

Cylindrical Capacitive Proximity Sensors

CP 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.

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.
- 10 - 30 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.
- This unit may be used in the following environments.
  - Indoors (UL Type 1 Enclosure)
  - Altitude max. 2,000 m
  - Pollution degree 3
  - Installation category II

Cautions for Installation

- Install the unit correctly with the usage environment, location, and the designated specifications.
- When the product is installed in an embedded (flush-mounted) configuration, the detection distance may differ from the rated value, or malfunction may occur.
- 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 4 mm cable with a tensile strength of 30 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 UKCA cULus LISTED

Ordering Information

This is only for reference, the actual product does not support all combinations.
For selecting the specified model, follow the Autonics website.

CP ❶ ❷ - ❸ ❹ ❺ - ❻

❶ Connection
No mark: Cable type
CM: Connector type

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

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

❹ Power supply
D: 10 - 30 VDC

❺ Control output
N: NPN Normally Open
N2: NPN Normally Closed
P: PNP Normally Open
P2: PNP Normally Closed

❻ Cable
No mark: Standard type
V: Oil Resistant cable type

Product Components

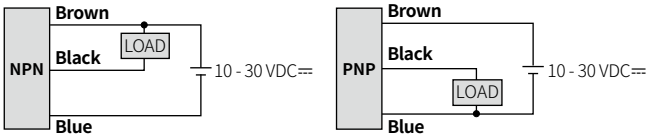
- Product × 1
- Nut × 2
- Instruction manual × 1
- Adjustment screwdriver × 1

Sold Separately

- M12 Connector cable: C□D(H)3-□

Connections

■ Cable type



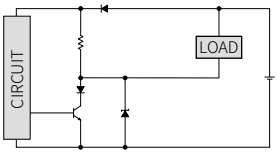
■ Connector type

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

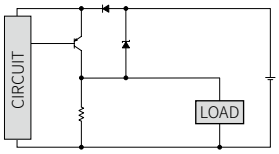


Pin	Color	Function
①	Brown	+V
②	-	-
③	Blue	0 V
④	Black	OUT

■ Inner circuit (NPN output)



■ Inner circuit (PNP output)

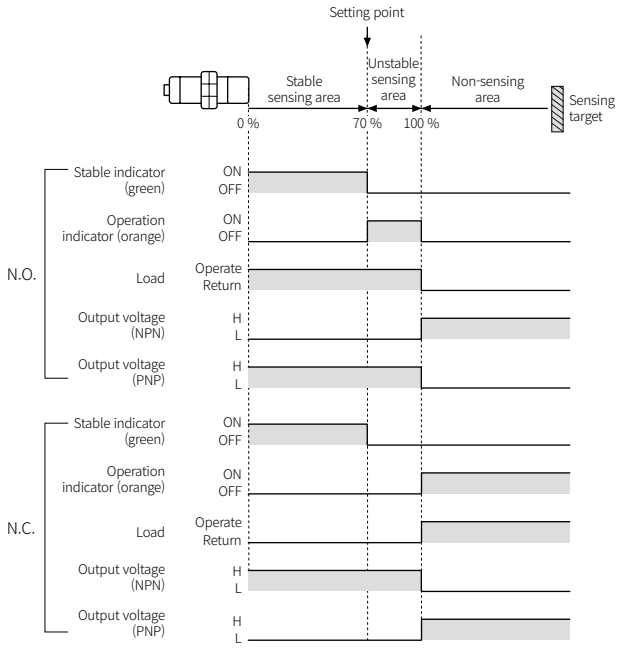


Sensitivity Adjustment

- The sensitivity adjustment volume increases sensitivity when turned to the right, and decreases sensitivity when turned to the left.
- The sensitivity adjustment is available from 30 % (min.) to 150 % (max.) of the rated sensing distance.
  If the sensitivity is at min. or max., the green LED flashes 5 times at 0.1 sec intervals.
- The number of valid rotation is 20±3 times for adjustment.
  The adjustment volume does not stop and just spins idle even after being turned more than the adjustment number of times.
- Use the offered adjustment screwdriver. Do NOT turn with excessive force to prevent product damage.
- ( ) is for Normally closed type.

