



Cylindrical Capacitive Proximity Sensors

CP Series (IO-Link)

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.
In case of IO-Link mode, the cable length between the unit and the IO-Link Master should be under 20 m.
- Factory default is push-pull N.O. mode in SIO mode.

Product Components

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

Sold Separately

- M12 Connector cable: C□D(H)3-□

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	①	②	-	③	④	-	⑤	-	⑥
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① Connection

No mark: Cable type
CM: Connector type

② DIA. of sensing side

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

③ Sensing distance

Number: Sensing distance (unit: mm)

④ Power supply

D: 10 - 30 VDC

⑤ Cable

No mark: Standard type
V: Oil Resistant cable type

⑥ Communication

IL2: IO-Link COM2

Software

Download the installation file and the manuals from the Autonics website.

■ atIOLink

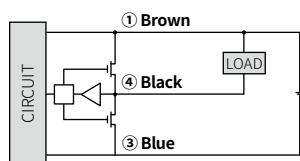
atIOLink with purposes for setting, diagnosis, and maintenance of IO-Link device via IODD file is provided as the Port and Device Configuration Tool (PDCT).

Circuits

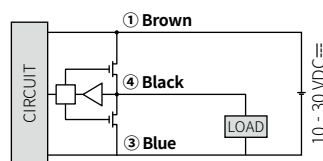
① Brown	② White	③ Blue	④ Black
L+	-	L-	C/Q

■ SIO mode

- In case of NPN connection



- In case of PNP connection



Connector Specification

- 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.

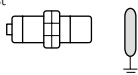


① Brown	② White	③ Blue	④ Black
L+	-	L-	C/Q

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 small induced electric charge.



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).

Specifications

Installation	Non-flush type		
Model	CP□12-8D-□-IL2	CP□18-15D-□-IL2	CP□30-25D-□-IL2
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	IO-Link mode, SIO mode		
IO-Link mode	Communication indicator (flashing green), operation indicator (orange), abnormal detect indicator (cross-flashing green, orange) ⁽⁰⁴⁾		
SIO mode	Operation indicator (orange), stable indicator (green), abnormal detect indicator (cross-flashing green, orange) ⁽⁰⁴⁾		
Certification	CE, RoHS, IO-Link		

(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)

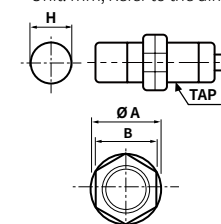
Power supply	10 - 30 VDC≡ (ripple P-P: ≤ 10 %)
Current consumption	≤ 20 mA
Control output	≤ 100 mA
Residual voltage	≤ 2.5 V
Protection circuit	Surge protection circuit, reverse polarity protection circuit, output short over current protection circuit, reverse output protection circuit
Insulation resistance	≥ 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/s ² (≈ 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)

IO-Link Communication Interface

Version	Ver. 1.1
Class	Class A
Baud rate	COM2 (38.4 kbps)
Min. cycle time	2.3 ms
Data length	PD: 2 byte, OD: 1 byte (M-sequence: TYPE_2_2)
Vendor ID	899 (0x383)

Cut-out Dimensions

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



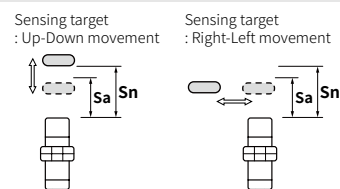
	Ø 12 mm	Ø 18 mm	Ø 30 mm
Mounting hole (H)	Ø 12.5 ^{+0.5} ₀	Ø 18.5 ^{+0.5} ₀	Ø 30.5 ^{+0.5} ₀
TAP	M12×1	M18×1	M30×1.5

	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 %

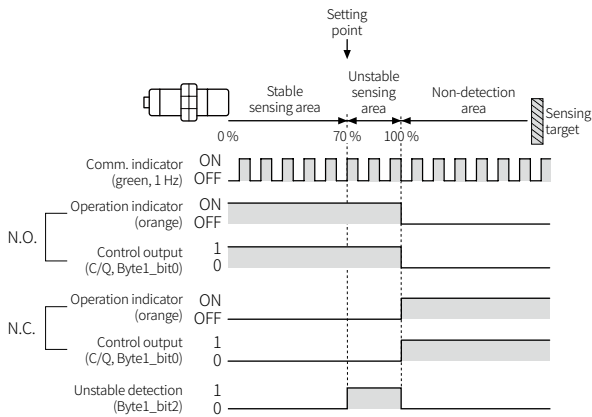


Operation Timing Chart

- Refer to the Setting Distance Formula for the unstable detection area.

