

NEW & KEY PRODUCTS 2013



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Fiber Sensors

Tough Fiber

Introducing a tough fiber that transcends common knowledge!

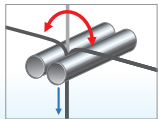
Conventional 3 types rolled into 1 !!

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

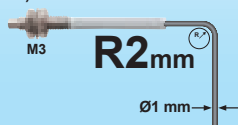
10 million times (Typical)

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

More flexible

R2 to R4 mm

Ex) FT-31



Ex) FT-42



Reduced the time for selecting fiber and registration numbers

For Designers

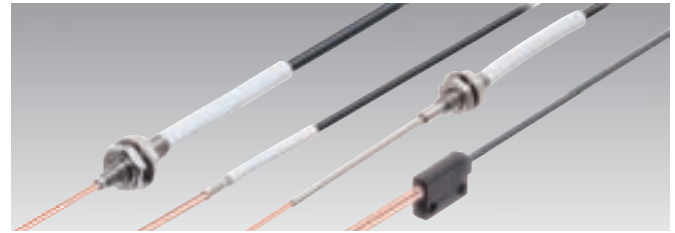
High-quality

- 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.

Previous flexible fiber



Previous sharp bending fiber



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

New fiber

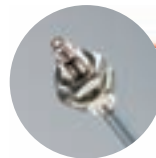


The new standard fiber is composed of a single fiber core, achieving uniform light intensity.

- 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 $\pm 10\%$

Variation in emission intensity of the fiber core is controlled down to less than $\pm 10\%$, 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.

Expanded temperature range

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

1.2 times
more than previous

−55 to +80 °C

Integrated high-precision plug

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.



More flexible!

R4

Bending radius
[Previous is R25 mm]

R4mm

1/6 of that of previous



More bendable!

Bending durability
[Previous is 1,000 times]

10,000 times
more than previous

10 million times

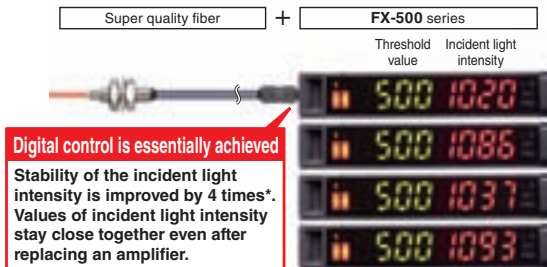
Fiber Sensors

Dual Digital Display Fiber Sensor FX-500 SERIES Ver.2

At the industry's leading edge

A different stability!

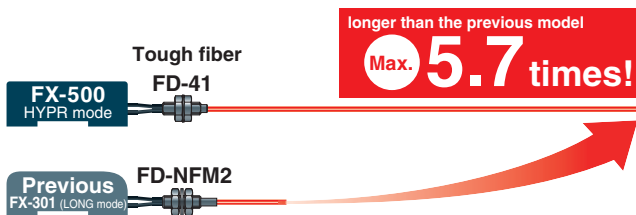
When used with the super quality fiber as a set, the incident light intensity variation among units is decreased to only 1/4 of that of conventional models.



* Using a small diameter fiber (fiber core ϕ 0.5 mm). If using a standard fiber (fiber core ϕ 1.0 mm), the variation will be double of that of conventional models.

HYPR mode incorporated

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



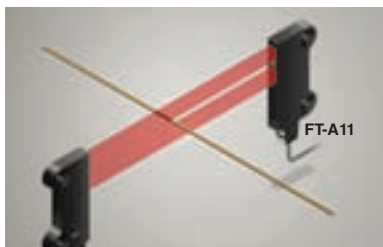
Max. 25 μ s response time

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



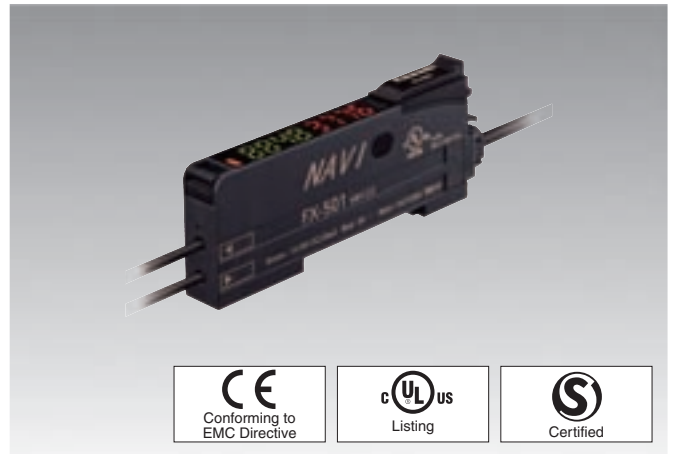
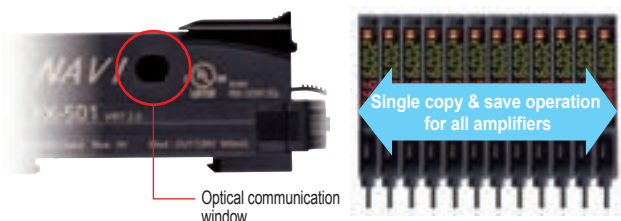
A different accuracy!

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



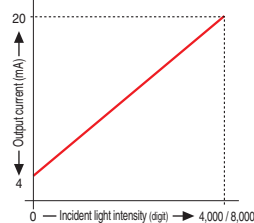
An optical communication function allows sensors to be adjusted simultaneously

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.

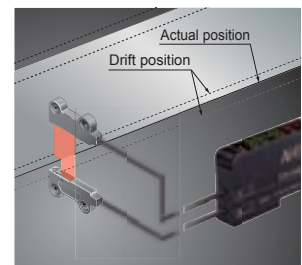


Analog output cable type FX-505(P)-C2

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.

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 $\begin{smallmatrix} +10 \\ -15 \end{smallmatrix}$ %		
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

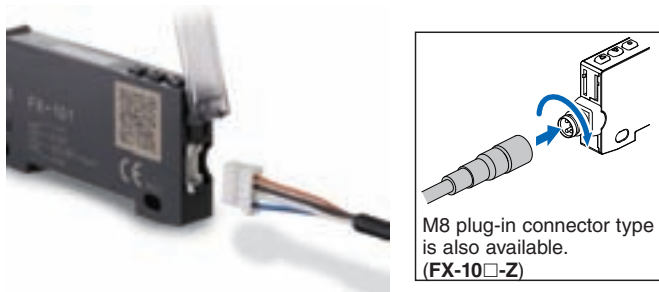
Space-saving 9 mm in width

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.



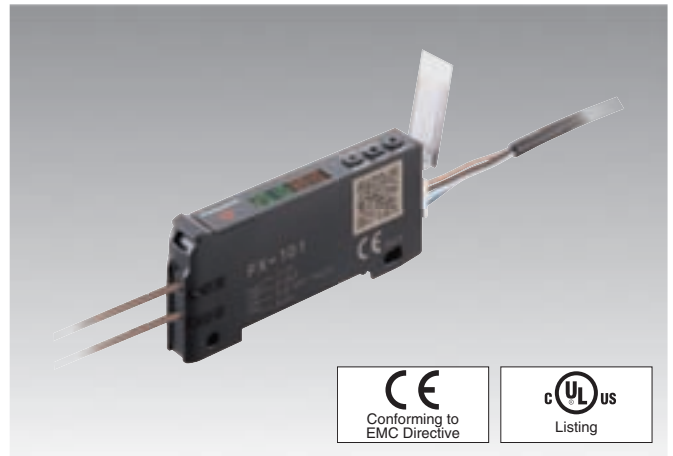
Wiring can be carried out using commercially-available connectors

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 modified 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.	NPN output	FX-101-CC2	FX-101(-Z)	FX-102-CC2	FX-102(-Z)
(Note)	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: 2.5 ms or less	
		Emission frequency 1: 450 μs or less		Emission frequency 2: 2.8 ms or less	
		Emission frequency 2: 500 μs or less		Emission frequency 3: 3.2 ms or less	
		Emission frequency 3: 600 μs 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			

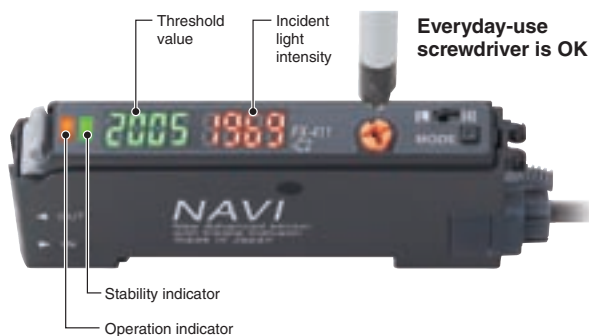
Note: Model Nos. having the suffix '-Z' are M8 plug-in connector type.

Dual Digital Display Fiber Sensor FX-410 SERIES

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

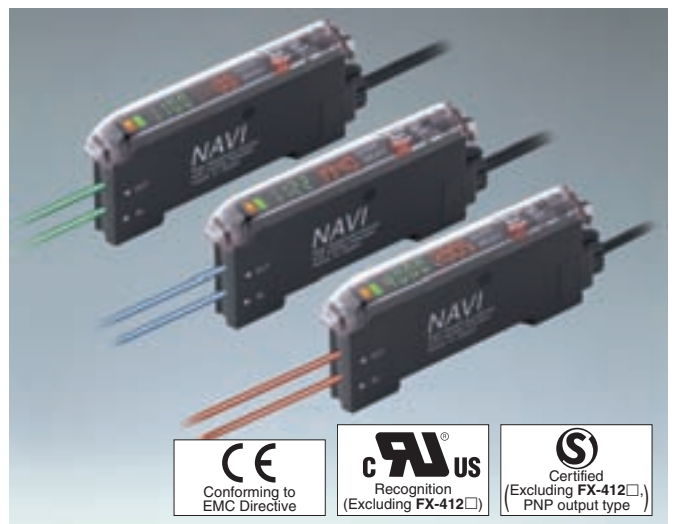
Incident light intensity and threshold value are displayed simultaneously

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 $\pm 10\%$

Output: FX-411□/412□ NPN open-collector transistor

FX-411□P PNP open-collector transistor

Dimensions: W10 \times H30.5 \times 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

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.



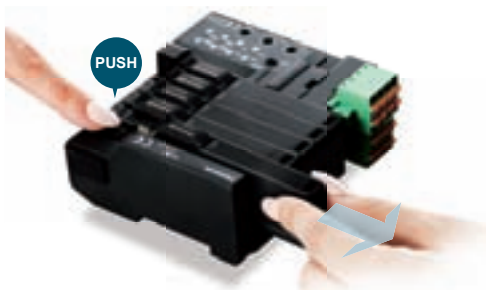
Wire-saving construction greatly reduces labor.

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



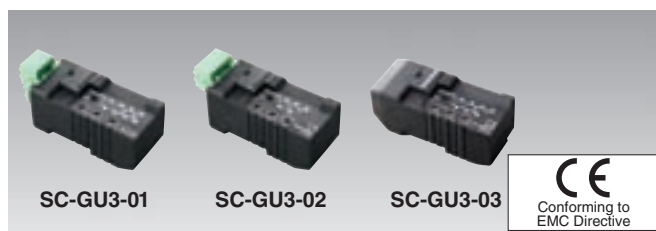
Sensors are easily replaced without removing adjacent sensor amplifiers.

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 adjacent 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 FX-411, FX-412, FX-311 (B/G) 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)

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 $\pm 10\%$				
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				

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.

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		
Allowable passing current	Wire-saving connector 2 A (Note)		
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		

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

Designation	Communication unit for EtherCAT NEW	
Model No.	SC-GU3-03	
Number of connectable units	Max. 16 units per SC-GU3-03 (Max. 12 units for FX-500 Series)	
Supply voltage	24 V DC $\pm 10\%$	
Allowable passing current	Wire-saving connector 2 A (Note)	
Compliance standard	IEEE802.3u	
Baud rate	100 Mbps	
Communication ports	RJ45 \times 2	
EtherCAT communication standard	Process data communication, Mailbox communication	

EtherCAT is registered trademark of Beckhoff Automation GmbH.

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

Laser Sensors

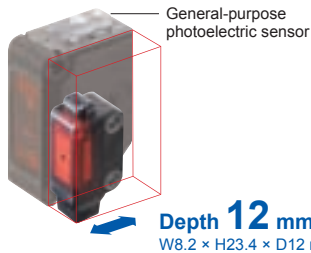
Amplifier Built-in • Ultra-compact Laser Sensor EX-L200 SERIES

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.

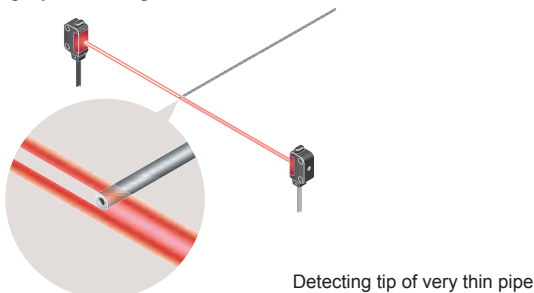
The laser adopted is Class 1 (IEC / JIS / FDA) laser that is safe to use, so that there is no need to separate the areas of sensor usage.



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 $\phi 0.01$ mm.



