Autonics

Cylindrical Inductive General / Spatter-Resistant Proximity Sensors

PR / PRA Series (AC 2-wire)

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.

Major Features

- Excellent noise immunity with specialized sensor IC
- Built-in surge protection circuit
- Simple operation, reliable performance, and high durability
- Spatter-resistant type: PTFE coated for high heat resistance (prevent malfunction from welding spatter)
- Cable connector type / Connector type: easy maintenance and wiring
- Operation indicator (red LED)
- IP67 Protection structure (IEC standards)
- Durable and reliable alternative to micro switches and limit switches

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 or electric shock.

04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire or electric shock.

05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire or electric shock.

⚠ 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 or electric shock.

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.
- 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.
- Do not connect capacity load to the output terminal directly.
- 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 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.

CE EAC

Ordering Information

This is only for reference.
For selecting the specific model, follow the Autonics web site.

PR ❶ ❷ ❸ ❹ - ❺ A ❻

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)

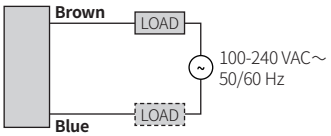
❺ Sensing distance
Number: Sensing distance (unit: mm)

❻ Control output
O: Normally open
C: Normally closed

Connections

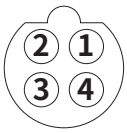
- LOAD can be wired to any direction.
- Connect LOAD before suppling the power.

■ Cable type



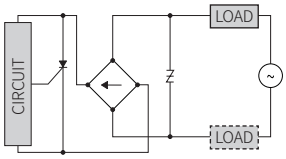
■ Cable connector type / Connector type

- 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	-	-
②	-	-
③	Blue	100-240 VAC~ 50/60 Hz
④	Brown	

■ Inner circuit



Operation Timing Chart

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

Sold Separately

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

Specifications

Installation	Flush type		
General	PR□12-2A□	PR□18-5A□	PR□30-10A□
Spatter-resistant	PRA□12-2A□	PRA□18-5A□	PRA□30-10A□
DIA. of sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Sensing distance	2 mm	5 mm	10 mm
Setting distance	0 to 1.4 mm	0 to 3.5 mm	0 to 7 mm
Hysteresis	≤ 10 % of sensing distance		
Standard sensing target: iron	12 × 12 × 1 mm	18 × 18 × 1 mm	30 × 30 × 1 mm
Response frequency 01)	20 Hz		
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C		
Indicator	Operation indicator (red)		
Approval	CE EAC	CE EAC	CE EAC

Installation	Non-flush type		
General	PR□12-4A □	PR□18-8A □	PR□30-15A □
DIA. of sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Sensing distance	4 mm	8 mm	15 mm
Setting distance	0 to 2.8 mm	0 to 5.6 mm	0 to 10.5 mm
Hysteresis	≤ 10 % of sensing distance		
Standard sensing target: iron	12 × 12 × 1 mm	25 × 25 × 1 mm	45 × 45 × 1 mm
Response frequency 01)	20 Hz		
Affection by temperature	≤ ± 10 % for sensing distance at ambient temperature 20 °C		
Indicator	Operation indicator (red)		
Approval	CE EAC	CE EAC	CE 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 12 mm	Ø 18 mm	Ø 30 mm
Cable	Normal	≈ 72 g (≈ 84 g) 01)	≈ 118 g (≈ 130 g) 02)	≈ 170 g (≈ 207 g)
	Long	-	≈ 130 g (≈ 142 g)	≈ 208 g (≈ 245 g)
Cable connector	Normal	≈ 42 g (≈ 54 g)	≈ 66 g (≈ 78 g)	≈ 122 g (≈ 134 g)
	Long	-	≈ 78 g (≈ 90 g)	≈ 158 g (≈ 195 g)
Connector	Normal	≈ 30 g (≈ 42 g)	≈ 54 g (≈ 66 g)	≈ 142 g (≈ 154 g)
	Long	-	≈ 66 g (≈ 78 g)	≈ 182 g (≈ 194 g)

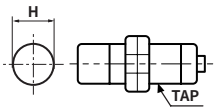
01) Spatter-resistant type: ≈ 66 g (≈ 78 g)
02) Spatter-resistant type: ≈ 106 g (≈ 118 g)

