Panasonic INSTRUCTION MANUAL

Photoelectric Sensor

Compact, Adjustable Range Reflective Type

CX-440 Series

MEUEN-CX440 V2.1

Thank you for purchasing products from Panasonic. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

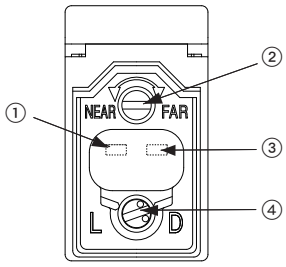
⚠ WARNING

- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

1 CAUTIONS

- This product has been developed / produced for industrial use only.
- Make sure to carry out wiring with the power OFF.
- Incorrect wiring will damage the sensor.
- Verify that the supply voltage including the ripple is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this product, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- Do not use during the initial transient time (50ms) after the power supply is switched on.
- This sensor is suitable for indoor use only.
- You can extend the cable up to 100m max. with 0.3mm^2 or more cable (thru-beam type, both emitter and receiver). However, in order to reduce noise, make the wiring as short as possible.
  To comply with the requirements for the Korean S-Mark, the power supply line must be 10m or less.
- Do not apply stress directly to the sensor cable joint by forcibly bending or pulling.
- Ensure that the sensor is not directly exposed to fluorescent light from a rapid-starter lamp, a high frequency lighting device or sunlight etc., as it may affect the sensing performance.
- A mechanical structure is employed for the distance adjuster. Do not drop the product.
- Do not use this sensor in places having excessive vapor, dust, etc., or where it may come in contact with corrosive gas, etc.
- Take care that the sensor does not come in contact with oil, grease, organic solvents such as thinner, etc., strong acid, or alkaline.
- Do not use this sensor in an environment containing inflammable or explosive gases.
- Never disassemble or modify the sensor.

2 PART NAMES



No.	Part	Description
①	Stability indicator (green)	Lights up under the stable Light or stable Dark condition. See “STABILITY INDICATOR” on page 3.
②	Distance adjuster (5-turn)	Sensing range increased when turned clockwise. See “DISTANCE ADJUSTMENT” on page 3.
③	Operation indicator (orange)	Lights up when the sensing output is ON.
④	Operation mode switch	• L: Light-ON Light-ON mode is obtained when the switch is turned fully clockwise (L). • D: Dark-ON Dark-ON mode is obtained when the switch is turned fully counterclockwise (D). See “BGS / FGS FUNCTION” on page 2.

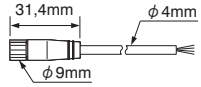
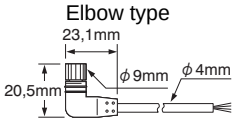
☛ When turning the distance adjuster or operation mode switch, use a standard screwdriver and turn slowly. Using excessive force will damage them.

3 CONNECTOR CABLES

Connector cables for the M12 pigtailed type

Type	Model no.	Cable length
2-core type	CN-22-C2	2m
	CN-22-C5	5m
4-core type	CN-24-C2	2m
	CN-24-C5	5m

Connector cables for the M8 connector type

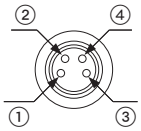
Type	Model no.	Cable length
Straight type 	UZZ80820	2m
	UZZ80850	5m
Elbow type 	UZZ80821	2m
	UZZ80851	5m

4 I/O CIRCUIT DIAGRAMS

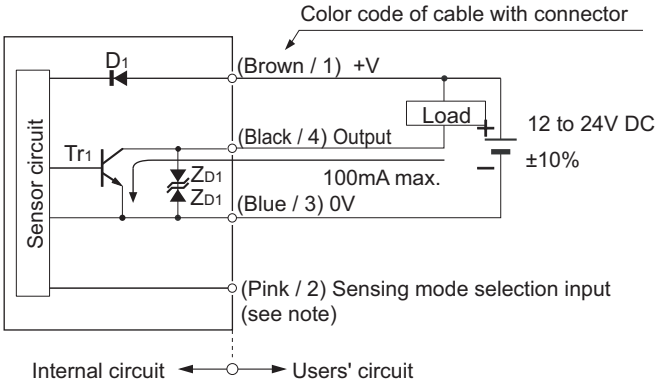
The following symbols are used in this section.