Model No. (Minute object detection type)	Minimum sensing object (Typical)	Repeatability (Typical)
EX-L211 (Thru-beam type)	$\phi 0.3$ mm	0.01 mm or less
EX-L221 (Reflective type)	$\phi 0.01$ mm	0.02 mm or less

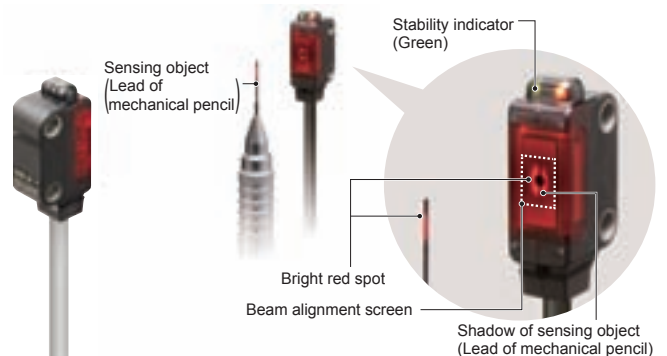
Sensitivity adjuster EX-L211/L221/L291/L26□

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

Spot beam type EX-L261: Spot size $\phi 0.1$ mm or less (typical)

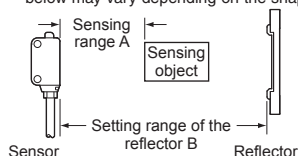
Sensing range 20 to 50 mm

Line beam type EX-L262: Spot size Approx. 1×5 mm (typical)

Sensing range 20 to 70 mm

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)	φ 1 mm or less (at a sensing distance of 300 mm)	φ 1 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□/L212□ 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).

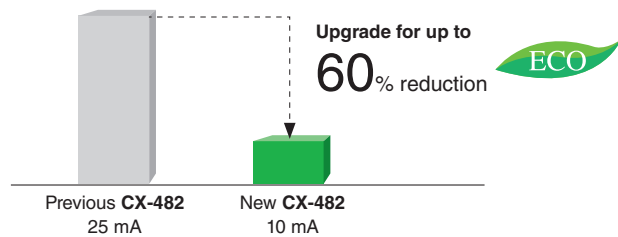
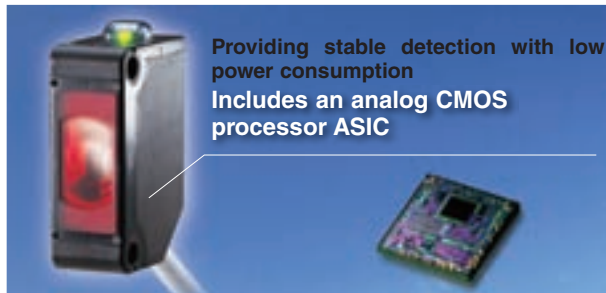
Photoelectric Sensors

Amplifier Built-in • Compact Photoelectric Sensor CX-400 SERIES Ver.2

Sensors that are environmentally and user friendly.

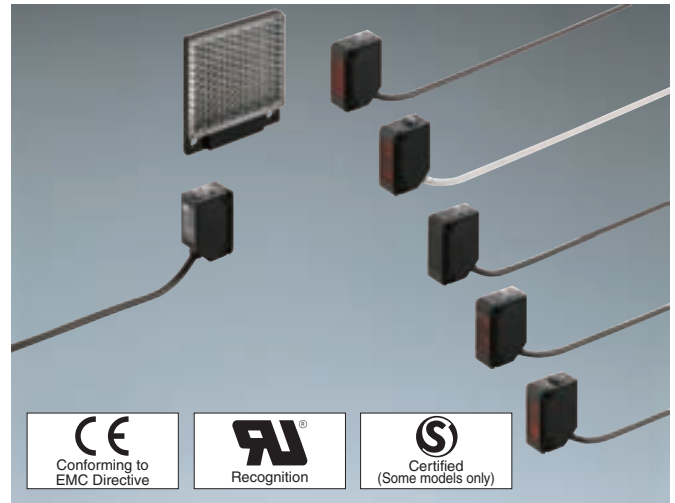
Reducing environmental burdens further Up to 60% less power consumption

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.



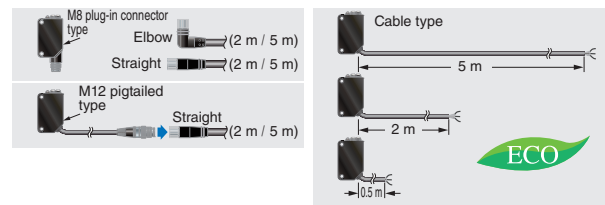
Compact size

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.



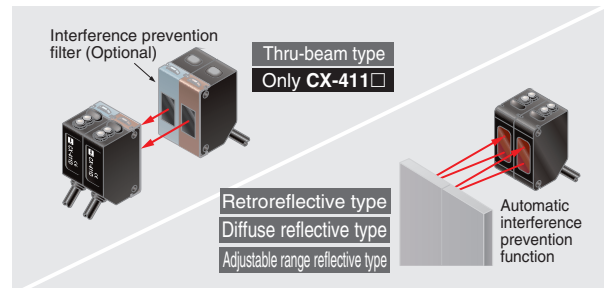
Less processing

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 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	Adjustable range reflective			
	Small spot			
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 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

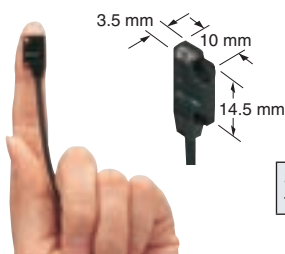


Photoelectric Sensors

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

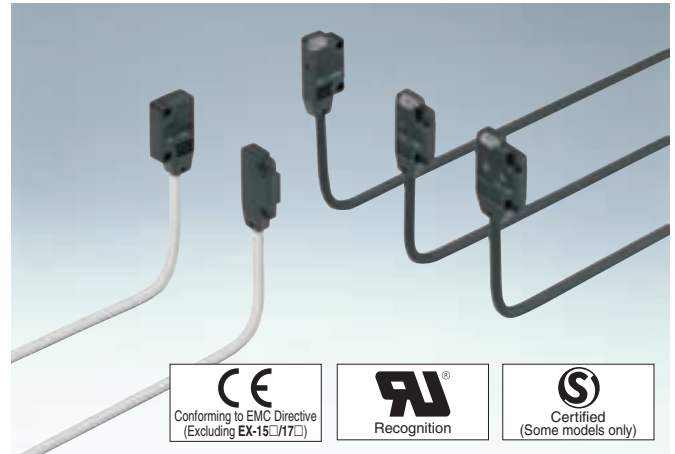
Smallest body: 3.5 mm thick

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.

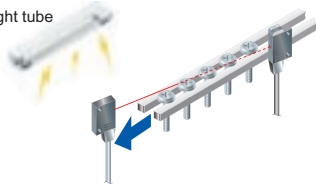
* Effective from production in October 2010.

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		φ 1 mm opaque object		φ 2 mm opaque object				φ 1 mm opaque object	φ 2 mm opaque object	φ 0.1 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.

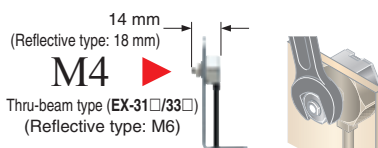
4) 5 m cable length type (standard: 2 m) is also available.

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

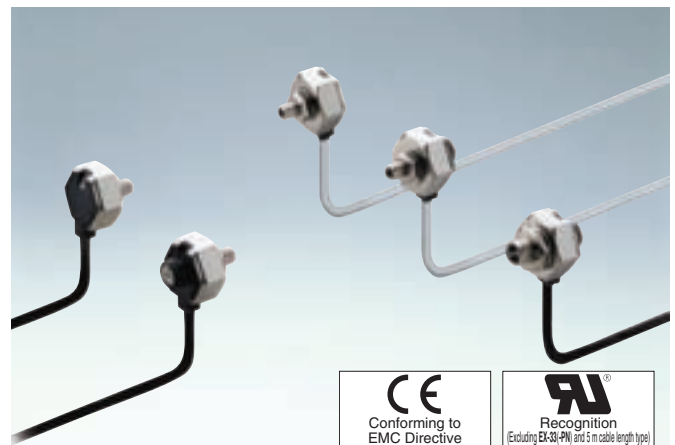


No protective tube needed



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.



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		φ 2 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)]

Electric power saving

Incorporated an inverter countermeasure circuit

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

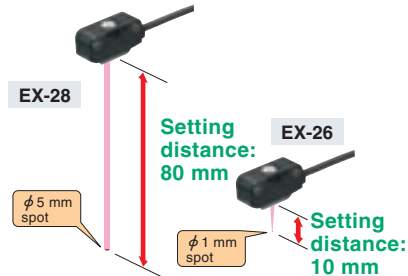
Long sensing range

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.



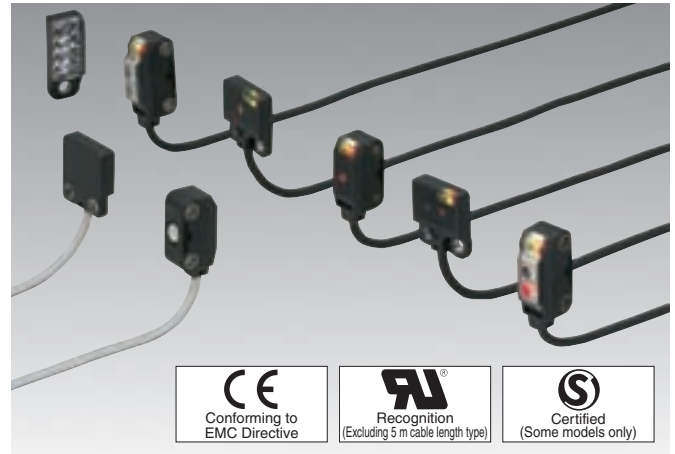
Clear beam spot using red LED dot light source

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
		Front sensing	Side sensing	Side sensing	Side sensing	Diffuse beam	Small spot beam	Long distance spot beam
Model No.	Light-ON	EX-21A(-PN)	EX-23(-PN)	EX-29A(-PN)	EX-22A(-PN)	EX-24A(-PN)	EX-26A(-PN)	EX-28A(-PN)
(Note 1)	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. ϕ 2.6 mm opaque object	Min. ϕ 3 mm opaque object	ϕ 15 mm or more opaque or translucent object	Opaque, translucent or transparent object	Min. ϕ 0.1 mm copper wire (Setting distance: 10 mm)		Opaque, translucent or transparent object
Supply voltage		12 to 24 V DC \pm 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.

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

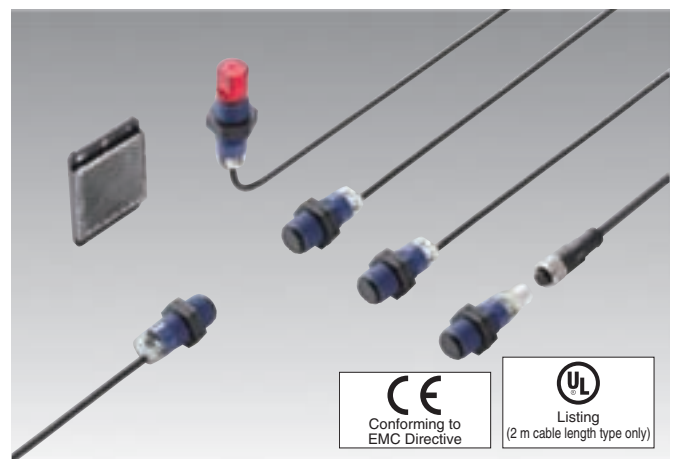
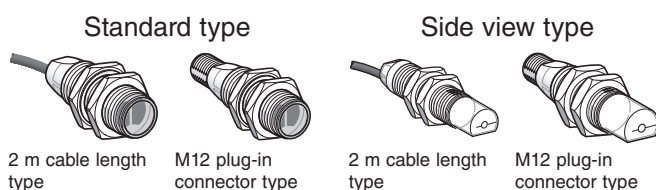
Easily mountable with M18 thread

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.

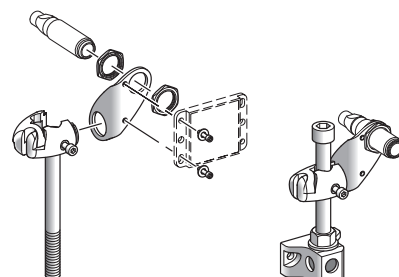
Type	Sensing range
Thru-beam CY-111□	15 m
Retroreflective CY-192□	4 m
Retroreflective (with polarizing filters) CY-191□	2 m
Diffuse reflective CY-121□	100 mm
Diffuse reflective (with sensitivity adjuster) CY-122□	600 mm

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



Convenient universal sensor mounting stand

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



Supply voltage: 12 to 24 V DC \pm 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

Wire-saving Systems

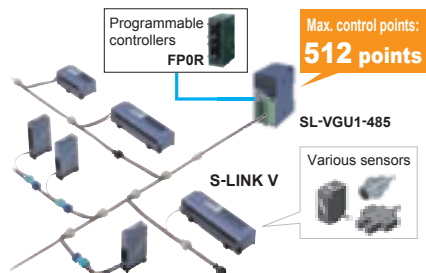
Flexible Wire-saving Link System **S-LINK V** **NEW** RS-485 / RS-232C Gateway Controller SL-VGU1-485

Simple Communication link to Various PLC and Personal Computers!

Two versions of serial communications are supported. Bit information of various sensors and switches is sent directly to the PLC.

