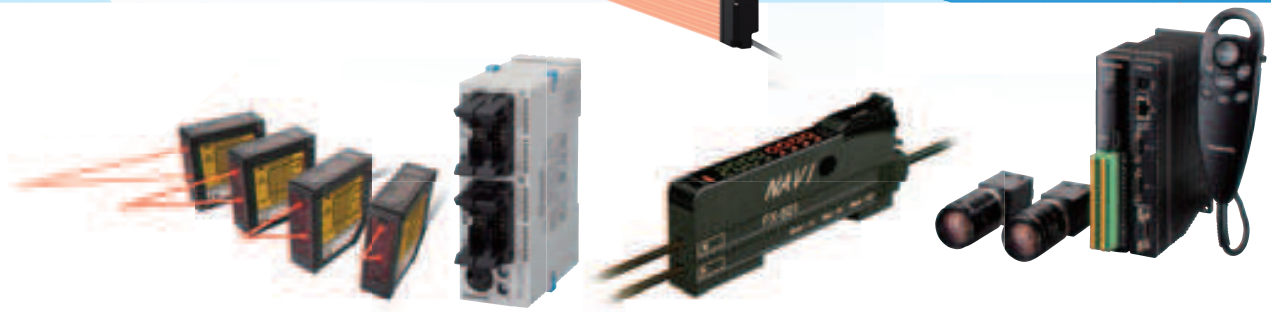
Panasonic
ideas for life

formerly SUNX

www.sunxsensors.com

NEW & KEY PRODUCTS 2012 -2013



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Fiber Sensors

Tough Fiber

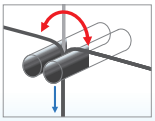
NEW

Introducing a tough fiber that transcends common knowledge!

Conventional 3 types rolled into 1 !!
New standard fiber

It has toughness that can be used in moving parts, toughness that can be bent with precision, and high-quality for all purposes. It changes common knowledge about fibers.

Break-free

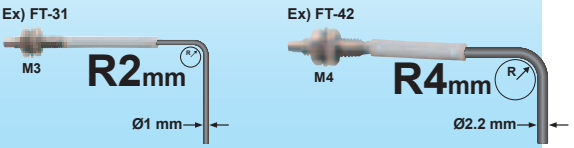


Flexible durability

10 million times (Typical)

Bending conditions
Bending radius: R10 mm, Reciprocating bending: 180°

More flexible R2 to R4 mm



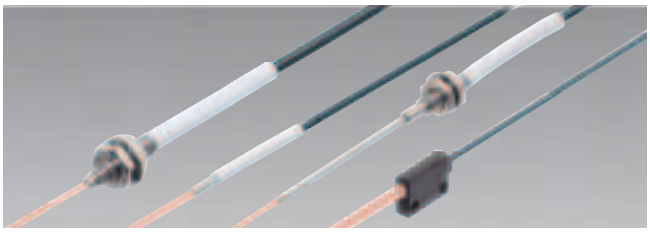
Reduced the time for selecting fiber and registration numbers

For Designers High-quality

- High-quality in whichever tough fiber you choose!
- Easy selection!
- Reduced risk of breaking and bending during installation!

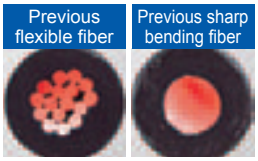
For Buyers Low Price

- Cost savings!
- Reduced registration numbers!
- Reduced frequency of maintenance stockpiling and replacement!

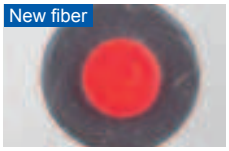


Reduced variation in sensing

Beams at the fiber aperture are uniform, leading to stable sensing.



Generally flexible fibers and sharp bending fibers are composed of multiple fiber cores, often resulting in large variations in light intensity.

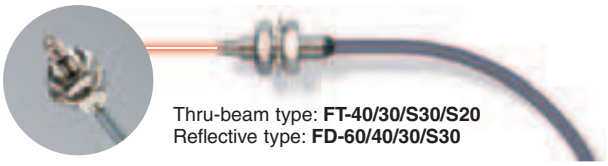


The new standard fiber is composed of a single fiber core, achieving uniform light intensity.

- **Uniform and highly accurate sensing**
- **Stable sensing even if the fiber is bent**

Super Quality Fiber

Under our new manufacturing method and quality control system, we have developed fiber heads that have a stabilized light emission. When used with the **FX-500** amplifier, a complete digital control is essentially achieved.



Thru-beam type: **FT-40/30/S30/S20**
Reflective type: **FD-60/40/30/S30**

Stable emission intensity ±10

Variation in emission intensity of the fiber core is controlled down to less than ±10%, achieving a stable detection.

Ø2.2 mm standard fiber

Single core standard fiber with high flexibility

In general, high-flexibility types adopt a multi-fiber core which may result in large variation in light emission.

Ambient temperature [–40 to +70 °C in previous]

1.2 times more than previous

–55 to +80 °C

R4

Bending radius [Previous is R25 mm]

R4mm

1/6 of that of previous

The centering precision of the fiber core attached to the inserting plug is doubled. As the insertion precision is increased, the variation among units can be greatly suppressed.

Bending durability [Previous is 1,000 times]

10,000 times more than previous

10 million times

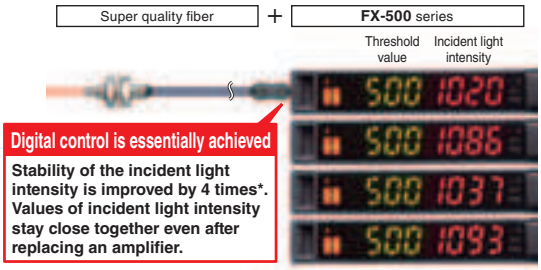
Fiber Sensors

Dual Digital Display Fiber Sensor
FX-500 SERIES

At the industry's leading edge

A different stability!

When used with the super quality fiber as a set, the incident light intensity variation among units is decreased to only 1/4 of that of conventional models.

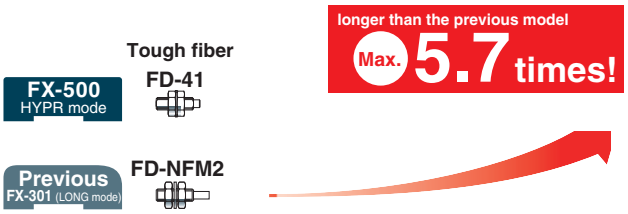


* Using a small diameter fiber (fiber core ϕ0.5 mm). If using a standard fiber (fiber core ϕ1.0 mm), the variation will be double of that of conventional models.

Hyper

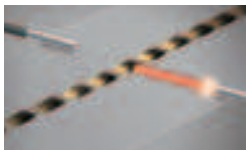
HYPR mode incorporated

FX-500 in combination with the small diameter fiber which can handle challenging detections, allows super long sensing range.



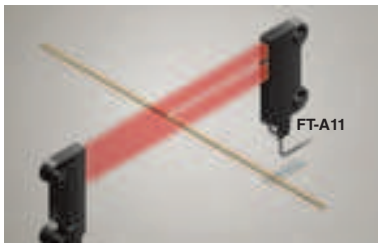
Max. 25 µs response time

FX-500 with its ultra high response time improves productivity.



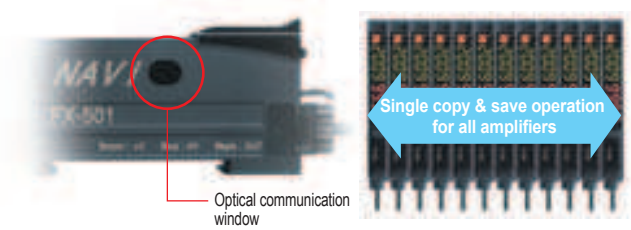
A different accuracy!

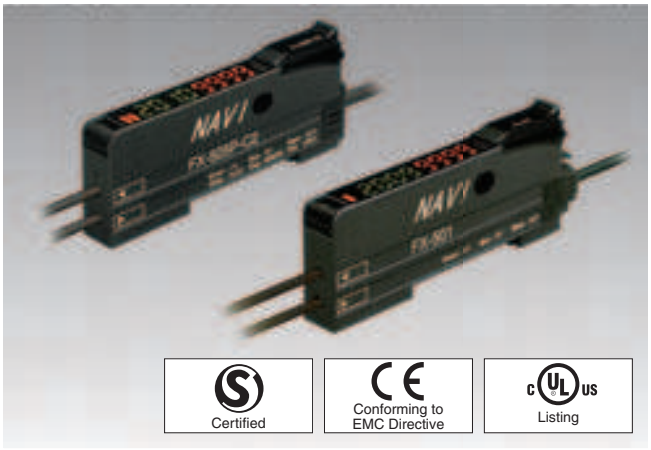
FX-500 with its accurate detection catches fractional difference in light intensity, fulfilling high precision and low-hysteresis applications.



An optical communication function allows sensors to be adjusted simultaneously

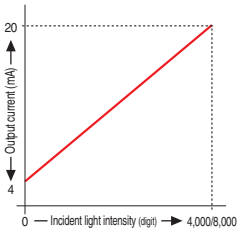
The optical communication function allows the data that is currently set to be copied and saved all at once for all amplifiers connected together from the right side. This greatly reduces troublesome setup tasks and makes setup much smoother.



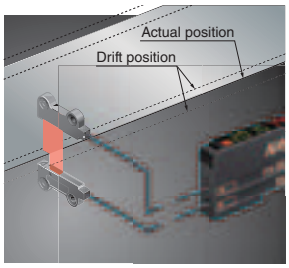


Analog output cable type FX-505(P)-C2

A 4 to 20 mA analog output represents the digital value of incident light intensity



■Edge tracking of film or sheet



Drifting path can be tracked as the light intensity changes.

Item \ Type		Standard type (Note)	2-output type (Note)	Cable type
Model No.	NPN output	**FX-501**	**FX-502**	**FX-505-C2**
	PNP output	**FX-501P**	**FX-502P**	**FX-505P-C2**
Supply voltage		12 to 24 V DC $^{+10}_{-15}$ %		
Output		NPN open-collector transistor or PNP open-collector transistor	NPN open-collector transistor or PNP open-collector transistor×2	
	Output points	1 point	2 points	
	Output operation	Switchable either Light-ON or Dark-ON by L/D mode		
Response time		H-SP: 25 µs or less, FAST: 60 µs or less, STD: 250 µs or less, LONG: 2 ms or less, U-LG: 4 ms or less, HYPR: 24 ms or less, selectable		
Analog output		—		4 to 20 mA approx.
External input		—	Incorporated, Switchable with Output 2	Incorporated
Possible external input function		—	Incorporated	
Ambient temperature		−10 to +55 °C (unless 4 units or more are mounted in cascade)		
Emitting element (modulated)		Red LED (Peak emission wavelength: 643 nm)		
Dimensions		W10×H32×D75 mm		

Note: The cable for amplifier connection is not supplied as an accessory with the connector type amplifier. Make sure to use the optional quick-connection cable given below.

For **FX-501(P)** Main cable (3-core): **CN-73-C1** (cable length 1 m), **CN-73-C2** (cable length 2 m), **CN-73-C5** (cable length 5 m)
Sub cable (1-core): **CN-71-C1** (cable length 1 m), **CN-71-C2** (cable length 2 m), **CN-71-C5** (cable length 5 m)
For **FX-502(P)** Main cable (4-core): **CN-74-C1** (cable length 1 m), **CN-74-C2** (cable length 2 m), **CN-74-C5** (cable length 5 m)
Sub cable (2-core): **CN-72-C1** (cable length 1 m), **CN-72-C2** (cable length 2 m), **CN-72-C5** (cable length 5 m)

Fiber Sensors

Dual Digital Display Fiber Sensor
FX-100 SERIES

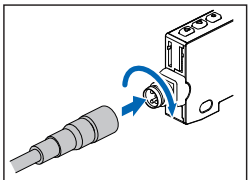
Taking digital fiber sensors to the next level

Space-saving 9 mm in width

The unit is a slim 9 mm in width, even with the digital dual screen display. It both saves space and is easy to handle.

