Autonics



Cylindrical Inductive Long-Distance Proximity Sensors

PRD Series (DC 3-wire)

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

CE UK CA EAC

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.

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 or over, 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 ❶ ❷ ❸ ❹ - ❺ ❻ ❼ - ❽

❶ Characteristic
No mark: General type
A: Spatter-resistant type

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

❸ Body length
No mark: Normal
L: Long

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

❺ Sensing distance
Number: Sensing distance (unit: mm)

❻ Power supply
D: 12 - 24 VDC

❼ Control output
N: NPN Normally open
N2: NPN Normally closed
P: PNP Normally open
P2: PNP Normally closed

❽ Cable
No mark: Standard type
V: Oil resistant cable type

Product Components

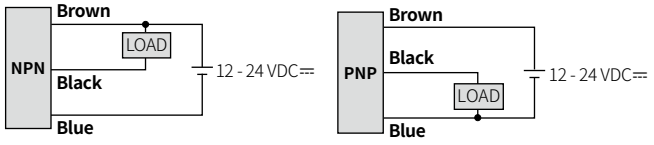
- Product × 1
- Instruction manual × 1
- Nut × 2
- Washer × 1

Sold Separately

- M12 Connector cable: C□D(H)3-□
- Fixing bracket: P90-R□
- Spatter protection cover: P90-M□

Connections

■ Cable type



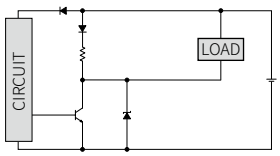
■ Cable connector type / Connector type

- 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.

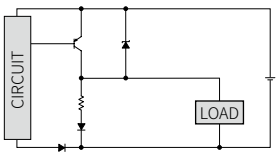


Pin	Color	Function
①	Brown	+V
②	-	-
③	Blue	0 V
④	Black	OUT

■ Inner circuit (NPN output)



■ Inner circuit (PNP output)



Operation Timing Chart

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

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	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	500 Hz	300 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 UK EAC	CE UK EAC	CE UK EAC	CE UK EAC

Installation	Non-flush type			
General	PRD□08-4D□	PRD□12-8D□	PRD□18-14D□	PRD□30-25D□
DIA. of sensing side	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 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	≤ 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 UK EAC	CE UK EAC	CE UK EAC	CE UK EAC

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.

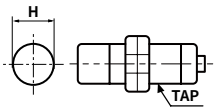
Unit weight (package)		Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm
Cable	Normal	≈ 43 g (≈ 63 g)	≈ 62 g (≈ 74 g)	≈ 97 g (≈ 115 g)	≈ 143 g (≈ 180 g)
	Long	-	≈ 82 g (≈ 94 g)	≈ 127 g (≈ 145 g)	≈ 183 g (≈ 220 g)
Cable connector	Normal	≈ 25 g (≈ 45 g)	≈ 37 g (≈ 67 g)	≈ 62 g (≈ 80 g)	≈ 108 g (≈ 145 g)
	Long	-	≈ 32 g (≈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

Power supply	12 - 24 VDC⎓ (ripple P-P: ≤ 10 %), operating voltage: 10 - 30 VDC⎓
Current consumption	≤ 10 mA
Control output	≤ 200 mA
Residual voltage	DIA. of sensing side Ø 8mm: ≤ 2 V DIA. of sensing side Ø 12 mm, Ø 18 mm, Ø 30 mm: ≤ 1.5 V
Protection circuit	Surge protection circuit, output short over current protection circuit, reverse polarity protection circuit
Insulation resistance	≥ 50 MΩ (500 VDC⎓ megger)
Dielectric strength	DIA. of sensing side Ø 8mm : 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/s² (≈ 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 Ø 8 mm: Ø 3.5 mm, 3-wire DIA. of sensing side Ø 12 mm: Ø 4 mm, 3-wire DIA. of sensing side Ø 18 mm, Ø 30 mm: Ø 5 mm, 3-wire
Wire spec.	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

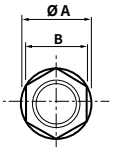
01) Except spatter-resistant type
02) Cable type: 2 m, Cable connector type: 300 mm

Cut-out Dimensions

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



	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

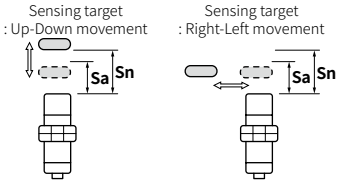


	Ø 8 mm	Ø 12 mm	Ø 18 mm	Ø 30 mm
Ø A	15	21	29	42
B	13	17	24	35

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%

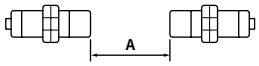


Mutual-interference & Influence by Surrounding Metals

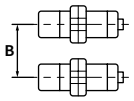
■ Mutual-interference

When plural proximity sensors are mounted in a close row, malfunction of sensor may be caused due to mutual interference.
Therefore, be sure to maintain at least the minimum distances specified in the table below.

[Face to Face]

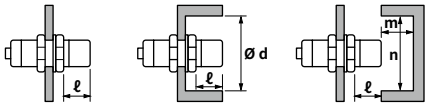


[Parallel]



■ 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.



