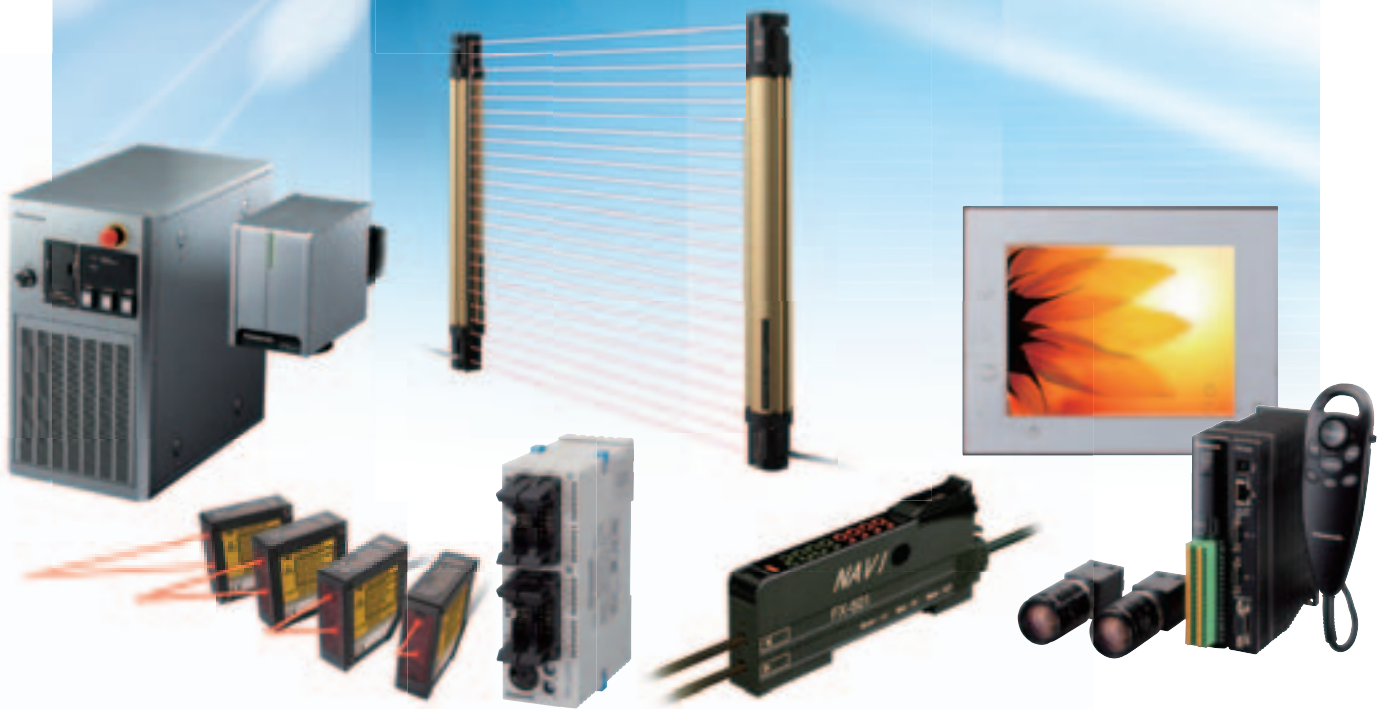


## NEW & KEY PRODUCTS 2012



### Contents

Fiber Sensors .....	P.1~
Simple Wire-saving Units .....	P.4
Photoelectric Sensors .....	P.6~
Micro Photoelectric Sensors .....	P.8
Laser Sensors .....	P.9
Particular Use Sensors.....	P.10
Light Curtains .....	P.11~
Pressure Sensors .....	P.13
Inductive Proximity Sensors .....	P.5,14

Measurement Sensors .....	P.15~
Programmable Controllers(HMI)...	P.17~
Programmable Displays .....	P.20~
Laser Markers .....	P.23~
Machine Vision System.....	P.25
UV Curing System .....	P.26
Energy Consumption Visualization Components .....	P.27~
Timers and Counters .....	P.30

# Fiber Sensors

## Tough Fiber

**NEW**

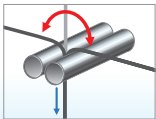
Introducing a tough fiber that transcends common knowledge!

Conventional 3 types rolled into 1 !!  
New standard fiber



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

### Break-free



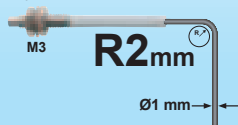
**Flexible durability**  
**10 million times** (Typical)

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

### More flexible

R2 to R4 mm

Ex) FT-31



Ex) FT-42



Reduced the time for selecting fiber and registration numbers

For Designers

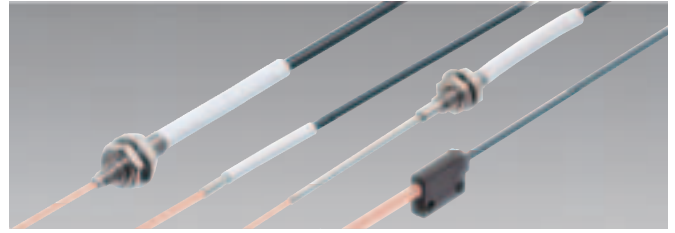
**High-quality**

- 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

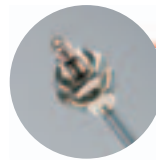


The new standard fiber is composed of a single fiber core, achieving uniform light intensity.

- 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

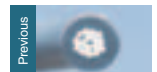
### Stable emission intensity $\pm 10\%$

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]

**R4 mm**

**1/6** of that of previous

### More bendable!

Bending durability  
[Previous is 1,000 times]

**10,000 times**  
more than previous

**10 million times**

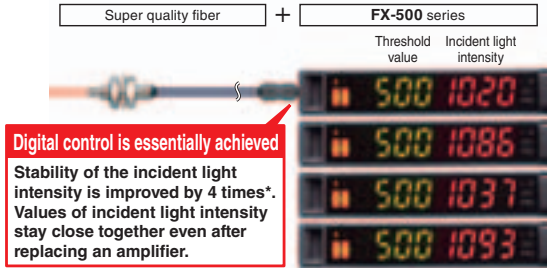
# Fiber Sensors

## Dual Digital Display Fiber Sensor FX-500 SERIES

At the industry's leading edge

### A different stability!

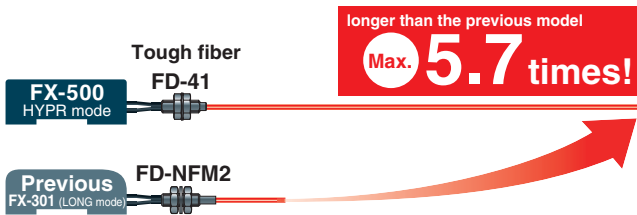
When used with the super quality fiber as a set, the incident light intensity variation among units is decreased to only 1/4 of that of conventional models.



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

### Hyper HYPR mode incorporated

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



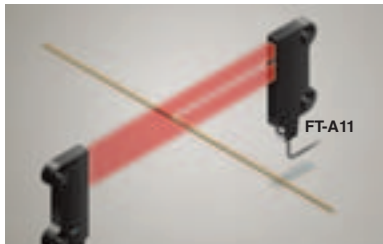
### Max. 25 $\mu$ s response time

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



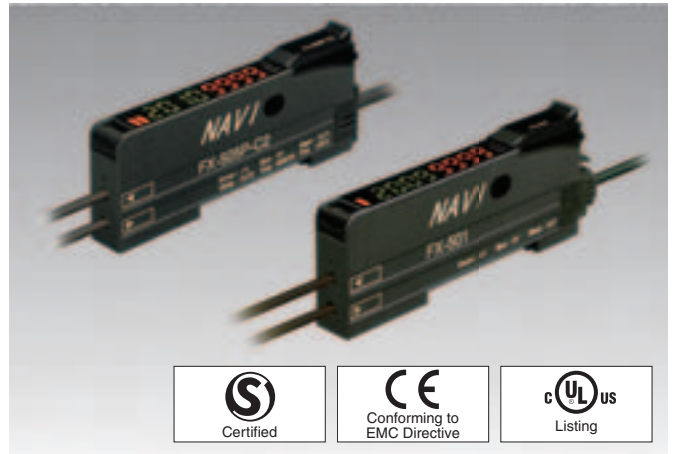
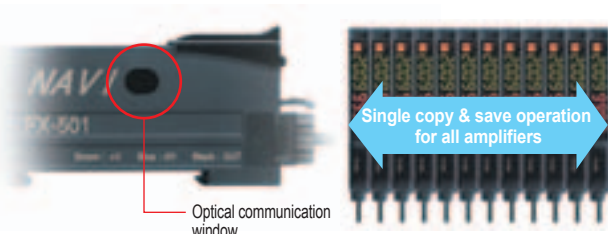
### A different accuracy!

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



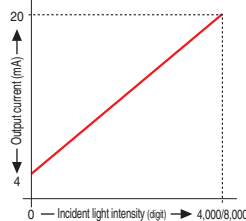
### An optical communication function allows sensors to be adjusted simultaneously

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.

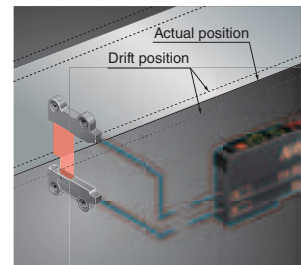


### Analog output cable type FX-505(P)-C2

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.

Item	Type	Standard type (Note)	2-output type (Note)	Cable type
	Model No.	NPN output	FX-501	FX-502
	PNP output	FX-501P	FX-502P	FX-505P-C2
Supply voltage	12 to 24 V DC $\pm 10\%$ / $-15\%$			
Output		NPN open-collector transistor or PNP open-collector transistor	NPN open-collector transistor or PNP open-collector transistor $\times 2$	
	Output points	1 point	2 points	
	Output operation	Switchable either Light-ON or Dark-ON by L/D mode		
Response time	H-SP: 25 $\mu$ s or less, FAST: 60 $\mu$ s or less, STD: 250 $\mu$ s 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 $^{\circ}$ C (unless 4 units or more are mounted in cascade)			
Emitting element (modulated)	Red LED (Peak emission wavelength: 643 nm)			
Dimensions	W10 $\times$ H32 $\times$ 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

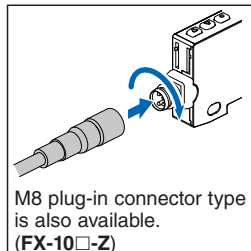
### Space-saving 9 mm in width

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.

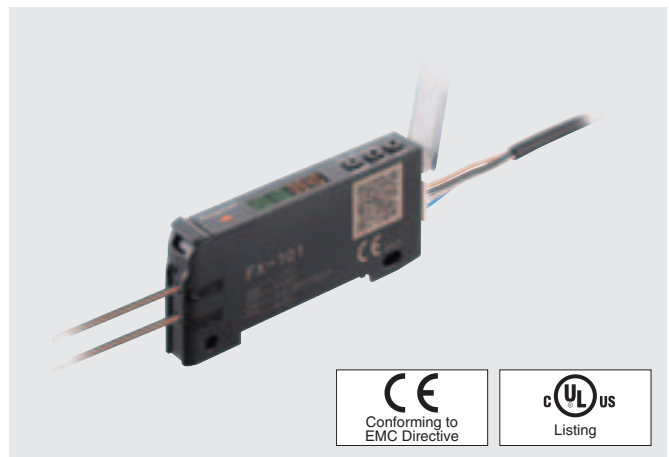


### Wiring can be carried out using commercially-available connectors

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.