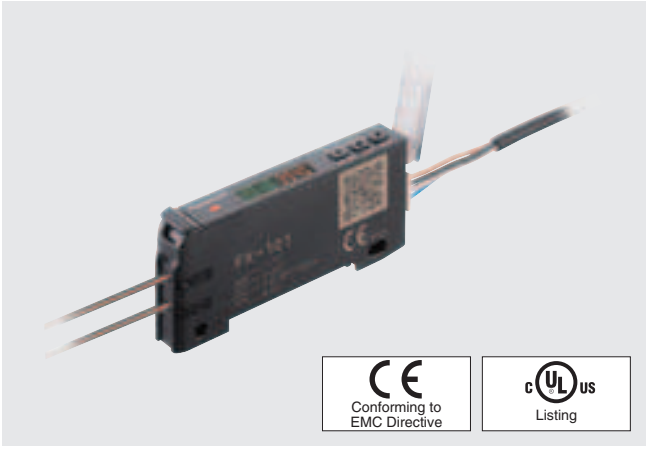
Wiring can be carried out using commercially-available connectors

The **DP-100** series of digital pressure sensors and the **PM-64** series of micro photoelectric sensors can be wired using the same commercially-available connectors.



M8 plug-in connector type is also available. (**FX-10□-Z**)

FX-100 series has been modificated from July 2011 production. The color of enclosure has been changed from white to dark gray and the protection cover has been attached.



Simple operation

Setting details are divided into three levels for simple operation, so that settings for normal operation are made in 'RUN mode', basic settings are made in 'SET mode', and advanced functions are set in 'PRO mode'.

RUN mode
Functions used during normal operation
[Function table]
- Changing threshold values
- Key lock
- Quick settings
- Code settings

SET mode
Functions used when initializing the sensor and carrying out maintenance
[Function table]
- Teaching • L-ON / D-ON setting
- Timer setting
- Light-emitting amount selection
- Emission frequency setting function

PRO mode
Equipped with a full complement of digital fiber sensor functions
[Function table]
- Shift • External input • Reset
- GETA • ECO • Display reversing
- Surplus value display • Copy
- Threshold value seeking cycle setting

Type		Staudand type		Long sensing range type	
		Cable set		Cable set	
Model No. (Note)	NPN output	**FX-101-CC2**	**FX-101(-Z)**	**FX-102-CC2**	**FX-102(-Z)**
	PNP output	**FX-101P-CC2**	**FX-101P(-Z)**	**FX-102P-CC2**	**FX-102P(-Z)**
Supply voltage		12 to 24 V DC±10 %			
Output		NPN open-collector transistor or PNP open-collector transisitor			
Output operation		Selectable either Light-ON or Dark-ON, at SET mode			
Response time		Emission frequency 0: 250 μs or less Emission frequency 1: 450 μs or less Emission frequency 2: 500 μs or less Emission frequency 3: 600 μs or less		Emission frequency 1: 2.5 ms or less Emission frequency 2: 2.8 ms or less Emission frequency 3: 3.2 ms or less Emission frequency 4: 5.0 ms or less	
Ambient temperature		−10 to +55 °C			
Emitting element (modulated)		Red LED (Peak emission wavelength : 632 nm)			
Dimensions		W92×H30×D65.5 mm			

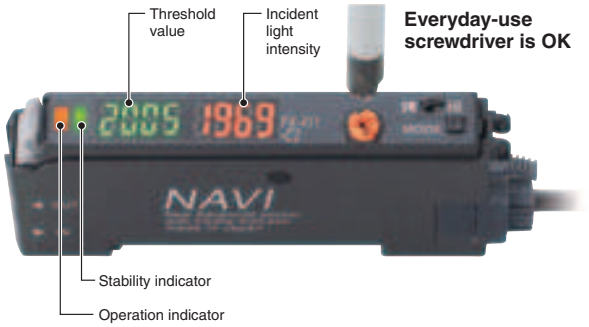
Note: Model Nos. having the suffix '**-Z**' are M8 plug-in connector type.

Dual Digital Display Fiber Sensor
FX-410 SERIES

Just "Look" and "Turn", simple, easy-to-use fiber sensor

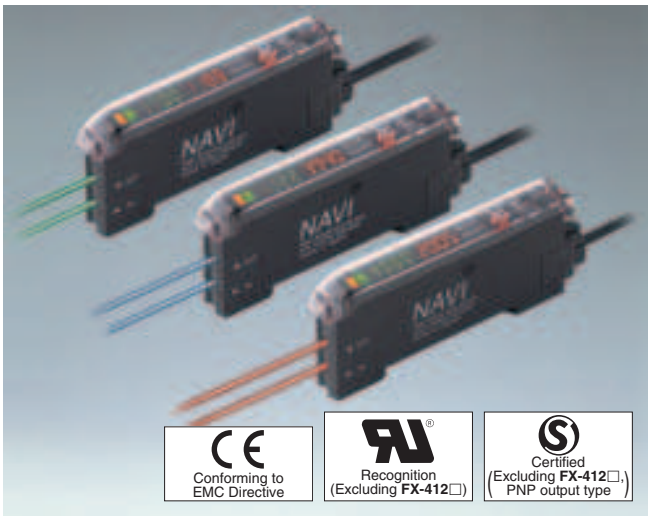
Incident light intensity and threshold value are displayed simultaneously

The incident light intensity and threshold value can be checked at the same time with no operations needed. In addition, no complex mode settings are needed when the values are adjusted.



New FX-412 can be turned by finger!

The adjuster can be turned directly by finger, without the need for a screwdriver.



Sensing range (Red LED type):
FT-43 2,200 mm (U-LG), 450 mm (STD), 310 mm (FAST)
FD-62 820 mm (U-LG), 180 mm (STD), 130 mm (FAST)
Supply voltage: 12 to 24 V DC±10 %
Output: **FX-411**□ / **412**□ NPN open-collector transistor
FX-411□**P** PNP open-collector transistor
Dimensions: W10×H30.5×D64.5 mm

Note: The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cable given below.
Main cable (3-core): **CN-73-C1** (cable length 1 m), **CN-73-C2** (cable length 2 m) **CN-73-C5** (cable length 5 m)
Sub cable (1-core): **CN-71-C1** (cable length 1 m), **CN-71-C2** (cable length 2 m) **CN-71-C5** (cable length 5 m)

Simple Wire-saving Units

Communication Unit for Open Network **NEW**

SC-GU3 SERIES

The SC-GU3 Series is easy to install and enables flexible remote operation over a network.

Sensor information can be checked and changed via an open network.

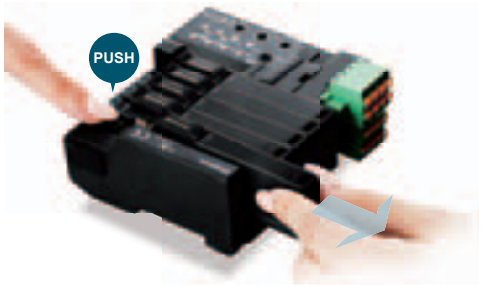
The status of sensors in remote locations can now be checked via an open network. Digital readings are also acquired periodically and displayed in graph form to facilitate preventative maintenance.
The ability to communicate with sensors allows for the batch transfer of threshold value changes from a remote location to improve productivity.

Wire-saving construction greatly reduces labor.

Connectors are used to attach sensors. This eliminates the need to use connection cables, thus reducing the labor required for wiring.

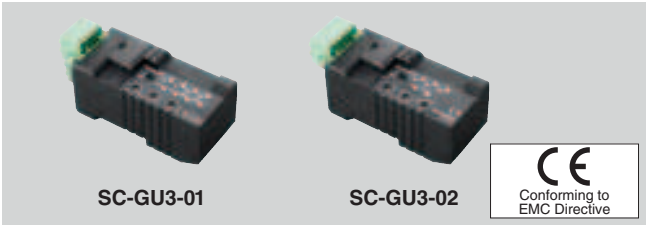
Sensors are easily replaced without removing adjacent sensor amplifiers.

Sensors are removed by simply sliding the sensor amplifier sideways while pressing on the connection unit lever.
Install new sensors by simply sliding the amplifier into the array without requiring the removal of the adjascent sensors.



Installation made easy by the adoption of optical communication

Installation and maintenance workability have been improved by switching from a link cable to optical communication for communication from the end unit.



SC-GU3-Compatible Sensors

Digital communication supporting sensors

(optical communication compatible)

Fiber sensors	**FX-501**, **FX-502**, **FX-301** (those produced after June 2004), **FX-305**
Laser sensor	**LS-403**
Pressure sensors	**DPS-401**, **DPS-402**
Sensor input unit	**SC-T1JA** (in combination with **SC-71**)

Sensors that only output information

(not optical communication compatible)

Fiber sensors	**FX-301**(those produced up to May 2004) **FX-301**(**B**/**G**/**H**), **FX-301-HS**
Manually set fiber sensors	**FX-411**, **FX-412**, **FX-311**(**B**/**G**)
Fiber sensors for leaks/liquid fibers	**FX-301-F**, **FX-301-F7**
Laser sensor	**LS-401**
Compact inductive proximity sensor	**GA-311**
1-channel connector input extension unit	**SC-T1J** (in combination with **SC-71**)
8-channel connector input unit	**SC-T8J** (those produced from June 2011, in combination with **SC-BU**)

Item \ Designation	Communication unit for CC-Link				
Model No.	**SC-GU3-01**				
Number of connectable units	Max. 16 units per **SC-GU3-01** (Max. 12 units for **FX-500** Series)				
Supply voltage	24 V DC $^{+10}_{-15}$ %				
Current consumption	120 mA or less (excluding connected sensor amplifiers)				
Allowable passing current	Wire-saving connector 2 A (Note 1), supply connector 6 A (Note 2)				
Communication method	CC-Link Ver.1.10				
Number of occupied station	Switchable 1 or 4 station				
Baud rate	10 Mbps	5 Mbps	2.5 Mbps	625 kbps	156 kbps
Station No. setting	1 to 64 (0 and 65 or more: Error)				
Remote station type	Remote device station				
Ambient temperature	−10 to +55 °C (If 4 to 7 units are connected in cascade: −10 to +50 °C, if 8 to 16 units are connected in cascade: −10 to +45 °C) (No dew condensation or icing allowed), Storage: −20 to +70 °C				

Notes: 1) Be sure to check that total current consumption of sensor amplifiers connected in cascade does not exceed allowable passing current.
2) In case of supplying power to other devices, be sure to set the current less than allowable passing current.

Item \ Designation	Communication unit for DeviceNet		
Model No.	**SC-GU3-02**		
Number of connectable units	Max. 16 units per **SC-GU3-02** (Max. 12 units for **FX-500** Series)		
Supply voltage	11 to 25 V DC		
Current consumption	80 mA or less (at 24 V) (excluding connected sensor amplifiers)		
Allowable passing current	Wire-saving connector 2 A (Note 1)		
Communication method	DeviceNet compliant		
Baud rate	500 kbps	250 kbps	125 kbps
Address setting	0 to 63 (64 or more: Error)		
Supported functions	I/O communication (Poll), Explicit message communication		
Ambient temperature	−10 to +55 °C (If 4 to 7 units are connected in cascade: −10 to +50 °C; if 8 to 16 units are connected in cascade: −10 to +45 °C) (No condensation or icing allowed), Storage: −20 to +70 °C		

Note: Be sure to check that total current consumption of sensor amplifiers connected in cascade does not exceed allowable passing current.

Photoelectric Sensors

Amplifier Built-in • Cylindrical Photoelectric Sensor
CY-100 SERIES

NEW

Easily mountable with M18 thread

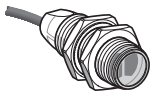
Great lineup of 80 models

The **CY-100** series has an excellent cost performance. Moreover, a wide number of variations means that there sure will be a sensor that fits your needs.