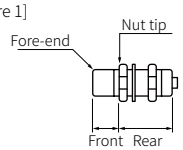
(unit: mm)

Item \ Sensing side	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

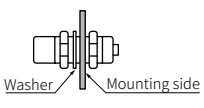
Tightening Torque

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].

[Figure 1]



[Figure 2]



Strength \ Sensing side	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	

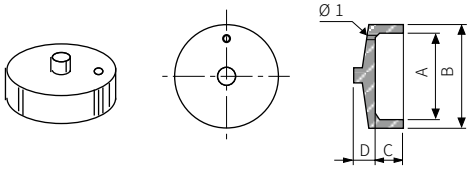
Sold Separately: M12 Connector Cable

• For detailed information, refer to the 'M8/M12 Connector Cable' manual.

Appearance	Power	Connector 1	Connector 2	Length	Feature	Model
	DC	M12 (Socket-Female) 4-pin	3-wire	2 m	PVC	CID3-2
				5 m		CID3-5
	DC	M12 (Socket-Female) 4-pin	3-wire	2 m	Oil resistant PVC	CIDH3-2
				5 m		CIDH3-5
	DC	M12 (Socket-Female) 4-pin, L type	3-wire	2 m	PVC	CLD3-2
				5 m		CLD3-5
	DC	M12 (Socket-Female) 4-pin, L type	3-wire	2 m	Oil resistant PVC	CLDH3-2
				5 m		CLDH3-5

Sold Separately: Protection Cover (P90-M□)

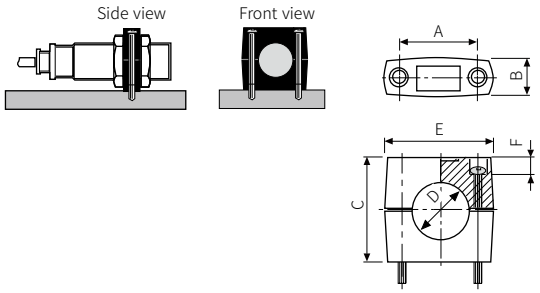
The welding tip (spatter) generated during arc welding has a property of sticking to plastics and metals. If several welding tips are attached to the front or body of the proximity sensor, it may be difficult to replace the body or cause a malfunction. When using a general type proximity sensor, use a silicone protective cover (sold separately). Only for flush type.



Item (mm) \ Model	P90-M12	P90-M18	P90-M30
A	Ø 11	Ø 17	Ø 28.5
B	Ø 14	Ø 21	Ø 33
C	5.0	6.0	8.0
D	1.0	3.0	6.0
Applied sensing side size	M12	M18	M30

Sold Separately: Fixing Bracket (P90-R□)

If fixing holes are not made for cylindrical proximity sensor, use a cylindrical fixing bracket as below. For Non-flush type, be sure effect by ambient material.



Item (mm) \ Model	P90-R12	P90-R18	P90-R30
A	24 ± 0.2	32 ± 0.2	45 ± 0.2
B	≤ 11.5	≤ 16	≤ 16
C	20	30	50
D	Ø 12	Ø 18	Ø 30
E	≤ 34.4	≤ 47	≤ 60
F	6.0	10	10
Fixing bolt	M4 × 20	M5 × 30	M5 × 50
Applied sensing side size	M12	M18	M30

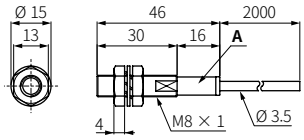
Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

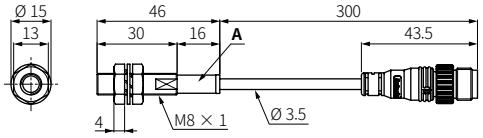
A	Operation indicator (red)

■ Flush type

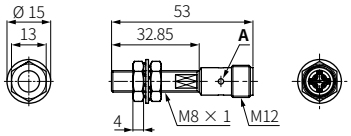
- PRD08-2DN
- PRD08-2DN2
- PRD08-2DN-V
- PRD08-2DN2-V
- PRD08-2DP
- PRD08-2DP2
- PRD08-2DP-V
- PRD08-2DP2-V



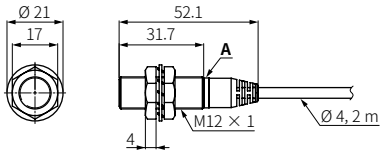
- PRDW08-2DN
- PRDW08-2DN-V
- PRDW08-2DN2
- PRDW08-2DN2-V
- PRDW08-2DP
- PRDW08-2DP-V
- PRDW08-2DP2
- PRDW08-2DP2-V



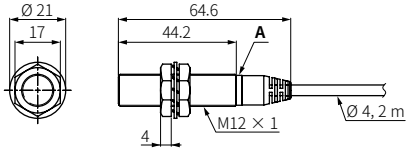
- PRDCM08-2DN
- PRDCM08-2DN2
- PRDCM08-2DP
- PRDCM08-2DP2