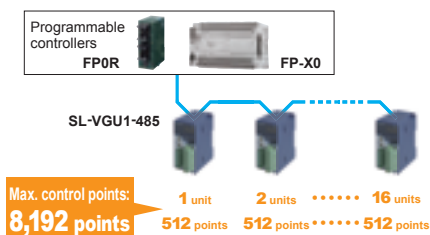
RS-232C Communications

Communication protocols: for MEWTOCOL-COM / Modbus RTU



RS-485 Communications

Communication protocols: for MEWTOCOL-COM / Modbus RTU



Model No.	SL-VGU1-485	
Supply voltage	24 V DC $\pm 10\%$	
Interface	RS-485	RS-232C
Transmission speed	9,600, 19,200, 38,400, 57,600, 115,200, 230,400 bps	
Transmission form	1: N communication	1: 1 communication
Connecting station No.	Max. 16 stations	1 station
Transmission type / Synchronizing method	Half duplex / Asynchronous communication method	Full duplex / Asynchronous communication method
Transmission distance	Transmission speed except 230,400 bps: Max. 1,200 m Transmission speed at 230,400 bps: Max. 700 m	Max. 15 m
Transmission code	MEWTOCOL-COM: ASCII, Modbus-RTU: Binary	
Transmission format	Data length: 8 bits (Fixed), Parity: Odd / Even / None, Stop bit: 1 bit / 2 bits	
Ambient temperature	0 to +55 °C	
Dimensions	W48 × H100 × D78 mm	

Sensor & Wire-saving Link System **S-LINK** **NEW** Picking Switch SL-PK01

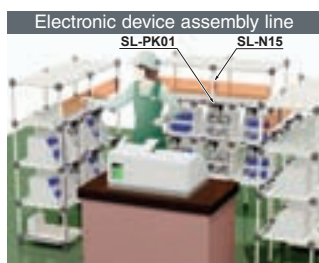
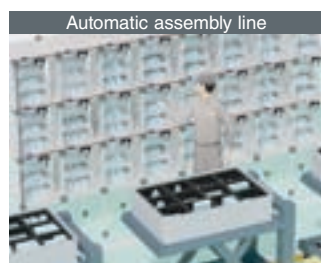
Ideal for anti-absentmindedness in assembly lines

Pipe attachment type picking switch

This prevents operators from picking up the wrong parts or omitting parts attachment, and can be attached by simply connecting the connectors.



Model No.	SL-PK01
Supply voltage	24 V DC $\pm 10\%$ (Supplied from the S-LINK control unit. A separate power supply can also be used.)
FAN-in	2.2
Input operation	When the lever switch is tilted 15 ° or more, the input goes ON. Tension strength: 3N approx.
Number of I/O	1 input and 1 output
Lamp	Green (Lights up when the output signal from the signal transmission line goes ON.)
Ambient temperature	0 to +50 °C
Dimensions	W90 × H54 × D73 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.

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	$\phi 14$ mm opaque object	$\phi 25$ mm opaque object	$\phi 45$ 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** SF4B-G SERIES Ver.2

Robust and Shock resistant

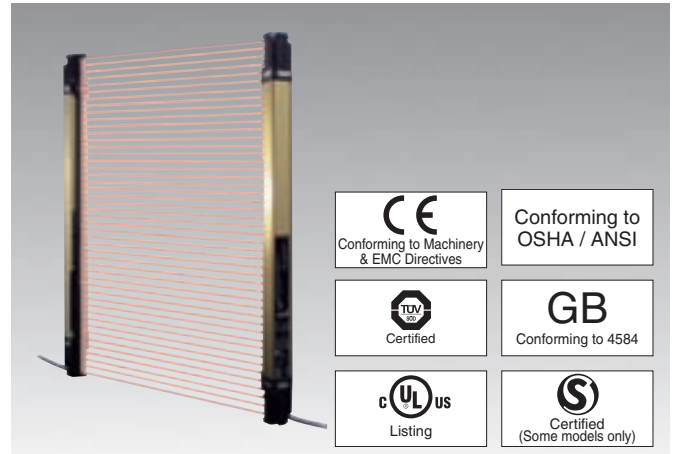
Thick and robust housing resistant to impact

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.



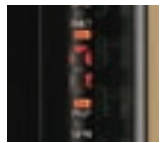
No guard needed

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



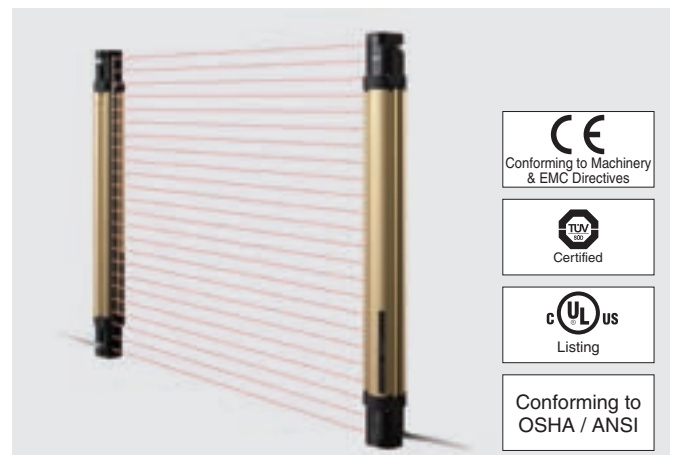
Equipped with a digital error indicator

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.



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

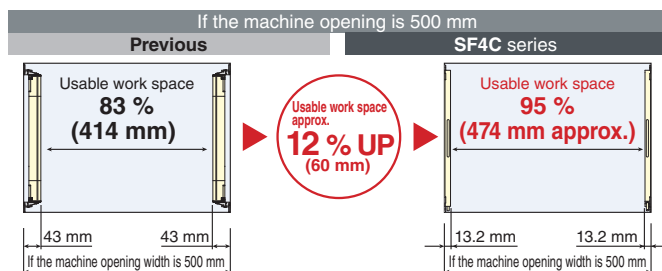
Machine safeguarding without sacrificing productivity
Ultra-slim Light Curtain

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.

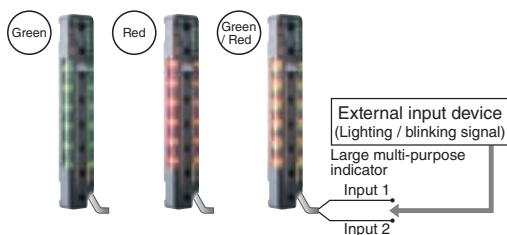
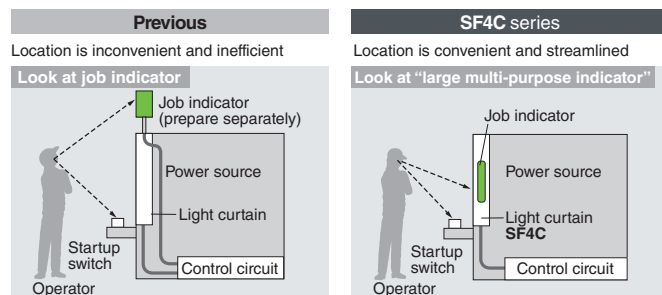
Slim size for efficient applications

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



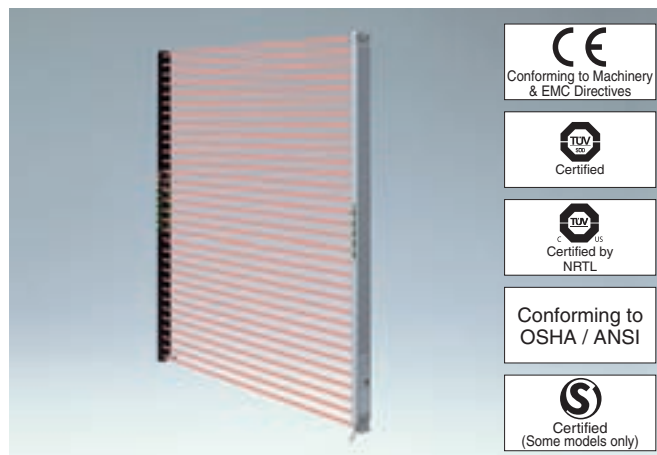
Can be used in a variety of applications for simplified equipment [Large multi-purpose indicator]

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.

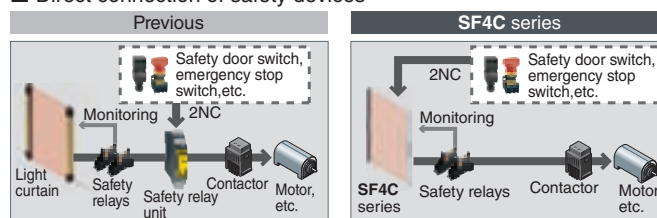


Wire-saving when connecting to safety devices [Safety input function]

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□

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

Safety distance	
Hand protection type	102 mm
Finger protection type	18 mm
Shortened by 84 mm	

* 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	φ 14 mm opaque object		φ 25 mm opaque object
Supply voltage	24 V DC $\pm 10\%$		
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
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

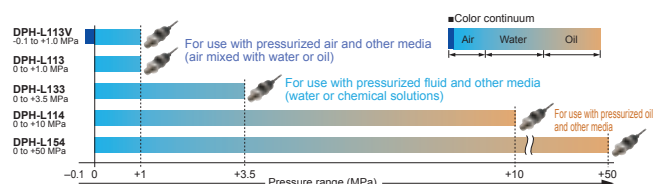
- Suitable for use with a wide range of fluids
- Oil-less diaphragm



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

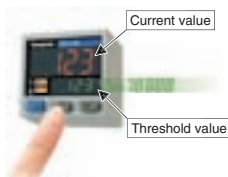
System accuracy: $\pm 1\%$ F.S. (at 23°C)
(Throughout operating ambient temperature range: $\pm 2\%$ F.S.)
Analog voltage: Within ± 0.04 V
(1 MPa type: Within ± 0.01 MPa)

Product line

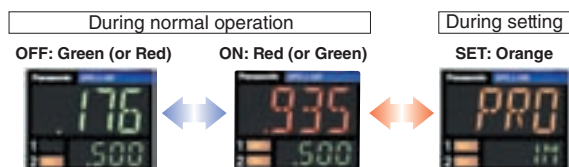


Direct setting of threshold value

"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

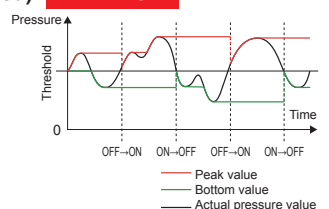
Hold functions

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 embedded)				
Dimensions	W25 × H25 × D(73) mm				

Note: The sensor head can be used independently.

Controllers

Model No.	NPN output PNP output	DPC-L101 DPC-L101-P				
		DPH-L113V	DPH-L113	DPH-L133	DPH-L114	DPH-L154
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 24 V 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				

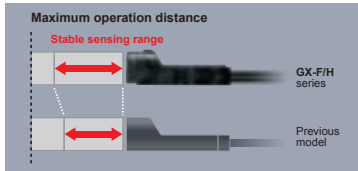
Inductive Proximity Sensors

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.

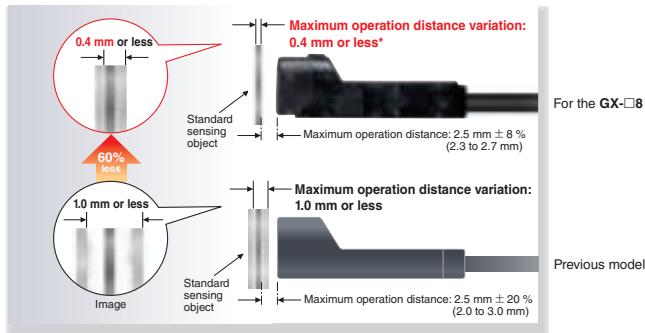


Type	Maximum operation distance	Stable sensing range GX-F/H series	Previous model
GX-□6	1.6 mm	0 to 1.3 mm	0 to 1.2 mm
GX-□8	2.5 mm	0 to 2.1 mm	0 to 1.8 mm
GX-□12	4.0 mm	0 to 3.3 mm	0 to 3.0 mm
GX-□15	5.0 mm	0 to 4.2 mm	0 to 4.0 mm
Long sensing range	8.0 mm	0 to 6.7 mm	0 to 6.4 mm

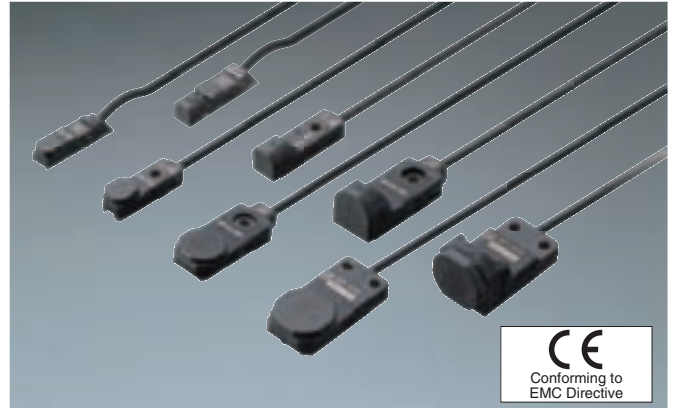
* With standard sensing object

Variation at the maximum operation distance is within $\pm 8\%$

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.

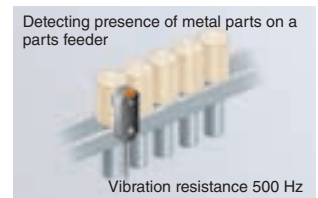


* Not including temperature characteristics.