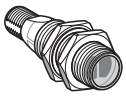
Type	Sensing range
Thru-beam **CY-111**□	15 m
Retroreflective **CY-192**□	4 m
Retroreflective (with polarizing filters) **CY-191**□	2 m
Diffuse reflective **CY-121**□	100 mm
Diffuse reflective (with sensitivity adjuster) **CY-122**□	600 mm

Output	NPN, PNP
Output operation	Light-ON, Dark-ON
Connecting method (Note 1)	2 m cable length type, M12 plug-in connector type
Shape	Standard type, Side view type

Standard type



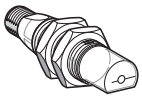
2 m cable length type



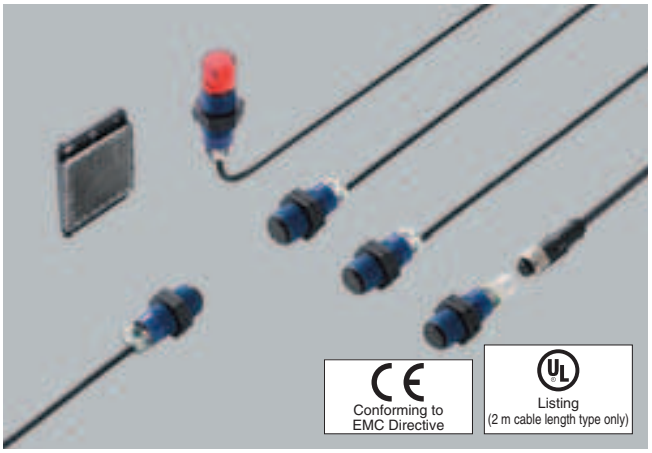
M12 plug-in connector type

Side view type

2 m cable length type

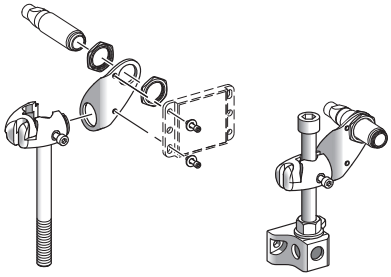


M12 plug-in connector type



Convenient universal sensor mounting stand

It can adjust the height of the sensor and reflector **RF-420**.



Supply voltage: 12 to 24 V DC±10 %
Output: NPN open-collector transistor or PNP open-collector transistor
Response time: 1 ms or less
Protection: IP67 (IEC)
Ambient temperature: −25 to +55 °C

Inductive Proximity Sensors

Cylindrical Inductive Proximity Sensor
GX-M SERIES

NEW

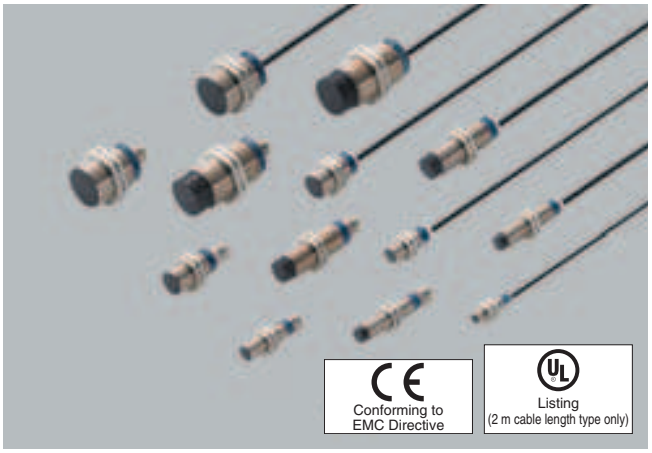
Wide variations

Wide product range

Type: DC 3-wire shielded type
DC 3-wire non-shielded type
DC 2-wire standard type
DC 2-wire long range type
Size: M8, M12, M18, M30
Connector: 2 m cable length type
M12 plug-in connector type
Strong resistance IP68 (**GX-M8**□: IP67) (IEC)

Wiring cost is reduced to 2/3

The DC 2-wire type (**GX-M**□**-U**) reduces the wiring cost to 2/3. Besides, it prevents trouble due to miswiring.



Max. operation distance (Note): 22 mm ±10 % (**GX-MK30A**□)
Supply voltage: 12 to 24 V DC±10 %
Output: NPN open-collector transistor / PNP open-collector transistor
(DC 3-wire type),
Non-contact DC 2-wire type

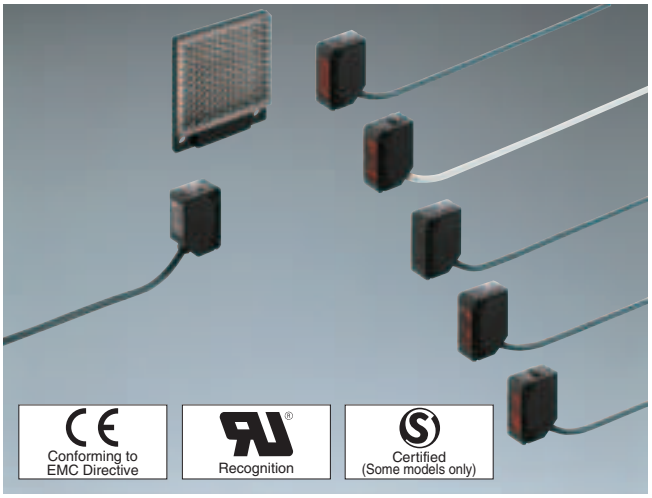
Note: It is the value in state where the circum ference of a detection side has a metal object.

Photoelectric Sensors

Amplifier Built-in • Compact Photoelectric Sensor

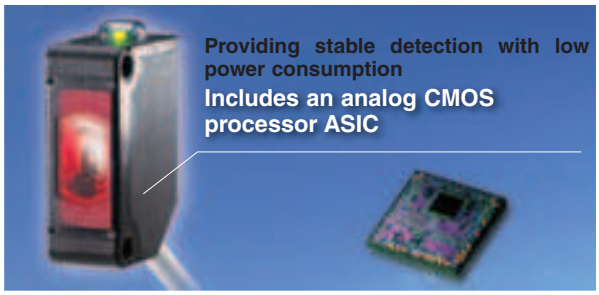
CX-400 SERIES Ver.2

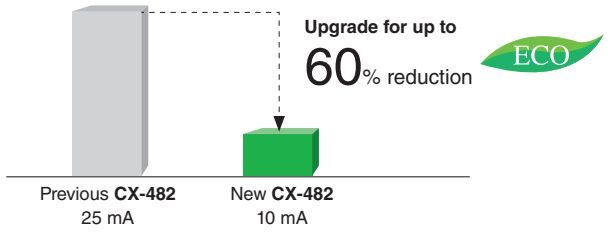
Sensors that are environmentally and user friendly.



Reducing environmental burdens further
Up to 60% less power consumption

The total lineup of 148 models covers through the inclusion of a newly developed custom integrated circuit. The **CX-400** series achieves reductions in power consumption of up to 60%, averaging 44% reduction when upgrading due to its unique design. These sensors reduce carbon emissions and contribute to environmental friendliness.



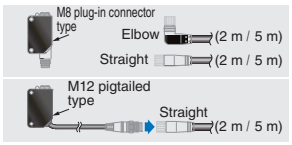


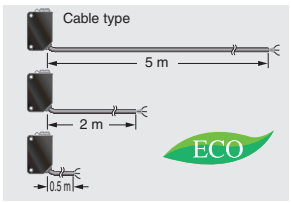
Compact size

The sensors are compact in size at W11.2×H31×D20 mm.
The mounting pitch is also at the world standard size of 25.4 mm.

Less processing

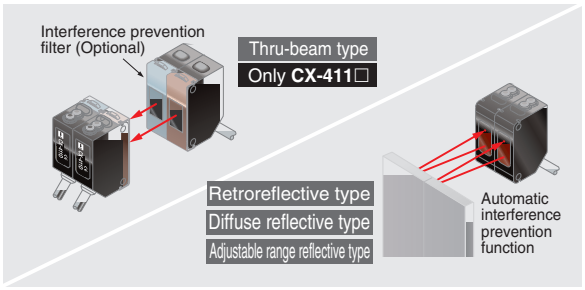
M8 plug-in connector type and M12 pigtailed type are available. This contributes to less time spent in setting up. In addition, cable types are available with cable lengths of 0.5 m, 2 m and 5 m. This results in less wastage.





Strong against interference

The interference prevention function lets two sensors to be mounted close together precisely.



Type		Thru-beam			Retroreflective					Diffuse reflective			
			Long sensing range		With polarizing filters	Long sensing range	For transparent object sensing						Narrow-view
Model No.	NPN output	CX-411	CX-412	CX-413	CX-491	CX-493	CX-481	CX-483	CX-482	CX-424	CX-421	CX-422	CX-423
	PNP output	CX-411-P	CX-412-P	CX-413-P	CX-491-P	CX-493-P	CX-481-P	CX-483-P	CX-482-P	CX-424-P	CX-421-P	CX-422-P	CX-423-P
Sensing range		10 m	15 m	30 m	3 m	5 m	50 to 500 mm	50 to 1,000 mm	0.1 to 2 m	100 mm	300 mm	800 mm	70 to 300 mm
Supply voltage		12 to 24 V DC±10 %											
Output		NPN output type: NPN open-collector transistor, PNP output type: PNP open-collector transistor											
	Output operation	Switchable either Light-ON or Dark-ON											
Response time		1 ms or less		2 ms or less	1 ms or less								
Protection		IP67 (IEC)											
Ambient temperature		−25 to +55 °C											
Emitting element (modulated)		Red LED	Infrared LED		Red LED		Infrared LED						Red LED

Note: 0.5 m / 5 m cable length type (standard: 2 m), M8 plug-in connector type, and M12 pigtailed type are available.

Type		Small spot	Adjustable range reflective		
Model No.	NPN output	CX-441	CX-443	CX-444	CX-442
	PNP output	CX-441-P	CX-443-P	CX-444-P	CX-442-P
Adjustable range (Note 1)		20 to 50 mm		20 to 100 mm	40 to 300 mm
Sensing range (with white non-glossy paper)		2 to 50 mm		15 to 100 mm	20 to 300 mm
Supply voltage		12 to 24 V DC±10 %			
Output		NPN output type: NPN open-collector transistor, PNP output type: PNP open-collector transistor			
	Output operation	Switchable either Detection-ON or Detection-OFF			
Response time		1 ms or less			
Sensing mode		BGS / FGS functions Switchable with wiring of sensing mode selection input			
Protection		IP67 (IEC)			
Ambient temperature		−25 to +55 °C			
Emitting element		Red LED (modulated)			

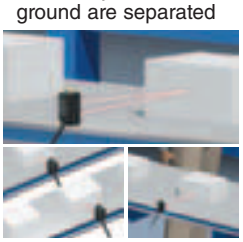
Notes: 1) The adjustable range stands for the maximum sensing range which can be set with the distance adjuster. The sensor can detect an object 2 mm [**CX-444**(**-P**): 15 mm, **CX-442**(**-P**): 20 mm], or more away.
2) M8 plug-in connector type is also available.

BGS / FGS functions make even the most challenging settings possible!

BGS

Background not present

- When object and background are separated



FGS

Background present

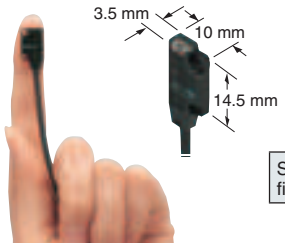
- When object and background are close together
- When the object is glossy or uneven

Photoelectric Sensors

Amplifier Built-in • Ultra-slim Photoelectric Sensor
EX-10 SERIES Ver.2

Smallest body: 3.5 mm thick

Freely mountable fingertip size



Freely mountable W10×H14.5×D3.5 mm size (thru-beam, front sensing type). Moreover, easy alignment is possible with the visible red LED beam source.

Six types of mounting brackets, fixable with M3 screws, are available.

Electric power saving*

The **EX-10** series achieves reductions in power consumption of up to 65 %. These sensors contribute to environmental friendliness.

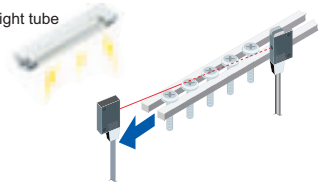
* Effective from production in October 2010.

Incorporated an inverter countermeasure circuit*

The **EX-10** series become significantly stronger against inverter light and other extraneous light.

* Effective from production in October 2010.

