

Cylindrical Inductive Long-Distance / Long-Distance Spatter-Resistant Proximity Sensors PRD / PRDA Series (DC 3-wire)

INSTRUCTION MANUAL

DRW200028AA

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.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Follow Autonics website for the latest information.

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 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.

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.
- Do NOT impacts with a hard object or excessive bending of the wire lead-out. It may cause damage the water resistance.
- Do NOT pull the \varnothing 3.5 mm cable with a tensile strength of 25 N, the \varnothing 4 mm cable with a tensile strength of 30 N or over and the \varnothing 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.

For selecting the specific model, follow the Autonics web site.

PRD ① ② ③ ④ - ⑤ D ⑥ - ⑦

① Characteristic

No mark: General type
A: Spatter-resistant type

② Connection

No mark: Cable type
W: Cable connector type
CM: Connector type

③ Body length

No mark: Normal
L: Long

④ DIA. of sensing side

Number: DIA. of sensing side (unit: mm)

⑤ Sensing distance

Number: Sensing distance (unit: mm)

⑥ Control output

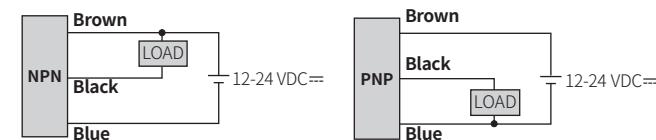
N: NPN Normally open
N2: NPN Normally closed
P: PNP Normally open
P2: PNP Normally closed

⑦ Cable

No mark: Standard type
V: Oil resistant cable type

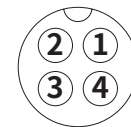
Connections

■ Cable type



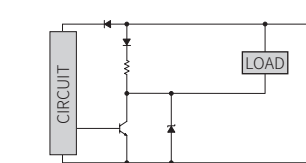
■ Cable connector type / Connector type

- For LOAD connection, follow the cable type connection.
- Fasten the connector nut to the thread. (0.39 to 0.49 N m)
- Fasten the vibration part with PTFE tape.

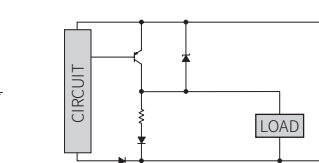


Pin	Color	Function
①	Brown	+V
②	-	-
③	Blue	0V
④	Black	OUT

■ Inner circuit (NPN output)



■ Inner circuit (PNP output)



Operation Timing Chart

	Normally open	Normally closed
Sensing target	Presence: High pulse Nothing: Low	Presence: High pulse Nothing: Low
Load	Operation: High pulse Return: Low	Operation: High pulse Return: Low
Output voltage	NPN output : H/L pulses PNP output : H/L pulses	NPN output : H/L pulses PNP output : H/L pulses
Operation indicator (red)	ON: High pulse OFF: Low	ON: High pulse OFF: Low

Sold Separately

- Connector cable, connector connection cable
- Transmission coupler
- Spatter protection cover
- Fixed bracket

Specifications

Installation	Flush type			
General	PRD□08-2D□	PRD□12-4D□	PRD□18-7D□	PRD□30-15D□
Spatter-resistant	-	PRDACM12-4D□	PRDACM18-7D□	PRDACM30-15D□
DIA. of sensing side	\varnothing 8 mm	\varnothing 12 mm	\varnothing 18 mm	\varnothing 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	\leq 15 % of sensing distance	\leq 10 % of sensing distance		
Standard sensing target: iron	$8 \times 8 \times 1$ mm	$12 \times 12 \times 1$ mm	$20 \times 20 \times 1$ mm	$45 \times 45 \times 1$ mm
Response frequency (01)	1 kHz	500 Hz	300 Hz	100 Hz
Affection by temperature	\leq \pm 10 % for sensing distance at ambient temperature 20 °C (DIA. of sensing side \varnothing 8 mm: \leq \pm 15 %)			
Indicator	Operation indicator (red)			
Approval	CE ENEC	CE ENEC	CE ENEC	CE ENEC

Installation	Non-flush type			
General	PRD□08-4D□	PRD□12-8D□	PRD□18-14D□	PRD□30-25D□
DIA. of sensing side	\varnothing 8 mm	\varnothing 12 mm	\varnothing 18 mm	\varnothing 30 mm
Setting distance	0 to 2.8 mm	0 to 5.6 mm	0 to 9.8 mm	0 to 17.5 mm
Sensing distance	4 mm	8 mm	14 mm	25 mm
Hysteresis	\leq 15 % of sensing distance	\leq 10 % of sensing distance		
Standard sensing target: iron	$12 \times 12 \times 1$ mm	$25 \times 25 \times 1$ mm	$40 \times 40 \times 1$ mm	$75 \times 75 \times 1$ mm
Response frequency (01)	800 Hz	400 Hz	200 Hz	100 Hz
Affection by temperature	\leq \pm 10 % for sensing distance at ambient temperature 20 °C (DIA. of sensing side \varnothing 8 mm: \leq \pm 15 %)			
Indicator	Operation indicator (red)			
Approval	CE ENEC	CE ENEC	CE ENEC	CE ENEC