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.



High resistant to water or oil! IP68g protective construction



Model No.	Front sensing Top sensing	GX-F6□ GX-H6□	GX-F8□ GX-H8□	GX-F12□ GX-H12□	GX-F15□ GX-H15□	GX-FL15□ GX-HL15□
Max. operation distance (Note 1)		1.6 mm $\pm 8\%$	2.5 mm $\pm 8\%$	4.0 mm $\pm 8\%$	5.0 mm $\pm 8\%$	8.0 mm $\pm 8\%$
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 12×12×1 mm	Iron sheet 15×15×1 mm	Iron sheet 20×20×1 mm	Iron sheet 20×20×1 mm	Iron sheet 30×30×1 mm
Repeatability		Along sensing axis, perpendicular to sensing axis: 0.04 mm or less				
Supply voltage		12 to 24 V DC $\pm 10\%$				
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 frequency 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□)

Cylindrical Inductive Proximity Sensor GX-M SERIES

Wide variations

Wide product range 88 models line up

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

M12 pigtailed type (DC 2-wire M8 type only)

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 $\pm 10\%$ (GX-MK30A□)
Supply voltage: 12 to 24 V DC $\pm 10\%$
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 circumference of a detection side has a metal object.

Measurement Sensors

Compact Laser Displacement Sensor

HL-G1 SERIES

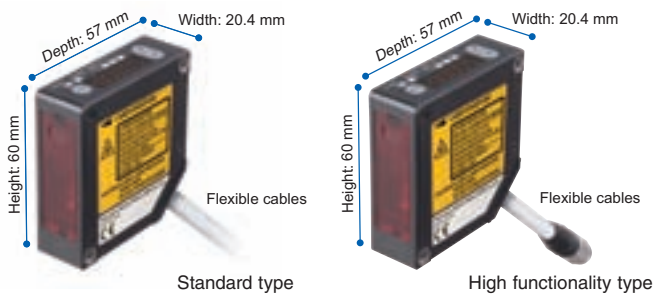
A variety of high-end functions are included in a compact, self-contained body for exceptional ease of use.

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

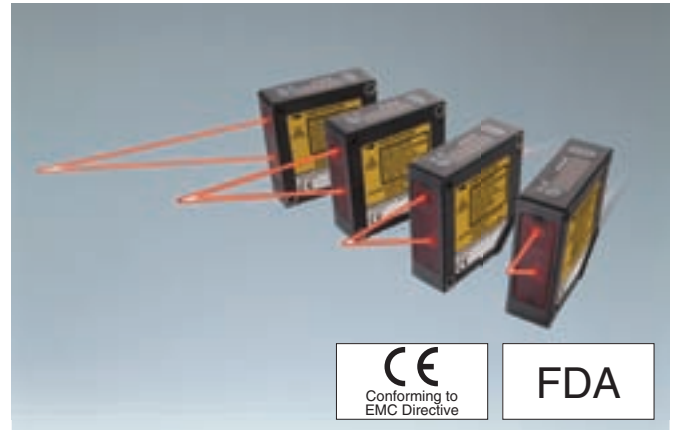
Timing input and multi input

In addition 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.



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)

The GT02 / GT12 HMI operator panel 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 panels:
 Power supply: 24 V
 Communications port: RS422 (RS485)
 • AIG02GQ 14D
 • AIG02MQ 15D
 • AIG12GQ 14D/15D
 • AIG12MQ 14D/15D



Type		Standard	High functionality	Standard	High functionality	Standard	High functionality	Standard	High functionality
Item	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.							
Temperature 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							
	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/e² (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.

3) The fluctuation by ambient illuminance is ±0.1 % F.S. or less.

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

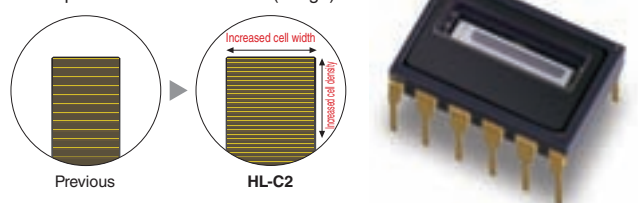
Red semiconductor laser
HL-C211F(-MK)
Class 2 (IEC), Class II (FDA)
HL-C211F5(-MK)
Class 3R (IEC), Class IIIa (FDA)

HDLC-CMOS sensors

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

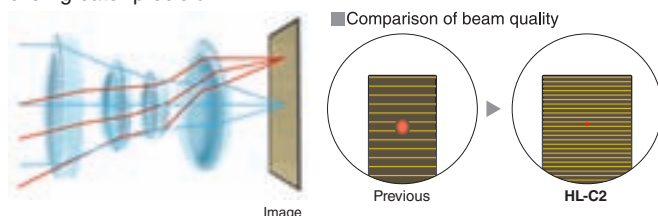
■ Comparison of cell structures (image)



High-resolution lens

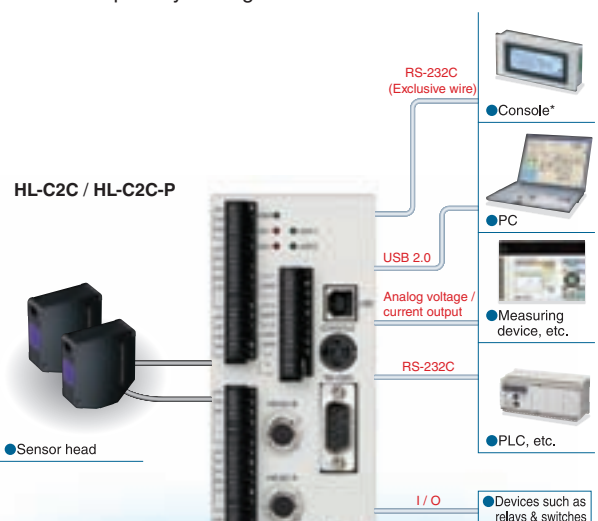
High-resolution lens has been newly designed to perfectly suit HDLC-CMOS sensors.

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.



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.



*Order of console will be accepted until September 2013.

Static Control Devices

Area Ionizer **Pulse AC Method**

NEW

ER-X SERIES

High-Speed, Wide Area Charge Removal

Three charge removal modes for diverse application coverage

The **ER-X** series offers an airless charge removal capability to eliminate the need for compressed air in addition to low pressure and high speed compressed air based modes.

Fast charge removal

Massive ion discharge when using air reduces charge removal time.

Airless or low-pressure

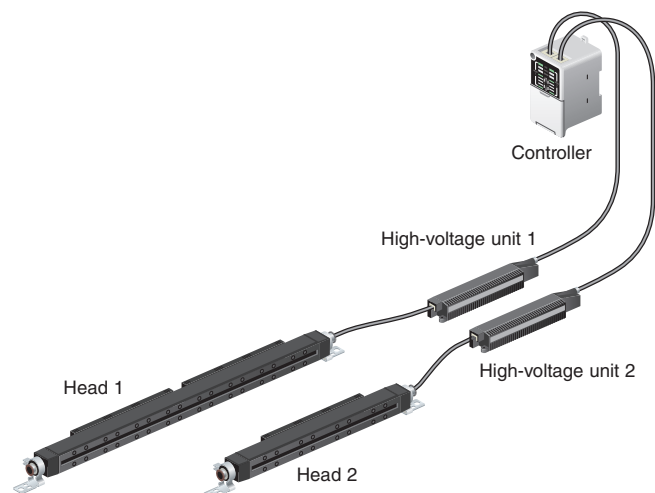
Resolves target movement issues in the presence of compressed air.

Low-pressure (Air pressure: Less than 0.05MPa)

Prevents dust dispersion and cleanliness degradation!

Dual head configuration for enhanced charge area and layout expansion

Compressed air is supplied through a port opposite that of the power cable. This allows for the use of a single air line (using a T-branch) to supply multiple ionizers, while a single controller powers and manages two heads. The **ER-X** series allows for a combination of varied heads sizes for enhanced charge removal area and layout expansion.

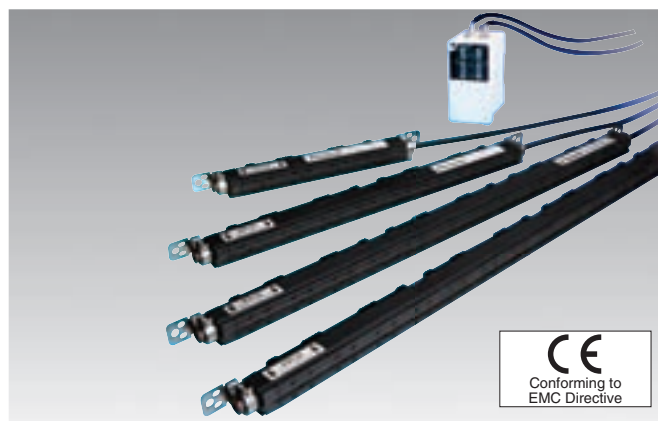


* The two head units can be set to the same discharge frequency for synchronization or alternating frequencies between the two heads.

Heads

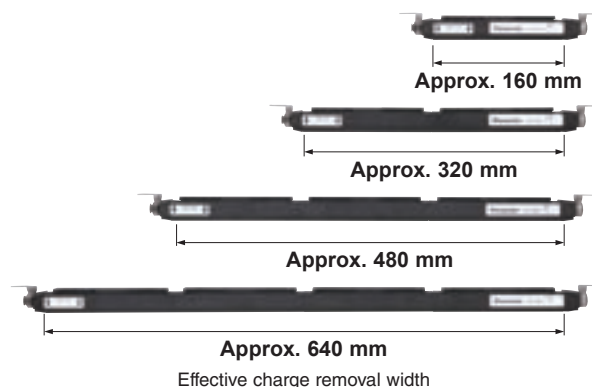
Model No.	ER-X016	ER-X032	ER-X048	ER-X064
Effective charge removal width	160 mm approx.	320 mm approx.	480 mm approx.	640 mm approx.
Charge removal time	1 sec. or less (Note 1)			
Ion balance	± 30 V or less (Note 1, 2)			
Discharge method	Pulse AC method			
Discharge output voltage	7,000 V approx			
Ozone generation	0.01 ppm or less			
Maximum air pressure	0.5 MPa			
Applicable fluid	Air (dried clean air) (Note 3)			
Ambient temperature	0 to +50 °C			
Dimensions(mm) (Head section only)	W22 × H138.8 × D30	W22 × H212.8 × D30	W22 × H244.8 × D30	W22 × H256.8 × D30

Notes: 1) In condition of discharge distance 100 mm, center of the product, discharge wavelength 50 Hz and no air supply.
2) Ion balance is average of plus and minus. Also, the specification value is typical value in condition of less than ± 10 °C ambient temperature change, set the ion balance after 30 minutes of the discharge starting, switching on the ion balance control function.
3) The dried clean air is dried (dew point: equivalent of -20 °C) and filtered (mesh-size: equivalent of 0.01 μ m) air.



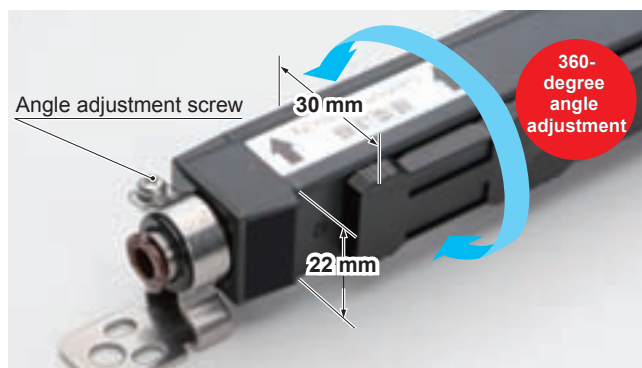
Head variations

The **ER-X** series offers four head sizes so you can choose one that best fits your work piece.



Compact heads with a 360-degree angle adjustment mechanism

The **ER-X** series heads are compact in size (30 × 22 mm) and installable even in a narrow space. The heads can be rotated 360 degrees to enable charge removal area adjustment after installation.



Controller

Model No.	ER-XC02
Number of heads conneced	Maximum 2 units
Supply voltage	24 V DC ± 10 %
Current consumption	450 mA or less when connecting 1 heads. 800 mA or less when connecting 2 heads
Output [ALARM ERROR COM (Common)]	PhotoMOS relay output • Maximum load current: 100 mA • Applied voltage: 30 V DC or less (between output-output common) • Residual voltage: 1.5 V or less (at load current of 100 mA)
Output operation	ALARM: ON when dirt or wear of the discharge needle is detected; OFF when operation is normal. ERROR: OFF when abnormal discharge is detected; ON when operation is normal.
Short-circuit protection	Incorporated (automatic reset type)
Discharge control input (DSC OFF)	Discharge allowed: Open Discharge halt: 24 V or 0 V shorted
Ambient temperature	0 to +50 °C
Dimensions	W53 × H64 × D103.5

Programmable Controllers

Programmable Controller

FP7 SERIES

Coming Soon

New PLC: 7 Main Features

All about Efficiencies for Your Manufacturing

Shorter development time

Programming by blocks allows multiple programmers to create program.