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	Standard 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 transistor				
Output operation	Selectable either Light-ON or Dark-ON, at SET mode				
Response time	Emission frequency 0: 250 μs or less Emission frequency 1: 450 μs or less Emission frequency 2: 500 μs or less Emission frequency 3: 600 μs or less		Emission frequency 1: 2.5 ms or less Emission frequency 2: 2.8 ms or less Emission frequency 3: 3.2 ms or less Emission frequency 4: 5.0 ms or less		
Ambient temperature	-10 to +55 °C				
Emitting element (modulated)	Red LED (Peak emission wavelength : 632 nm)				
Dimensions	W92 × H30 × D65.5 mm				

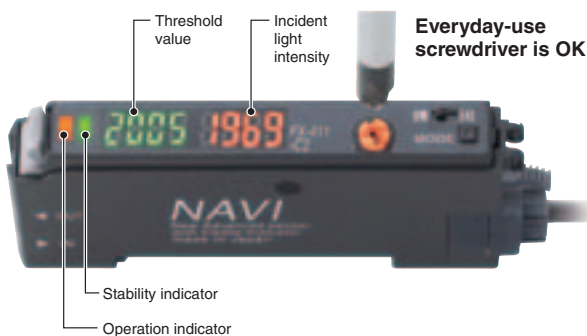
Note: Model Nos. having the suffix '-Z' are M8 plug-in connector type.

## Dual Digital Display Fiber Sensor FX-410 SERIES

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

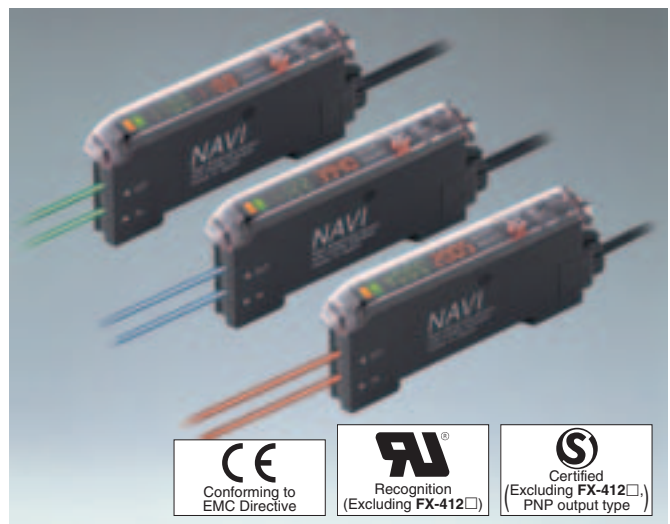
### Incident light intensity and threshold value are displayed simultaneously

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



### New FX-412 can be turned by finger!

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



Sensing range (Red LED type):

FT-43 2,200 mm (U-LG), 450 mm (STD), 310 mm (FAST)

FD-62 820 mm (U-LG), 180 mm (STD), 130 mm (FAST)

Supply voltage: 12 to 24 V DC ± 10 %

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

FX-411 □ P PNP open-collector transistor

Dimensions: W10 × H30.5 × D64.5 mm

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

Main cable (3-core): CN-73-C1 (cable length 1 m), CN-73-C2 (cable length 2 m) CN-73-C5 (cable length 5 m)

Sub cable (1-core): CN-71-C1 (cable length 1 m), CN-71-C2 (cable length 2 m) CN-71-C5 (cable length 5 m)

# Simple Wire-saving Units

Communication Unit for Open Network **NEW**  
**SC-GU3** SERIES

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

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

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



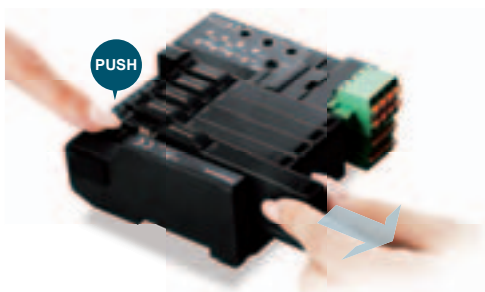
Wire-saving construction greatly reduces labor.

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



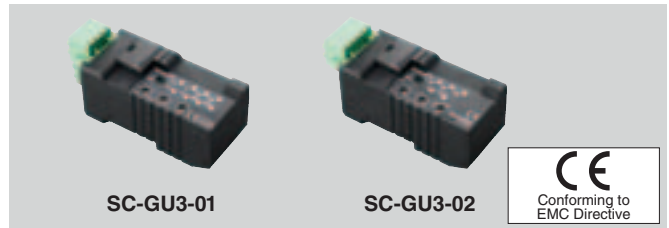
Sensors are easily replaced without removing adjacent sensor amplifiers.

Sensors are removed by simply sliding the sensor amplifier sideways while pressing on the connection unit lever. Install new sensors by simply sliding the amplifier into the array without requiring the removal of the 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	<b>FX-501, FX-502, FX-301</b> (those produced after June 2004), <b>FX-305</b>
Laser sensor	<b>LS-403</b>
Pressure sensors	<b>DPS-401, DPS-402</b>
Sensor input unit	<b>SC-T1JA</b> (in combination with <b>SC-71</b> )

## Sensors that only output information

(not optical communication compatible)

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

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

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

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

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



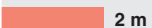

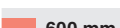
# Photoelectric Sensors

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

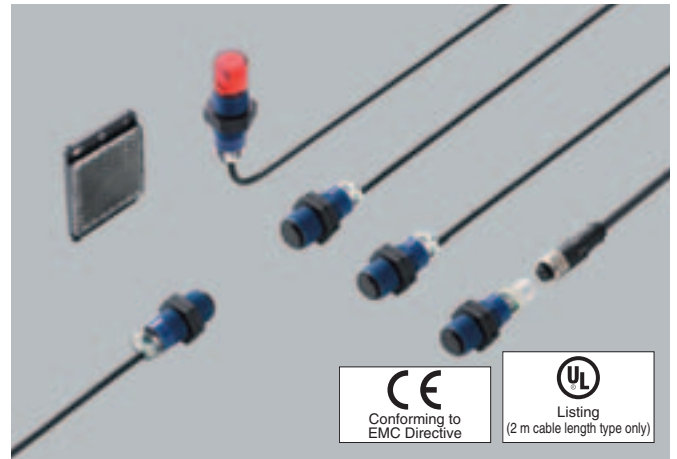
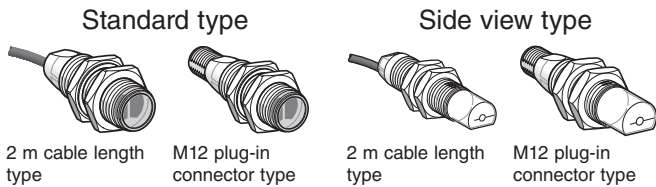
**Easily mountable with M18 thread**

**Great lineup of 80 models**

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

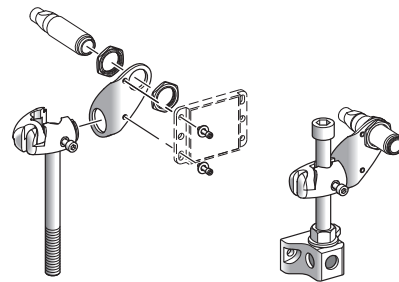
Type	Sensing range
Thru-beam <b>CY-111</b> □	 15 m
Retroreflective <b>CY-192</b> □	 4 m
Retroreflective (with polarizing filters) <b>CY-191</b> □	 2 m
Diffuse reflective <b>CY-121</b> □	 100 mm
Diffuse reflective (with sensitivity adjuster) <b>CY-122</b> □	 600 mm

<b>Output</b>	NPN, PNP
<b>Output operation</b>	Light-ON, Dark-ON
<b>Connecting method (Note 1)</b>	2 m cable length type, M12 plug-in connector type
<b>Shape</b>	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 ± 10 %  
 Output: NPN open-collector transistor or PNP open-collector transistor  
 Response time: 1 ms or less  
 Protection: IP67 (IEC)  
 Ambient temperature: -25 to +55 °C

# Inductive Proximity Sensors

Cylindrical Inductive Proximity Sensor  
**GX-M** SERIES NEW

**Wide variations**

**Wide product range**

Type: DC 3-wire shielded type  
 DC 3-wire non-shielded type  
 DC 2-wire standard type  
 DC 2-wire long range type

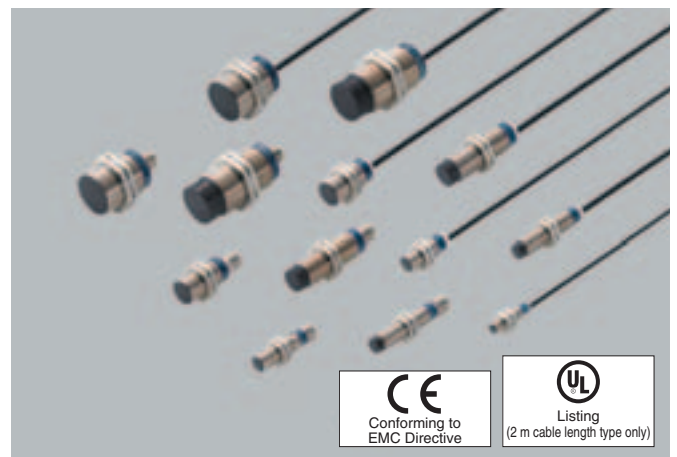
Size: M8, M12, M18, M30

Connector: 2 m cable length type  
 M12 plug-in connector type

Strong resistance IP68 (**GX-M8**□: IP67) (IEC)

**Wiring cost is reduced to 2/3**

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



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

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



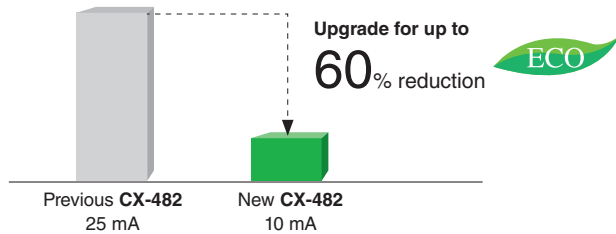
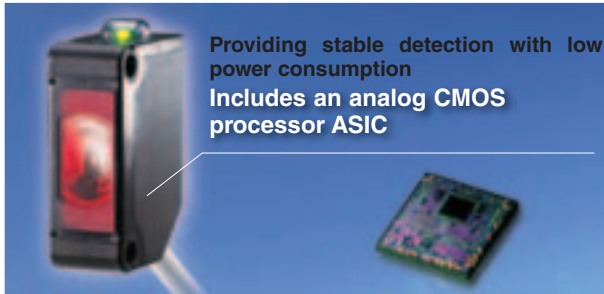
# Photoelectric Sensors

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

Sensors that are environmentally and user friendly.