Power supply	100-240 VAC~ 50/60 Hz, operating voltage: 85-264 VAC~
Leakage current	≤ 2.5 mA
Control output	DIA. of sensing side Ø 12 mm: 5 to 150 mA DIA. of sensing side Ø 18 mm, Ø 30 mm: 5 to 200 mA
Residual voltage	≤ 10 V
Protection circuit	Surge protection circuit
Insulation resistance	≥ 50 MΩ (500 VDC⎓ megger)
Insulation type	Double insulation or reinfored insulation (symbol: ⧈) dielectric strength between the measuring input part and the power part: general type 1 kV, spatter-resistant type 1.5 kV
Dielectric strength	General type : 2,500 VAC~ 50/60 Hz for 1 min (between all terminals and case) Spatter-resistant type : 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/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 / Cable connector type 01) / Connector type 01) model
Cable spec. 02)	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
Wire spec.	AWG 22 (0.08 mm, 60-wire), insulator diameter: Ø 1.25 mm
Connector spec.	M12 connector
Material	Standard type cable (black): polyvinyl chloride (PVC)
General	Case/Nut: nickel plated brass, washer: nickel plated iron, sensing side: PBT
Spatter-resistant	Case/Nut: PTFE coated brass, washer: PTFE coated iron, sensing side: PTFE

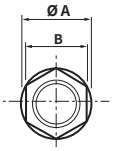
01) Except spatter-resistant type
02) Cable type: 2 m, cable connector type: 300 mm

Cut-out Dimensions

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



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

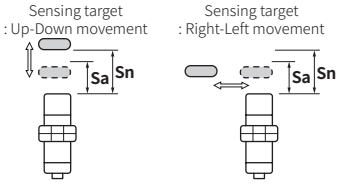


	Ø 12 mm	Ø 18 mm	Ø 30 mm
Ø A	21	29	42
B	17	24	35

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%



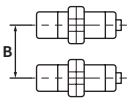
Mutual-interference & Influence by Surrounding Metals

■ 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.

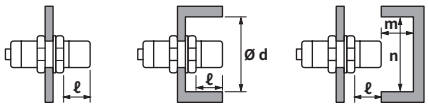
[Face to Face]

[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.



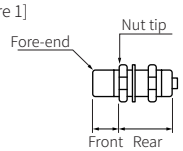
(unit: mm)

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

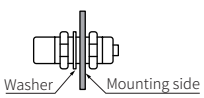
Tightening Torque

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].

[Figure 1]

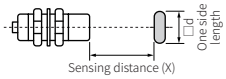


[Figure 2]



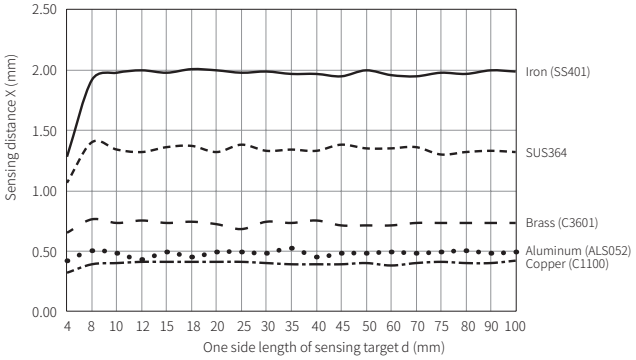
Strength \ Sensing side	Ø 12 mm		Ø 18 mm		Ø 30 mm	
	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush
Front size	13 mm	7 mm	-	-	26 mm	12 mm
Front torque	6.37 N m		14.7 N m		49 N m	
Rear torque	11.76 N m		14.7 N m		78.4 N m	