Procedure	Description	
1	 Stop at OFF (ON) position	Put the object in right sensing position, turn the sensitivity adjustment volume slowly to the left and stop at the point proximity sensor is OFF (ON).
2	 Stop at ON (OFF) position	With the sensing object present, turn the sensitivity adjustment volume slowly to the right and stop at the point proximity sensor is ON (OFF).

Operation Timing Chart



Specifications

Installation	Non-flush type		
Model	CP□12-8D□-□	CP□18-15D□-□	CP□30-25D□-□
DIA. of sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Sensing distance	8 mm	15 mm	25 mm
Setting distance[01]	0 to 5.6 mm	0 to 10.5 mm	0 to 17.5 mm
Hysteresis	≤ 20 % of sensing distance		
Standard sensing target: iron[02]	24 × 24 × 1 mm	45 × 45 × 1 mm	75 × 75 × 1 mm
Response frequency[03]	50 Hz		
Affection by temperature	≤ ± 20 % for sensing distance at ambient temperature 20 °C		
Indicator	Operation indicator (orange), stable indicator (green), Abnormal detect indicator (cross-flashing green, orange)[04]		
Certification	CE UK CA cULus		

01) Use the device within the range where the stable indicator (green) is ON.
02) Based on grounding status of the standard target.
03) 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.
04) The indicator flashes when an error occurs, such as operating time alarm, device hardware fault, parameter setting error, or overcurrent detection error. If the abnormality indicator remains ON after corrective action has been taken, please contact the customer service center.

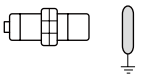
Unit weight (package)	Ø 12 mm	Ø 18 mm	Ø 30 mm
Cable type	≈ 62 g (≈ 77 g)	≈ 72 g (≈ 88 g)	≈ 92 g (≈ 112 g)
Connector type	≈ 10 g (≈ 25 g)	≈ 18 g (≈ 36 g)	≈ 38 g (≈ 60 g)

Power supply	10 - 30 VDC⎓ (ripple P-P: ≤ 10 %)
Current consumption	≤ 20 mA
Control output	≤ 200 mA
Residual voltage	≤ 2.0 V
Protection circuit	Surge protection circuit, reverse polarity protection circuit, output short over current protection circuit, reverse output protection circuit
Insulation resistance	≥ 50 MΩ (500 VDC⎓ megger)
Dielectric strength	Between the charging part and the case : 1,500 VAC~ 50 / 60Hz for 1 min
Vibration	1.5 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 temp.	-25 to 70 °C, storage: -30 to 80 °C (no freezing or condensation)
Ambient humi.	35 to 95 %RH, storage: 35 to 95 %RH (no freezing or condensation)
Protection structure	IP67 (IEC standard)
Connection	Cable / Connector type
Cable spec.	Ø 4 mm, 3-wire, 2 m
Wire spec.	AWG 23 (0.08 mm, 60-core), insulator diameter: Ø 1.28 mm
Connector spec.	M12 plug connector
Material	Case / Nut: PBT (DIA. of sensing side Ø 18 mm nut: PA6), Standard type cable (black): polyvinyl chloride (PVC), Oil resistant cable type cable (gray): polyvinyl chloride (oil resistant PVC)

Grounding

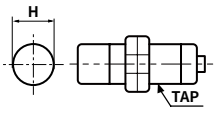
The sensing distance may vary depending on the grounding status.
Adjust the sensitivity according to the usage environment.

- Use the sensor with the sensing target grounded. If it is not grounded, the sensing distance may be shortened due to a small induced electric charge.

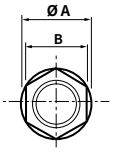


Cut-out Dimensions

- Unit: mm, Refer to the dimensions in the product manual or on the Autonics website.