Symbol	Meaning
D_1, D_2	Reverse supply polarity protection diode
Z_{D1}, Z_{D2}	Surge absorption zener diode
Tr_1	NPN output transistor
Tr_2	PNP output transistor

Pin assignment

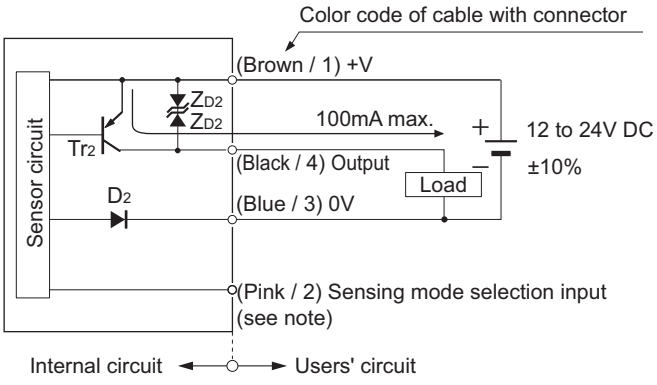
M8 connector type	Terminal name
	1) +V 2) Sensing mode selection input 3) 0V 4) Output

NPN output type



☛ The sensing mode (BGS / FGS function) is determined by how you wire the sensing mode selection input (pink / 2). See “BGS / FGS FUNCTION” on page 2.

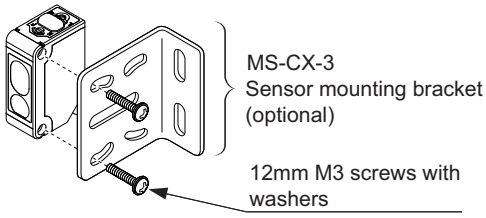
PNP output type



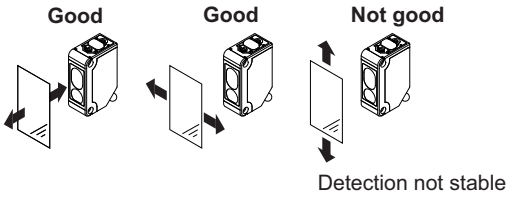
☛ The sensing mode (BGS / FGS function) is determined by how you wire the sensing mode selection input (pink / 2). See “BGS / FGS FUNCTION” on page 2.

5 MOUNTING

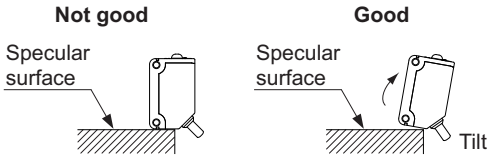
Mount the sensor with a tightening torque of 0.5N·m or less.



Consider which direction the object being sensed will move and mount the sensor accordingly.



When a specular body, e.g. aluminum or copper foil, is present below the sensor, tilt the sensor slightly upwards to avoid faulty operation.

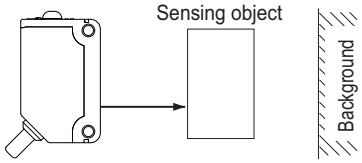


☛
- When detecting a specular object (aluminum or copper foil, etc.) or an object with a glossy surface or coating, a small change in angle, wrinkles on the object surface, etc. may lead to faulty detection.
- If a specular body is present in the background, faulty detection may result due to a small change in the angle of the background body. In such cases, tilt the sensor and confirm operation with the actual sensing object.
- There is a non-detactable area right in front of the sensor.

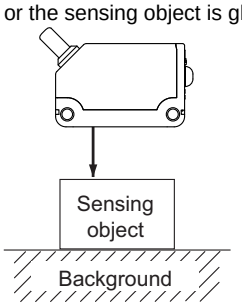
6 BGS / FGS FUNCTION

This sensor incorporates the BGS / FGS function.

- BGS = background suppression
  This function is used when the sensing object is apart from the background.

