

## Cylindrical Capacitive Proximity Sensors

# CR Series (AC 2-wire)

## INSTRUCTION MANUAL

TCD210256AC

**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 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.
- 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.
- 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  $\varnothing$  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, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

CR ① - ② ③ ④

- ① DIA. of sensing side**  
Number: DIA. of sensing side (unit: mm)
- ② Sensing distance**  
Number: Sensing distance (unit: mm)
- ③ Power supply**  
A: 100 - 240 VAC
- ④ Control output**  
O: Normally Open  
C: Normally Closed

### Product Components

	Product	Instruction manual	Nut	Washer
CR18	× 1	× 1	× 2	-
CR30	× 1	× 1	× 2	× 1

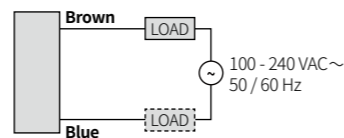
### Sold Separately

- Fixed bracket: P90-□

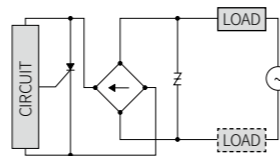
### Connections

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

#### ■ Cable type



#### ■ Inner circuit



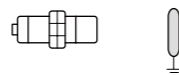
### Operation Timing Chart

	Normally open	Normally closed
<b>Sensing target</b>	Presence	Presence
<b>Load</b>	Operation	Operation
<b>Operation indicator (red)</b>	ON	ON

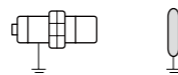
### Grounding

- The sensing distance is varied by grounding status of the capacity proximity sensor or the target. Check the material when installing the sensor and selecting the target.
  - When the capacity proximity sensor and the target are grounded, the electric field is concentrated on the detection surface and the sensing distance may increase.
  - If it is not grounded, the sensing distance may be shorten due to small electric charge.
- If the sensor is installed with a bracket, ground the sensor connection to the bracket.

■ CR18-8A□



■ CR30-15A□



### Specifications

Installation	Non-flush type	
<b>Model</b>	CR18-8A□	CR30-15A□
<b>DIA. of sensing side</b>	$\varnothing$ 18 mm	$\varnothing$ 30 mm
<b>Sensing distance<sup>01)</sup></b>	8 mm	15 mm
<b>Setting distance</b>	0 to 5.6 mm	0 to 10.5 mm
<b>Hysteresis</b>	$\leq$ 20 % of sensing distance	
<b>Standard sensing target: iron</b>	50 × 50 × 1 mm	
<b>Response frequency<sup>02)</sup></b>	20 Hz	
<b>Affection by temperature</b>	$\leq \pm$ 20 % for sensing distance at ambient temperature 20 °C	
<b>Indicator</b>	Operation indicator (red)	
<b>Approval</b>	ERC	ERC
<b>Unit weight (package)</b>	$\approx$ 70 g ( $\approx$ 82 g)	$\approx$ 200 g ( $\approx$ 237 g)

01) Based on grounding status of the standard target.

02) 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.

<b>Power supply</b>	100 -240 VAC~ 50 / 60 Hz, operating voltage: 85 ~ 264 VAC~
<b>Leakage current</b>	$\leq$ 2.2 mA
<b>Control output</b>	$\leq$ 5 to 200 mA
<b>Residual voltage</b>	$\leq$ 20 V
<b>Protection circuit</b>	Surge protection circuit
<b>Insulation resistance</b>	$\geq$ 50 M $\Omega$ (500 VDC= megger)
<b>Dielectric strength</b>	Between the charging part and the case : 1,500 VAC~ 50 / 60Hz for 1 min
<b>Vibration</b>	1 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
<b>Shock</b>	500 m/s <sup>2</sup> ( $\approx$ 50 G) in each X, Y, Z direction for 3 times
<b>Ambient temperature</b>	-25 to 70 °C, storage: -30 to 80 °C (no freezing or condensation)
<b>Ambient humidity</b>	35 to 95 %RH, storage: 35 to 95 %RH (no freezing or condensation)
<b>Protection structure</b>	DIA. of sensing side $\varnothing$ 18 mm: IP66 (IEC standard) / DIA. of sensing side $\varnothing$ 30 mm: IP65 (IEC standard)
<b>Connection</b>	Cable type
<b>Cable spec.</b>	DIA. of sensing side $\varnothing$ 18 mm: $\varnothing$ 4 mm, 2-wire, 2 m DIA. of sensing side $\varnothing$ 30 mm: $\varnothing$ 5 mm, 2-wire, 2 m
<b>Wire spec.</b>	AWG 22 (0.08 mm, 60-core), insulator DIA.: $\varnothing$ 1.25 mm
<b>Material</b>	Standard type cable (black): polyvinyl chloride (PVC)
DIA. of sensing side $\varnothing$ 18 mm	Case / Nut: PAG
DIA. of sensing side $\varnothing$ 30 mm	Case / Nut: nickel-plated brass, washer: nickel-plated iron, sensing side: PBT