Fluorescent light tube



Type		Thru-beam						Thru-beam • with operation mode switch on bifurcation		Convergent reflective	
Model No. (Note 1)		EX-11A(-R)	EX-11B(-R)	EX-13A(-R)	EX-13B(-R)	EX-19A(-R)	EX-19B(-R)	EX-15	EX-17	EX-14A(-R)	EX-14B(-R)
Sensing range		150 mm		500 mm		1 m		150 mm	500 mm	2 to 25 mm (Conv. point: 10 mm)	
Min. sensing object		ϕ1 mm opaque object		ϕ2 mm opaque object				ϕ1 mm opaque object	ϕ2 mm opaque object	ϕ0.1 mm copper wire (Setting distance: 10 mm)	
Supply voltage		12 to 24 V DC±10 %									
Output		NPN open-collector transistor (Note 2)									
	Output operation	Light-ON	Dark-ON	Light-ON	Dark-ON	Light-ON	Dark-ON	Switchable either Light-ON or Dark-ON		Light-ON	Dark-ON
Response time		0.5 ms or less									
Protection		IP67 (IEC)									
Ambient temperature		−25 to +55 °C									
Dimensions		W10×H14.5×D3.5 mm						W10×H14.5×D3.5 mm (sensor head)		W13×H14.5×D3.5 mm	

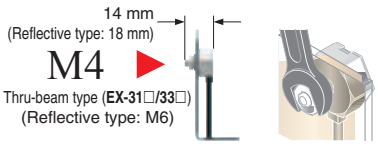
Notes: 1) **EX-□-R** is flexible cable type.
2) PNP output type is also available. (Excluding flexible cable type, **EX-15** and **EX-17**)
3) Side sensing type (excluding **EX-19**□ and **EX-14**□) is also available.
4) 5 m cable length type (standard: 2 m) is also available.

Amplifier Built-in • Threaded Miniature Photoelectric Sensor
EX-30 SERIES Ver.2

A new alternative to fiber sensors

Can be installed in the same way as standard fibers

The **EX-30** series can be screw-mounted (M4 for thru-beam type, M6 for reflective type) in the same way as standard fiber sensors. This means that they can be inserted into production lines in exactly the same way as conventional high-priced fiber sensors.

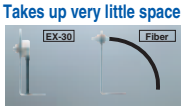


New design solves all weak points of fiber sensors

The **EX-30** series solves all of the difficulties associated with fiber sensors, such as “Difficulty finding a suitable place for the amplifier”, “Fragility of the fiber”, “Extra space needed because of difficulty in bending the fiber”, “The nuisance of having to use a protective tube to prevent fiber breakages”.

Unbreakable

Takes up very little space

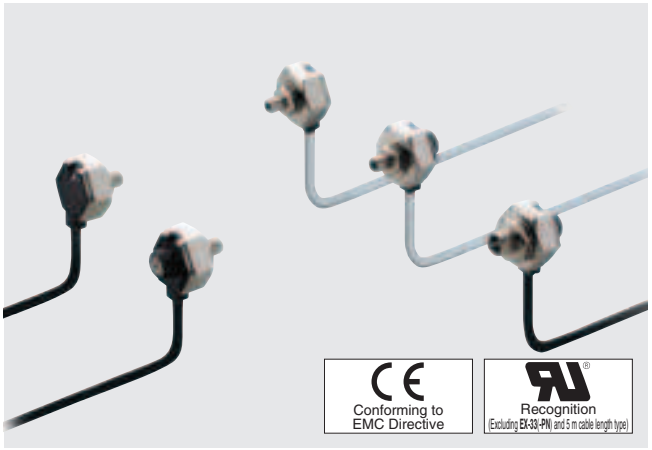


No protective tube needed

800 mm thru-beam type available EX-33□

The sensing range is 1.5 times greater than previous models! It also has a sensitivity adjuster to enable compatibility with a wide range of applications.

Electric power saving | Incorporated an inverter countermeasure circuit



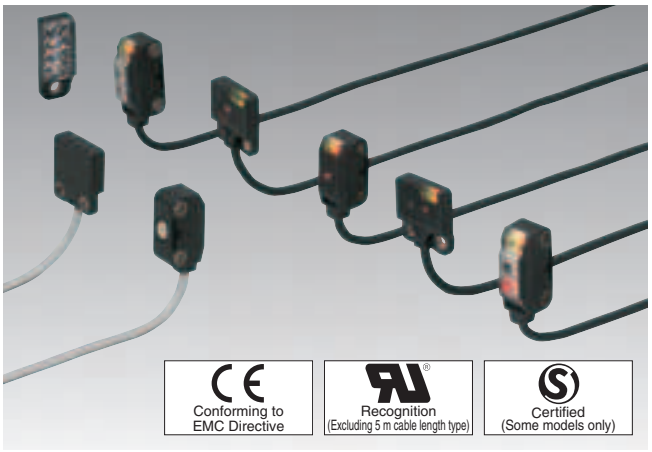
Type		Thru-beam			Diffuse reflective	
Model No.	NPN output	EX-31A	EX-31B	EX-33	EX-32A	EX-32B
	PNP output	EX-31A-PN	EX-31B-PN	EX-33-PN	EX-32A-PN	EX-32B-PN
Sensing range		500 mm		800 mm	50 mm	
Sensing object		ϕ2 mm or more opaque object			Opaque, translucent or transparent object	
Supply voltage		12 to 24 V DC±10 %				
Output		NPN output type: NPN open-collector transistor PNP output type: PNP open-collector transistor				
	Output operation	Light-ON	Dark-ON	Variable (Switching method)	Light-ON	Dark-ON
Response time		0.5 ms or less				
Protection		IP67 (IEC)				
Ambient temperature		−25 to +55 °C				

Note: 5 m cable length type (standard: 2 m) is also available. [excluding **EX-33(-PN)**]

Photoelectric Sensors

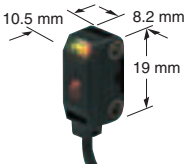
Amplifier Built-in • Ultra-compact Photoelectric Sensor

EX-20 SERIES Ver.2



Miniature-sized and still mountable with M3 screws

Mountable with M3 screws in spite of miniature size

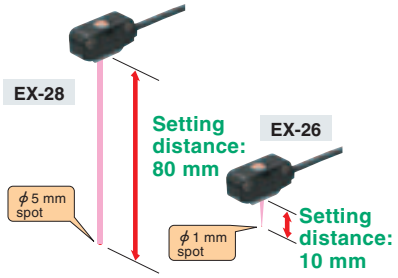


Long sensing range

The **EX-20** series achieves long distance sensing [thru-beam type: 2 m, retroreflective type: 200 mm (when using the attached reflector), diffuse reflective type: 160 mm], despite its miniature size. Hence, it is usable even on a wide conveyor.

Clear beam spot using red LED dot light source

The emission area of a dot light source is smaller than that of a conventional LED flat light source, and it is possible to design a high power, narrow beam. Since a red LED dot light source is used, the red beam spot is clear even at a far place, so that alignment and confirmation of sensing position is easy.



Electric power saving

Incorporated an inverter countermeasure circuit

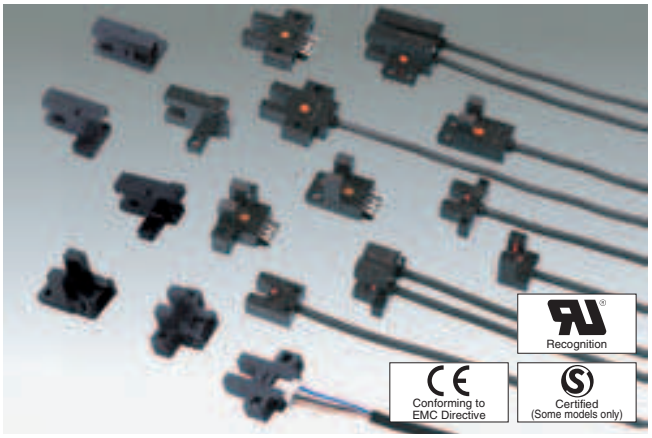
Type		Thru-beam		Retroreflective	Diffuse reflective	Convergent reflective		Narrow-view reflective
						Diffuse beam	Small spot beam	Long distance spot beam
		Front sensing	Side sensing	Side sensing	Side sensing	Front sensing	Side sensing	Side sensing
Model No. (Note 1)	Light-ON	**EX-21A(-PN)**	**EX-23(-PN)**	**EX-29A(-PN)**	**EX-22A(-PN)**	**EX-24A(-PN)**	**EX-26A(-PN)**	**EX-28A(-PN)**
	Dark-ON	**EX-21B(-PN)**		**EX-29B(-PN)**	**EX-22B(-PN)**	**EX-24B(-PN)**	**EX-26B(-PN)**	**EX-28B(-PN)**
Sensing range		1 m	2 m	30 to 200 mm	5 to 160 mm	2 to 25 mm (Conv. point: 10 mm)	6 to 14 mm (Conv. point: 10 mm)	45 to 115 mm
Sensing object		Min. ϕ2.6 mm opaque object	Min. ϕ3 mm opaque object	ϕ15 mm or more opaque or translucent object	Opaque, translucent or transparent object	Min. ϕ0.1 mm copper wire (Setting distance: 10 mm)		Opaque, translucent or transparent object
Supply voltage		12 to 24 V DC±10 %						
Output		NPN output type: NPN open-collector transistor, PNP output type: PNP open-collector transistor						
Response time		0.5 ms or less						
Protection		IP67 (IEC)						
Ambient temperature		−25 to +55 °C						
Dimensions (mm)		W16×H18×D4.5	W8.2×H19×D10.5	W8.2×H22×D12.3		W16×H18×D4.5	W8.2×H22×D12.3	

Notes: 1) **EX-□-PN** is PNP output type.
2) 5 m cable length type (standard: 2 m) is also available.

Micro Photoelectric Sensors

Amplifier Built-in • U-shaped Micro Photoelectric Sensor

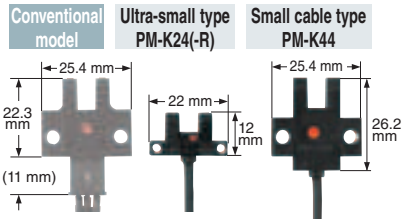
PM SERIES



Enables equipment miniaturization and quick construction

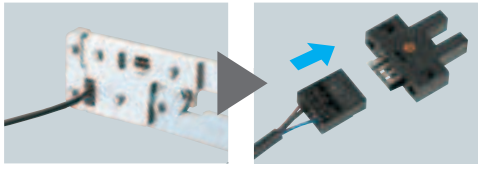
Extremely compact

Ultra-small type **PM-□24(-R)** achieves an extremely compact size.
It contributes to the miniaturization of your equipment.



Quick fitting hook-up connector

Easy to maintain connector type models are available. Its exclusive connector is the hook-up connector.
Since only crimping with exclusive pliers is to be done, cumbersome soldering or insulation is absolutely not required.
Further, connector attached cable (**CN-14H-C1/C3**) is also available.



Crimp the connector on the cable. Quick connection to the sensor

Quick-connector connections with commercially-available connectors

PM-□64: Built-in connector type

The connector is built-in, allowing greater space savings.
Commercially-available general-purpose connectors can be used with some types for improved reliability.

Type		Ultra-small type	Small type		
		With cable	With cable	With connector	Built-in connector
Model No.	NPN output	**PM-□24(-R)** (Note)	**PM-□44**	**PM-□54**	**PM-□64**
	PNP output	**PM-□24P**	**PM-□44P**	**PM-□54P**	**PM-□64P**
Sensing range		5 mm (fixed)			
Min. sensing object		0.8×1.8 mm opaque object			
Repeatability		0.03 mm or less			0.01 mm or less
Supply voltage		5 to 24 V DC±10 %			
Output		NPN output type: NPN open-collector transistor PNP output type: PNP open-collector transistor			
Output operation		Incorporated with 2 outputs: Light-ON / Dark-ON			
Response time		Under light incident condition: 20 μs or less Under light interrupted condition: 100 μs or less (Response frequency: 1 kHz or more)			
Ambient temperature		−25 to +55 °C			

Notes: 1) **PM-□24-R** is flexible cable type.
2) 3 m cable length type (standard: 1 m) is also available [**PM-□24** and **PM-□44(P)** only].

Laser Sensors

Amplifier Built-in • Ultra-compact Laser Sensor
EX-L200 SERIES

Built-in amplifier in this size?