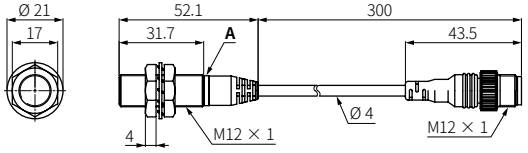
- PRD12-4DN
- PRD12-4DN2
- PRD12-4DN-V
- PRD12-4DP
- PRD12-4DP2
- PRD12-4DP-V



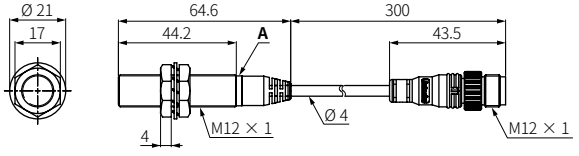
- PRDL12-4DN
- PRDL12-4DN2
- PRDL12-4DP
- PRDL12-4DP2



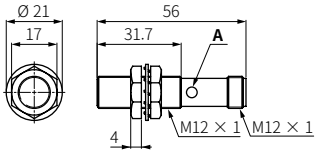
- PRDW12-4DN
- PRDW12-4DN-V
- PRDW12-4DN2
- PRDW12-4DN2-V
- PRDW12-4DP
- PRDW12-4DP-V
- PRDW12-4DP2
- PRDW12-4DP2-V



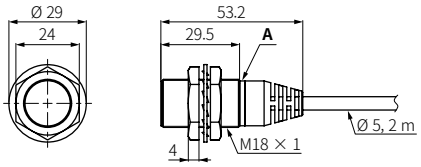
- PRDWL12-4DN
- PRDWL12-4DN2
- PRDWL12-4DP
- PRDWL12-4DP2



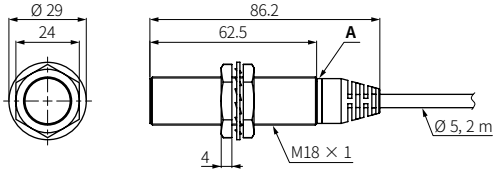
- PRDCM12-4DN
- PRDCM12-4DN2
- PRDCM12-4DP
- PRDCM12-4DP2



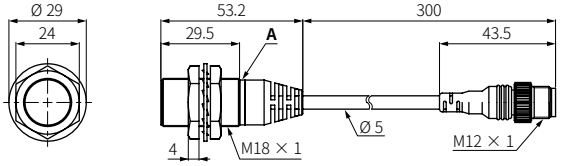
- PRD18-7DN
- PRD18-7DN-V
- PRD18-7DN2
- PRD18-7DP
- PRD18-7DP-V
- PRD18-7DP2



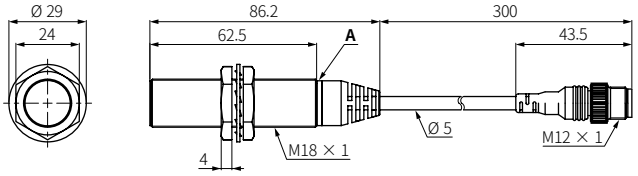
- PRDL18-7DN
- PRDL18-7DN2
- PRDL18-7DN-V
- PRDL18-7DP
- PRDL18-7DP2



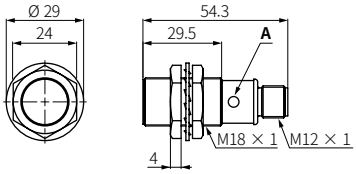
- PRDW18-7DN
- PRDW18-7DN-V
- PRDW18-7DN2
- PRDW18-7DP2-V
- PRDW18-7DP
- PRDW18-7DP-V
- PRDW18-7DP2
- PRDW18-7DN2-V



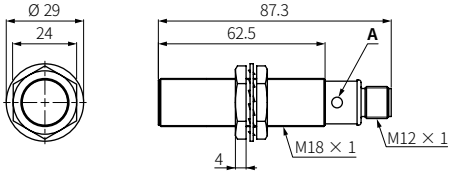
- PRDWL18-7DN
- PRDWL18-7DN2
- PRDWL18-7DP
- PRDWL18-7DP2



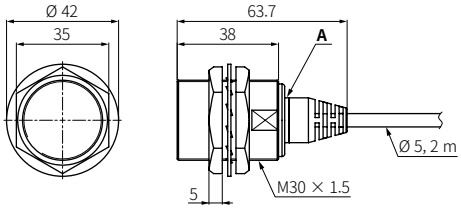
- PRDCM18-7DN
- PRDCM18-7DN2
- PRDCM18-7DP
- PRDCM18-7DP2



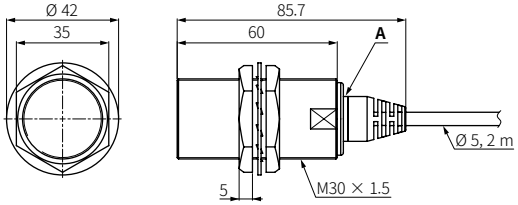
- PRDCML18-7DN
- PRDCML18-7DN2
- PRDCML18-7DP
- PRDCML18-7DP2