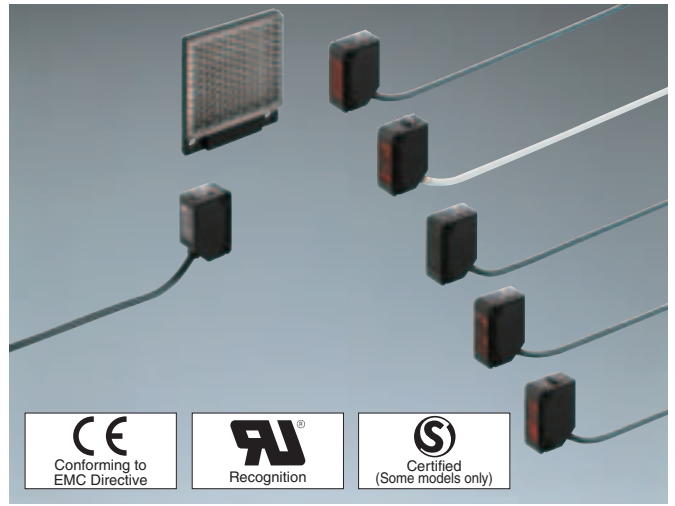
### Reducing environmental burdens further Up to 60% less power consumption

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



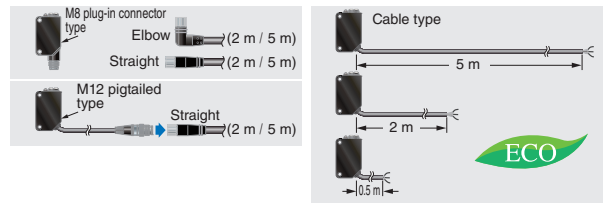
### Compact size

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



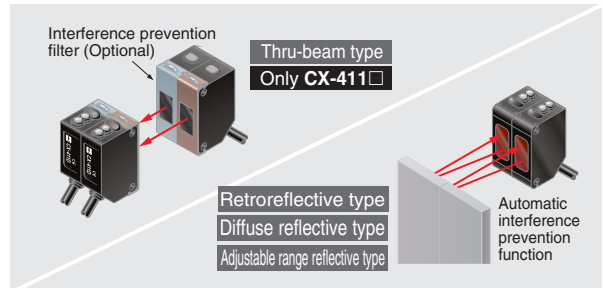
### Less processing

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



### Strong against interference

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



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

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

Type	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			
Output operation	Switchable either Detection-ON or Detection-OFF			
Response time	1 ms or less			
Sensing mode	BGS / FGS functions Switchable with wiring of sensing mode selection input			
Protection	IP67 (IEC)			
Ambient temperature	-25 to +55 °C			
Emitting element	Red LED (modulated)			

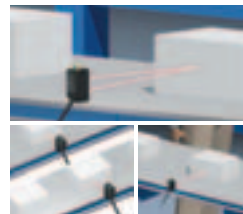
Notes: 1) The adjustable range stands for the maximum sensing range which can be set with the distance adjuster. The sensor can detect an object 2 mm [CX-444(-P): 15 mm, CX-442(-P): 20 mm], or more away.  
2) M8 plug-in connector type is also available.

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



#### Background not present

- When object and background are separated



#### Background present

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

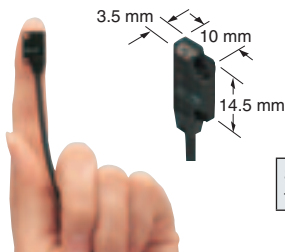


# Photoelectric Sensors

## 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.

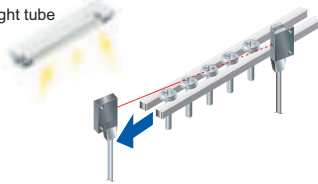
\* Effective from production in October 2010.

### 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.

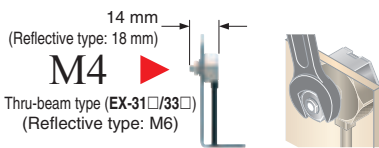
4) 5 m cable length type (standard: 2 m) is also available.

## 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**

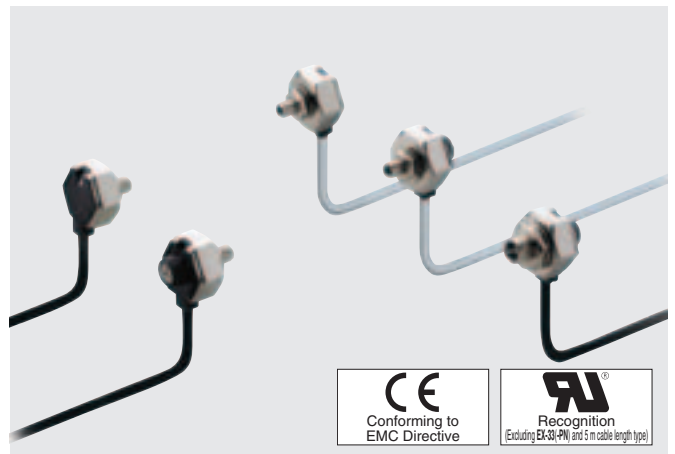


**No protective tube needed**



### 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

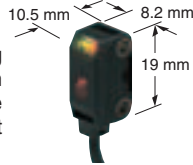
Amplifier Built-in • Ultra-compact Photoelectric Sensor  
**EX-20** SERIES Ver.2

Miniature-sized and still mountable with M3 screws

Mountable with M3 screws in spite of miniature size

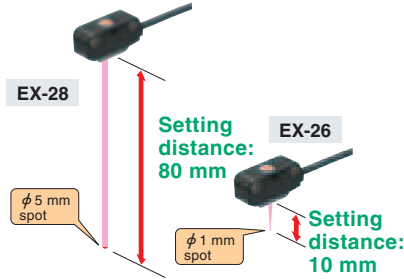
Long sensing range

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.



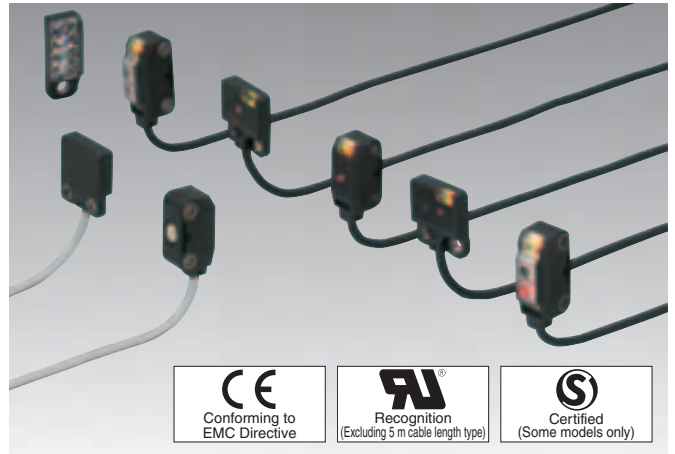
Clear beam spot using red LED dot light source

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. $\phi$ 2.6 mm opaque object	Min. $\phi$ 3 mm opaque object	$\phi$ 15 mm or more opaque or translucent object	Opaque, translucent or transparent object	Min. $\phi$ 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.

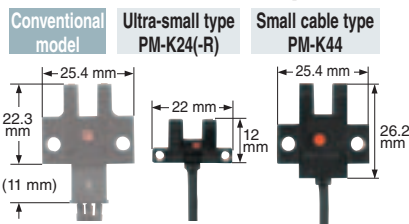
# Micro Photoelectric Sensors

Amplifier Built-in • U-shaped Micro Photoelectric Sensor  
**PM** SERIES

Enables equipment miniaturization and quick construction

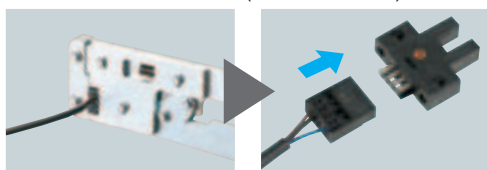
Extremely compact

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



Quick fitting hook-up connector

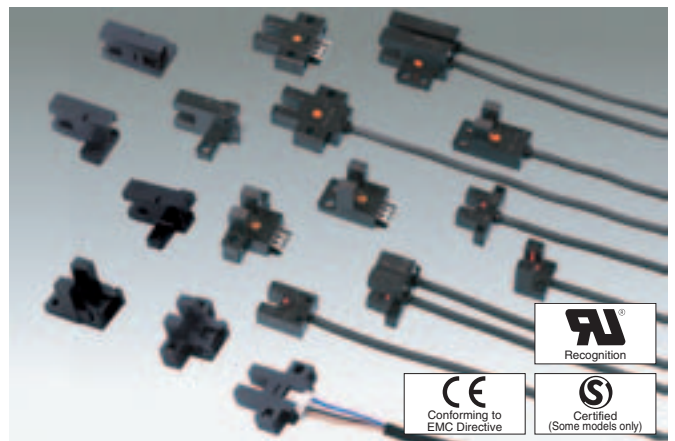
Easy to maintain connector type models are available. Its exclusive connector is the hook-up connector. Since only crimping with exclusive pliers is to be done, cumbersome soldering or insulation is absolutely not required. Further, connector attached cable (CN-14H-C1/C3) is also available.



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

Quick-connector connections with commercially-available connectors PM-□64: Built-in connector type

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



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

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

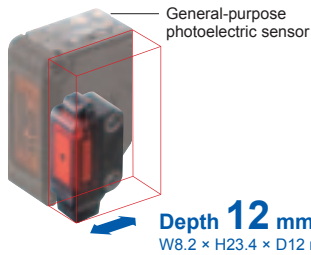
# Laser Sensors

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

### Built-in amplifier in this size?

#### Ultra-compact

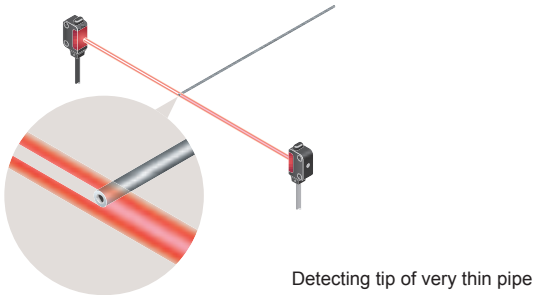
Due to the customized IC and optical design, high precision detection is fulfilled in an ultra-compact size with directivity and visibility achievable only by laser. The laser adopted is Class 1 (IEC / JIS / FDA) laser that is safe to use, so that there is no need to separate the areas of sensor usage.