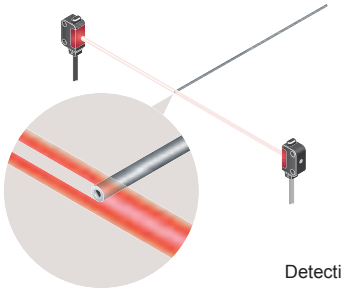
Ultra-compact

Due to the customized IC and optical design, high precision detection is fulfilled in an ultra-compact size with directivity and visibility achievable only by laser.
The laser adopted is Class 1 (IEC / JIS / FDA) laser that is safe to use, so that there is no need to separate the areas of sensor usage.

Depth 12 mm
W8.2 × H23.4 × D12 mm (Thru-beam type)

Highly accurate detection EX-L211 / L221

Suitable for positioning and minute object detection
A repeatability of 0.02 mm or less at a range from 100 to 200 mm makes this type best suitable for positioning applications (**EX-L221**). Moreover, it boasts a top-class detection precision in the compact laser sensor category with the gold wire of ø0.01 mm.

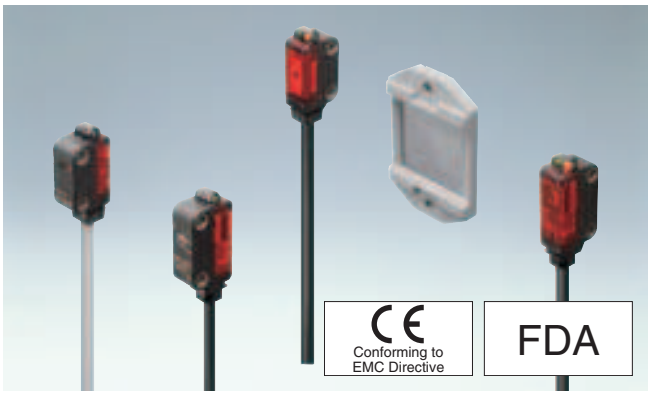


Detecting tip of very thin pipe

Model No. (Minute object detection type)	Minimum sensing object (Typical)	Repeatability (Typical)
EX-L211 (Thru-beam type)	ø0.3 mm	0.01 mm or less
EX-L221 (Reflective type)	ø0.01 mm	0.02 mm or less

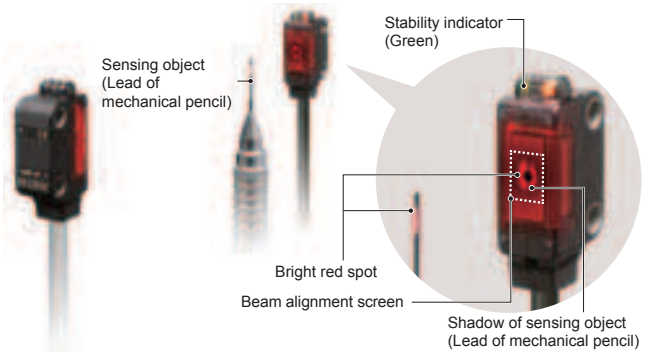
Sensitivity adjuster EX-L211 / L221 / L291 / L26□

A sensitivity adjuster of ultra-compact size is incorporated to offer strong performance in minute detection or high precision detection.

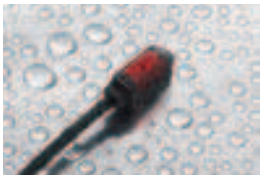


Easy beam-axis alignment EX-L211 / L212

Visually confirm the optimal receiver position, adjusting the beam axis by aligning the objects while watching the red spot on the beam alignment screen. The below diagram shows an example with the lead of a mechanical pencil being detected through visual adjustment.



Strong against water and dust with protection structure IP67

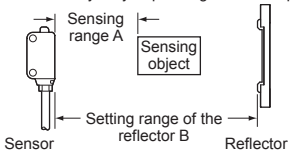


Convergent reflective type EX-L261 / L262 NEW

Spot beam type **EX-L261**: Spot size ϕ0.1 mm or less (typical)
Sensing range 20 to 50 mm
Line beam type **EX-L262**: Spot size Approx. 1 × 5 mm (typical)
Sensing range 20 to 70 mm

Item \ Type	Thru-beam		Retroreflective	Spot reflective	Convergent reflective	
	Minute object detection	Long sensing range	Long sensing range	Minute object detection	Spot beam	Line beam
Model No.	**EX-L211(-P)**	**EX-L212(-P)**	**EX-L291(-P)**	**EX-L221(-P)**	**EX-L261(-P)**	**EX-L262(-P)**
Sensing range	1 m	3 m	4 m (Note 1)	45 to 300 mm (for non-gloss white paper 100 × 100mm)	20 to 50 mm (Conv. point: 22 mm)	20 to 70 mm (Conv. point: 22 mm)
Emission spot size (Typical)	6 × 4 mm (vertical × horizontal) (at a sensing distance of 1 m)	8 × 5.5 mm (vertical × horizontal) (at a sensing distance of 1 m) (Note 2)	6 × 4 mm (vertical × horizontal) (at a sensing distance of 1 m) (Note 2)	ϕ1 mm or less (at a sensing distance of 300 mm)	ϕ1 mm or less (at a sensing distance of 50 mm)	Approx. 1 × 5 mm (at a sensing distance of 50 mm)
Sensing object	Opaque object of ϕ2 mm or more	Opaque object of ϕ3 mm or more	Opaque or translucent object of ϕ2.5 mm or more	Opaque, translucent or transparent object		
Min. sensing object (Typical)	Opaque object of ϕ0.3 mm	—	—	Gold wire of ϕ0.01 mm		—
Repeatability	Perpendicular to sensing axis: 0.05 mm or less		Perpendicular to sensing axis: 0.2 mm or less			
Supply voltage	12 to 24 V DC ±10 %					
Output	NPN open-collector transistor or PNP open-collector transistor					
Response time	0.5 ms or less					
Interference prevention function	—		Incorporated (Two sensors can be mounted close together.)		—	
Ambient temperature	−10 to +55 °C					
Emitting element	Red semiconductor laser Class 1 (IEC / JIS / FDA), Maximum output (**EX-L211/212**□ 390 μW, **EX-L291**□ 0.5 mW, **EX-L221**□ 2 mW, **EX-L261**□ 1 mW, **EX-L262**□ 1.3 mW), Peak emission wavelength: 655 nm					
Dimensions	W8.2 × H23.4 × D12 mm		W8.2 × H27.4 × D13 mm		W8.2 × H27.4 × D13.5 mm	

Notes: 1) The sensing range is the value for **RF-330** reflector (accessory). The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in " A " of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.



	RF-330 (Accessory)	With **PF-EXL2-1** polarizing filters (optional)
A	0 to 4 m	0 to 4 m
B	0.2 to 4 m	0.4 to 4 m

2) **EX-L212**□: In the case sensing distance is 3 m, the emission spot size is H 17 × W 11 mm (visual reference value).
EX-L291□: In the case sensing distance is 4 m, the emission spot size is H 18 × W 10 mm (visual reference value).

Particular Use Sensors

Safety Liquid Leak Sensor

NEW

Control Category 4 PLe SIL3

SQ4 SERIES

Two-stage detection × Safety certification

Improved productivity Two-stage detection

Lights up when conditions are normal (and at incipient liquid leak detection)

• Monitoring

Lights up at incipient liquid leak detection (and at abnormal leak detection)

• First stage: Initial detection (non-safety output)

Use as a warning Ensure productivity

By quickly detecting even small liquid leaks (incipient leaks), personnel can perform preventive maintenance or plan maintenance, thereby reducing both downtime and damage to work in progress.

Lights up at abnormal liquid leak detection

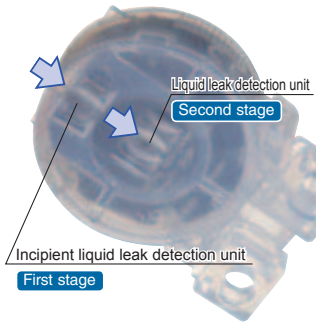
• Second stage: Liquid leak detection (safety-critical output)

Emergency stop Ensure safety

In the event of a high-volume liquid leak (an abnormal liquid leak), the target equipment is stopped immediately to ensure safety.

Two-stage detection addresses both incipient liquid leaks (by generating a warning) and abnormal liquid leaks (by initiating an emergency stop).

On the bottom of the sensor are two detection units, one located at the front and one at the center. If a liquid leak occurs in front of the sensor, the front detection unit will detect even a small incipient leak. When the leak increases in volume and reaches the center of the sensor, it will be detected as an abnormal leak.
While previous implementations of two-stage liquid leak detection have relied on two separate sensors installed at different heights, the **SQ4** delivers the same full-featured detection capability in a single sensor unit.



The SQ4 can also detect human error (improper installation).

In addition to detecting liquid leaks, the **SQ4** can detect both human error (such as a failure to install the sensor) and sensor malfunctions. If the sensor itself or the sensor and its mounting bracket have become dislodged, have been improperly installed, or are suffering from a broken cable connection, light from the emitter will not reach the receiver, causing the device to generate the same output as if a liquid leak had occurred.

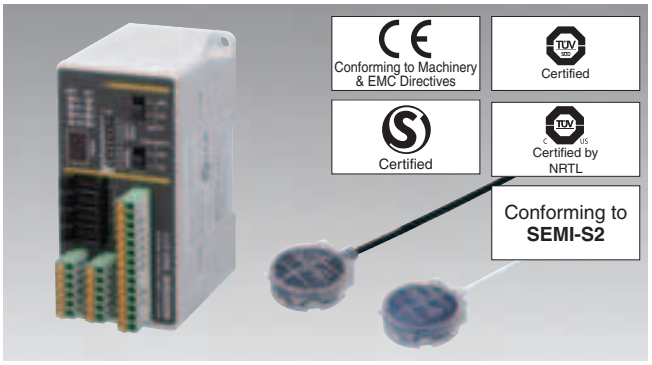
When the sensor has been installed improperly

When the sensor has become dislodged

When the sensor and its mounting bracket have become dislodged (Inadequately tightened screws or defective installation bolts or adhesive)

The SQ4 can also be used alone.

The **SQ4** can also be used without a controller, allowing the benefits of two-stage detection to be added to existing equipment by augmenting or replacing existing detection systems.



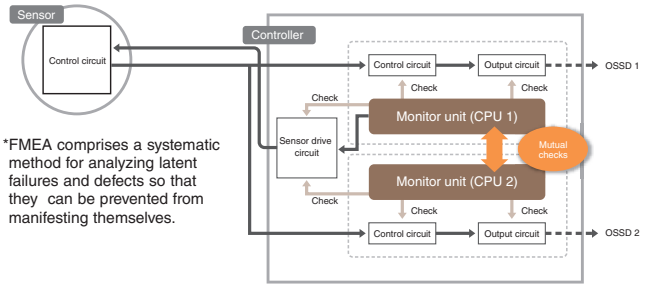
Industry first* to earn safety certification

*As of October 2010; according to research by Panasonic Electric Works SUNX.

The **SQ4** system is designed to fulfill safety requirements imposed by international standards. When used in combination, the **SQ4-A** sensor and **SQ4-C11** controller meet category 4 / PLe / SIL3 requirements under ISO 13849-1:2006, which has been updated to add probability criteria to the existing risk evaluation system (in the control category), allowing the functional safety of programmable electronic control systems and related devices to be evaluated. The sensor fulfills category 1 / PLc / SIL1 requirements when used in a standalone configuration.

Dual CPUs deliver an advanced level of safety control.

The controller's two independent CPUs mutually check the unit's operating state, and redundant signal processing and output circuits ensure safety. Failure mode and effects analysis (FMEA)* further increases operational safety.



*FMEA comprises a systematic method for analyzing latent failures and defects so that they can be prevented from manifesting themselves.