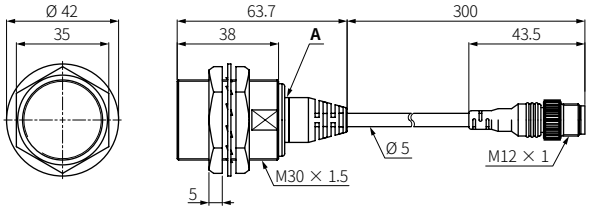
- PRD30-15DN
- PRD30-15DN-V
- PRD30-15DN2
- PRD30-15DN2-V
- PRD30-15DP
- PRD30-15DP-V
- PRD30-15DP2
- PRD30-15DP2-V



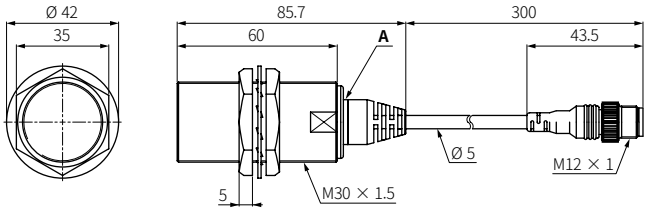
- PRDL30-15DN
- PRDL30-15DN2
- PRDL30-15DP
- PRDL30-15DP2



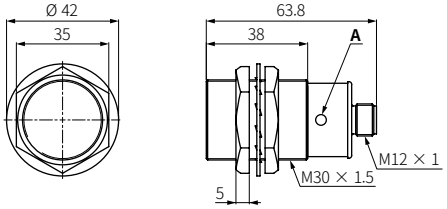
- PRDW30-15DN
- PRDW30-15DN-V
- PRDW30-15DN2
- PRDW30-15DN2-V
- PRDW30-15DP
- PRDW30-15DP-V
- PRDW30-15DP2
- PRDW30-15DP2-V



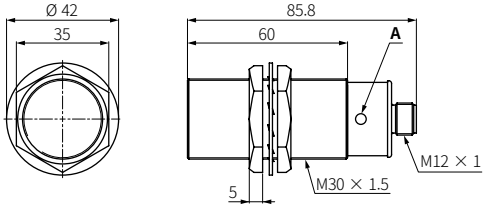
- PRDWL30-15DN
- PRDWL30-15DN2
- PRDWL30-15DP
- PRDWL30-15DP2



- PRDCM30-15DN
- PRDCM30-15DN2
- PRDCM30-15DP
- PRDCM30-15DP2

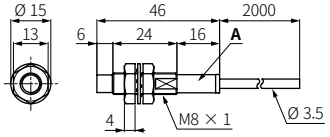


- PRDCML30-15DN
- PRDCML30-15DN2
- PRDCML30-15DP
- PRDCML30-15DP2

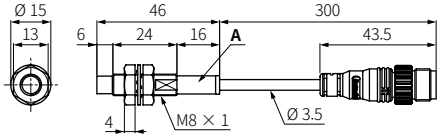


■ Non-flush type

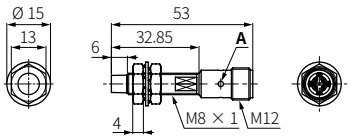
- PRD08-4DN
- PRD08-4DN-V
- PRD08-4DN2
- PRD08-4DN2-V
- PRD08-4DP
- PRD08-4DP-V
- PRD08-4DP2
- PRD08-4DP2-V



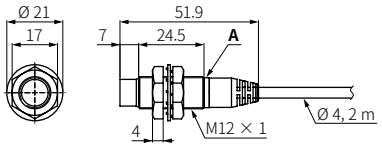
- PRDW08-4DN
- PRDW08-4DN-V
- PRDW08-4DN2
- PRDW08-4DN2-V
- PRDW08-4DP
- PRDW08-4DP-V
- PRDW08-4DP2
- PRDW08-4DP2-V



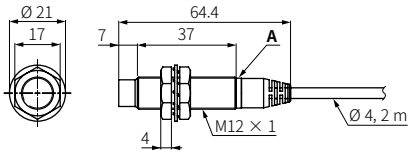
- PRDCM08-4DN
- PRDCM08-4DN2
- PRDCM08-4DP
- PRDCM08-4DP2



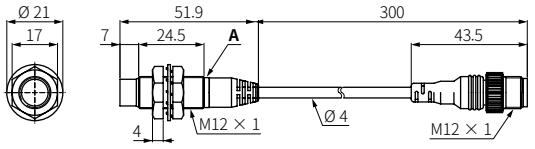
- PRD12-8DN
- PRD12-8DN-V
- PRD12-8DN2
- PRD12-8DP
- PRD12-8DP-V
- PRD12-8DP2



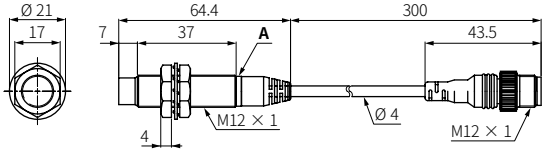
- PRDL12-8DN
- PRDL12-8DN2
- PRDL12-8DP
- PRDL12-8DP2