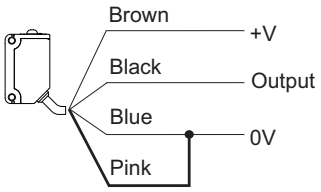
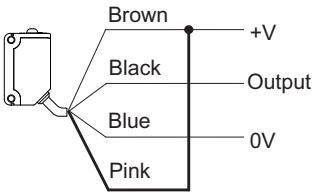


- FGS = foreground suppression
  This function is used when the sensing object contacts the background or the sensing object is glossy, etc.



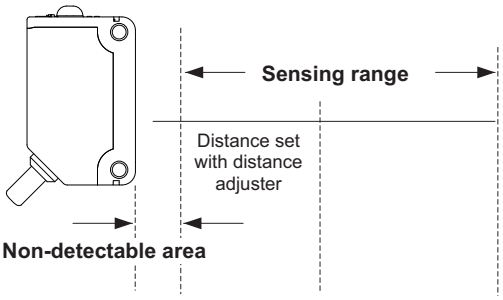
Sensing mode selection input

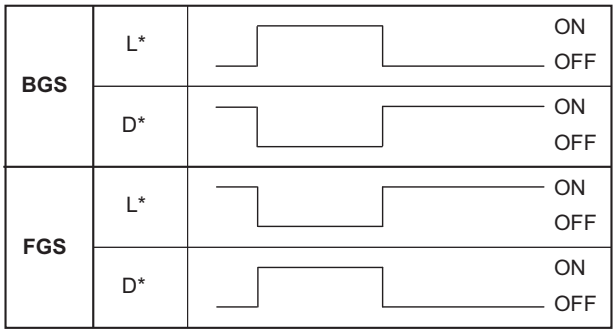
The sensing mode (BGS / FGS function) is determined by how you wire the sensing mode selection input (pink / 2).

BGS	FGS
	

Output

The sensing output depends on whether the BGS or FGS function is selected.



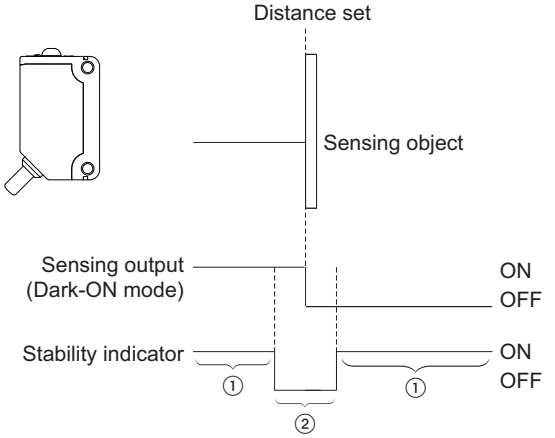


***L = Light-ON, D = Dark-ON.**

7 STABILITY INDICATOR

Since the CX-440 uses a two-segment photodiode as its receiving element, and sensing is based on the difference between the angle of the incident beam and the reflected beam, the sensing output operates according to the distance to the object and the distance set.

There is a margin of instability around the exact distance set. The stability indicator shows when sensing is stable.



① = Stable operating condition

② = Unstable operating condition

8 DISTANCE ADJUSTMENT

☛ Be sure to wire the sensing mode selection input (pink / 2) before carrying out distance adjustment. If wiring is done after distance adjustment, the sensing area changes.

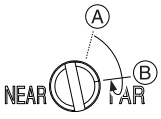
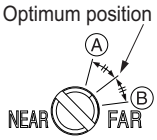
You must carry out distance adjustment when using this product.

☛ Since the distance adjuster is a 5-turn adjuster, remember how many turns you have made when finding the optimum position.

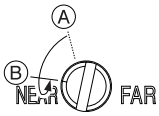
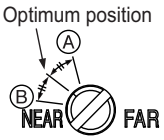
When the BGS function is used

When the sensing object moves horizontally, follow this procedure.

When the object is approaching or moving away from the sensor, follow steps 1 and 2.