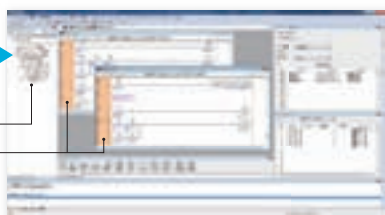
- Programming by blocks
- Effective use of program assets

- Using local device that is only effective in the program block makes it easier to reuse program from another project
- Improved efficiency by programming by blocks

- Supports multiple program in a single project
- Possible to copy / paste program from another project

Project tree

Screen shot of Ladder editor

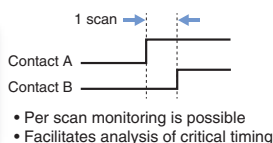


Speed-Efficient debugging

Per scan monitoring is possible, allowing for facilitating analysis of critical timing.

- Enhancing trigger of time chart monitor
- Data collection for each scan

- Upon power up, operation status is available.
- Useful for finding cause of error or fault

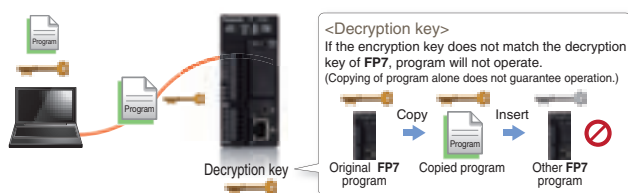


Security countermeasure

Illegal copying of program can be prevented. Copying of the program alone does not guarantee operation. Thus, if the encryption key does not match the decryption key of FP7, program will not operate.

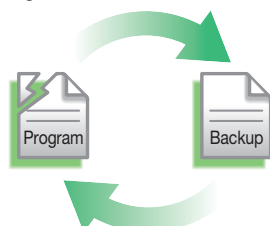
- Encrypted Program

- Program will be unreadable.
- Even if the program is copied, it will not operate.



Safe-Quick recovery from error

- Ability to back up program



- With SD memory card, upgrading of PLC program is possible after operation check.
- Historical achieving of program changes can be checked at manufacturing place. Access record is applicable during debugging, and it is also useful for finding cases of errors and faults.

Operation speed
11 ns

Max. I/O points:
8,192

Program capacity
196 k steps

Tool port
USB

Ethernet



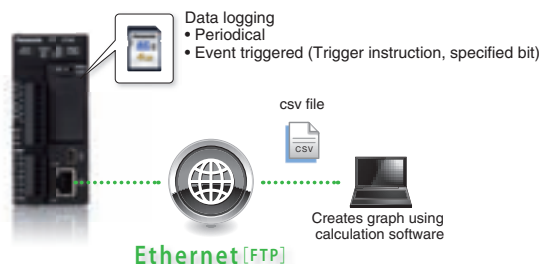
Supervise

Monitoring data of programmable controller and contents in SD memory card can be remotely accessed.

- Data logging using SD memory card

- Access content in SD memory card via Ethernet (FTP)

- Collection of traceability information
- Remote access possible
- Logger unit is unnecessary → Cost saving

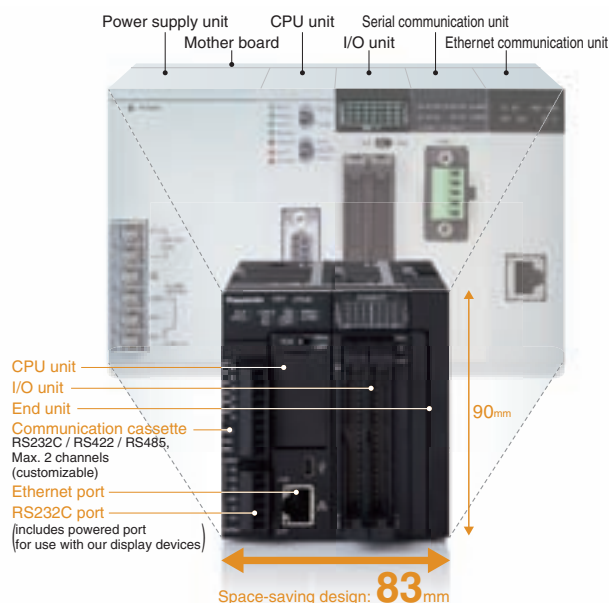


Service-Easy maintenance

- Supports multiple languages for programming comments. Thus, manufacturing can be transferred to overseas regardless of location or language.
- Battery-less data backup: No need to change battery.
- Timing of maintenance can be judged based on duration of ON time and the number of times that contact is ON.

Saving cost and space

- Maintains high performance while saving cost and space



Programmable Controllers

Programmable Controller FP0R

Ultra-high speed processing enhances productivity.

Ultra-high speed processing

Ultra-high speed: 80 ns/step (ST instructions)

* Within a range of 0 to 3,000 steps. Processing of the 3,001st and later steps is 580 ns, 1.5 times faster than the conventional model.

Note: Unit expansion increases the base time.

Equipped with RS485 port

Up to 99 units can be connected, expanding applications for the eco-conscious business field.

The PLC link is available with up to 16 other FP series and FP0R units.

Large capacity independent comment memory

Program maintenance and management become easier.

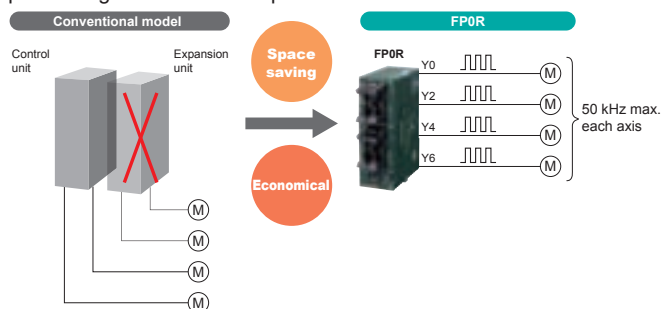
Battery-less automatic backup of all data

The F type (FP0R-F32) has a built-in FeRAM, which is a cutting-edge device that allows the automatic real-time saving of all data without a backup battery.

Battery-less

Multi-axis (4-axis) control is available without expansion units.

The built-in 4-axis pulse outputs allow multi-axis motor control without positioning units or other expansion units.



Operation speed
80 ns (Up to 3000 steps)
580 ns (3001st and later steps)

Max. I/O points:
128

Program capacity
32 k steps

Tool port
MiniUSB

Battery-less
F type



USB tool port provided as standard equipment

Programming work becomes simpler, easier, and quicker, improving the production efficiency.

Full-fledged positioning functions

A variety of dedicated instructions enable high-accuracy positioning.

Large capacity program

Program capacity: 32 k steps *

Data register: 32 k words *

* C10, C14 or C16 control unit: Program capacity of 16 k steps and data register of 12 k words

Typical model number

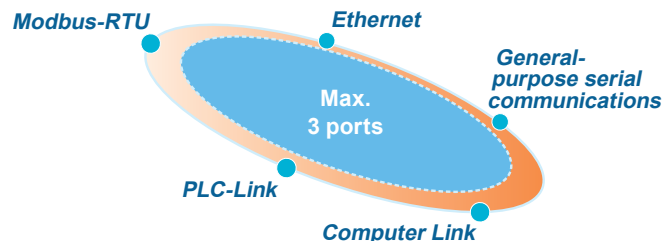
Product name	Built-in memory (Program capacity)	Specifications						Model No.
		Number of I/O points		Power supply voltage	Input	Output	Connection type	
FP0R-C10 Control unit	EEPROM (16 k steps)	10	Input: 6 Output: 4	24 V DC	24 V DC Sink/Source (±common)	Relay: 2 A	Terminal block	AFP0RC10RS
								AFP0RC10MRS
FP0R-C16 Control unit	EEPROM (16 k steps)	16	Input: 8 Output: 8	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RC16T
								AFP0RC16MT
FP0R-T32 Control unit with real-time clock function	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RT32CT
								AFP0RT32MT
FP0R-F32 Control unit, Battery-less F type	EEPROM (32 k steps)	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RF32CT
								AFP0RF32MT

Programmable Controllers

Programmable Controller

FP-X

Multiple communication ports expandable to a maximum of three channels



Add-on to equip a compact PLC with an Ethernet port



- Easily enables Ethernet connections with a compact PLC, which had been previously abandoned.
- Also equipped with an RS232C port. Together with the tool port (programming port), a total of three communication ports are available, which is remarkable for a compact PLC.
- For example, the following operations are simultaneously available with this cassette attached:
 1. I/O control;
 2. Reading data from a tester (measuring instrument) of inspection equipment (RS232C);
 3. Collecting the read data from the host computer (Ethernet); and
 4. Setting/monitoring by a touch panel (Tool port)

Operation speed 320 ns	Max. I/O points: 382	Program capacity 32 k steps	Tool port USB
Ethernet	Add-on cassette x 3	Transistor output 0.5 A	



Lineup of products with high expandability for functionality enhancement

Control Unit: 18 types

(14, 30 or 60 points) x (Relay, NPN or PNP) x (AC or DC)

Expansion Unit: 11 types

(16 points) x (Relay, NPN or PNP)
(30 points) x (Relay, NPN or PNP) x (AC or DC)
(16 points Input only)
(14 points Relay output only)



Add-on Cassette: 16 types

Input/Output, Pulse I/O, Analog I/O, Communication (RS485, RS232C, Ethernet), External memory



Typical model number

	Product name	Power supply	Descriptions	Program capacity	Model No.
Transistor output	FP-X C14T	100 to 240 V AC	8-point input of 24 V DC, 0.5 A/5 to 24 V DC, 6-point output of transistor (NPN)	16 k steps	AFPX-C14T
	FP-X C30T	100 to 240 V AC	16-point input of 24 V DC, 0.5 A/5 to 24 V DC, 14-point output of transistor (NPN)	32 k steps	AFPX-C30T
	FP-X C60T	100 to 240 V AC	32-point input of 24 V DC, 0.5 A/5 to 24 V DC, 28-point output of transistor (NPN)	32 k steps	AFPX-C60T
	FP-X E30T Expansion I/O unit	—	16-point input of 24 V DC, 0.5 A/5 to 24 V DC, 14-point output of transistor (NPN)	—	AFPX-E30T

Note: The relay output type and DC power type are also available.

Programmable Controller

FP-X0

NEW

New Multi-functional & Economical PLC

Super-high processing speed

80 ns/step (0 to 3,000 steps for ST command)

Number of I/O points expandable up to 216 max.

(When using FP0R extension unit *2)

Combined output (Ry+Tr)

Tr: 4 points, 0.5 A (Only 2 points for L14)

Built-in 2-axis pulse output

50 kHz max.*1

Built-in 2-channel multi-functional analog input

Voltage, thermistor and potentiometer input *2

Built-in calendar / clock*2

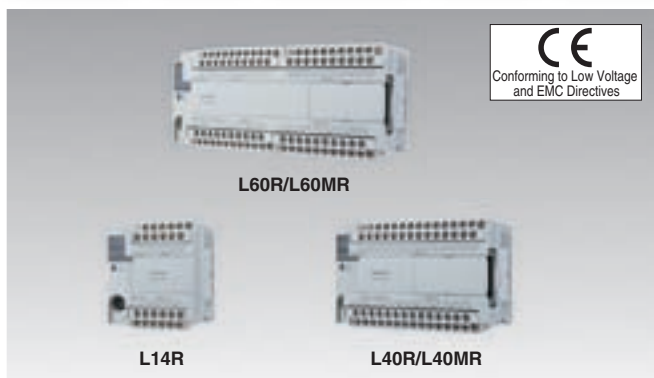
Built-in RS485 communication port*3

*1) L14 is 1-axis/20 kHz max. and L30 is 2-axis/20 kHz max.

*2) Only for L40R, L40MR, L60R and L60MR models

*3) Only for L40MR and L60MR models

Operation speed 80 ns	Max. I/O points: 216	Program capacity L14 / L30: 25 k steps L40 / L60: 8 k steps	Add-on cassette x 3	Transistor output 0.5 A
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Programmable Controllers

Programmable Controller

FP2SH

Scanning time of 1 ms for 20 k steps
A high-performance model for high-speed operation

Scanning time of 1 ms for 20 k steps

With an operating speed at the top of its class, super high-speed processing is made possible. It will dramatically decreased tact time and high-speed device.

Large programming capacity: Maximum 120 k steps

Both the large programming capacities of 60 k and 120 k are available depending on the model.

Optional small PC card is also available

The small PC card is available for programming backup or data memory expansion. This allows data processing of great amounts of data.

Built-in comment and calendar timer functions

These functions, options with the FP2, are built right into the FP2SH.

* The I/O unit and intelligent unit are the same for the FP2 series.