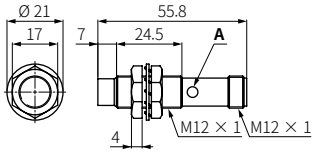
- PRDW12-8DN
- PRDW12-8DN-V
- PRDW12-8DN2
- PRDW12-8DN2-V
- PRDW12-8DP
- PRDW12-8DP-V
- PRDW12-8DP2
- PRDW12-8DP2-V



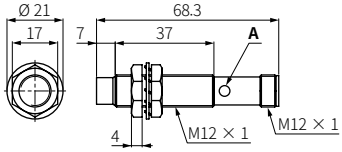
- PRDWL12-8DN
- PRDWL12-8DN2
- PRDWL12-8DP
- PRDWL12-8DP2



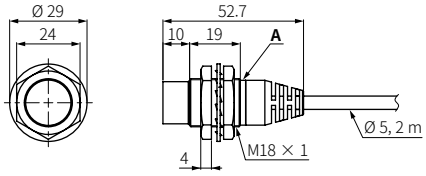
- PRDCM12-8DN
- PRDCM12-8DN2
- PRDCM12-8DP
- PRDCM12-8DP2



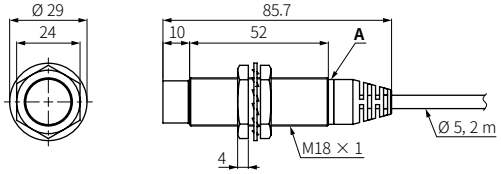
- PRDCML12-8DN
- PRDCML12-8DN2
- PRDCML12-8DP
- PRDCML12-8DP2



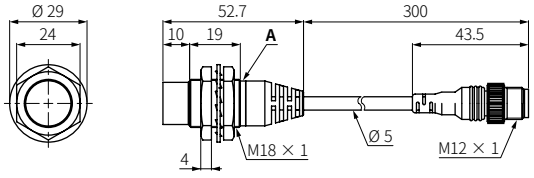
- PRD18-14DN
- PRD18-14DN-V
- PRD18-14DN2
- PRD18-14DP
- PRD18-14DP-V
- PRD18-14DP2



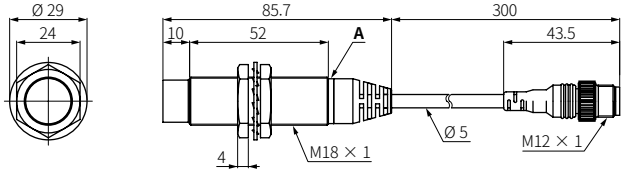
- PRDL18-14DN
- PRDL18-14DN2
- PRDL18-14DP
- PRDL18-14DP-V
- PRDL18-14DP2



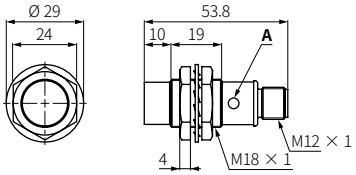
- PRDW18-14DN
- PRDW18-14DN-V
- PRDW18-14DN2
- PRDW18-14DN2-V
- PRDW18-14DP
- PRDW18-14DP-V
- PRDW18-14DP2
- PRDW18-14DP2-V



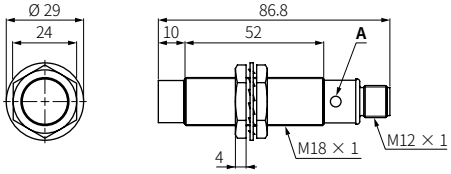
- PRDWL18-14DN
- PRDWL18-14DN2
- PRDWL18-14DP
- PRDWL18-14DP2



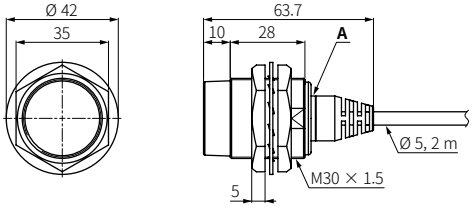
- PRDCM18-14DN
- PRDCM18-14DN2
- PRDCM18-14DP
- PRDCM18-14DP2



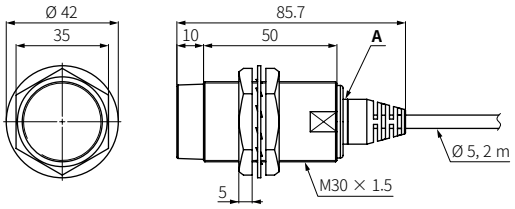
- PRDCML18-14DN
- PRDCML18-14DN2
- PRDCML18-14DP
- PRDCML18-14DP2