#### Highly accurate detection EX-L211 / L221

##### Suitable for positioning and minute object detection

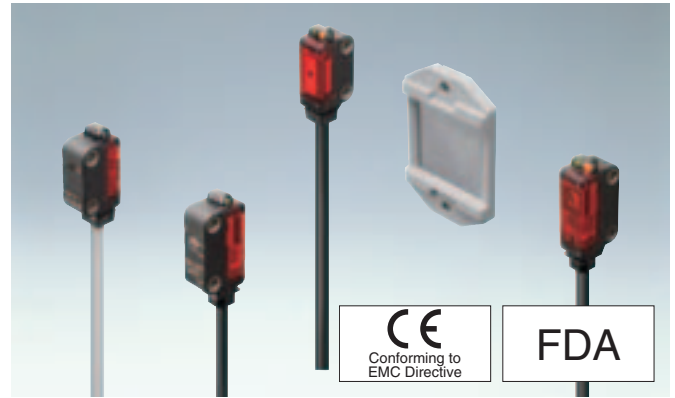
A repeatability of 0.02 mm or less at a range from 100 to 200 mm makes this type best suitable for positioning applications (EX-L221). Moreover, it boasts a top-class detection precision in the compact laser sensor category with the gold wire of  $\phi 0.01$  mm.



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

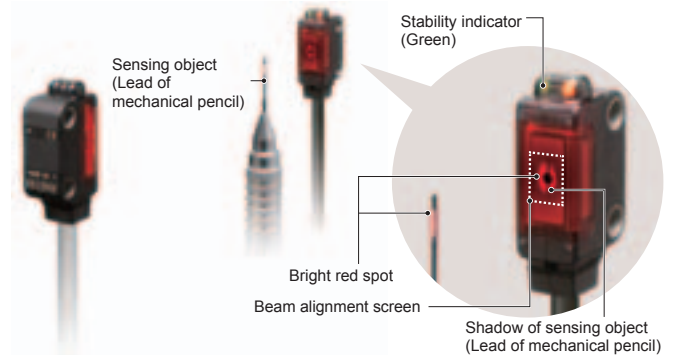
#### Sensitivity adjuster EX-L211 / L221 / L291 / L26□

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

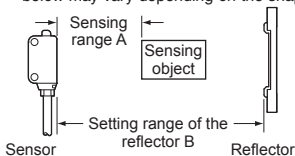


#### Convergent reflective type EX-L261 / L262 NEW

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.  $1 \times 5$  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	
Item	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)	$\phi 1$ mm or less (at a sensing distance of 300 mm)	$\phi 1$ mm or less (at a sensing distance of 50 mm)	Approx. $1 \times 5$ mm (at a sensing distance of 50 mm)
Sensing object		Opaque object of $\phi 2$ mm or more	Opaque object of $\phi 3$ mm or more	Opaque or translucent object of $\phi 2.5$ mm or more	Opaque, translucent or transparent object		
Min. sensing object (Typical)		Opaque object of $\phi 0.3$ mm	—	—	Gold wire of $\phi 0.01$ 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 $\pm 10$ %					
Output		NPN open-collector transistor or PNP open-collector transistor					
Response time		0.5 ms or less					
Interference prevention function		—	Incorporated (Two sensors can be mounted close together.)			—	
Ambient temperature		-10 to +55 °C					
Emitting element		Red semiconductor laser Class 1 (IEC / JIS / FDA), Maximum output (EX-L211/212□ 390 $\mu$ W, EX-L291□ 0.5 mW, EX-L221□ 2 mW, EX-L261□ 1 mW, EX-L262□ 1.3 mW), Peak emission wavelength: 655 nm					
Dimensions		W8.2 × H23.4 × D12 mm		W8.2 × H27.4 × D13 mm		W8.2 × H27.4 × D13.5 mm	

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



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

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

# Particular Use Sensors

## Safety Liquid Leak Sensor

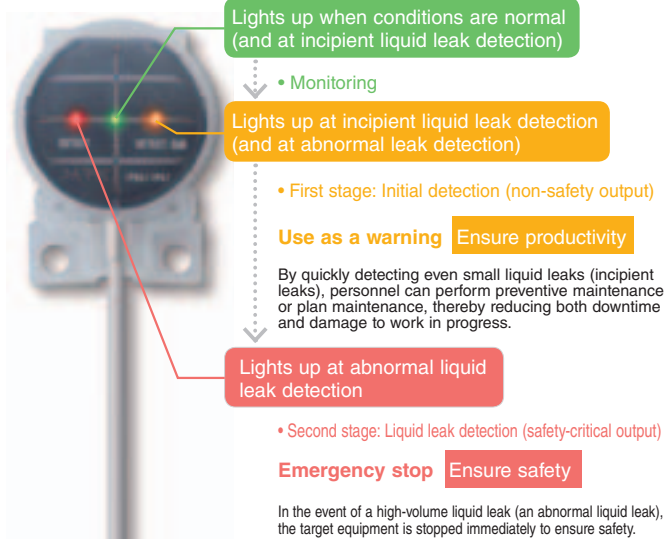
Control Category 4 PLe SIL3

NEW

### SQ4 SERIES

Two-stage detection × Safety certification

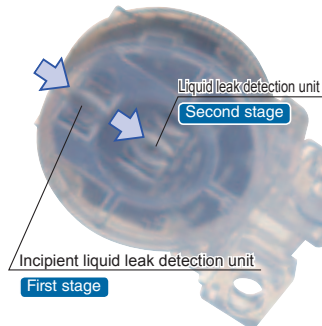
Improved productivity Two-stage detection



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

On the bottom of the sensor are two detection units, one located at the front and one at the center. If a liquid leak occurs in front of the sensor, the front detection unit will detect even a small incipient leak. When the leak increases in volume and reaches the center of the sensor, it will be detected as an abnormal leak.

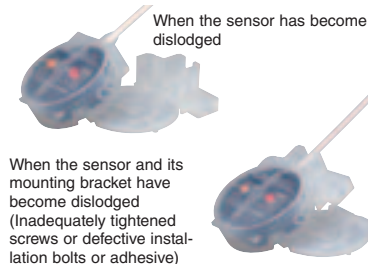
While previous implementations of two-stage liquid leak detection have relied on two separate sensors installed at different heights, the **SQ4** delivers the same full-featured detection capability in a single sensor unit.



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

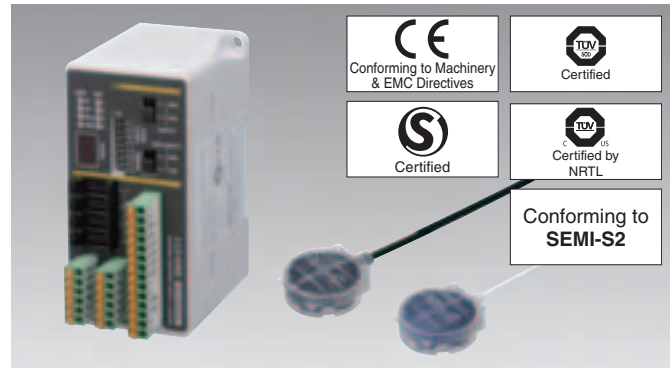
In addition to detecting liquid leaks, the **SQ4** can detect both human error (such as a failure to install the sensor) and sensor malfunctions. If the sensor itself or the sensor and its mounting bracket have become dislodged, have been improperly installed, or are suffering from a broken cable connection,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

### When the sensor has been installed improperly



## The SQ4 can also be used alone.

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



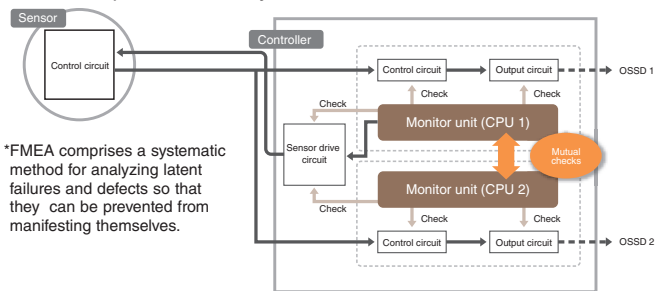
## Industry first\* to earn safety certification

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

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

## Dual CPUs deliver an advanced level of safety control.

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



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

## Sensors

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

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

## Controller

Model No.	SQ4-C11
Power voltage	24 V DC $\pm 10\%$
Control output (OSSD 1, OSSD 2)	PNP open-collector transistor / NPN open-collector transistor (switch method)
Response time	20 ms or less (excluding the response time of the sensor)
Output operation	ON when initial detection, OFF when detection leakage or wrong installation
Sensor monitor output (AU1, 2, 3, 4, Non-safety output)	PNP open-collector transistor / NPN open-collector transistor (switch method)
Response time	100 ms or less (excluding the response time of the sensor)
Output operation	ON when normal condition, OFF when initial detection or accidental leakage
Protection	IP20 (IEC) (However, it should be in IP54 protection structure of control panel)
Ambient temperature	- 10 to + 55 °C
Material	Main unit case: PC / ABS (alloy)
Dimensions	W48 × H100 × D(82.5) mm



# Light Curtains

## Light Curtain **Type 4** SF4B SERIES Ver.2

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

### Seamless structure and IP67 protection **New structure**

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

### Selectable from among three types according to the worksite



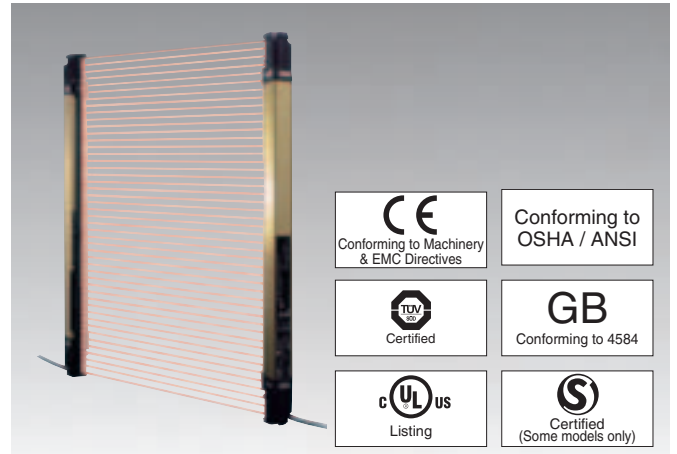
### A unified response time of 14 ms for all models makes setup easy

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

### A muting control function is provided

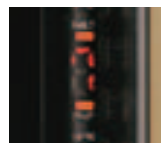
The light curtain is equipped with a muting control function that causes the line to stop only when a person passes through the light curtain, and does not stop the line when an object passes through.