### Sensitivity Adjustment

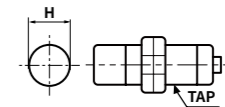
Please turn potentation VR to set sensitivity as below procedure.

- When there is distance fluctuation between proximity sensor and the target, please adjust 2 at the farthest distance from this unit.
  - Turning potentation VR toward clockwise, it will be max., or turning toward counter clockwise, it will be min. The number of adjustment should be  $15 \pm 3$  revolution and if it is turned to the right or left excessively, it will not stop, but it idles without breakdown.
- ( ) is for Normally closed type.

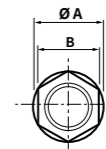
Procedure	Potentation VR	Description
1	 Stop at ON (OFF) position	Without a sensing object, turn the potentation VR to the right and stop at the proximity sensor is ON (OFF).
2	 Stop at OFF (ON) position	Put the object in right sensing position, turn the potentation VR to the left and stop at the proximity sensor is OFF (ON).
3	 It is stable when it is over 1.5 times OFF (ON) position      ON (OFF) position	If the difference of the number of potentation VR rotation between the ON (OFF) point and the OFF (ON) point is more than 1.5 turns, the sensing operation will be stable.
4	 Adjustment completed OFF (ON) position      ON (OFF) position	If it is set in sensitivity adjustment position of potentation VR at center between 1 and 2, sensitivity setting will be completed.

### Cut-out Dimensions

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



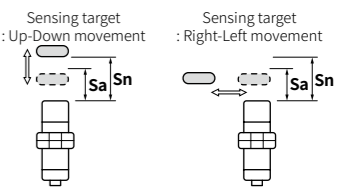
	$\varnothing$ 18 mm	$\varnothing$ 30 mm
<b>Mounting hole (H)</b>	$\varnothing$ 18.5 <sup>+0.5</sup> <sub>0</sub>	$\varnothing$ 30.5 <sup>+0.5</sup> <sub>0</sub>
<b>TAP</b>	M18×1	M30×1.5



	$\varnothing$ 18 mm	$\varnothing$ 30 mm
<b><math>\varnothing</math> A</b>	26.5	42
<b>B</b>	24	35

### Setting Distance Formula

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

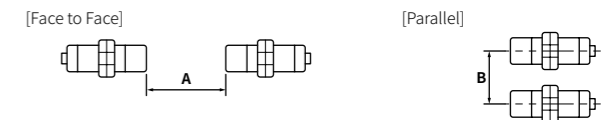


### Mutual-interference & Influence by Surrounding Metals

#### ■ Mutual-interference

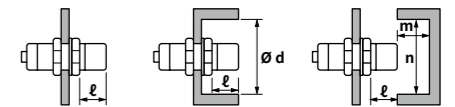
When plural proximity sensors are mounted in a close row, malfunction of sensor may be caused due to mutual interference.

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 for preventing malfunction of long sensing distance or return error. Therefore, be sure to provide a minimum distance as below chart.



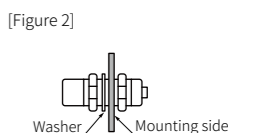
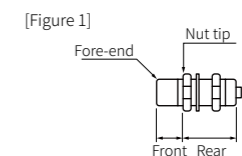
(unit: mm)

Sensing side	$\varnothing$ 18 mm	$\varnothing$ 30 mm
<b>Item</b>		
<b>A</b>	48	90
<b>B</b>	54	90
<b>l</b>	20	10
<b><math>\varnothing</math> d</b>	54	90
<b>m</b>	24	45
<b>n</b>	54	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	$\varnothing$ 18 mm	$\varnothing$ 30 mm
<b>Strength</b>		
<b>Front size</b>	-	12 mm
<b>Front torque</b>	0.39 N m	49 N m
<b>Rear torque</b>	0.39 N m	78.4 N m