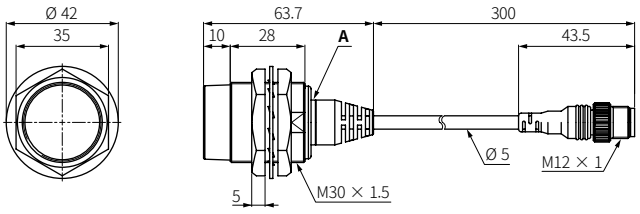
- PRD30-25DN
- PRD30-25DN-V
- PRD30-25DN2
- PRD30-25DN2-V
- PRD30-25DP
- PRD30-25DP-V
- PRD30-25DP2
- PRD30-25DP2-V



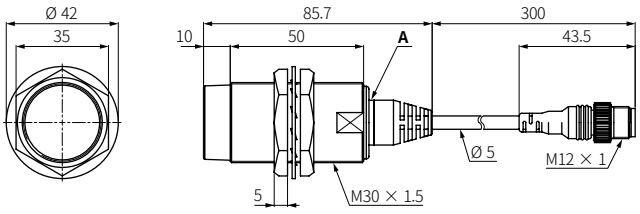
- PRDL30-25DN
- PRDL30-25DN2
- PRDL30-25DP
- PRDL30-25DP2



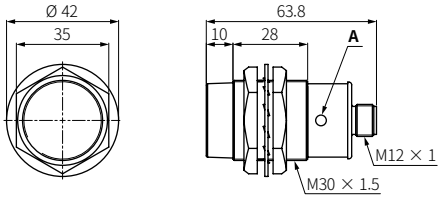
- PRDW30-25DN
- PRDW30-25DN-V
- PRDW30-25DN2
- PRDW30-25DN2-V
- PRDW30-25DP
- PRDW30-25DP-V
- PRDW30-25DP2
- PRDW30-25DP2-V



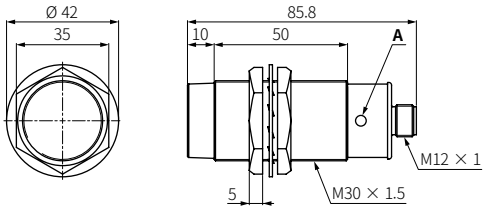
- PRDWL30-25DN
- PRDWL30-25DN2
- PRDWL30-25DP
- PRDWL30-25DP2



- PRDCM30-25DN
- PRDCM30-25DN-V
- PRDCM30-25DN2
- PRDCM30-25DP
- PRDCM30-25DP2



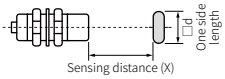
- PRDCML30-25DN
- PRDCML30-25DN2
- PRDCML30-25DP
- PRDCML30-25DP2



Product Characteristics

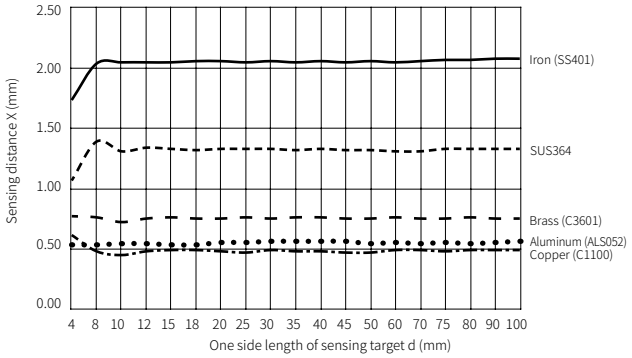
This data is based on internal testing and for reference only. Performance may vary by installation and usage environment. Product testing prior to use is recommended.

Sensing Distance Feature Data by Target Material and Size (Typical)