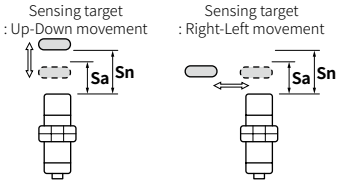
	Ø 12 mm	Ø 18 mm	Ø 30 mm
Mounting hole (H)	Ø 12.5 $^{+0.5}_{0}$	Ø 18.5 $^{+0.5}_{0}$	Ø 30.5 $^{+0.5}_{0}$
TAP	M12×1	M18×1	M30×1.5



	Ø 12 mm	Ø 18 mm	Ø 30 mm
Ø A	19	26.5	39
B	17	24	36

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%

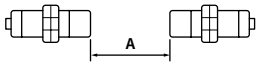


Mutual-interference & Influence by Surrounding Metals

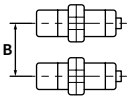
■ Mutual-interference

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]

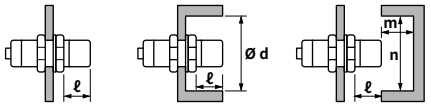


[Parallel]



■ Influence by surrounding metals

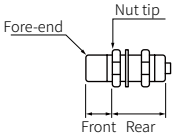
When sensors are mounted on metallic panel, it must be prevented sensors from being affected by any metallic object except target for preventing malfunction of long sensing distance or return error. Therefore, be sure to provide a minimum distance as below chart. If the detection distance increases during installation, adjust the sensitivity accordingly.



(unit: mm)

Item \ Sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
A	24	45	75
B	24	36	60
ℓ	12	18	20
Ø d	36	54	90
m	24	45	75
n	24	36	90

Tightening Torque



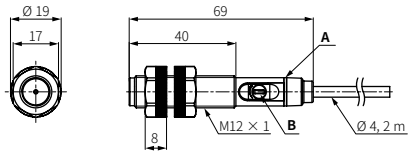
Strength \ Sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Front / Rear torque	1 N m	2 N m	7 N m

Dimensions

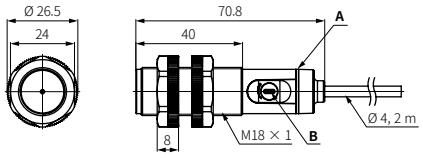
- Unit: mm, For the detailed drawings, follow the Autonics website.
- The indicator operates by detection state. Refer to the 'Specifications' for details.

A	Indicator	B	Sensitivity adjustment volume

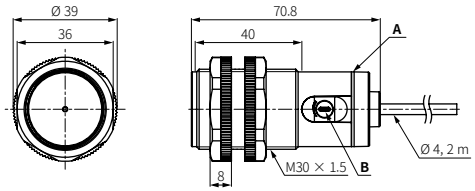
- CP12-8DN
- CP12-8DN-V
- CP12-8DP
- CP12-8DP-V
- CP12-8DN2
- CP12-8DN2-V
- CP12-8DP2
- CP12-8DP2-V



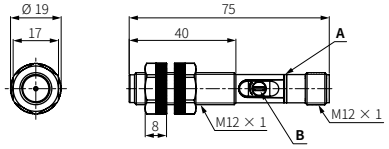
- CP18-15DN
- CP18-15DN-V
- CP18-15DP
- CP18-15DP-V
- CP18-15DN2
- CP18-15DN2-V
- CP18-15DP2
- CP18-15DP2-V



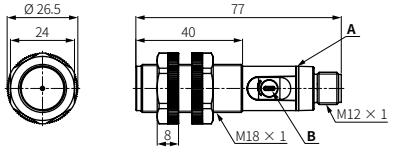
- CP30-25DN
- CP30-25DN-V
- CP30-25DP
- CP30-25DP-V
- CP30-25DN2
- CP30-25DN2-V
- CP30-25DP2
- CP30-25DP2-V



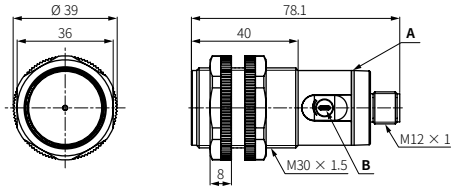
- CPCM12-8DN
- CPCM12-8DN2
- CPCM12-8DP
- CPCM12-8DP2



- CPCM18-15DN
- CPCM18-15DN2
- CPCM18-15DP
- CPCM18-15DP2



- CPCM30-25DN
- CPCM30-25DN2
- CPCM30-25DP
- CPCM30-25DP2



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