Sensors

Type		For standard liquid	For chemical liquid
Model. No.	PNP output	**SQ4-A21-P**	**SQ4-A22-P**
	NPN output	**SQ4-A21-N**	**SQ4-A22-N**
Sensing object (Note 1)		Water (Standard liquid)	Sulfuric acid, Hydrochloric acid,Phosphoric acid, Ammonia, Fluorinert (Note 2), Galden (Note 2), Hydrofluoric acid etc.
Supply voltage		12 to 24 V DC ±10 %	
Leakage detection output (Abnormal leakage detection, Safety output)		PNP output type: PNP open-collector transistor NPN output type: NPN open-collector transistor	
	Response time	10 ms or less	
	Output operation	ON when initial detection, OFF when detection leakage or wrong installation	
Initial leakage detection output (Initial leakage, Non-safety output)		PNP output type: PNP open-collector transistor NPN output type: NPN open-collector transistor	
	Response time	50 ms or less	
	Output operation	ON when normal condition, OFF when initial detection or accidental leakage	
Protection		IP65 / IP67 (IEC)	
Ambient temperature		−10 to +55 °C (Note 3)	
Materal		Enclosure: Polypropylene	Enclosure: PFA
Dimensions		W36 × H35.8 × D15.7 mm	

Notes: 1) The agents mentioned above are examples. It may not be detected depending on viscosity the agent. Before using this device, check the detecting liquid and installation condition.
2) Fluorinert™ is the world wide trademark of 3M. Galden is the world wide trademark of Solvay Solexis.
3) Liquid being detected should be also kept within the rated ambient temperature range.

Controller

Model No.		SQ4-C11
Power voltage		24 V DC $^{+10}_{-15}$ %
Control output (OSSD 1, OSSD 2)		PNP open-collector transistor / NPN open-collector transistor (switch method)
	Response time	20 ms or less (excluding the response time of the sensor)
	Output operation	ON when inntial detection, OFF when detection leakage or wrong installation
Sensor monitor output (AUX1, 2, 3, 4, Non-safety output)		PNP open-collector transistor / NPN open-collector transistor (switch method)
	Response time	100 ms or less (excluding the response time of the sensor)
	Output operation	ON when normal condition, OFF when initial detection or accidental leakage
Protection		IP20 (IEC) (However, it should be in IP54 protection structure of control panel)
Ambient temperature		−10 to +55 °C
Material		Main unit case: PC / ABS (alloy)
Dimensions		W48 × H100 × D(82.5) mm

Light Curtains

Light Curtain Type 4
SF4B SERIES Ver.2

New version with improved environmental resistance performance! Protection structure IP67 is achieved

Seamless structure and IP67 protection New structure

A seamless structure with least seam area possible is newly developed. The inner unit is protected by a cylindrical inner case. Seams such as unit and lens surfaces have been greatly reduced, so that particles such as oil mists and dust are prevented from getting in, rising its environmental resistance performance.

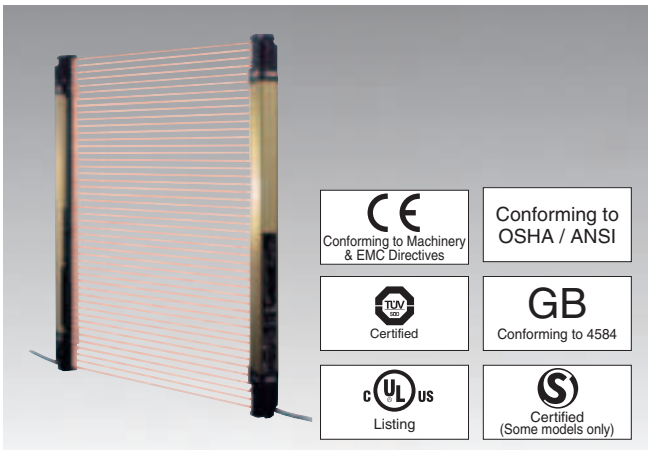
Selectable from among three types according to the worksite

A unified response time of 14 ms for all models makes setup easy

A fast response time of 14 ms has been achieved regardless of the number of beam channels, the beam axis pitches and the number of units connected in series. This reduces calculation work required for the safety distance.

A muting control function is provided

The light curtain is equipped with a muting control function that causes the line to stop only when a person passes through the light curtain, and does not stop the line when an object passes through.



Equipped with a digital error indicator

If an error occurs, details of the error appear on the digital display, so that maintenance can be carried out quickly.

Supports both PNP and NPN polarities in a single model

The **SF4B** series combines PNP transistor output and NPN transistor output in a single model. Overseas equipment that uses PNP, replacement with NPN sensors, factories that are positively grounded, and transfer of equipment overseas are all situations where the control circuits for a single model are suitable for use worldwide.

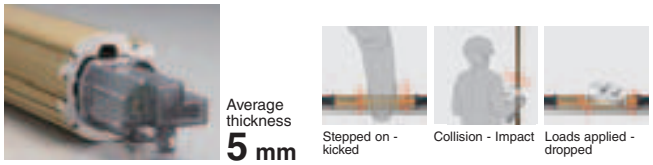
Type	Finger protection type	Hand protection type	Arm / Foot protection type
Model No.	**SF4B-F□<V2>**	**SF4B-H□<V2>**	**SF4B-A□<V2>**
Beam pitch	10 mm	20 mm	40 mm
Operating range	0.3 to 7 m	0.3 to 9 m (72 beam channels or more: 0.3 to 7 m)	0.3 to 9 m (36 beam channels or more: 0.3 to 7 m)
Protective height	230 to 1,270 mm	230 to 1,910 mm	230 to 1,910 mm
Min. sensing object	ϕ14 mm opaque object	ϕ25 mm opaque object	ϕ45 mm opaque object
Supply voltage	24 V DC±10 %		
Control output	PNP open-collector transistor / NPN open-collector transistor (selectable using wiring)		
Response time	OFF response: 14 ms or less, ON response: 80 to 90 ms		
Degree of protection	IP67 / IP65 (IEC)		
Dimensions	W28 × H protective height × D30 mm		

Robust Light Curtain Type 4 NEW
SF4B-G SERIES Ver.2

Robust and Shock resistant

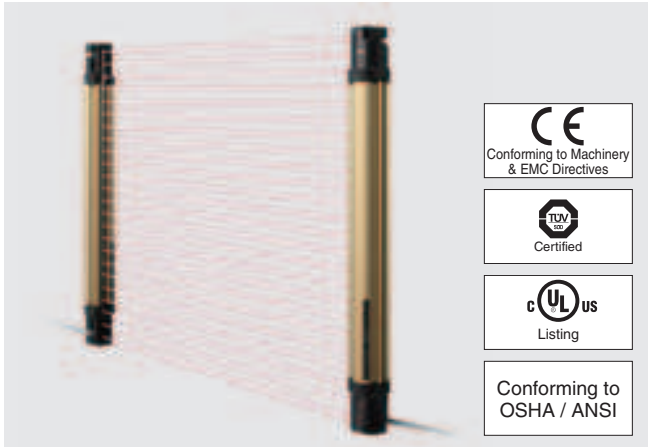
Thick and robust housing resistant to impact

The **SF4B-G** series light curtain is enclosed in a 5 mm thick robust metal case, protecting the workpiece from various types of impact, such as collision or being stepped on.



No guard needed

The robust light curtain can be used without an L-shape or U-shape guard, reducing installation and maintenance.



Differences from standard type

The robust type **SF4B-□G<V2>** is different from the standard type **SF4B-□<V2>** in the following ways:

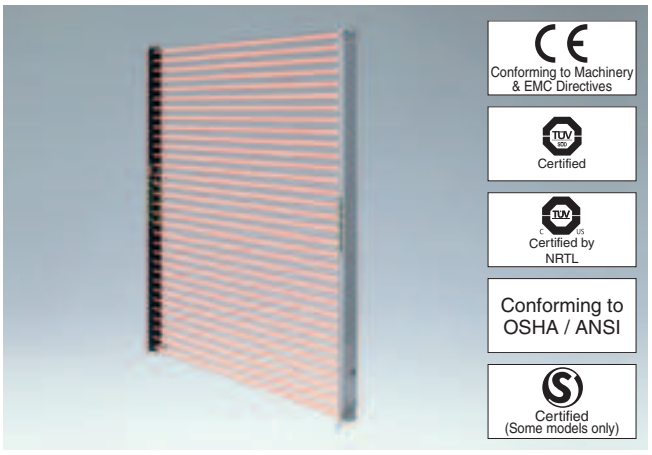
- Sensing width (protective height) • Profile • Net weight • Mounting bracket
- Large alignment tool • Noncompliant with Japanese and Korean press standard
- Noncompliant with Korean regulations
- Noncompliant with Chinese GB standard (acquisition planned)

Other specifications, input/output circuits, and options are common to the standard type. For details of specifications etc., refer to our website.

Light Curtains

Ultra-slim Light Curtain Type 4
SF4C SERIES

Machine safeguarding without sacrificing productivity
Ultra-slim Light Curtain

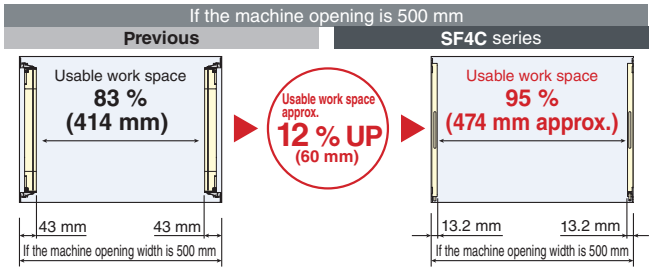


With a slimness of 13 mm, SF4C fits efficiently into small equipment

Introducing a Type 4 light curtain that combines high end performance with an ultra-slim enclosure.

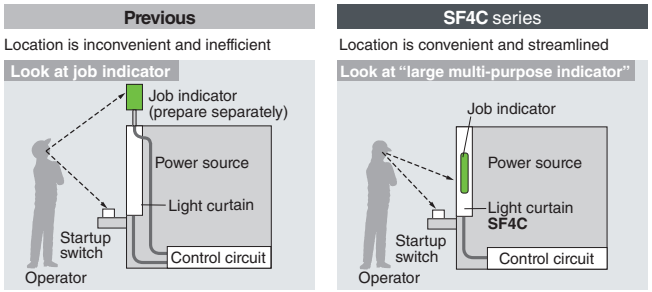
Slim size for efficient applications

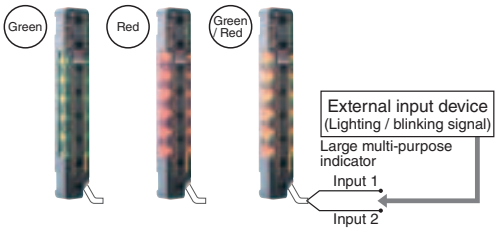
Available work space is expanded from the previous model, and productivity is improved.



Can be used in a variety of applications for simplified equipment [Large multi-purpose indicator]

The bright LED indicators located in the center of both sides of each light curtain can be illuminated green or red by using external inputs. There is no need for setting up a separate indicator, so that equipment is consolidated.



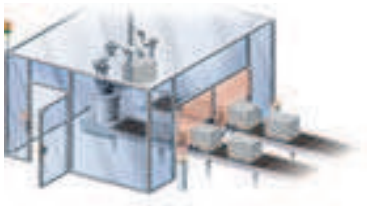


IP67 protection structure

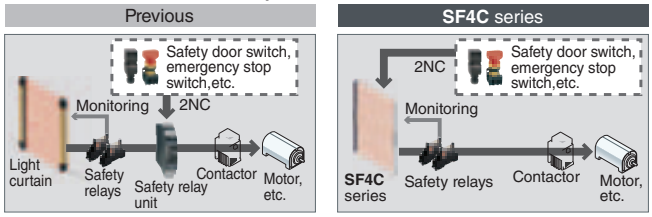
An IP67 (IEC / JIS) rating is achieved with an ultra-slim size for protection from environmental factors.

Wire-saving when connecting to safety devices [Safety input function]

Contact outputs such as an emergency stop switches or a safety door switches can be connected to the light curtain. Also, by using the handy-controller **SFC-HC** up to three sets of light curtains can be cascade connected for a consolidated safety output.



■ Direct connection of safety devices



A safety relay unit is needed for connecting safety devices other than light curtain.

Direct connection of various safety devices is possible for a simplified safety circuit.

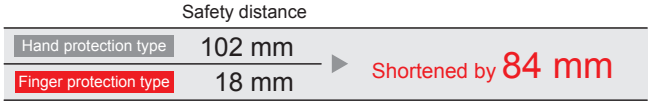
Lightweight!