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 $\pm 10$ %		
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		



### 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.

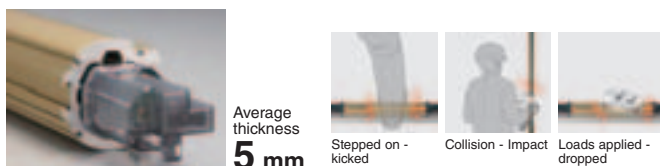
## Robust Light Curtain **Type 4** SF4B-G SERIES Ver.2

**NEW**

### Robust and Shock resistant

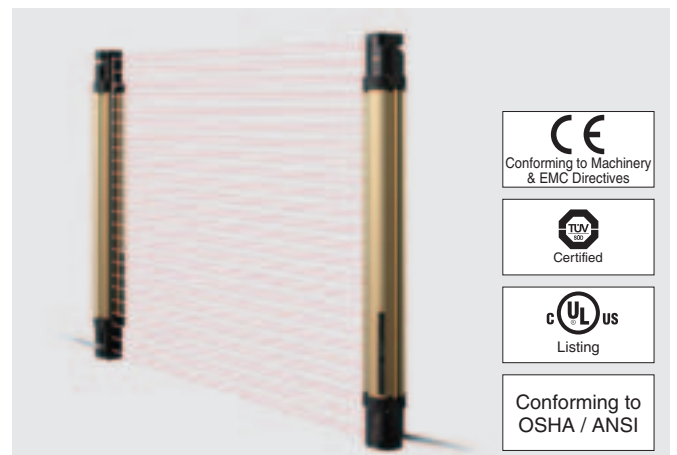
#### Thick and robust housing resistant to impact

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



### No guard needed

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



### Differences from standard type

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

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

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

# Light Curtains

## Ultra-slim Light Curtain **Type 4** SF4C SERIES

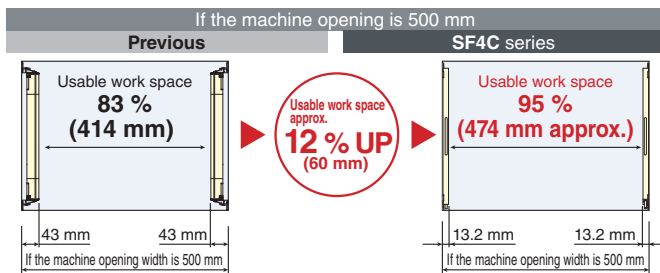
**Machine safeguarding without sacrificing productivity**  
**Ultra-slim Light Curtain**

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

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

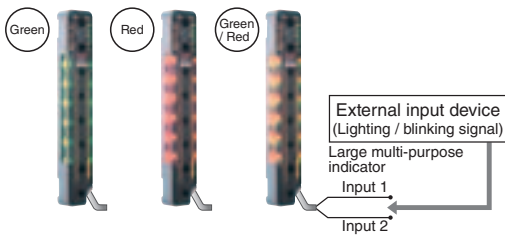
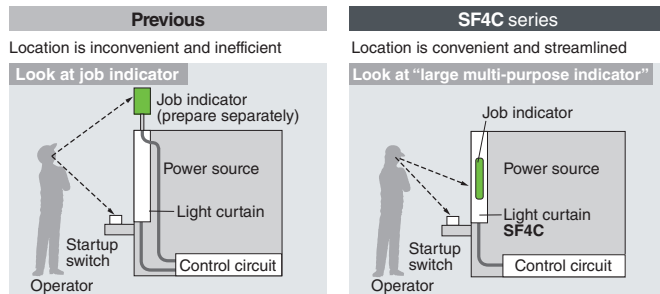
### Slim size for efficient applications

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



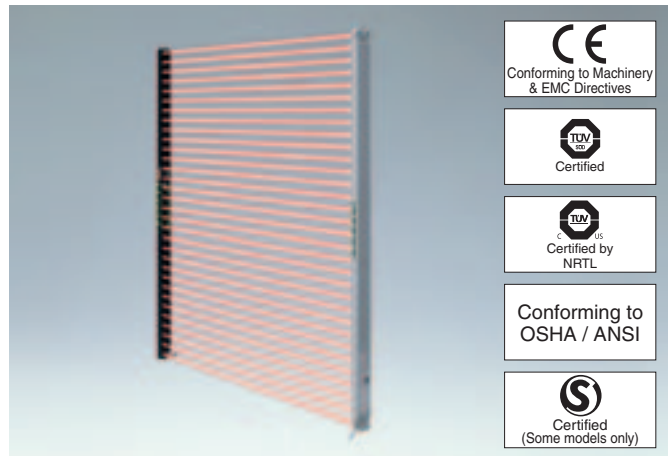
### Can be used in a variety of applications for simplified equipment [Large multi-purpose indicator]

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



### IP67 protection structure

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

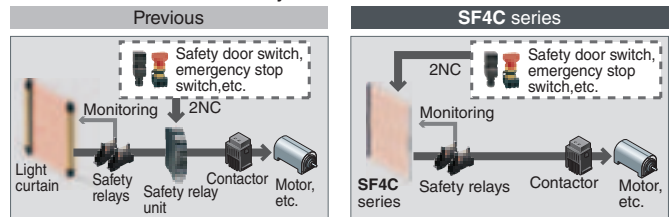


### Wire-saving when connecting to safety devices [Safety input function]

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



#### Direct connection of safety devices



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

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

### Lightweight!

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

\*Except the cable part

### Finger protection type SF4C-F

**NEW**

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

	Hand protection type	Safety distance
Hand protection type	102 mm	Shortened by <b>84 mm</b>
Finger protection type	18 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.	Pigtiled type: <b>SF4C-F□-J05</b> Cable type: <b>SF4C-F□</b>	<b>SF4C-H□-J05</b> <b>SF4C-H□</b>
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 **NEW**  
 Digital Pressure Sensor  
 DPC-L100 SERIES DPH-L100 SERIES

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

**Featuring exceptional resistance to...**



- Interference**  
The DPC-L100 and DPH-L100 comply with EMC directives, ensuring they won't succumb to external interference.
- Pressure surges**  
An integrated throttle prevents damage from sudden bursts of high pressure.
- Vibrations and mechanical shock**  
The DPC-L100 and DPH-L100 are easy to use with devices that are subject to high levels of vibration.
- Water and dust**  
The DPC-L100 and DPH-L100 feature an IP67-compliant protective enclosure. (IEC)
- Fluid heat**  
The DPC-L100 and DPH-L100 can accommodate media at temperatures of up to 125°C (10 MPa and 50 MPa models).

## All-stainless-steel construction

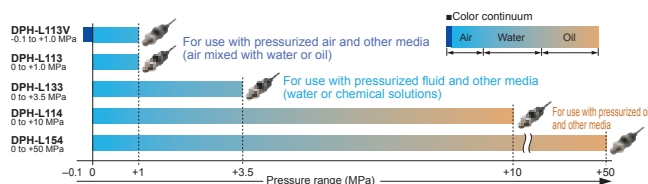
- Suitable for use with a wide range of fluids
- Oil-less diaphragm



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

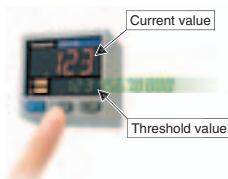
System accuracy:  $\pm 1\%$  F.S. (at 23°C)  
 (Throughout operating ambient temperature range:  $\pm 2\%$  F.S.)  
 Analog voltage: Within  $\pm 0.04\text{ V}$   
 (1 MPa type: Within  $\pm 0.01\text{ MPa}$ )

## Product line

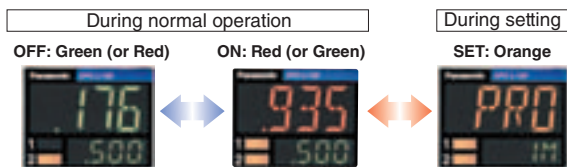


## Direct setting of threshold value

"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 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**

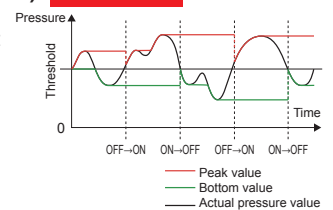
## Hold functions

### 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 +1.0 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	DPC-L101				
	PNP output	DPC-L101-P				
Applicable sensor head	DPH-L113V	DPH-L113	DPH-L133	DPH-L114	DPH-L154	
Rated pressure range	-0.1 to +1 MPa	0 to +1 MPa	0 to +3.5 MPa	0 to +10 MPa	0 to +50 MPa	
Supply voltage	12 to 24V DC					
Comparative outputs (2 outputs)	NPN open-collector transistor or PNP open-collector transistor					
Response time	5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1,000ms, 5,000ms Selectable by key operation					
Analog output	Analog voltage output: 1 to 5 V DC, Analog current: 4 to 20 mA					
Protection	IP40 (IEC)					
Ambient temperature	-10 to +50 °C					
Dimensions	W30 × H30 × D30.7 mm					



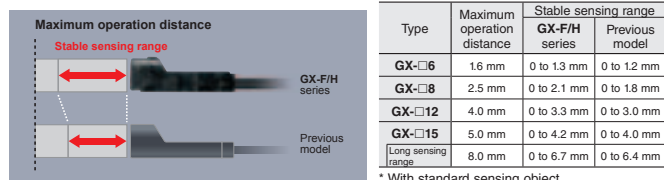
# Inductive Proximity Sensors

Amplifier Built-in • Rectangular-shaped Inductive Proximity Sensor  
**GX-F/H SERIES**

Superior stability in detection

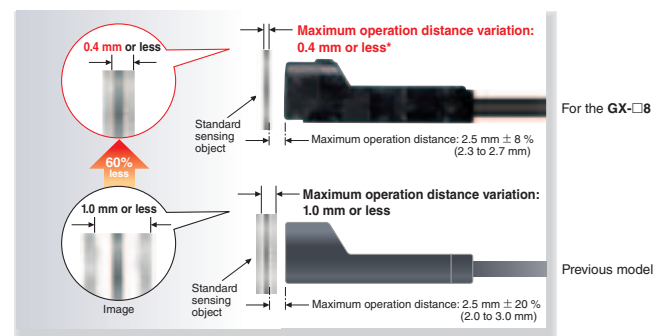
Can be installed with ample space

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



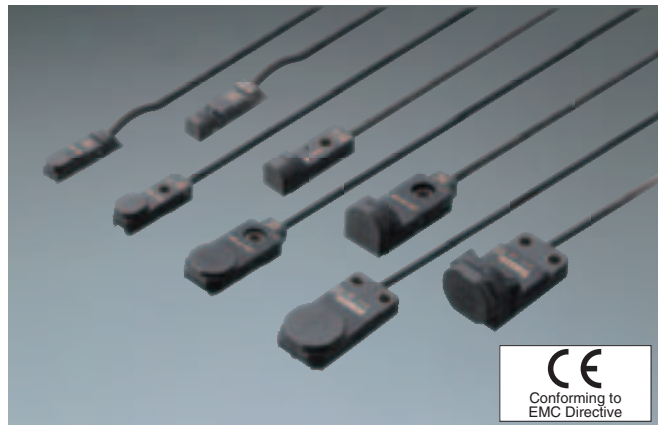
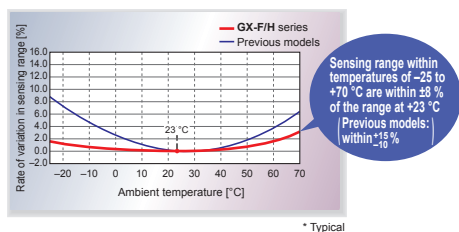
Variation at the maximum operation distance is within  $\pm 8\%$

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.