Step	Description	Distance adjuster
①	Turn the distance adjuster fully counter-clockwise to the minimum sensing range (approx. 20mm, 40mm for CX-442).	 Turn fully
②	Place an object at the required distance. Turn the distance adjuster gradually clockwise, and locate point A, where the operation indicator turns ON.	
③	Remove the object. Turn the adjuster clockwise until the operation indicator turns ON again. Turn the adjuster back a little until the operating indicator turns OFF. That position is point B. If the operation indicator does not turn ON even if the adjuster is turned fully clockwise, the full clockwise position is point B.	
④	The position exactly between points A and B is the optimum sensing position.	

When the FGS function is used

Step	Description	Distance adjuster
①	Turn the distance adjuster fully clockwise to the maximum sensing range (approx. 50mm , 100mm approx. for CX-444, 300mm approx. for CX-442.)	 Turn fully
②	Turn the distance adjuster gradually counterclockwise to locate point A, where the operation indicator turns OFF.	
③	Place an object at the required distance from the sensor. Turn the adjuster counterclockwise until the operation indicator turns OFF again. Turn the adjuster backward a little until the operation indicator turns ON. This is point B. If the operation indicator does not turn OFF even if the adjuster is turned fully counterclockwise, the full counterclockwise position is point B.	
④	The position exactly between points A and B is the optimum sensing position.	

9 SPECIFICATIONS

Item		Adjustable range reflective type			
		Small spot			
		CX-441 (NPN)[*1]	CX-443 (NPN)[*1]	CX-444 (NPN)[*1]	CX-442 (NPN)[*1]
		CX-441-P (PNP)[*1]	CX-443-P (PNP)[*1]	CX-444-P (PNP)[*1]	CX-442-P (PNP)[*1]
Adjustable sensing range		20 to 50mm		20 to 100mm	40 to 300mm
Sensing range		2 to 50mm		15 to 100mm	20 to 300mm
Spot diameter		approx. ∅ 2mm at 50mm sensing range	approx. ∅ 6.5mm at 50mm sensing range	approx. ∅ 9mm at 100mm sensing range	approx. ∅ 15 x 15mm at 300mm sensing range
Hysteresis		2% or less of operation distance			5% or less of operation distance
Repeatability		Along sensing axis: 0.5mm or less. Perpendicular to sensing axis: 0.2mm or less (with white, non-glossy paper)			
Supply voltage		12 to 24V DC ±10% Ripple P-P 10% or less			
Current consumption		20mA or less			
Output		NPN output type • NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1V or less (at 100mA sink current), 0.4V or less (at 16mA sink current)		PNP output type • PNP open-collector transistor • Maximum source current: 100mA • Applied voltage: 30V DC or less (between output and +V) • Residual voltage: 1V or less (at 100mA source current), 0.4V or less (at 16mA source current)	
	Output operation	Light-ON or Dark-ON can be selected			
	Short-circuit protection	Incorporated			
Response time		1ms or less			
Operation indicator		Orange LED, lights up when the output is ON.			
Stability indicator		Green LED, lights up under stable operating condition.[*2]			
Distance adjuster		5-turn mechanical adjuster			
Sensing mode		BGS or FGS function active depending on wiring of sensing mode selection input			
Automatic interference prevention function		Incorporated, two sets of sensors can be mounted close together.[*3]			
Protection		IP67 (IEC)			
Ambient temperature		-25 to +55°C (No dew condensation or icing allowed), Storage: -30 to +70°C			
Ambient humidity		35 to 85% RH, Storage: 35 to 85% RH			
Emitting element		Red LED (modulated)			
Material		Enclosure: PBT, Front cover: Polycarbonate, Display cover: Polycarbonate			
Cable		0.2mm^2 4-core cabtyre cable, 2m long			
Weight		Approx. 55g			

[*1] Model nos. with the suffix -Z indicate the M8 plug-in connector type.
[*2] See “STABILITY INDICATOR” on page 3.
[*3] Detection may be unstable depending on the mounting conditions or the object being sensed. After the sensor is mounted, confirm operation under actual operating conditions.

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