The **SF4C** series is made of resin that is approx. 45 % lighter than the conventional aluminum case type. Its lightweight body eases the burden on the mounting surface of the equipment and contributes to overall reduced weight during equipment transportation or overseas shipment.

*Except the cable part

Finger protection type SF4C-F□ NEW

The **SF4C-F** light curtain has a 10 mm beam pitch which allows additional protection while reducing overall size.



* Calculation based on ISO 13855 with 41 ms or longer being the machinery's maximum stopping time.

Type		Finger protection type (10 mm beam pitch)	Hand protection type (20 mm beam pitch)
Model No.	Pigtailed type	**SF4C-F□-J05**	**SF4C-H□-J05**
	Cable type	**SF4C-F□**	**SF4C-H□**
Protective height		160 to 640 mm	
Operating range		0.1 to 3 m	
Min. sensing object		ϕ14 mm opaque object	ϕ25 mm opaque object
Supply voltage		24 V DC $^{+10}_{-15}$ %	
Control output		PNP open-collector transistor / NPN open-collector transistor (switching method)	
Response time		OFF response: 9 ms or less, ON response: 90 ms or less	OFF response: 7 ms or less, ON response: 90 ms or less
Degree of protection		IP67 / IP65 (IEC)	
Dimensions		W30 × H protective height × D13 mm	

Pressure Sensors

Head-separated·Dual display **For gas & liquid** **NEW**
Digital Pressure Sensor

DPC-L100 SERIES DPH-L100 SERIES

Powerful and Simple
High-precision detection of fluid and air pressure

Featuring exceptional resistance to…

Interference
The DPC-L100 and DPH-L100 comply with EMC directives, ensuring they won't succumb to external interference.

Pressure surges
An integrated throttle prevents damage from sudden bursts of high pressure.

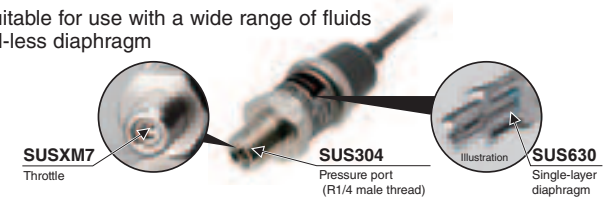
Vibrations and mechanical shock
The DPC-L100 and DPH-L100 are easy to use with devices that are subject to high levels of vibration.

Water and dust
The DPC-L100 and DPH-L100 feature an IP67-compliant protective enclosure. (IEC)

Fluid heat
The DPC-L100 and DPH-L100 can accommodate media at temperatures of up to 125°C (10 MPa and 50 MPa models).

All-stainless-steel construction

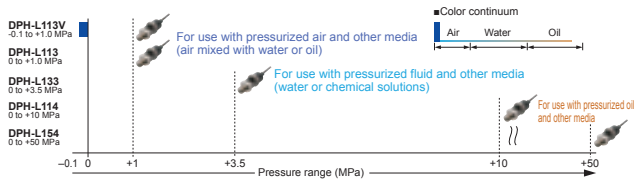
- Suitable for use with a wide range of fluids
- Oil-less diaphragm



High-precision pressure control at a system accuracy of within 1% F.S.

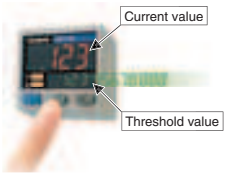
System accuracy: ±1 % F.S. (at 23°C)
(Throughout operating ambient temperature range: ±2 % F.S.)
Analog voltage: Within ±0.04 V
(1 MPa type:Within ±0.01 MPa)

Product line

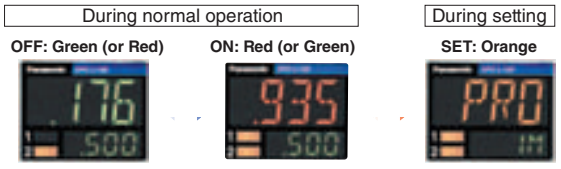


Direct setting of threshold value

"Current value" and "Threshold value" can be checked at the same time.
The threshold value can be changed in RUN mode directly.



3-color display (Red, Green, Orange)



Full range of performance and functions in a compact body

1 model to suit a wide variety of applications

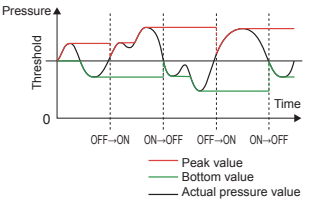
Equipped with independent dual output and three output modes (EASY mode, Hysteresis mode, Window comparator mode)

Equipped with auto-reference / remote zero-adjustment functions

Hold functions

Peak / Bottom hold 1 (standard)
The peak values and bottom values for fluctuating pressures can be displayed using the dual display.

Peak / Bottom hold 2 (output-linked) **NEW FEATURE**
When output turns on (or off), the controller's digital display (current value) is reset and peak / bottom hold operation starts. For example, this functionality could be used to verify the peak pressure for an industrial press each time a work-piece is loaded.



Current value hold **NEW FEATURE**
The controller's digital display (current value) is held while external input is on. By activating external input the moment you wish to capture the pressure value, you can pause and verify the display.

Sensor heads

Type	Compound pressure	Positive pressure			
	−0.1 to 1 MPa type	1 MPa type	3.5 MPa type	10 MPa type	50 MPa type
Model No.	**DPH-L113V**	**DPH-L113**	**DPH-L133**	**DPH-L114**	**DPH-L154**
Type of pressure	Sealed gauge pressure				
Rated pressure range	−0.1 to +1 MPa	0 to +1 MPa	0 to +3.5 MPa	0 to +10 MPa	0 to +50 MPa
Applicable fluid	Gases and fluids that do not corrode SUS630, SUS304, or SUSXM7				
Supply voltage	9 to 36 V DC [9 to 32 V DC when using the attached connector (e-CON)]				
Analog voltage output	Output voltage: 1 to 5 V DC (over rated pressure range)				
Protection	IP67 (IEC)				
Ambient temperature	−20 to +70 °C				−20 to +80 °C (Pressure port: −20 to +125 °C)
Grounding method / Pressure port	Capacitor earth (Enclosure-supply terminal) / R1/4 male thread (throttle embeded)				
Dimensions	W25 × H25 × D(73) mm				

Note: The sensor head can be used independently.

Controllers

Model No.	NPN output	DPC-L101				
	PNP output	DPC-L101-P				
Applicable sensor head		**DPH-L113V**	**DPH-L113**	**DPH-L133**	**DPH-L114**	**DPH-L154**
Rated pressure range		−0.1 to +1 MPa	0 to +1 MPa	0 to +3.5 MPa	0 to +10 MPa	0 to +50 MPa
Supply voltage		12 to 24V DC				
Comparative outputs (2 outputs)		NPN open-collector transistor or PNP open-collector transistor				
Response time		5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1,000ms, 5,000ms Selectable by key operation				
Analog output		Analog voltage output: 1 to 5 V DC, Analog current: 4 to 20 mA				
Protection		IP40 (IEC)				
Ambient temperature		−10 to +50 °C				
Dimensions		W30 × H30 × D30.7 mm				

Inductive Proximity Sensors

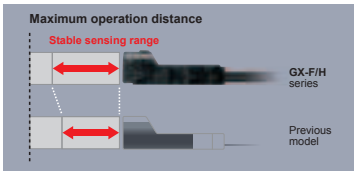
Amplifier Built-in • Rectangular-shaped Inductive Proximity Sensor

GX-F/H SERIES

Superior stability in detection

Can be installed with ample space

This sensor has the longest stable sensing range among the same level of rectangular inductive proximity sensors in the industry. It is easy to install the sensor.

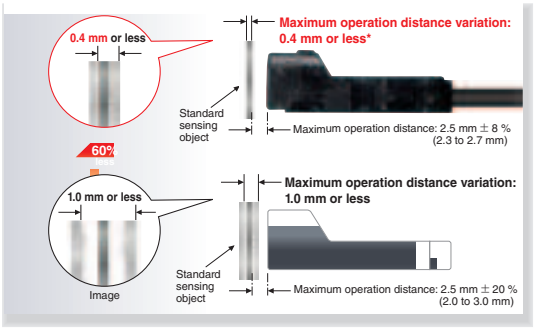


Type	Maximum operation distance	Stable sensing range	
		GX-F/H series	Previous model
GX-□6	1.6 mm	0 to 1.3 mm	0 to 1.2 mm
GX-□8	2.5 mm	0 to 2.1 mm	0 to 1.8 mm
GX-□12	4.0 mm	0 to 3.3 mm	0 to 3.0 mm
GX-□15	5.0 mm	0 to 4.2 mm	0 to 4.0 mm
Long sensing range	8.0 mm	0 to 6.7 mm	0 to 6.4 mm

* With standard sensing object

Variation at the maximum operation distance is within ±8 %

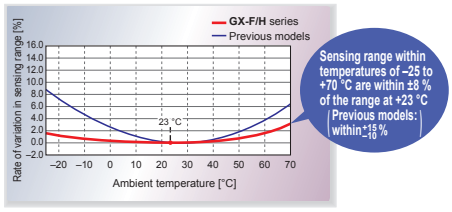
Thorough adjustment and control of sensitivity greatly reduces individual sensor differences and variations. The work of adjusting sensor positions when using multiple sensors and when sensors have been replaced has become much easier.



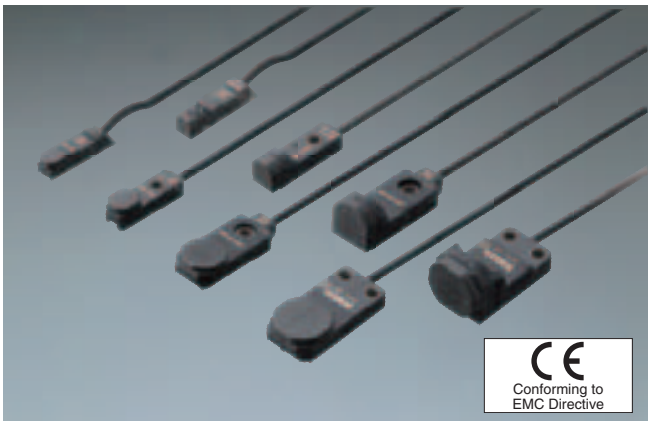
* Not including temperature characteristics.

Temperature characteristics vary within ±8 %

Components such as the sensor coil and core and product design have been totally revised to provide excellent temperature characteristics. Stable sensing can be obtained regardless of the time of day or the yearly season.

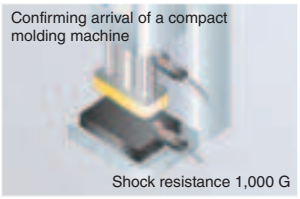


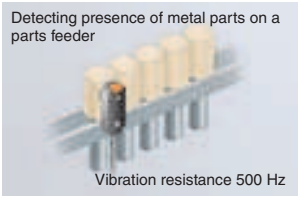
* Typical



10 times the durability! (Compared to previous models)

The new integrated construction method used provides shock resistance of 10,000 m/s² (approx. 1,000 G in X, Y and Z directions for three times each), and vibration resistance clears durability tests of between 10 and 500 Hz (3 mm amplitude in X, Y and Z directions for 2 hours each). In addition, resistance to impulse noise is approx. three times greater than for previous models.



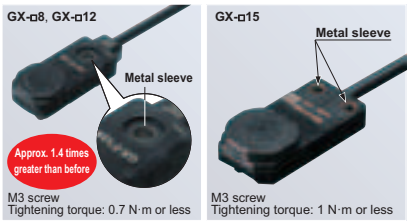


Highly resistant to water or oil! IP68g protective construction

The new integrated construction method used improves environmental resistance performance. The IP68g prevents damage to the sensor by stopping water and oil getting inside.

Tightening strength increased with no damage! (excluding GX-□6)

A metal sleeve has been inserted.
It prevents the sensor from being damaged by tightening too much.