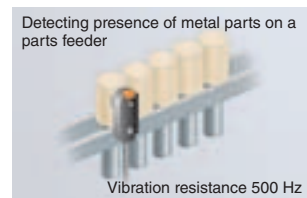
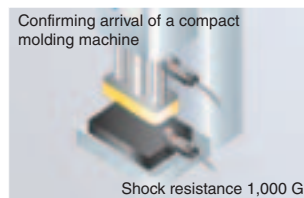
Temperature characteristics vary within  $\pm 8\%$

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



10 times the durability! (Compared to previous models)

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



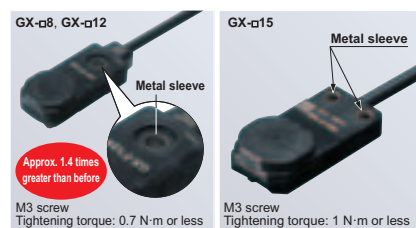
Highly resistant to water or oil! IP68g protective construction

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



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

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



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

Notes: 1) The maximum operation distance stands for the maximum distance for which the sensor can detect the standard sensing object. The stable sensing range stands for the sensing range for which the sensor can stably detect the standard sensing object even if there is an ambient temperature drift and/or supply voltage fluctuation.  
 2) Different 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□)

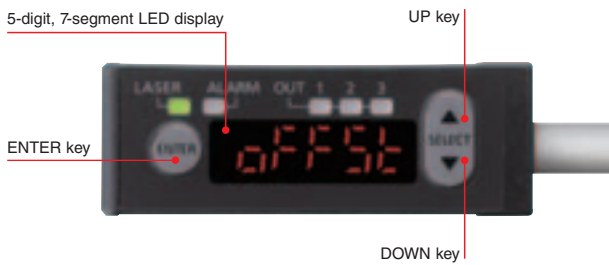
# Measurement Sensors

## Compact Laser Displacement Sensor HL-G1 SERIES

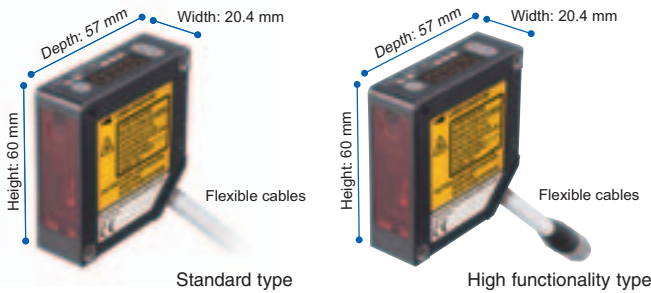
A variety of high-end functions are included in a compact, self-contained body for exceptional ease of use.

### 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

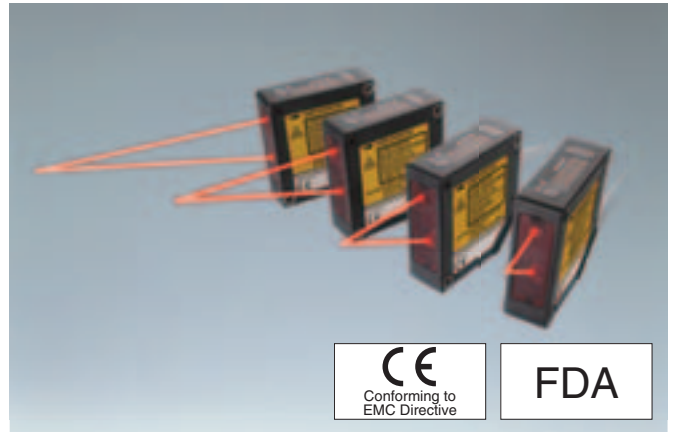
#### Featuring 3 outputs and an analog 2 outputs

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.

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/e<sup>2</sup> (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.



FREE DOWNLOAD

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

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

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



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

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



FREE DOWNLOAD

# Measurement Sensors

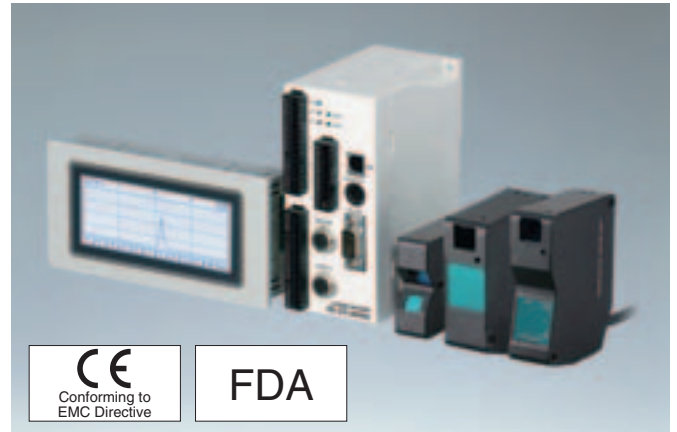
Ultra High-speed • High-precision  
Laser Displacement Sensor

## HL-C2 SERIES

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

### Excellent basic performance

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



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

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

#### HL-C201F / HL-C201F-MK

Sampling	Linearity	Resolution
100 kHz	±0.02 %	0.01 μm



Measurement center distance and measuring range

10 ± 1 mm

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

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

#### HL-C203F / HL-C203F-MK

Sampling	Linearity	Resolution
100 kHz	±0.03 %	0.025 μm



Measurement center distance and measuring range

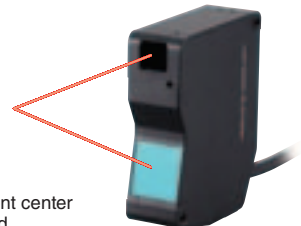
30 ± 5 mm

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

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

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

Sampling	Linearity	Resolution
100 kHz	±0.03 %	0.1 μm



Measurement center distance and measuring range

110 ± 15 mm

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

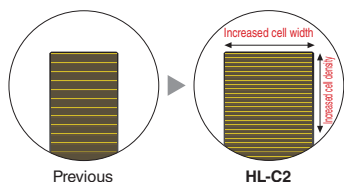
### HDLC-CMOS sensors

Resolution Sampling

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

HDLC: High Density Linear Cell

■ Comparison of cell structures (image)

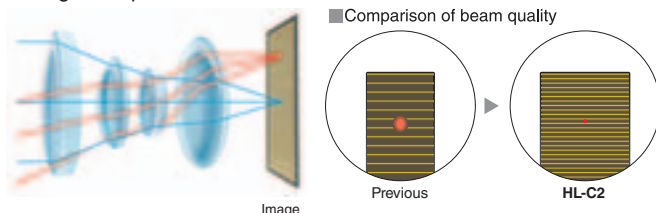


### High-resolution lens

Linearity Resolution

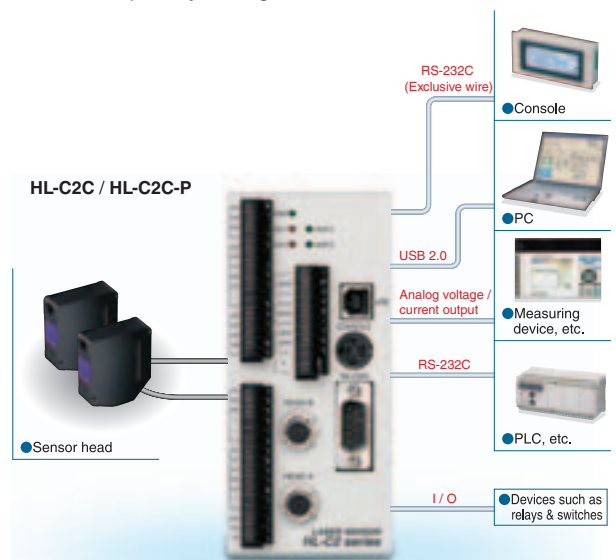
High-resolution lens has been newly designed to perfectly suit HDLC-CMOS sensors.

The light-receiving part can create images at a minimum point from light received from a variety of different angles to produce images with even greater precision.



### 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.





# 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

**NEW**

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.

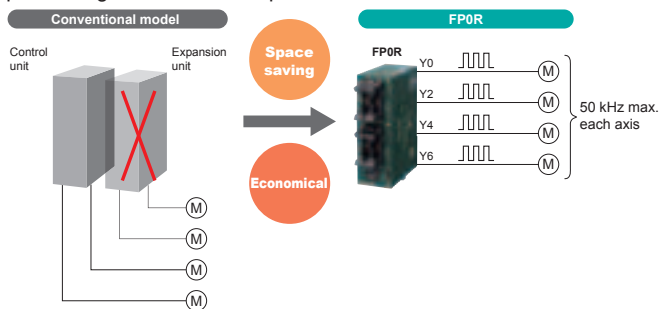
### Battery-less automatic backup of all data

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.



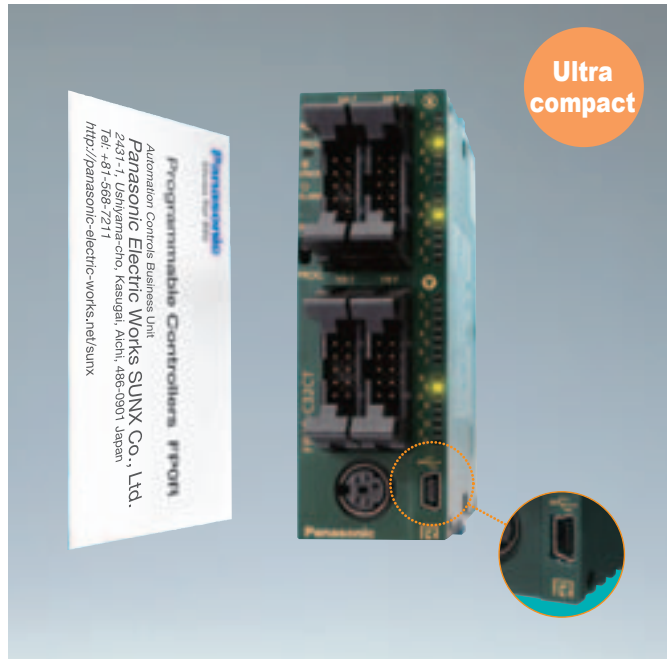
Operation speed  
80 ns (Up to 3000 steps)  
580 ns (3001st and later steps)

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

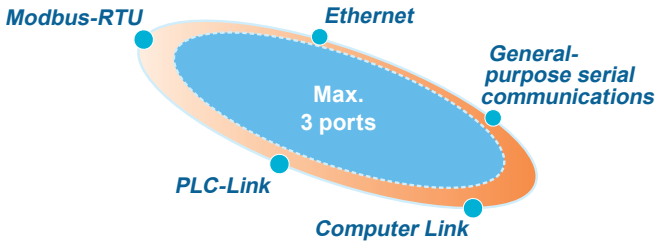
### Typical model number

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) with RS485	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) with RS485	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) with RS485	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) with RS485	32	Input: 16 Output: 16	24 V DC	24 V DC Sink/Source (±common)	Transistor NPN: 0.2 A	MIL connector	AFP0RF32CT
								AFP0RF32MT