Operation speed
30 ns

Max. I/O points:
2048

Program capacity
Max. 120 k steps

Open network
PROFIBUS DP
DeviceNet FL-NFT
CAN open Ethernet

Positioning
Network servo
Max. 256 axes

Positioning
Pulse output: 4 Mpps
Startup: 0.005 ms



Typical model number

	Product name	Operation speed	Model No.
FP2-C2L Control unit	32 k Standard type	0.03 μs/step	AFP2221
FP2-C2 Control unit	60 k Standard type		AFP2231
FP2-C2P Control unit	60 k type with IC memory card interface		AFP2235
FP2-C3P Control unit	120 k type with IC memory card interface		AFP2255

Programmable Controller

FP-e

Panel-mount type all-in-one controller - Combination of PLC and display

- Display 5-character, 2-line, 3-color
- Front operation switch
- Equipped **FP0-C14** Intelligence into small body
- Easy programming with wizard function
- Smooth debug
- Panel-mount type

Typical model number

	Product name	Model No.
FP-e Control unit	RS232C Standard type	AFPE224300
	RS232C with calendar timer	AFPE224305
	RS232C with thermocouple input	AFPE214325
	RS485 Standard type	AFPE224302
	RS485 with thermocouple input	AFPE214322

Operation speed
900 ns

Max. I/O:
14 points /
12 points + thermocouple

With
Display

Panel-mount type



Programmable Displays (HMI)

Programmable Display

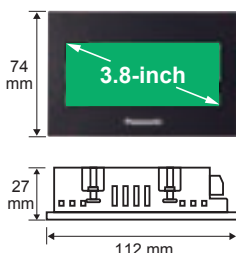
GT02

Only one in its class* compatible with SD/SDHC memory cards, which leads to the creation of new ideas

* Based on internal research as of August 1, 2010

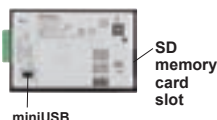
High viewability and user friendliness achieved with the small body

- The class's largest 3.8-inch display with an approx. 20% wider screen area than our conventional model
- 240 x 96 dots resolution, approx. 2.8 times higher than our conventional model
- High contrast black LCD capable of producing a "beautiful black color"



Small body with high functionality

- Capable of connecting to a maximum of 31 PLC units
- Security function for protection of data stored in the display unit and control of the authorization for operation
- Compatible with SD/SDHC memory cards of up to 32 GB






Entry-level touch panel GT02L

- Equipped with a 3.7-inch, 160 x 64-dot LCD
- You can easily design screens using dedicated software.
- Inherited the functions of the GT series such as:
Security functions, multiple unit connection function, graph function, analog-touch system, TrueType fonts, Kanji character display, etc.

* There are differences from GT02 5 V type with respect to the protective structure, LCD performance, and the number of registrable screens. In addition, the buzzer sound function is not available, and the Kanji characters cannot be used for character indications for data parts. Other functions are identical.



Product name	Description					Model No.
	LCD	Power supply	Communication port	Color of front panel	SD memory card slot	
GT02M 	STN monochrome LCD (Backlight: white, pink, red)	5 V DC	RS232C	Pure black	Not available	AIG02MQ02D
				Hairline silver		AIG02MQ03D
			RS422 / RS485	Pure black		AIG02MQ04D
				Hairline silver		AIG02MQ05D
		24 V DC	RS232C	Pure black		AIG02MQ12D
				Hairline silver		AIG02MQ13D
			RS422 / RS485	Pure black		AIG02MQ14D
				Hairline silver		AIG02MQ15D
			RS232C	Pure black	Available	AIG02MQ22D
				Hairline silver		AIG02MQ23D
			RS422 / RS485	Pure black		AIG02MQ24D
				Hairline silver		AIG02MQ25D
GT02G 	STN monochrome LCD (Backlight: green, orange, red)	5 V DC	RS232C	Pure black	Not available	AIG02GQ02D
				Hairline silver		AIG02GQ03D
			RS422 / RS485	Pure black		AIG02GQ04D
				Hairline silver		AIG02GQ05D
		24 V DC	RS232C	Pure black		AIG02GQ12D
				Hairline silver		AIG02GQ13D
			RS422 / RS485	Pure black		AIG02GQ14D
				Hairline silver		AIG02GQ15D
			RS232C	Pure black	Available	AIG02GQ22D
				Hairline silver		AIG02GQ23D
			RS422 / RS485	Pure black		AIG02GQ24D
				Hairline silver		AIG02GQ25D
GT02L 	STN monochrome LCD (Backlight: white)	5 V DC	RS232C	Black	Not available	AIG02LQ02D
			RS422 / RS485			AIG02LQ04D

Programmable Displays (HMI)

SD Solutions

Wide connection and expansion via SD using the GT series

Links
via SD

- ▶ Recipe (data table management)
- ▶ Transfer of PLC program data

Expansion
via SD

- ▶ Alarm history management
- ▶ Logging ▶ Display of graphs of stored data

Programmable Display GT05M/G/S



3.5-inch high-contrast black QVGA LCD/3-color LED backlight (320 x 240 dots)

3.5-inch STN *1 4,096-color QVGA LCD with a wide viewing angle

GT05M



GT05G



GT05S



- High-contrast LCD provides visibility ten times *Compared with GT01
- The high luminance LED provides three times higher brightness (monochrome), twice the brightness (color)
* Compared with GT01R (monochrome), Compared with GT21C (color)
- SD/SDHC memory card slot as standard equipment (32 GB max)
- USB interface as standard equipment, Supports the through function

Product name	Description			Model No.	
				Pure black	Hairline silver
GT05M Main unit	STN monochrome LCD	24 V DC	RS232C	AIG05MQ02D	AIG05MQ03D
GT05G Main unit	STN monochrome LCD	24 V DC	RS232C	AIG05GQ02D	AIG05GQ03D
GT05S Main unit	STN color LCD (Note 1)	24 V DC	RS232C	AIG05SQ02D	AIG05SQ03D

Notes: 1) It will be changed to TFT color LCD from production in December 2011.
2) The RS422 (RS485) type is also available.

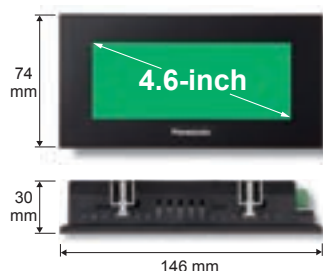
Programmable Display GT12




The 4.6-inch wide screen provides the highest visual quality in its class.

High contrast black LCD

The first SD/SDHC memory card slot in its class
320 x 120 dots Viewability



Product name		Description				Model No.	
<div>GT12</div> <div></div>	STN monochrome (Backlight: green / orange / red)	24 V DC	RS232C	Pure black	AIG12GQ12D		
				Hairline silver	AIG12GQ13D		
	RS422 / RS485		Pure black	AIG12GQ14D			
			Hairline silver	AIG12GQ15D			
	STN monochrome (Backlight: white / pink / red)		RS232C	Pure black	AIG12MQ12D		
				Hairline silver	AIG12MQ13D		
		RS422 / RS485	Pure black	AIG12MQ14D			
			Hairline silver	AIG12MQ15D			

Note: The model without an SD memory card slot type is also available.

Programmable Displays (HMI)

Programmable Display

GT32-E

Outdoor use made possible by significantly improved environmental resistance and visibility

Wide operating temperature range!

-20 °C to +60 °C (-20 °C to +55 °C when horizontally installed)

High waterproof performance!

Front panel: Rated IP67

Resistant to UV rays!

A front protection layer reduces the intensity of UV rays

High visibility display

Improved brightness and contrast, coupled with a new anti-glare coating provides exceptional viewing characteristics.



Product name	Description					Model No.
GT32M-E Main unit	TFT monochrome LCD	24 V DC	RS232C	Silver	Available	AIG32MQ03DE
			RS422 / RS485			AIG32MQ05DE
GT32T-E Main unit	TFT color LCD	24 V DC	RS232C	Silver	Available	AIG32TQ03DE
			RS422 / RS485			AIG32TQ05DE

Programmable Display

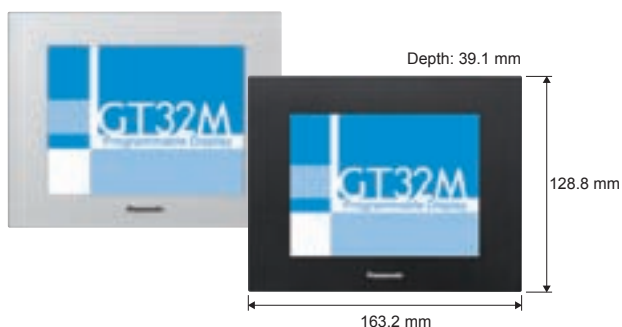
GT32M/T

Clear and beautiful display achieved by the high accuracy and long-life CFL backlight

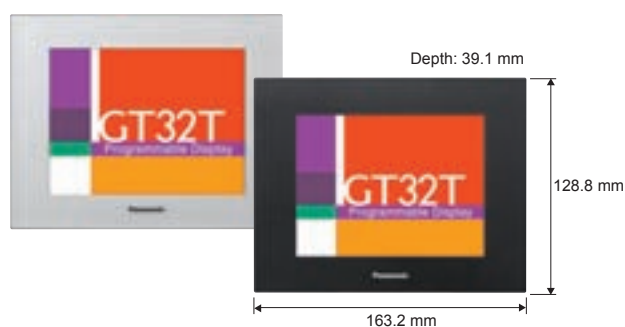
Amazingly beautiful and vivid 4,096-color TFT LCD



GT32M



GT32T



- SD memory card slot as standard equipment (32 GB max)
- USB interface as standard equipment
- **GT32T**: 4,096-color TFT LCD screen displays, **GT32M**: high accuracy and long-life CFL backlight
- Sound output function (for **GT32T1**)
- Ethernet connection (for **GT32T1**)

Product name	Description			Model No.	
				Pure black	Hairline silver
GT32M Main unit	STN monochrome LCD	24 V DC	RS232C	AIG32MQ02D	AIG32MQ03D
GT32T0 Main unit	TFT color LCD	24 V DC	RS232C	AIG32TQ02D	AIG32TQ03D
GT32T1 Main unit	TFT color LCD	24 V DC	RS232C	AIG32TQ12D	AIG32TQ13D

Note: The RS422 (RS485) type is also available.

Laser Markers

This product is introduced to only limited countries.
Please contact our office for details.

FAYb Laser Marker LP-S500W SERIES

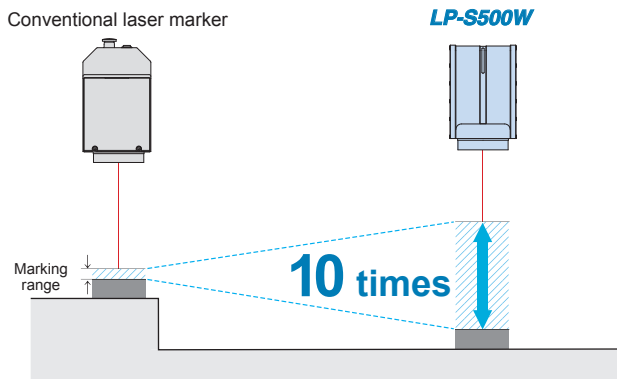
NEW

A New Standard Black Laser Annealing

Wide marking range New design

Reliable black laser annealing used to require strict management of the target's work distance. With the **LP-S500W** series, you now have ± 15 mm* more flexibility in work distance thanks to a newly developed optics design. There is no longer a need to do process changeovers for lines producing products of different sizes. And, because printing is done uniformly regardless of height differences, the **LP-S500W** series helps improve production reliability.

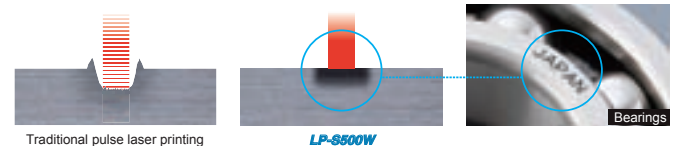
* In case of marking to SUJ2 (material) by **LP-S500W**



What is black laser annealing?

Black laser annealing is a printing technique that uses laser irradiation to heat up metal surfaces and form oxide films that appear as letters printed in black*. In contrast to traditional techniques involving metal surface etching, the absence of depressions or burrs keeps surfaces level. This makes black laser annealing the best printing technique for target objects such as bearings that require high surface precision.

*Black laser annealing may not be possible with certain materials.



New dual pointer marks New feature

The **LP-S500W** series allows the operator to visualize the printable range based on the relationship between the positions of the guide laser and laser pointer. Now you can check target object position and height based on the laser pointer's marker positions. Deviation amounts can also be checked. With this feature, equipment setup and maintenance gets a little easier.

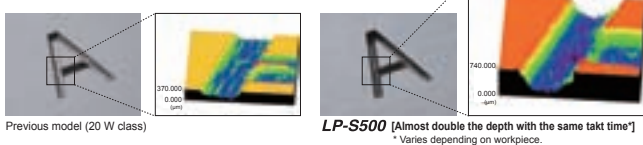
FAYb Laser Marker LP-S SERIES

High Output × Environmental Resistance

High output for superior deep engraving performance

The 42 W high-power output enables high-speed deep engraving and black printing on metal workpieces. This allows for quick and accurate marks to be performed on precision metal parts, such as bearings and tools.

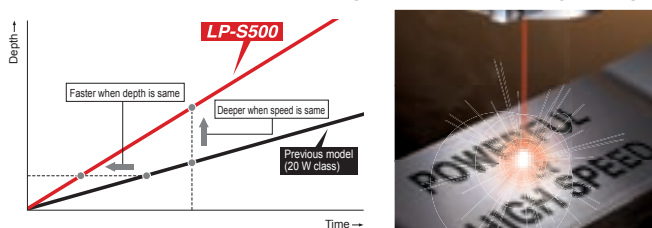
Cross-section image of engraved location



High speed for enhanced productivity

Faster and deeper printing or processing is possible as more energy is applied to the workpiece. The **LP-S500** is equipped with a high-output laser unit. This shortens the printing takt time greatly contributing to the improvement of productivity.

Simulated characteristics of high-speed deep engraving



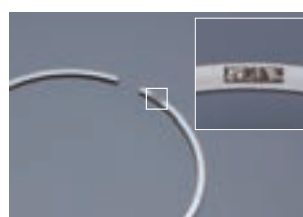
MARKING SAMPLES



Cylinder blocks



Pressure transducers



Joint



Medical instruments

Laser Markers

This product is introduced to only limited countries.
Please contact our office for details.