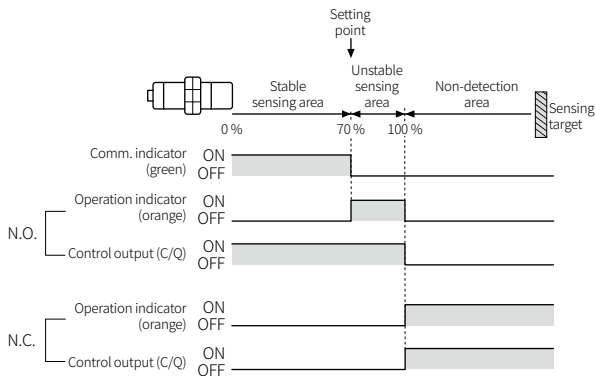
■ IO-Link mode

- Operates by setting value



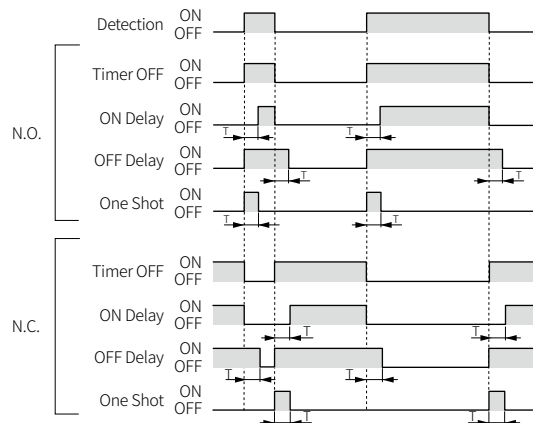
■ SIO mode

- Operates by factory default. (output type - Push-pull / output mode - N.O.)



Timer Operation Timing Chart

- T: Timer time (1 to 9999 ms)



Sold Separately: M12 Connector Cable

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

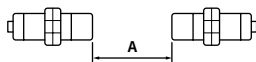
Appearance	Power	Connector 1	Connector 2	Length	Feature	Model
	DC	M12 (Socket-Female) 4-pin	3-wire	2 m	PVC	CID3-2
				5 m		CID3-5
	DC	M12 (Socket-Female) 4-pin	3-wire	2 m	Oil resistant PVC	CIDH3-2
				5 m		CIDH3-5
	DC	M12 (Socket-Female) 4-pin, L type	3-wire	2 m	PVC	CLD3-2
				5 m		CLD3-5
	DC	M12 (Socket-Female)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

Mutual-interference & Influence by Surrounding Metals

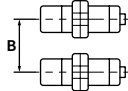
■ Mutual-interference

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]

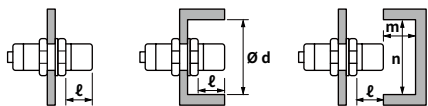


[Parallel]



■ Influence by surrounding metals

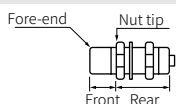
When sensors are mounted on metallic panel, it must be prevented sensors from being affected by any metallic object except target for preventing malfunction of long sensing distance or return error. Therefore, be sure to provide a minimum distance as below chart. If the detection distance increases during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



(unit: mm)

Sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Item			
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



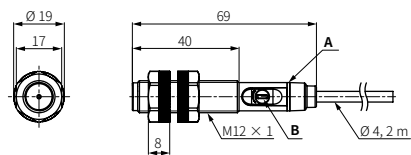
Sensing side	Ø 12 mm	Ø 18 mm	Ø 30 mm
Strength			
Front / Rear torque	1 N m	2 N m	7 N m

Dimensions

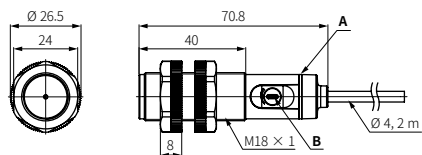
- Unit: mm, For the detailed drawings, follow the Autonics website.
- The indicator operates varied by mode. Refer to the 'Specifications' for details.

A	Indicator	B	Sensitivity adjustment volume
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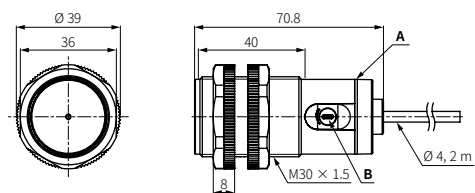
- CP12-8D-IL2
- CP12-8D-V-IL2



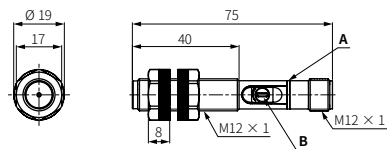
- CP18-15D-IL2
- CP18-15D-V-IL2



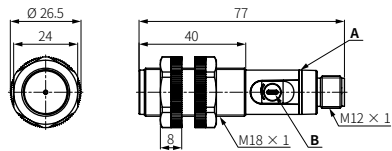
- CP30-25D-IL2
- CP30-25D-V-IL2



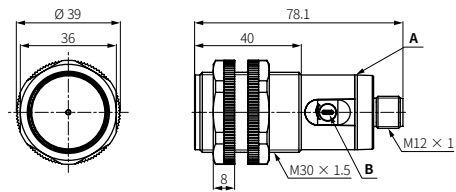
- CPCM12-8D-IL2



- CPCM18-15D-IL2



- CPCM30-25D-IL2



Parameter Index

■ Process data

- The current data value is displayed in real time.