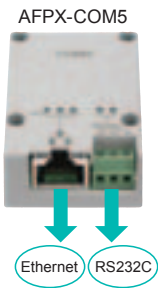
# Programmable Controllers

## 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



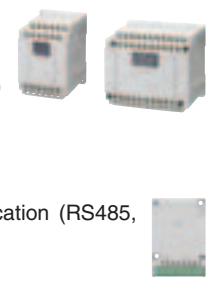
- Easily enables Ethernet connections with a compact PLC, which had been previously abandoned.
- Also equipped with an RS232C port. Together with the tool port (programming port), a total of three communication ports are available, which is remarkable for a compact PLC.
- For example, the following operations 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 FPΣ

Ultra-compact high performance PLC

- Abundant program capacity - 32 k steps
- High-speed positioning unit
- Equipped with a high speed RISC processor
- Simple temperature control

### Typical model number

Product name	Descriptions	Model No.
FPΣ C32 Control unit	Input 16 points DC, Transistor output (NPN) 16 points I/O control points when expanded: Max. 128 points	AFPG2543H
FPΣ C32 Left-side expansion type Control unit	Input 16 points DC, Transistor output (NPN) 16 points I/O control points when expanded: Max. 384 points Built-in linear interpolation and circular interpolation functions	AFPG2643H

Operation speed 320 ns	Max. I/O points: 384	Program capacity 32 k steps	Open network PROFIBUS Modbus-RTU DeviceNet CC-Link CAN open
Positioning Network servo Max. 16 axes	Positioning Pulse output: 4 Mpps Startup: 0.005 ms		



# 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.

### Typical model number

Product name		Operation speed	Model No.
FP2-C2L Control unit	32 k Standard type <b>NEW</b>	0.03 $\mu$ s / 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

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		



## 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
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# Programmable Displays

## Programmable Display GT02



**Only one in its class\*1 compatible with SD/SDHC memory cards, which leads to the creation of new ideas**

\*1 Based on internal research as of August 1, 2010

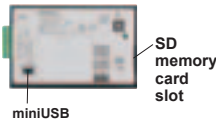
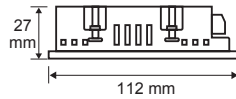
**High viewability and user friendliness achieved with the small body**

- 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**

**NEW**

- 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 AIG02MQ03D AIG02MQ04D AIG02MQ05D AIG02MQ12D AIG02MQ13D					
				Hairline silver							
			RS422 / RS485	Pure black							
				Hairline silver							
			24 V DC	RS232C			Pure black	Available	AIG02MQ14D AIG02MQ15D AIG02MQ22D AIG02MQ23D AIG02MQ24D AIG02MQ25D		
							Hairline silver				
		RS422 / RS485		Pure black							
				Hairline silver							
		5 V DC		STN monochrome LCD (Backlight: green, orange, red)		RS232C	Pure black			Not available	AIG02GQ02D AIG02GQ03D AIG02GQ04D AIG02GQ05D AIG02GQ12D AIG02GQ13D
							Hairline silver				
			RS422 / RS485			Pure black					
						Hairline silver					
24 V DC	RS232C		Pure black		Available	AIG02GQ14D AIG02GQ15D AIG02GQ22D AIG02GQ23D AIG02GQ24D AIG02GQ25D					
			Hairline silver								
	RS422 / RS485	Pure black									
		Hairline silver									
	NEW GT02L 	STN monochrome LCD (Backlight: white)	5 V DC				RS232C	Black	Not available		AIG02LQ02D
							RS422 / RS485				AIG02LQ04D

# Programmable Displays

## SD Solutions

### Wide connection and expansion via SD using the GT series

Links  
via SD

» Recipe (data table management)

» Transfer of PLC program data

NEW

Expansion  
via SD

» Alarm history management

» Logging » Display of graphs of stored data

NEW

## 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**

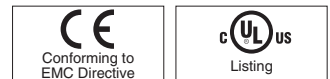


- High-contrast LCD provides visibility ten times \*Compared with GT01
- The high luminance LED provides three times higher brightness (monochrome), twice the brightness (color)
  - \* Compared with GT01R (monochrome), Compared with GT21C (color)
- SD/SDHC memory card slot as standard equipment (32 GB 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 *1	24 V DC	RS232C	AIG05SQ02D	AIG05SQ03D

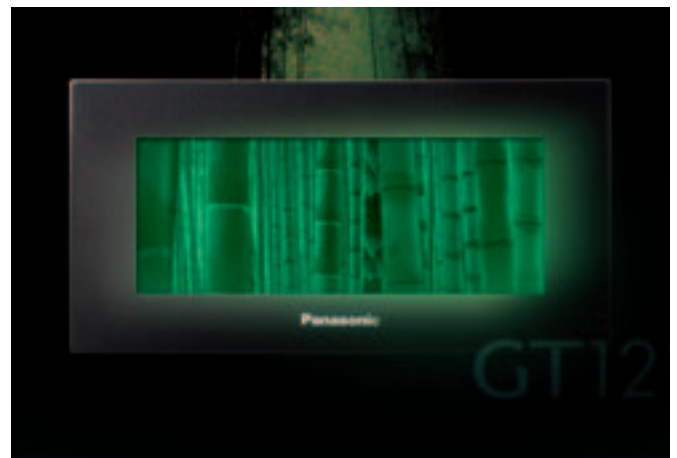
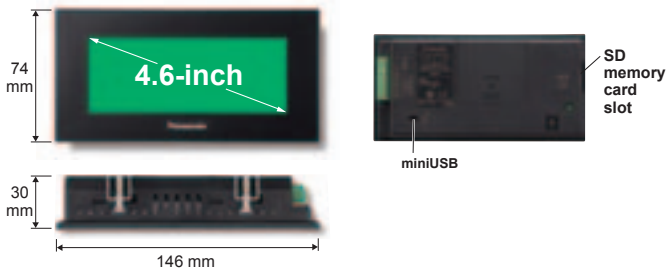
\*1 It will be changed to TFT color LCD from production in December 2011. \*2 The RS422 (RS485) type is also available.

## 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.	
				Pure black	Hairline silver
GT12 	STN monochrome (Backlight: green/orange/red)	24 V DC	RS232C	AIG12GQ12D	AIG12GQ13D
			RS422 / RS485	AIG12GQ14D	AIG12GQ15D
	STN monochrome (Backlight: white/pink/red)	24 V DC	RS232C	AIG12MQ12D	AIG12MQ13D
			RS422 / RS485	AIG12MQ14D	AIG12MQ15D

# Programmable Displays

## Programmable Display GT32-E

**NEW**



**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

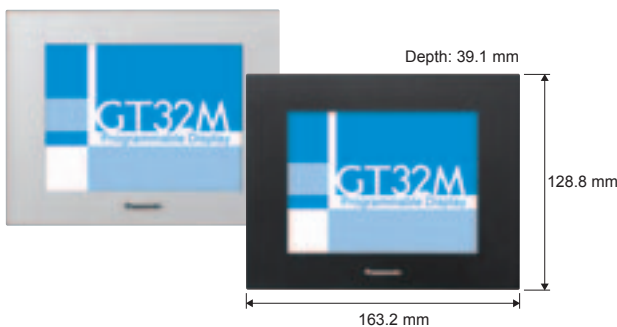
## Programmable Display GT32M/T



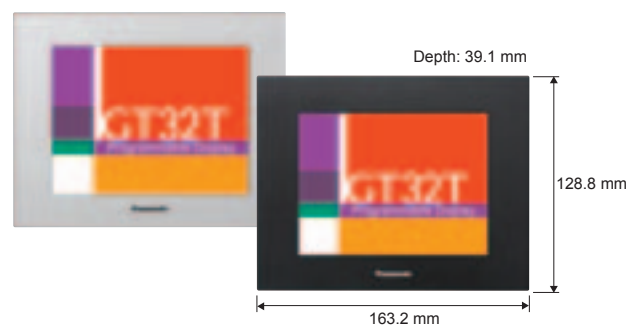
**Clear and beautiful display achieved by the high accuracy and long-life CFL backlight**

**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

\*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 **For metals**  
**LP-S** SERIES

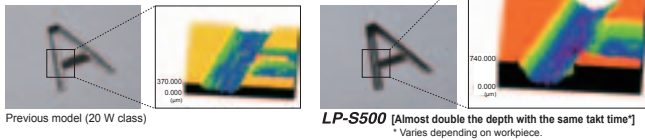
**NEW**

## 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.

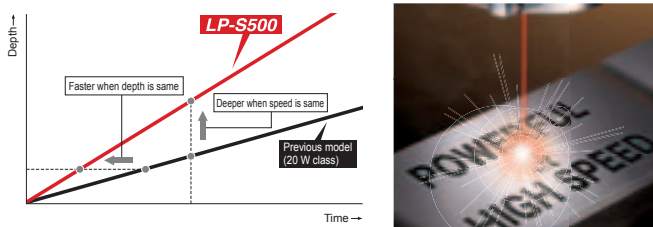
#### Cross-section image of engraved location



### High speed for enhanced productivity

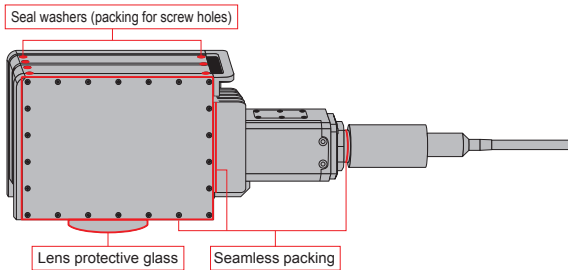
Faster and deeper printing or processing is possible as more energy is applied to the workpiece. The LP-S500 is equipped with a high-output laser unit. This shortens the printing takt time greatly contributing to the improvement of productivity.

#### Simulated characteristics of high-speed deep engraving



### Sealed, IP67G rated head enclosure

Use of high quality parts and well engineered design, have resulted in a robust IP67G enclosure.

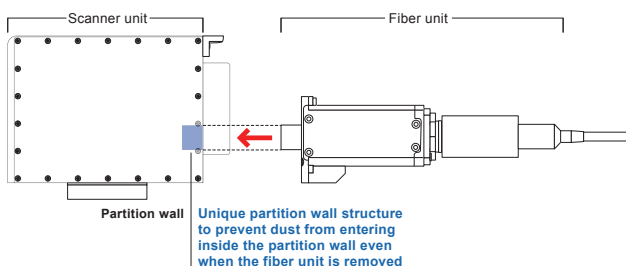


- Notes: 1) The product has a dust- and water-proof structure durable under conditions specified by IEC/JIS standards. Although oil-proof performance is evaluated using typical lubricants and cutting oils, this does not apply to all types of oils.  
 2) The parts must be attached correctly so that the FAYb Laser Maker can fully satisfy its environment resistance performance.

### Removable fiber unit Enhanced flexibility of equipment design

Panasonic's unique laser head design allows the fiber unit to be easily removed from the scanner unit. This revolutionary mechanism is a first in the fiber laser marker industry\*. Because the fiber unit is removable, it can be easily incorporated into equipment for easy installation and enhanced flexibility of equipment design.