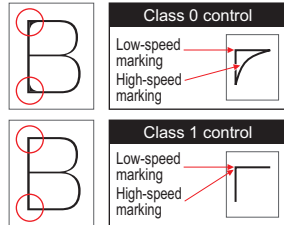
3D-control FAYb Laser Marker

LP-Z SERIES

Wide area 3D-control FAYb laser marker

Excellent processing quality is also achieved

By adopting the short pulse fiber laser that can achieve high peak power, heat has little effect on work and high-quality processing can be achieved. It also uses a high-speed galvano scanner. Beautiful print-outs can be produced without gaps even in high-speed printing because of the Class 1 galvano control system.

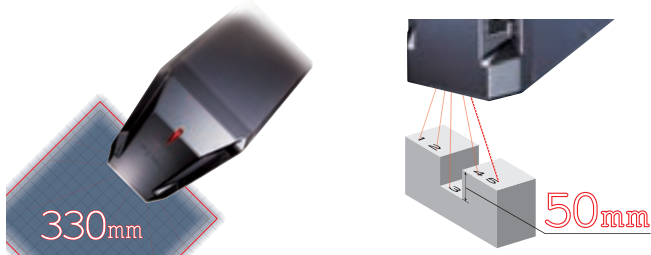


Wide

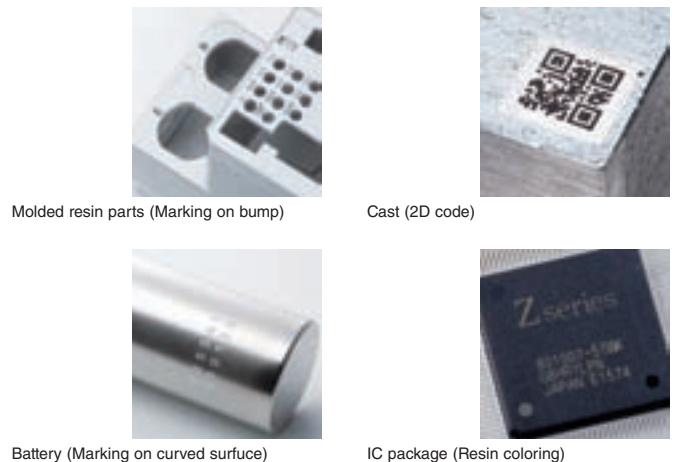
A Z-axis stroke mechanism is added resulting in a large printable area of (X) 330 mm × (Y) 330 mm × (Z) 50 mm*. This greatly improves production efficiency.
*LP-Z256

330 × 330 mm wide marking area

Z-axis stroke controls a wide range of 50 mm



MARKING EXAMPLES



CO₂ Laser Marker

LP-400 SERIES

High-speed, clear marking & high-quality processing

High-speed marking at 700 cps

Acceleration, deceleration and response speeds of the **LP-400** exceed those of previous models by at least 200 %. It is possible to mark on products that are moving rapidly. The **LP-400** that can mark 700 characters per second reduces tact time, leading to more than three times the productivity of previous models.
* Excluding 10 W type

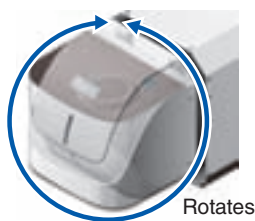


Clear marking

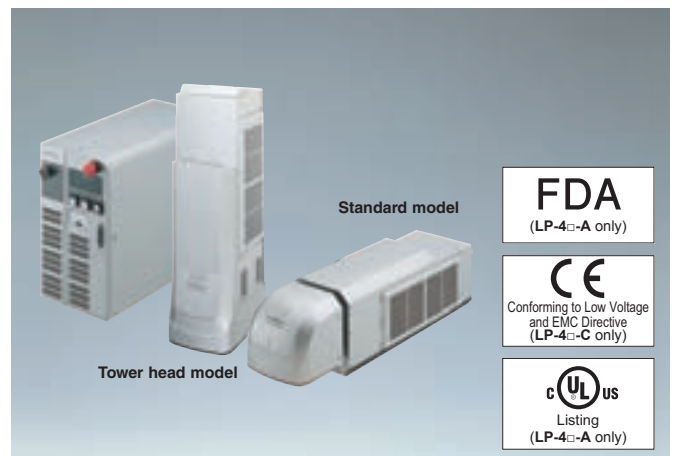
Well-matched to the heat absorption characteristics of plastics, the 9.3 μm wavelength laser allows marking on plastic surfaces by melting the surface layer without creating excessively deep marking and limiting damage to the substrate. This capability rectifies issues with previous models where deep marking would create pinholes or otherwise make marking output difficult to read.

Rotating head design (standard models)

A unique head design that rotates freely through 350° allows the laser marker to be installed even in a vertical orientation. Flexible installation options make it easy to fit the system into a variety of production environments.



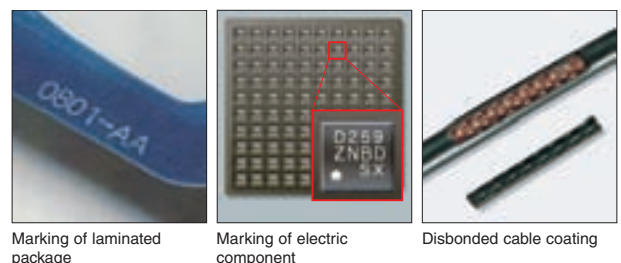
Rotates through 350°



High-quality processing

Short-wavelength laser radiation is readily absorbed by plastics, allowing the creation of sharp edges and increasing dimensional accuracy.

MARKING AND PROCESSING EXAMPLES



Machine Vision Systems

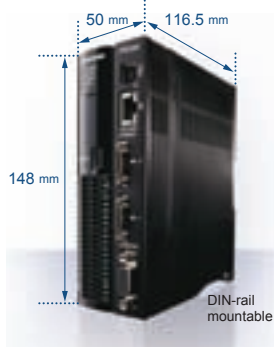
IMAGECHECKER PV200

Improved inspection reliability while reducing engineering time

COMPACT & HIGH SPEC

Image processing with impressive accuracy and performance can now be achieved while requiring a surprisingly low implementation and programming time.

The new ideal machine is a color/grey combination type.

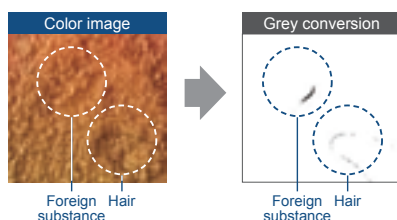


Color / grey combination inspection system & 4M grey camera

High definition color and grey cameras can be simultaneously connected. Inspections with color and grey images can be conducted concurrently. Six types of cameras, including a 4M grey camera, are available with the system.

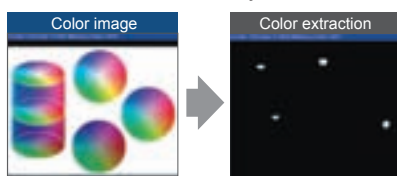
Grey conversion

Color images can be converted into grey images by specifying RGB values. This function makes it easier to find foreign substances, raising the inspection accuracy.



Color extraction

Colors in different color phases can be simultaneously extracted and inspected by using one inspection checker, which was previously impossible with a conventional model (AX40).

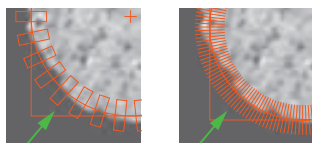


Smart Edge (Circle) / (Line)

A function for accurate approximation of circles/lines

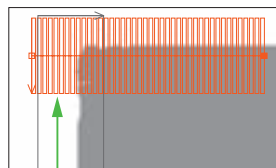
This function detects a maximum of 3,000 edge points for a line and 3,600 for a circle in one area, dramatically improving the accuracy of the measurement of dimensions and positions. This function has also significantly reduced the man-hours required for setting.

Smart Edge (line) setting example



One cell can have a minimum width of one pixel (linear scanning), and a maximum of 3,600 cells can be set per 0.1°.

Smart Edge (line) setting example



A maximum of 3,000 cells can be set.

Value Model PV200MC

This is our value model, which offers the same performance as the PV200 but can only be connected using a 0.3M grey camera.

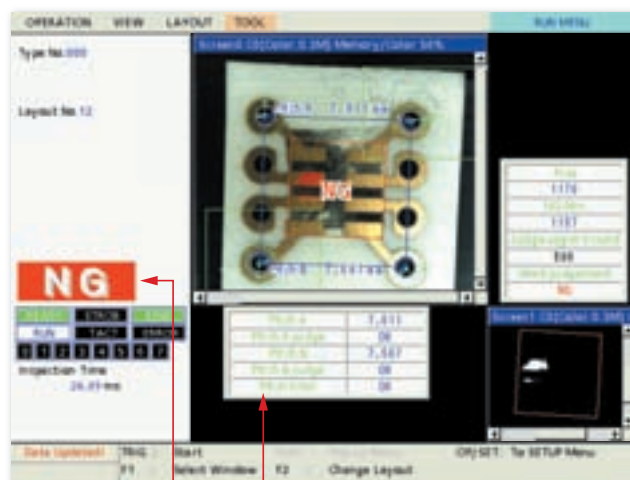


High-speed communications and storage

(Built-in memory / Ethernet / SD memory card)

Screen customization

The PV200 has been designed to simplify implementation in both pre-production and post-production.



Customizable Display

A function for drawing text (multi-lingual), measured values, cross marks, arrow marks (dimension lines), rectangles, and ellipses.

Data R (Read) / W (Write) function

Program modifications can be quickly made in the RUN mode without replacing the program or switching to the setting screen. This is useful in cases where changes to the inspection area and pre-processing parameters must be made after the program has been finalized.

All-in-one model featuring image processing, optical character recognition (OCR) and code reading (CR) functions PV230

NEW

- Compatible with a wide variety of cameras ranging from 0.3M to 4M pixels Reliable character extraction achieved by the color / gray combination function
- The optical character recognition (OCR) can read up to 80 characters. [Capable of case-sensitive (capital letter or small letters) reading]
- The 1D / 2D code reading function is compatible with the following code types and can read up to 80 characters.
 - 1D code: 25 types (Industrial 2 of 5, EAN-13, Code 39, etc.)
 - 2D code: 2 types (Data Matrix ECC 200, QR Code)
- Capable of checking the 1D / 2D code reading result with that of reading the character string indicated with the code
- Equipped with a function to check the 2D code print quality (Compliant with ISO / IEC 15415)
- Capable of combination inspections using a variety of checker functions of PV200 (Smart edge, etc.)

UV Curing Systems

LED Spot Type UV Curing System UJ30/35

Have lower energy consumption than UV lamp systems
And advanced features compared to other LED UV systems

Quick & Easy setup immediately after installation

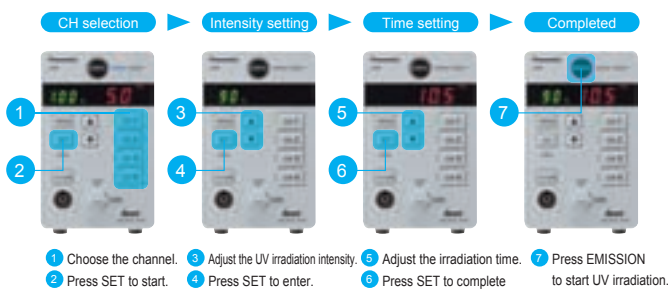
1. User-friendly interface

Simple interface

Easy-to-read display and easy-to-setup panel

Only three switches required for basic settings.

1. Choose LED head (CH1 to 4).
2. Set UV irradiation intensity (%).
3. Set irradiation time.



Four individually controllable heads

The irradiation power and time can be individually controlled.

Strict quality control

2. Stable irradiation

Prevention of resin curing defects and bonding failures

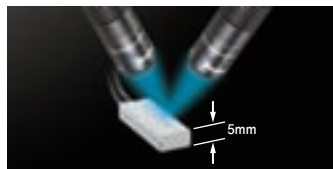
Temperature feedback control

±3 % or better UV irradiation accuracy (with the intensity set to 80 %)

Significantly higher reliability for bonding and fixing

New slim UV sensor port (UJ35)

The UV sensor for measuring irradiation intensity enables calibration in high-accuracy.

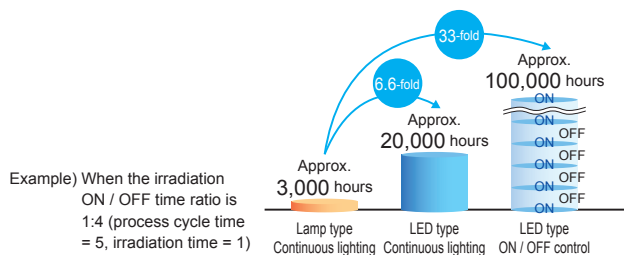


Reliable & Safe

3. Environmentally friendly and reliable

Long-lasting cost effective LED type UV system

Frequent part replacement is reduced by LED technology.