Parameter	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte0 (PD0)	Detection Level							
Byte1 (PD1)	Detection Level		-	Error	Warning	Instability Alarm	-	Output

Parameter	Description	Display range	Type
Detection Level	Outputs the position of the detected object as specific 10 bit.	0 to 1,023	UInteger
Error	Outputs internal sensor error status.	0: Normal, 1: Error	Boolean
Warning	Outputs internal sensor warning status.	0: Normal, 1: Warning	Boolean
Instability Alarm	Outputs instability detection status.	0: Stable, 1: Unstable	Boolean
Output	Displays sensor's output status. (PIN4, C/Q terminal)	0: OFF, 1: ON	Boolean

■ Identification menu

- The device's manufacturer information and sensor information is displayed.
It includes additionally information of companies and sensors from the IO-Link standard.

Index		Parameter	Description	Type	Access
hex.	dec.				
0x10	16	Vendor Name	Manufacturer name	String	RO
0x11	17	Vendor Text	Manufacturer description	String	RO
0x12	18	Product Name	Product name	String	RO
0x13	19	Product ID	Product ID	String	RO
0x14	20	Product Text	Product description	String	RO
0x15	21	Serial Number	Product serial number	String	RO
0x16	22	H/W Version	Hardware version	String	RO
0x17	23	F/W Version	Firmware version	String	RO
0x18	24	Application specific tag	Application program tag	String	RW
0x19	25	Function tag	Device function tag	String	RW
0x1A	26	Location tag	Device location tag	String	RW

■ Parameter menu

- Product settings such as output mode and timer can be changed according to the user environment.

Index		Subindex	Parameter	Description	Setting range	Default	Type	Access
hex.	dec.							
0x02	2	-	System command	Device Reset	Device reset	128	-	UInteger
				Application Reset	Application reset	129	-	UInteger
0x40	64	-	Output Operation Mode		PIN4 (C/Q) terminal output mode	0: N.O. (Normally Open), 1: N.C. (Normally Closed)	0	UInteger
0x42	66	1	Timer Output Setup	Mode	PIN4 (C/Q) terminal timer mode	0: Timer OFF, 1: ON Delay, 2: OFF Delay, 3: One Shot	0	UInteger
		2		Time	PIN4 (C/Q) terminal timer time	1 to 9,999 [ms]	5	UInteger
0x44	68	-	Instability Alarm ON Delay Timer		Output timing for instability detection	0: 0 ms, 1: 10 ms, 2: 50 ms, 3: 100 ms, 4: 300 ms, 5: 500 ms, 6: 1,000 ms	4	UInteger
0x45	69	-	Sensitivity Level		Detection sensitivity	0 to 110	80	UInteger
0x46	70	-	Sensitivity Setting Method		Sensitivity setting method	0: Sensitivity adjustment volume, 1: SP1, SP2 setting	0	UInteger
0x48	72	-	User Customize Operating Time		Device operating time alarm setting	0 to 131,071 [hour]	13,107	UInteger
0x49	73	-	Switching Point 1		Detection ON point	0 to 1,023 • Set SP1 to be greater than SP2. (SP1 > SP2)	-	UInteger
0x4A	74	-	Switching Point 2		Detection OFF point	0 to 1,023 • Set SP1 to be greater than SP2. (SP1 > SP2)	-	UInteger

■ Diagnosis Menu

- The information about problems encountered during sensor operation is displayed.

Index		Parameter	Description	Type	Access
hex.	dec.				
0x25	37	Detailed Device Status	Device detailed status	Record	RO
0x28	40	Process Data Input	Detected object position information	UInteger	RO
0x47	71	Operating Hours	Device operating time	UInteger	RO

■ Observation menu

- The device setting value is displayed.

Index		Sub index	Parameter	Description	Access
hex.	dec.				
0x28	40	1	Process data input	Detection Level	Current value
		2		Error	Error
		3		Warning	Warning
		4		Instability Detection Alarm	Unstable detection
		5		Output	PIN4 (C/Q) terminal output
0x47	71	-	Operating Hours	Device operating time	RO

■ Events

- When the corresponding error occurs, the abnormal indicator flashes.

Index		Parameter	Description	Type
hex.	dec.			
0x1800	6144	Operation time elapsed	Operation time alarm	Warning
0x5000	20480	Device hardware fault	Device hardware fault	Error
0x6320	25376	Parameter error	Parameter setting error	
0x7710	30480	Short circuit	Overcurrent detection error	