general type.					
Power supply	12 - 24 VDC≡ (ripple P-P: ≤ 10 %), operating voltage: 10 - 30 VDC≡				
Leakage current	DIA. of sensing side Ø 8mm: ≤ 0.8 mA DIA. of sensing side Ø 12 mm, Ø 18 mm, Ø 30 mm: ≤ 0.6 mA				
Control output	2 to 100 mA				
Residual voltage ⁰¹⁾	≤ 3.5 V (Non-polarity: ≤ 5 V)				
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection				
Insulation resistance	≥ 50 M.Ω (500 VDC≡ megger)				
Dielectric strength	DIA. of sensing side Ø 8 mm : 1,000 VAC~ 50/60 Hz for 1 min (between the charging part and the case) (connector type: 1,500 VAC~ 50/60 Hz for 1 min (between the charging part and the case))				
	DIA. of sensing side Ø 12 mm, Ø 18 mm, Ø 30 mm : 1,500 VAC~ 50/60 Hz for 1 min (between the charging part and the case)				
Vibration	1 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours				
Shock	500 m/s ² (≈ 50 G) in each X, Y, Z direction for 3 times				
Ambient temperature	-25 to 70 °C, storage: -30 to 80 °C (non-freezing or non-condensation)				
Ambient humidity	35 to 95 %RH, storage: 35 to 95 %RH (non-freezing or non-condensation)				
Protection structure	IP67 (IEC standards)				
Connection	Cable type / Cable connector type / Connector type model				
Cable spec. ⁰²⁾	DIA. of sensing side Ø 8 mm: Ø 3.5 mm, 2-wire DIA. of sensing side Ø 12 mm: Ø 4 mm, 2-wire DIA. of sensing side Ø 18 mm, Ø 30 mm: Ø 5 mm, 2-wire				
	Ø 3.5 mm cable : AWG 24 (0.08 mm, 40-core), insulator diameter: Ø 1 mm Ø 4 mm, Ø 5 mm cable : AWG 22 (0.08 mm, 60-core), insulator diameter: Ø 1.25 mm				
Connector spec.	M12 connector				
Material	Standard type cable (black): polyvinyl chloride (PVC) Oil resistant cable (gray): polyvinyl chloride (oil resistant PVC)				
General	Case/Nut: nickel plated brass (DIA. of sensing side Ø 8 mm case: SUS303), washer: nickel plated iron, sensing side: PBT				
Spatter-resistant	Case/Nut: PTFE coated brass, washer: PTFE coated iron, sensing side: PTFE				

Cut-out Dimensions

• Unit: mm, Refer to the dimension in the product manual or on the Autonics website.

The diagram shows a top-down view of the sensor's mounting flange. It is a circular component with a central hole. The dimension 'H' is indicated as the diameter of this central hole. To the right of the main circular body, there is a smaller cylindrical section with a thread. An arrow points to this section with the label 'TAP'.

	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm
Mounting hole (H)	Ø 8.5 ^{+0.5} ₀	Ø 12.5 ^{+0.5} ₀	Ø 18.5 ^{+0.5} ₀	Ø 30.5 ^{+0.5} ₀
TAP	M8×1	M12×1	M18×1	M30×1.5

The diagram shows a front view of the sensor. It has a hexagonal base. The dimension 'Ø A' is indicated as the outer diameter of the hexagonal part. The dimension 'B' is indicated as the width of the mounting flange, measured between the two vertical sides of the hexagon.

	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm
Ø A	15	21	29	42
B	13	17	24	35

Setting Distance Formula

Detecting distance can be changed by the shape, size or material of the target.

For stable sensing, install the unit within the 70 % of sensing distance.

Setting distance (Sa)
= Sensing distance (Sn) × 70 %

Mutual-interference & Influence by Surrounding Metals

■ Mutual-interference

When plural proximity sensors are mounted in a close row, malfunction of sensor may be caused due to mutual interference.

Therefore, be sure to provide a minimum distance between the two sensors, as below table.

■ Influence by surrounding metals

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

(unit: mm)

Sensing side Item	Ø 8 mm		Ø 12 mm		Ø 18 mm		Ø 30 mm	
	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush
A	20	80	25	120	50	200	110	350
B	15	60	25	100	35	110	90	300
ℓ	0	12	2.5	15	3.5	14	6	20
Ø d	8	24	18	40	27	70	45	120
m	6	8	12	20	24	40	45	90
n	12	24	18	40	27	70	45	120

Tightening Torque

Use the provided washer to tighten the nuts.

The tightening torque of the nut varies with the distance from the fore-end. [Figure 1]
If the nut tip is located at the front of the product, apply the front tightening torque.
the allowable tightening torque table is for inserting the washer as [Figure 2].

Sensing side Strength	Ø 8 mm	Ø 12 mm		Ø 18 mm		Ø 30 mm		
	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush
Front size	7 mm	5 mm	13 mm	7 mm	-	-	26 mm	12 mm
Front torque	3.92 N m		6.37 N m		14.7 N m		49 N m	
Rear torque	8.82 N m		11.76 N m		14.7 N m		78.4 N m	