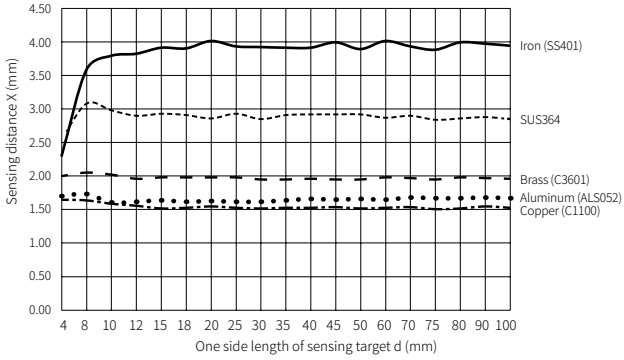


■ Flush + General type

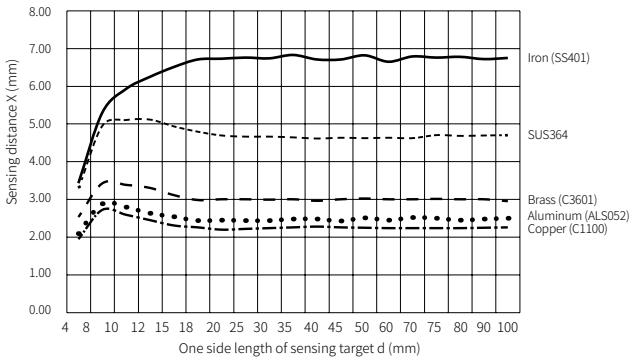
- Ø 8 mm



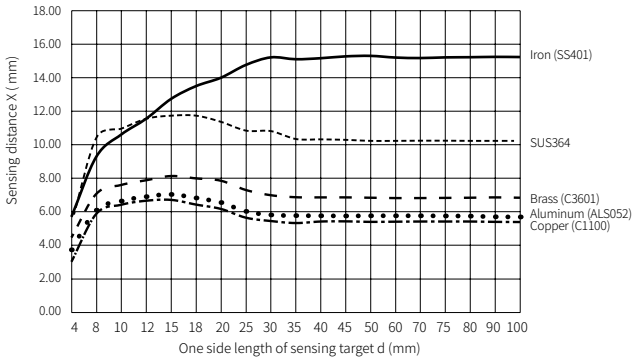
- Ø 12 mm



- Ø 18 mm

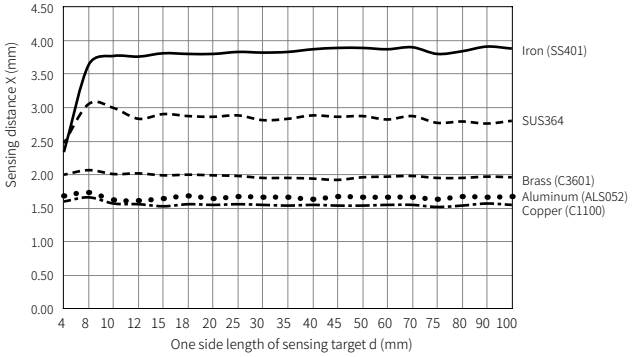


- Ø 30 mm

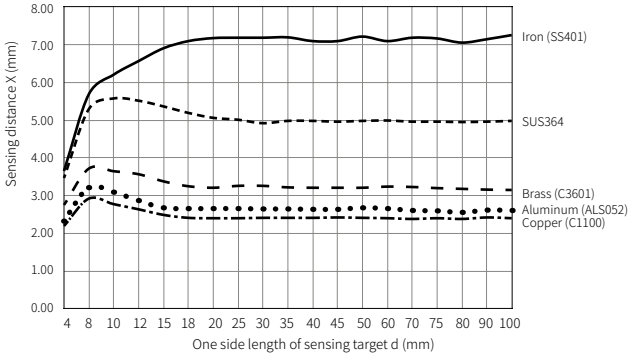


■ Flush + Spatter-resistant type

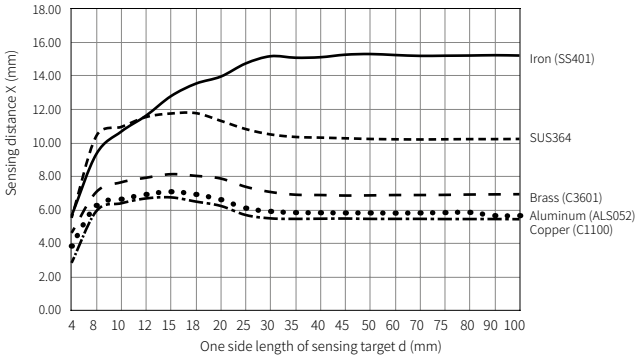
• Ø 12 mm



• Ø 18 mm

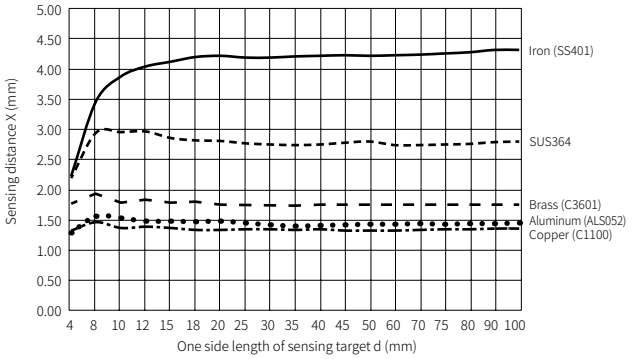


• Ø 30 mm

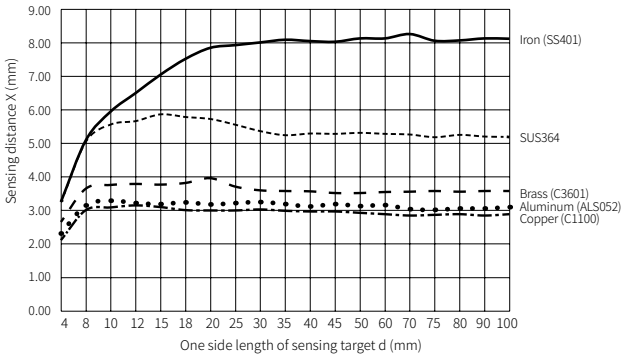


■ Non-flush + General type

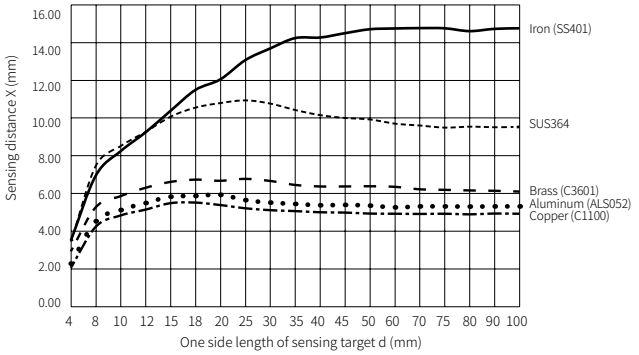
• Ø 8 mm



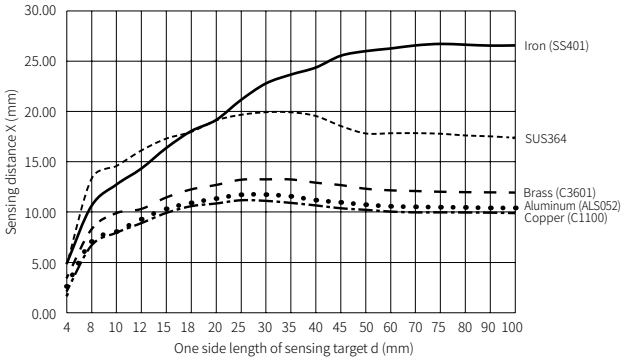