Application examples

Bonding of syringe needles

Bonding injection needles to hubs (bases)



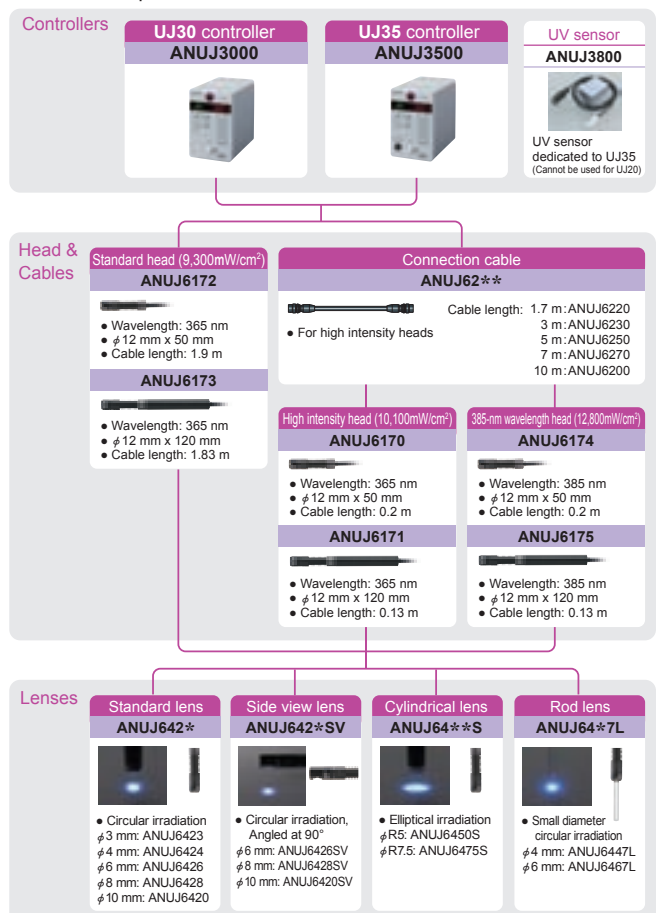
Bonding camera lenses to optical tubes for digital cameras, mobile phones, etc.



Curing ink on labels / stickers



Product Lineup



Energy Consumption Visualization Components

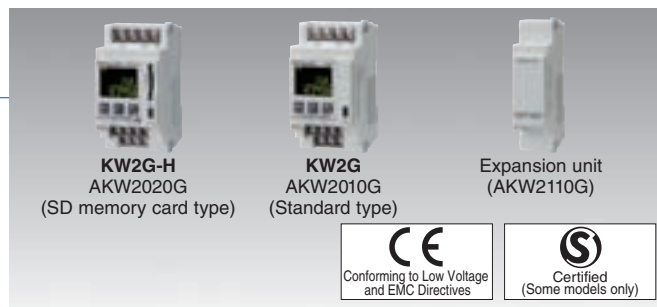
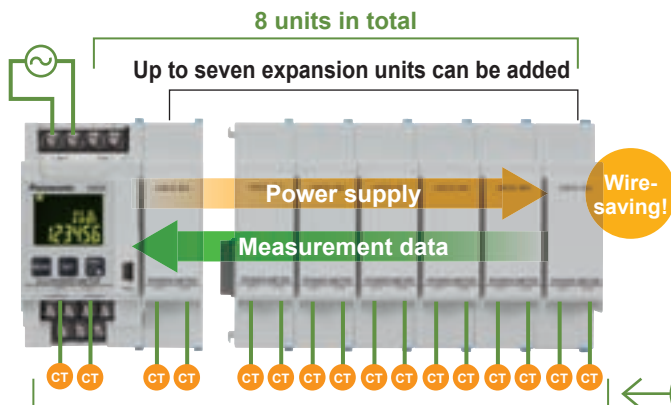
Eco-POWER METER

KW2G / KW2G-H **NEW**

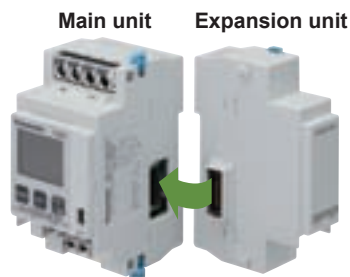
Up to 16 Circuits! Expandable and Efficient!

Easy wire-saving expansion

- Eliminate excess wiring by using up to seven expansion units to add on the required number of CT inputs for your application.
- SD memory card can be used for **KW2G-H**, which makes it possible to save the collected data automatically to the memory card.



Connector for easy expansion!



Maximum 16 circuits (single-phase two-wire system)
8 circuits (single-phase three-wire system and three-phase three-wire system)

Product name		Phase and wire system	Operating power supply	Measured current input	Current transformer (sold separately)	Model No.
KW2G / KW2G-H Eco-POWER METER	Main unit	Single-phase two-wire system Single-phase three-wire system Three-phase three-wire system	100 to 240 V AC 50 / 60 Hz	100 / 240 V AC system	Dedicated type 5 A, 50 A, 100 A, 250 A, 400 A, 600 A	AKW2010G AKW2020G
	Expansion unit					AKW2110G

Eco-POWER METER

KW9M

NEW

One Meter Works for Both Energy Saving and Power Surveillance

Multi function type developed by adding a power surveillance function to a simple power meter

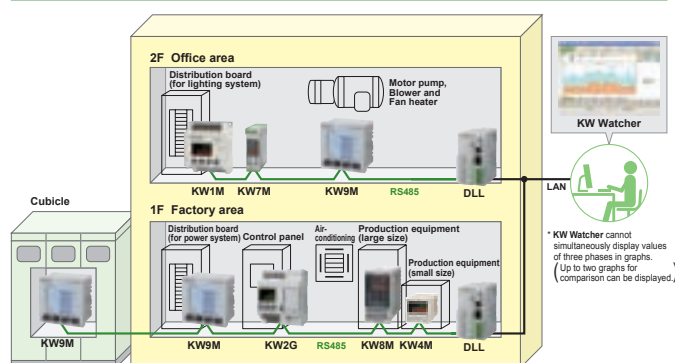
- High accuracy: Instantaneous active power: 1 %, Class 1 (IEC62053-21)
- The total and individual power values of each phase are displayed on one screen, enabling you to check the phase balance at a glance.
- Bidirectional integrated electric power of each circuit can be measured.
- Capable of simultaneously measuring up to three circuits in a single phase two-wire system of same power supply.

Product name	Phase and wire system	Input measurement voltage	Input measurement current	Model No.
KW9M Eco-POWER METER Standard type	Single-phase two-wire (1P2W)	0 to 500 V AC	1 to 4,000 A	AKW91110
	Single-phase three-wire (1P3W)			
	Three-phase three-wire (3P3W)			
	Three-phase four-wire (3P4W) (common)			

Note: The dedicated current transformer (CT) can not be used. Please use a general-purpose CT with a secondary side 1 A / 5 A.



Example of a comprehensive solution for the entire factory



Energy Consumption Visualization Components

Eco-POWER METER

KW1M/KW1M-H

Economically priced and ideal for individual power management inside devices and control panels.

- 50 mm thickness makes it perfect for control panel installations.
- Both screw and DIN rail installation (easy installation).
- Switchable between electrical power and electricity charge usage.
- Display of calculated CO₂ value possible.
- RS485 interface allows connection of up to 99 units.
- Communication speed up to 38.4 kbps
- Notification function (externally output) warns you of excessive electric power and current usage.

Features of KW1M-H (SD card type)

- Automatic logging of electricity usage amount and data reading using SD/SDHC memory card
- Direct input with 400 V AC system
- Simultaneous power/pulse measurement
- Built-in memory
- Built-in battery (for clock and log data backup)

Connection to Data Logger Light

Connect up to 99 units using RS485 (KW1M + other devices ≤ 99 units)



With "KW View" power display software tool for the KW1M-H, you can easily create graphs from SD / SDHC memory data. It is ideal for places where there is no LAN or for small-scale visualization.

Product name	Phase and wire system	Operating power supply	Input measured voltage	Current transformer (sold separately)	Model No.
KW1M (Standard type)	Single-phase two-wire system	100 to 240 V AC 50 / 60 Hz	100 / 200 V AC system	Dedicated type 5 A, 50 A, 100 A, 250 A, 400 A and 600 A	AKW1110
KW1M-H (SD memory card type)	Single-phase three-wire system		100 / 200 / 400 V AC system (Select with setting mode)		AKW1111
	Three-phase three-wire system Three-phase four-wire system (Note)				AKW1121

Note: For a three-phase four-wire system, exclude **AKW1110** from the selection.

Eco-POWER METER

KW8M

Lineup with new energy saving and environmentally friendly features!

Features of AKW8111

- Direct input with 400 V AC system
- Three-phase, four-wire system available
- Improved measurement function
- Simultaneous power and pulse measurement
- Supports Networking (RS485 communications port comes standard)

Features of AKW8111H

- Includes all the features of AKW8111.
- Built-in memory
- Built-in battery (for clock and log data backup)
- Optional functions (3 items) added
 - Each integrated electric power by month, day and hour
 - Arbitrary integrated active electrical power
 - Calendar timer function

Features of AKW8115

- Direct input of secondary side 1A / 5A CT
- High current circuit measurement

Main unit

Product name	Protocol	Phase and wire system	Input measured voltage	Current transformer (sold separately)	Model No.
KW8M Eco-POWER METER DIN 48 × 96 type		Single-phase two-wire system	100 / 200 / 400 V AC system (Select with setting mode)	Dedicated type 5 A, 50 A, 100 A, 250 A, 400 A and 600 A	AKW8111
	High performance type	Single-phase three-wire system Three-phase three-wire system			AKW8111H
	1 A / 5 A CT input type	Three-phase four-wire system		U.R.D., Ltd. CTL-CL series separate CT recommended (Check the specifications before use.)	AKW8115 (Note)

Note: Since a dedicated CT is not used, please use a 4,000 A or less type (secondary current: 1 A or 5 A).



Options

Product name	Application	Model No.
Mounting frame	KW8M all types (for control panel)	AKW8822
Terminal cover	KW8M all types	AKT8801
Spare battery (Note 1)	AKW8111H only	AFC8801

Notes: 1) This is attached to AKW8111H when shipped.

2) Please refer to P.27 for the dedicated current sensor (CT).

Energy Consumption Visualization Components

Data Logger

Data Logger Light

Supports “visualization” of electrical power when combined with Eco-POWER METER

Supports SD / SDHC memory card

USB port RS232C / RS485 communication port comes standard

Supports 100 to 240 V AC power supply

Product name	Model No.
Main unit	AKL1000

Note: SD / SDHC memory card (sold separately)



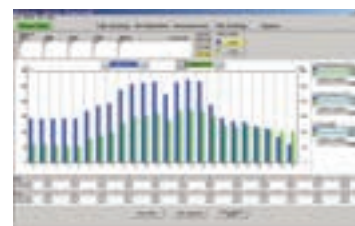
Software Tool

KW Watcher

For easy “visualization” of data collected in DLL and DLU*

*DLL is the abbreviation for Data Logger Light. DLU is the abbreviation for Web Datalogger Unit.

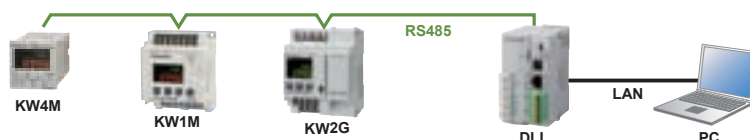
- Collected files stored according to unit of time on the Data logger, are downloaded as required to a PC and graphs and numerical data can be displayed for simple electric power, water amount, temperature, primary unit and air flow amount measurement values.
- Measurement is in 15 min., 30 min., and 60 min. units.
- KW1M-H / KW2G-H data stored on SD memory cards can also be displayed. (Requires change of KW Watcher settings)



Before and after chart of integrated electric power KW Watcher



Electric power use broken down by facility KW Watcher



Air Flow Monitor

EWA1 SERIES

Visualize air consumption to improve the efficiency

Ultrasonic detection system

Normal value conversion function

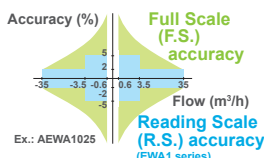
This monitor indicates the air consumption, pressure and temperature under normal conditions as obtained by using a normal value conversion function. You don't have to separately install a pressure gauge or thermometer.



High accuracy flow rate measurement

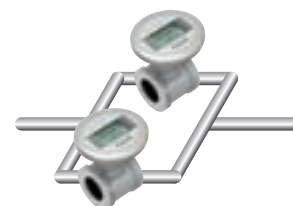
The R.S. (reading scale) is the accuracy applicable to all readings in the flow rate range.

Thus, even the low flow rate range can be read with high accuracy.



Usable in loop pipes

Direct and reverse flow can be measured and output.



Type	Appearance	Pipe size	Model No.	Flow range (at 20°C, 0.7MPa)	
				m³/h (normal)	L/min. (normal)
Small pipe size		25A (1B)	AEWA1025	± 4.4 ~ ± 258	± 73 ~ ± 4,300
		32A (1 1/4B)	AEWA1032	± 8.1 ~ ± 479	± 135 ~ ± 7,983
Medium pipe size		40A (1 1/2B)	AEWA1040	± 9.6 ~ ± 589	± 160 ~ ± 9,816
		50A (2B)	AEWA1050	± 18 ~ ± 1,105	± 300 ~ ± 18,416
		65A (2 1/2B)	AEWA1065	± 29 ~ ± 1,768	± 483 ~ ± 29,466
		80A (3B)	AEWA1080	± 37 ~ ± 2,211	± 616 ~ ± 36,850
Large pipe size		100A (4B)	AEWA1100	± 74 ~ ± 3,684	± 1,233 ~ ± 61,400
		150A (6B)	AEWA1150	± 177 ~ ± 8,842	± 2,950 ~ ± 147,366
		200A (8B)	AEWA1200	± 295 ~ ± 14,737	± 4,916 ~ ± 245,616

Note: Please refer to order guide of our EWA1 website for other temperature / pressure conditions.

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