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)	\varnothing 8 mm	\varnothing 12 mm	\varnothing 18 mm	\varnothing 30 mm
Cable	Normal \approx 43 g (\approx 63 g)	\approx 62 g (\approx 74 g)	\approx 97 g (\approx 115 g)	\approx 143 g (\approx 180 g)
	Long -	\approx 82 g (\approx 94 g)	\approx 127 g (\approx 145 g)	\approx 183 g (\approx 220 g)
Cable connector	Normal \approx 25 g (\approx 45 g)	\approx 37 g (\approx 67 g)	\approx 62 g (\approx 80 g)	\approx 108 g (\approx 145 g)
	Long -	\approx 32 g (\approx 55 g)	\approx 92 g (\approx 110 g)	\approx 130 g (\approx 203 g)
Connector	Normal \approx 12 g (\approx 32 g)	\approx 20 g (\approx 49 g)	\approx 41 g (\approx 81 g)	\approx 138 g (\approx 197 g)
	Long -	\approx 24 g (\approx 54 g)	\approx 60 g (\approx 78 g)	\approx 193 g (\approx 252 g)

Power supply	12-24 VDC (ripple P-P: \leq 10 %), operating voltage: 10-30 VDC
Current consumption	\leq 10 mA
Control output	\leq 200 mA
Residual voltage	DIA. of sensing side \varnothing 8mm: \leq 2V DIA. of sensing side \varnothing 12 mm, \varnothing 18 mm, \varnothing 30 mm: \leq 1.5V
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection
Insulation resistance	\geq 50 M Ω (500VDC = megger)
Dielectric strength	DIA. of sensing side \varnothing 8mm : 1,000 VAC ~ 50/60 Hz for 1 min (between all terminals and case) (connector type: 1,500 VAC ~ 50/60 Hz for 1 min (between all terminals and case)) DIA. of sensing side \varnothing 12 mm, \varnothing 18 mm, \varnothing 30 mm : 1,500 VAC ~ 50/60 Hz for 1 min (between all terminals and case)
Vibration	1 mm amplitude at frequency 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
Shock	500 m/s ² (\approx 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 (01) / Cable connector type (01) / Connector type model
Cable spec. (02)	DIA. of sensing side \varnothing 8 mm: \varnothing 3.5 mm, 3-wire DIA. of sensing side \varnothing 12 mm: \varnothing 4 mm, 3-wire DIA. of sensing side \varnothing 18 mm, \varnothing 30 mm: \varnothing 5 mm, 3-wire
Wire spec.	\varnothing 3.5 mm cable : AWG 24 (0.08 mm, 40-wire), insulator diameter: \varnothing 1 mm \varnothing 4 mm, \varnothing 5 mm cable : AWG 22 (0.08 mm, 60-wire), insulator diameter: \varnothing 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 \varnothing 8 mm connector type case: SUS303), washer: nickel plated iron, sensing side: PBT
Spatter-resistant	Case/Nut: PTFE coated brass, washer: PTFE coated iron, sensing side: PTFE

01) Except spatter-resistant type

02) Cable type: 2 m, Cable connector type: 300 mm

Cut-out Dimensions

Unit: mm, For the detailed drawings, follow the Autonics web site.

	\varnothing 8 mm	\varnothing 12 mm	\varnothing 18 mm	\varnothing 30 mm
Mounting hole (H)	\varnothing 8.5 $^{+0.5}_0$	\varnothing 12.5 $^{+0.5}_0$	\varnothing 18.5 $^{+0.5}_0$	\varnothing 30.5 $^{+0.5}_0$
TAP	M8×1	M12×1	M18×1	M30×1.5

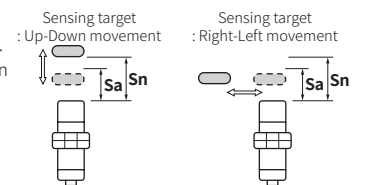
	\varnothing 8 mm	\varnothing 12 mm	\varnothing 18 mm	\varnothing 30 mm
Ø A	15	21	29	42
B	13	17	24	35

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%

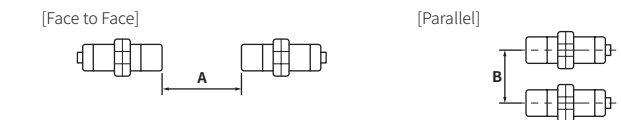


Mutual-interference & Influence by Surrounding Metals

■ Mutual-interference

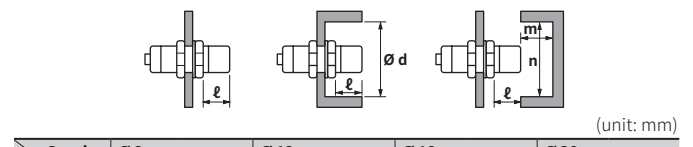
When plural proximity sensors are mounted in a close row, malfunction of sensor may be caused due to mutual interference.

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.



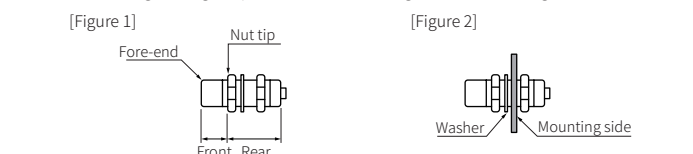
Sensing side	\varnothing 8 mm		\varnothing 12 mm		\varnothing 18 mm		\varnothing 30 mm	
	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush
A	9	12	12	24	30	48	60	90
B	16	24	24	36	36	54	60	90
l	0	8	0	11	0	14	0	15
Ø d	8	24	12	36	18	54	30	90
m	4.5	6	6	12	15	24	30	45
n	12	24	18	36	27	54	45	90

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	\varnothing 8 mm		\varnothing 12 mm		\varnothing 18 mm		\varnothing 30 mm	
	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush
Strength								
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	