Sensing Distance Feature Data by Target Material and Size

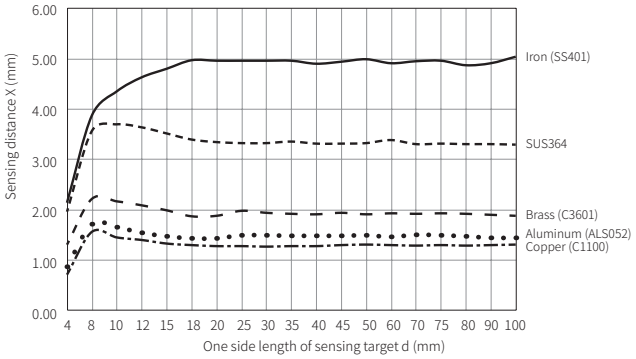


■ Flush + General type

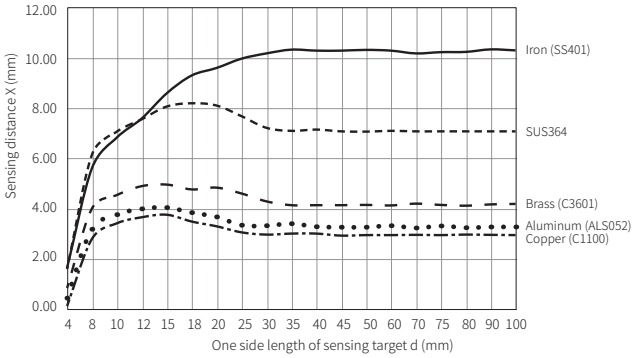
• Ø 12 mm



• Ø 18 mm

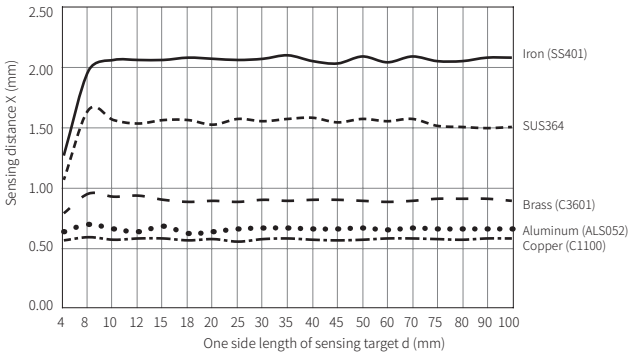


• Ø 30 mm

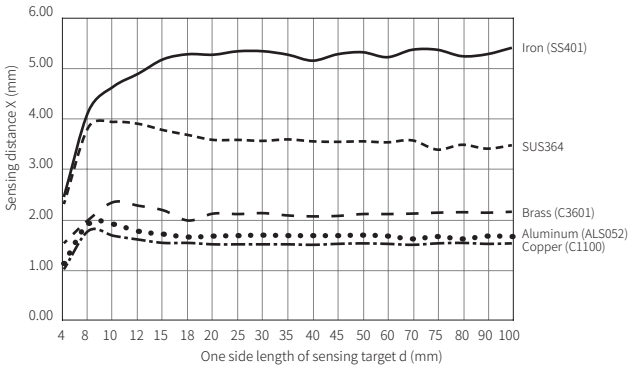


■ Flush + Spatter-resistant type

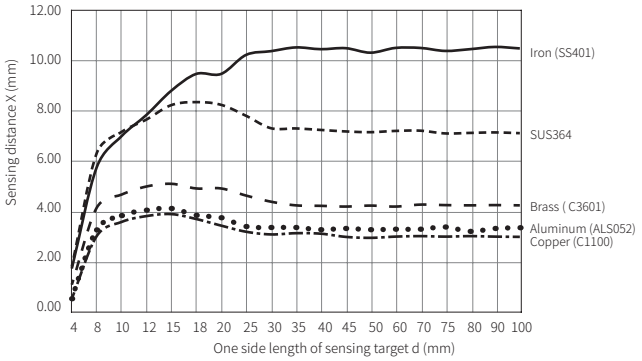
• Ø 12 mm



• Ø 18 mm

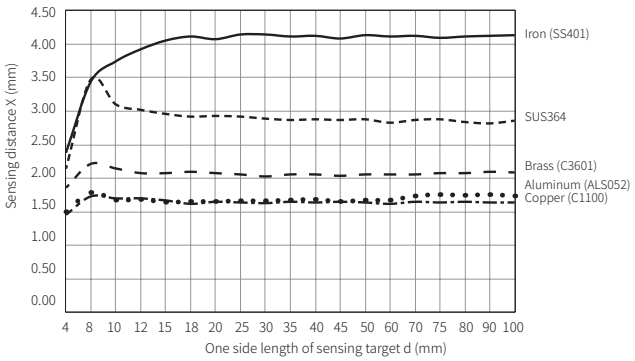


• Ø 30 mm

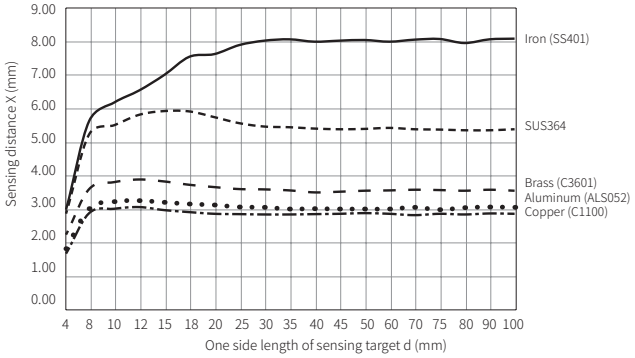


■ Non-flush + General type