• Ø 12 mm



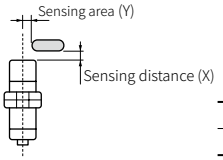
• Ø 18 mm



• Ø 30 mm



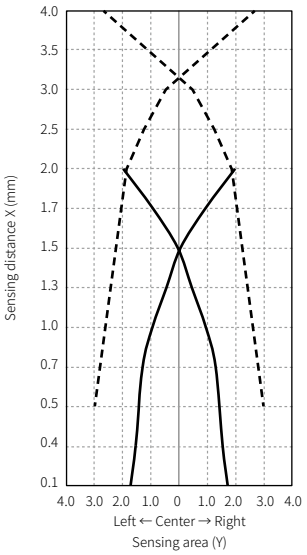
Sensing Distance Feature Data by Parallel (left/right) Movement (Typical)



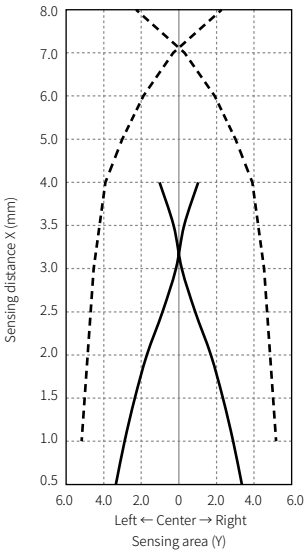
———	Flush type
- - - -	Non-flush type

■ General type

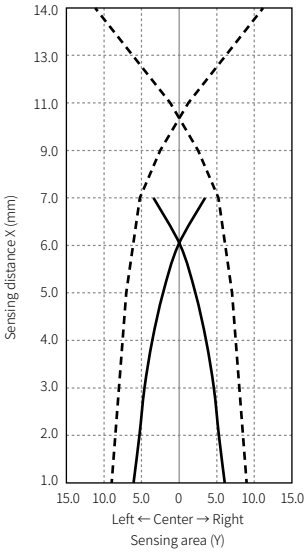
• Ø 8 mm



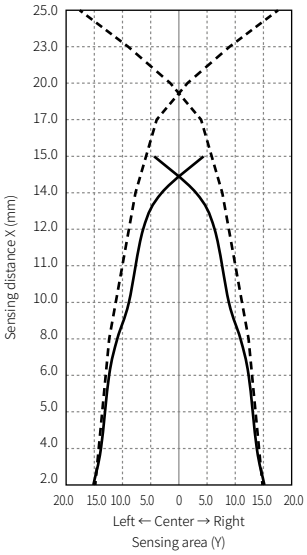
• Ø 12 mm



• Ø 18 mm

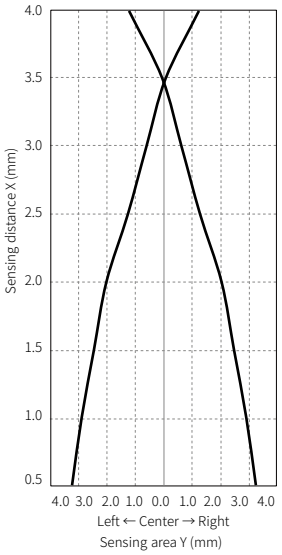


• Ø 30 mm

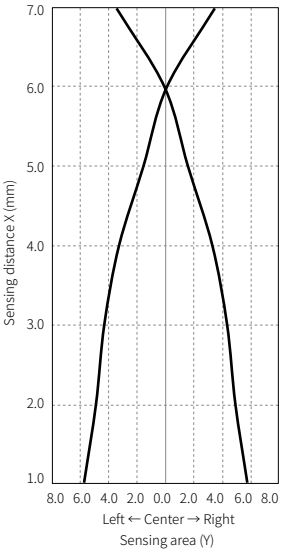


■ Spatter-resistant type

• Ø 12 mm



• Ø 18 mm



• Ø 30 mm