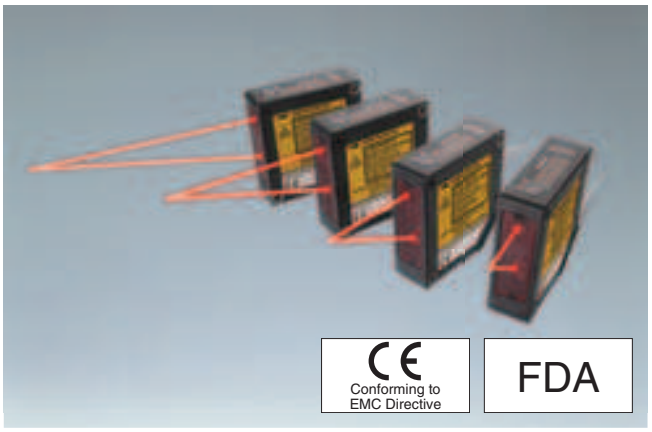
Model No.	Front sensing	GX-F6□	GX-F8□	GX-F12□	GX-F15□	GX-FL15□
	Top sensing	GX-H6□	GX-H8□	GX-H12□	GX-H15□	GX-HL15□
Max. operation distance (Note 1)		1.6 mm±8 %	2.5 mm±8 %	4.0 mm±8 %	5.0 mm±8 %	8.0 mm±8 %
Stable sensing range (Note 1)		0 to 1.3 mm	0 to 2.1 mm	0 to 3.3 mm	0 to 4.2 mm	0 to 6.7 mm
Standard sensing object		Iron sheet 12×12×t1 mm	Iron sheet 15×15×t1 mm	Iron sheet 20×20×t1 mm	Iron sheet 20×20×t1 mm	Iron sheet 30×30×t1 mm
Repeatability		Along sensing axis, perpendicular to sensing axis: 0.04 mm or less				
Supply voltage		12 to 24 V DC $^{+10}_{-15}$ %				
Output		NPN open-collector transistor or PNP open-collector transistor				
	Output operation	Normally open or Normally closed				
Max. response frequency		400Hz	500Hz		250Hz	150Hz
Protection		IP68 (IEC), IP68g (JEM)				
Ambient temperature		−25 to +70 °C				
Dimensions		**GX-F6□**: W6×H25×D6 mm, **GX-H6□**: W6×H6.5×D25 mm, **GX-F8□**: W8×H24×D7.4 mm, **GX-H8□**: W8×H9.1×D26 mm, **GX-F12□**: W12×H32.2×D7.1 mm, **GX-H12□**: W12×H13×D31.8 mm, **GX-F(L)15□**: W15×H31.5×D8 mm, **GX-H(L)15□**: W15×H16.5×D29.5 mm				

Notes: 1) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object.
The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.
2) Different freguency type is available.
3) 5 m cable length type (standard: 1 m) and flexible cable (excluding 5 m cable length type) are available. (excluding **GX-FL15□**, **GX-HL15□**)

Measurement Sensors

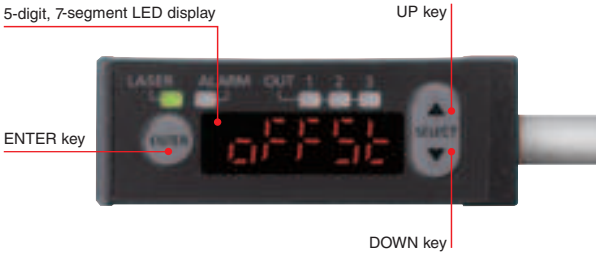
Compact Laser Displacement Sensor
HL-G1 SERIES

A variety of high-end functions are included in a compact, self-contained body for exceptional ease of use.

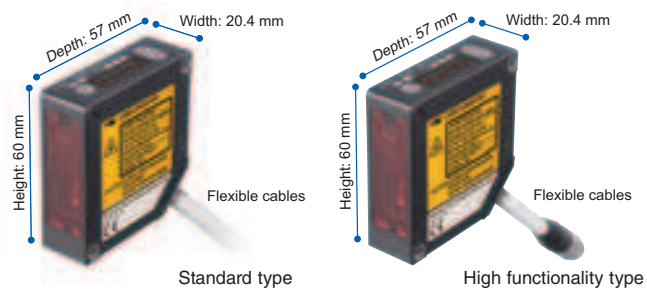


Easy configuration using the digital display

The built-in digital display makes it easy to configure sensor operation while checking displacement values.



Compact size despite the built-in controller and digital readout



Support for both NPN and PNP polarity

A single model number accommodates both NPN and PNP wiring polarity, reducing the number of model numbers that must be registered for maintenance purposes.

I/O to accommodate multiple needs

Timing input and multi input

Inaddition to timing input select the desired input according to your application:

- Zero set on/off
- Laser control
- Reset
- Teaching
- Memory switching
- Saving

Featuring 3 outputs and an analog 2 outputs

With three outputs, the **HL-G1** can be used to generate HI/GO/LOW judgment output or alarm output. The analog output can be used in both current and voltage modes.

FREE DOWNLOAD

Software tool for sensor configuration and evaluation (High functionality type only)

In addition to configuring up to 16 sensors at once, this free tool makes it easy to gather data needed for analysis, including received light waveform monitoring and data buffering. The interface language can be selected at the time of installation.

- **Data buffering**
- **Received light waveform display**
- **Measured value display**

HMI screen for HL-G1 (High functionality type only)

FREE DOWNLOAD

The **GT02** / **GT12** HMI operator pannel can be used in combination with the **HL-G1** to allow easy confirmation of sensor status and configuration of sensor settings from a remote location. Japanese, English, Chinese, and Korean are supported.

Select from the following HMI operator pannels:
Power supply: 24 V
Communications port: RS422 (RS485)
- AIG02GQ 14D
- AIG02MQ 15D
- AIG12GQ 14D/15D
- AIG12MQ 14D/15D

Item \ Type	Standard	High functionality	Standard	High functionality	Standard	High functionality	Standard	High functionality
Model No.	**HL-G103-A-C5**	**HL-G103-S-J**	**HL-G105-A-C5**	**HL-G105-S-J**	**HL-G108-A-C5**	**HL-G108-S-J**	**HL-G112-A-C5**	**HL-G112-S-J**
Measurement center distance	30 mm		50 mm		85 mm		120 mm	
Measuring range	±4 mm		±10 mm		±20 mm		±60 mm	
Resolution	0.5 µm		1.5 µm		2.5 µm		8 µm	
Linearity	±0.1 % F.S.							
Tempreratureure characteristics	±0.08 % F.S. / °C							
Light source	Red semiconductor laser, Class 2 (IEC / JIS / FDA, Laser Notice No. 50) Max. output: 1 mW (Peak emission wavelength: 655 nm)							
Beam diameter (Note 2)	0.1 × 0.1 mm		0.5 ×1 mm		0.75 × 1.25 mm		1.0 × 1.5 mm	
Receiving element	CMOS image sensor							
Supply voltage	24 V DC ±10 %							
Current consumption	100 mA or less							
Sampling rate	200 µs, 500 µs, 1 ms, 2 ms							
Analog output: Voltage	Output range: 0 to +10.5 V (normal), 11 V (alarm) Output impedance: 100 Ω							
Analog output: Current	Output range: 3.2 to 20.8 mA (normal), 21.6 mA (alarm) Load impedance: 300 Ω or less							
Output (OUT 1, OUT 2, OUT 3)	Judgment output or alarm output (Setting can be selected) Selectable NPN transistor open collector or PNP transistor open collector							

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were as follows: supply voltage 24 V DC, ambient temperature +20 °C, sampling rate 200 µs, average number of samples: 1024, measurement center distance, object measured is made of white ceramic and digital measurement values.
2) This beam diameter is the size at the measurement center distance. These values were defined by using $1/e^2$ (13.5 %) of the center light intensity. If there is a slight leakage of light outside the normal spot diameter and if the periphery surrounding the sensing point has a higher reflectivity than the sensing point itself, then the results may be affected.

Measurement Sensors

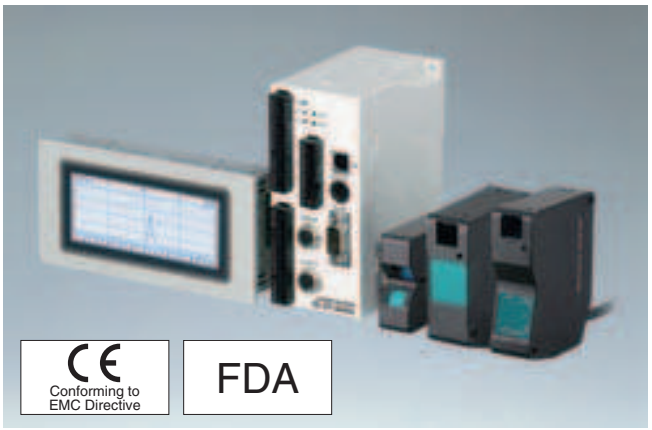
Ultra High-speed • High-precision
Laser Displacement Sensor

HL-C2 SERIES

Ultra high-speed, high-precision laser displacement sensors using a combination of new technology

Excellent basic performance

These sensors achieve an excellent level of performance in the three basic functions which are required of reflective type laser displacement sensors. They can provide "Surplus", "Reliability" and "Confidence" to production sites which demand high speeds and high precision.



* These products are introduced to limited countries only, because of falling under WA (Wassenaar Arrangement) 2.B.6.b.1.a and NSG (Nuclear Suppliers Group) 1.B.3.b.1. Some models, which fall outside of WA and NSG, are available. Please contact our office for details.

Particularly for specular reflection use, best suited for high precise measurement of the thickness and spacing of FPD glass

HL-C201F / HL-C201F-MK

Sampling	Linearity	Resolution
100 kHz	±0.02 %	0.01 μm

Measurement center distance and measuring range

10 ± 1 mm

Red semiconductor laser
Class 1 (IEC)
Class I (FDA)

Flagship model combined with high-speed and high-precision by our exclusive technology

HL-C203F / HL-C203F-MK

Sampling	Linearity	Resolution
100 kHz	±0.03 %	0.025 μm

Measurement center distance and measuring range

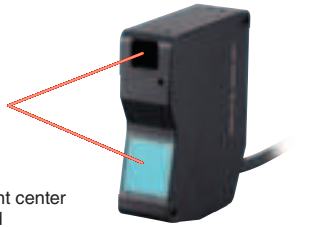
30 ± 5 mm

Red semiconductor laser
Class 2 (IEC)
Class II (FDA)

Applicable from metal to rubber, range and precision achieved at a high usability

HL-C211F / HL-C211F-MK
HL-C211F5 / HL-C211F5-MK

Sampling	Linearity	Resolution
100 kHz	±0.03 %	0.1 μm



Measurement center distance and measuring range

110 ± 15 mm

Red semiconductor laser
HL-C211F(-MK)
Class 2 (IEC), Class II (FDA)
HL-C211F5(-MK)
Class 3R (IEC), Class IIIa (FDA)

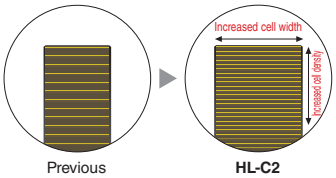
HDLC-CMOS sensors

Resolution | Sampling

The HDLC-CMOS sensors have been developed specially for the **HL-C2** series. High density light-receiving cells and a processing speed which is close to maximum limits result in high resolutions and high speeds which exceed all expectations for laser displacement sensors.

HDLC: High Density Linear Cell

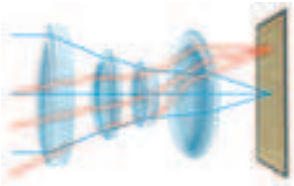
■Comparison of cell structures (image)



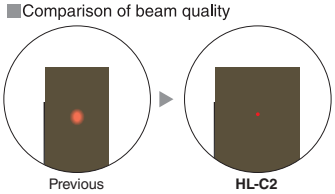
High-resolution lens

Linearity | Resolution

High-resolution lens has been newly designed to perfectly suit HDLC-CMOS sensors.
The light-receiving part can create images at a minimum point from light received from a variety of different angles to produce images with even greater precision.



■Comparison of beam quality



Compact controller equipped with a wide range of functions

This controller can be connected to a wide variety of devices, and is equipped with an extensive list of functions including a data buffering function for temporarily storing measurement values.