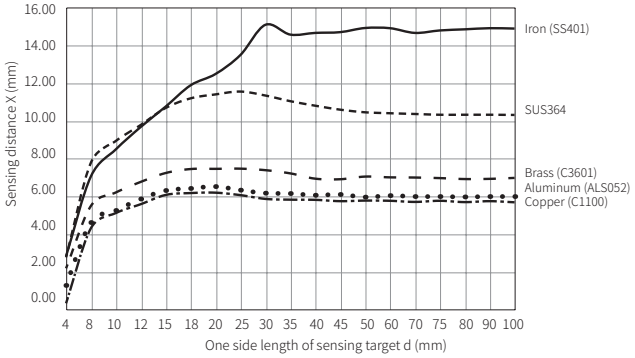
• Ø 12 mm



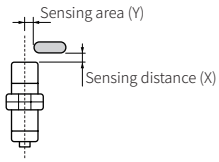
• Ø 18 mm



• Ø 30 mm



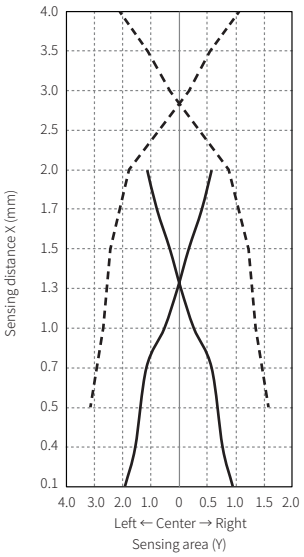
Sensing Distance Feature Data by Parallel (left/right) Movement



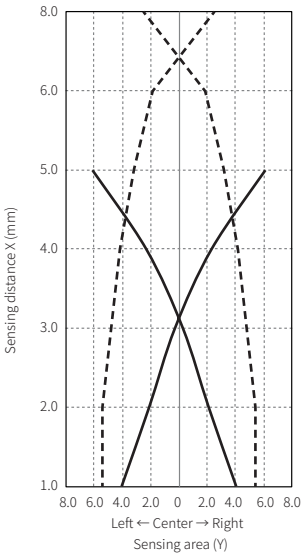
———	Flush type
- - - -	Non-flush type

■ General type

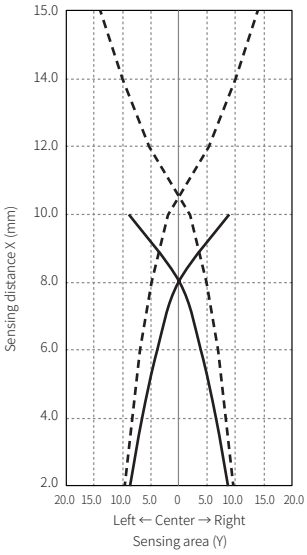
• Ø 12 mm



• Ø 18 mm

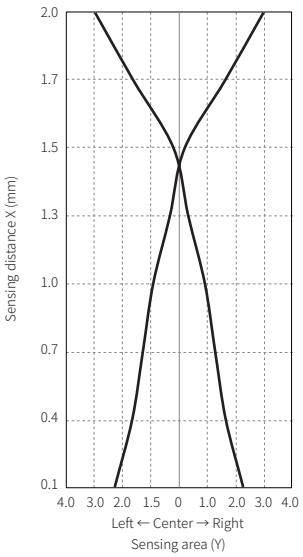


• Ø 30 mm

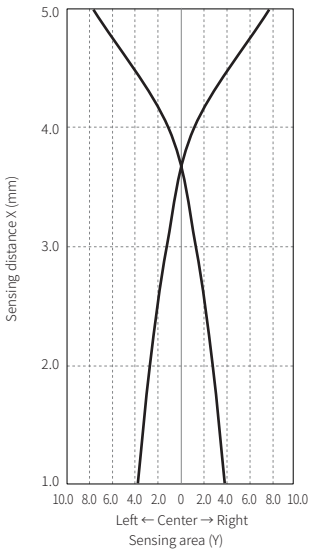


■ Spatter-resistant type

• Ø 12 mm



• Ø 18 mm



• Ø 30 mm