\* Data obtained by Panasonic Electric Works SUNX as of December 2010

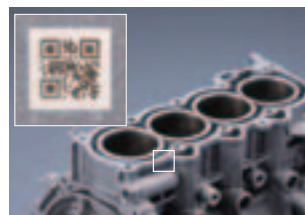


### Touch panel console optional Simple operation

A color touch panel is used so that even persons unfamiliar with machine operation can easily handle it. An intuitive and easily understandable software package allows the operator to smoothly access any setting screens, and the ergonomically designed console is easy to operate whether hand-held or directly attached to a machine.



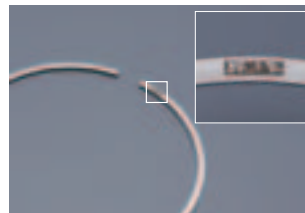
### MARKING SAMPLES



Cylinder blocks



Pressure transducers



Piston rings



Medical instruments



Tools (carbide)



Tweezers

# Laser Markers

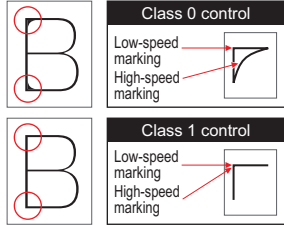
This product is introduced to only limited countries. Please contact our office for details.

## 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.

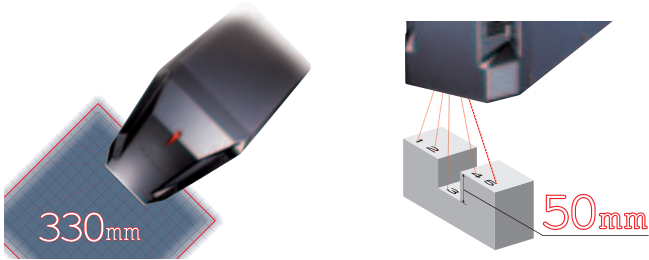


#### Wide

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



Molded resin parts (Marking on bump)



Cast (2D code)



Bearing (Black marking)



IC package (Resin coloring)

## CO<sub>2</sub> 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

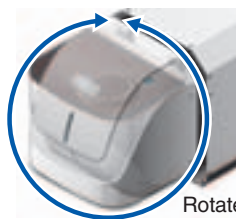


#### Clear marking

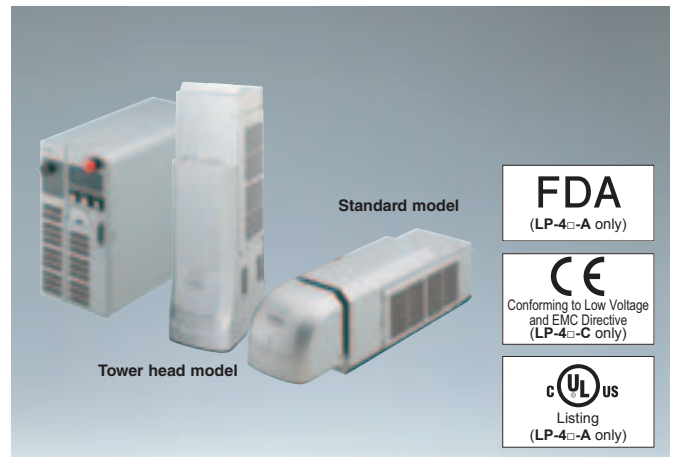
Well-matched to the heat absorption characteristics of plastics, the 9.3 μm wavelength laser allows marking on plastic surfaces by melting the surface layer without creating excessively deep marking and limiting damage to the substrate. This capability rectifies issues with previous models where deep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



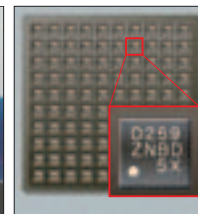
### High-quality processing

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

### MARKING AND PROCESSING EXAMPLES



Marking of laminated package



Marking of electric component



Disbonded cable coating

# Machine Vision System

## IMAGECHECKER PV200

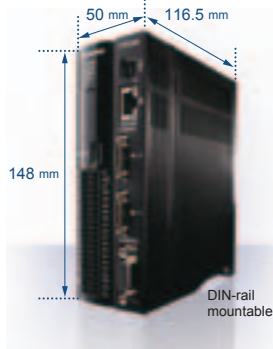
**NEW**

**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.

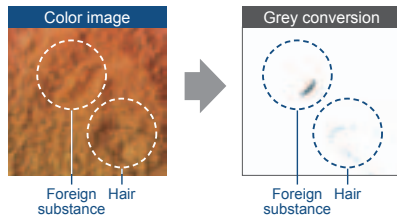


### Color / grey combination inspection system & 4M grey camera

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.

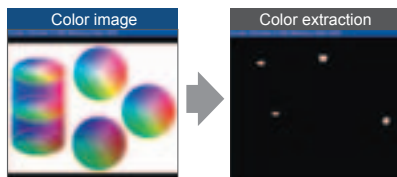
#### Grey conversion

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).

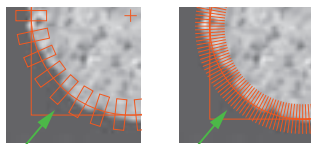


### Smart Edge (Circle) / (Line)

A function for accurate approximation of circles/lines

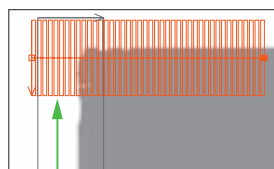
This function detects a maximum of 3,000 edge points for a line and 3,600 for a circle in one area, dramatically improving the accuracy of the measurement of dimensions and positions. This function has also significantly reduced the man-hours required for setting.

#### 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.

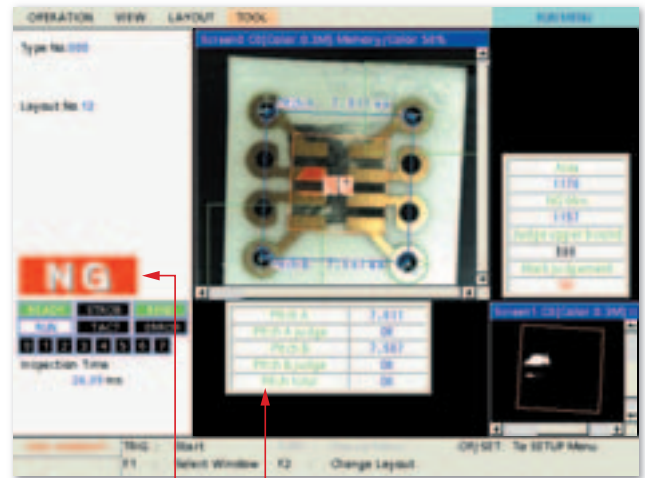


### High-speed communications and storage

(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.

### PVWIN200 setup software

You can set up reliable inspection systems in an off-line environment. PVWIN200 allows to operate easily, just drag the target image and drop it on PVWIN window.

Download PVWIN for free from:

<http://panasonic-electric-works.net/sunx>

Product name	Descriptions	Model No.
IMAGECHECKER PV200	Photomos output 2 camera type	ANPV0202ADP
IMAGECHECKER PV200 MC	Photomos output 2 camera type (Connectable to 0.3 M grey camera only)	ANPV0202MC



# UV Curing System

## 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

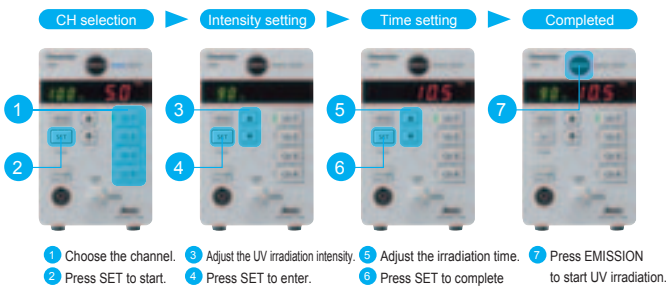
### 1. User-friendly interface

#### 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

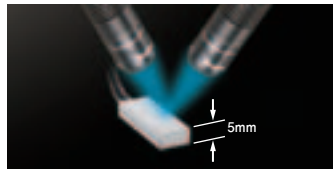
#### Temperature feedback control

±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.

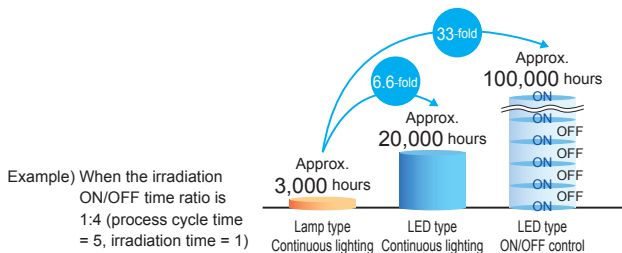


Reliable & Safe

### 3. Environmentally friendly and reliable

#### Long-lasting cost effective LED type UV system

Frequent part replacement is reduced by LED technology.

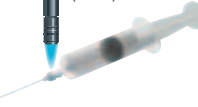


CE  
Conforming to  
EMC Directive

#### Application examples

##### Bonding of syringe needles

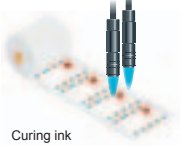
Bonding injection needles to hubs (bases)



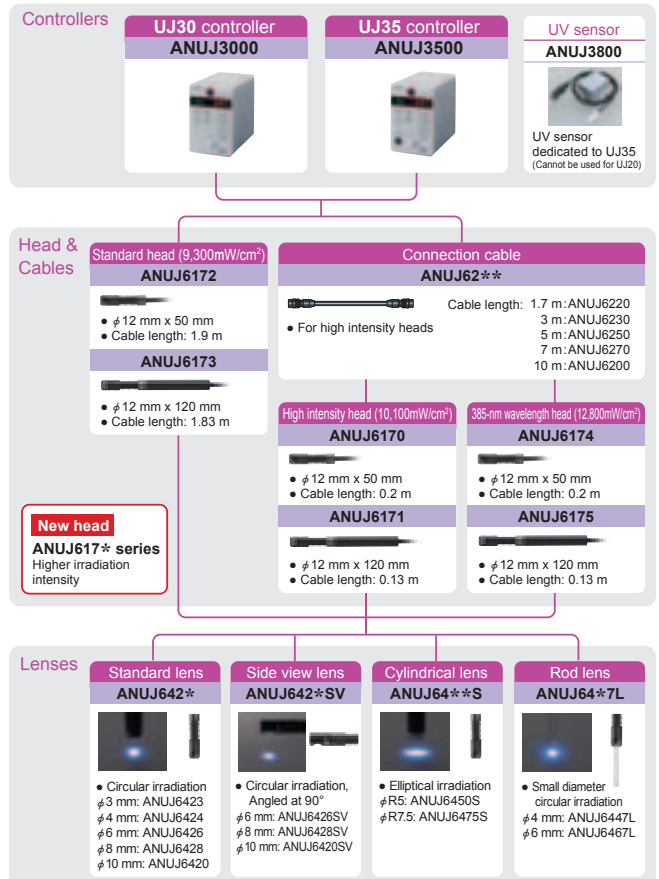
##### Bonding camera lenses to optical tubes for digital cameras, mobile phones, etc.



##### Curing ink on labels/stickers



#### Product Lineup



# Energy Consumption Visualization Components

Eco-POWER METER

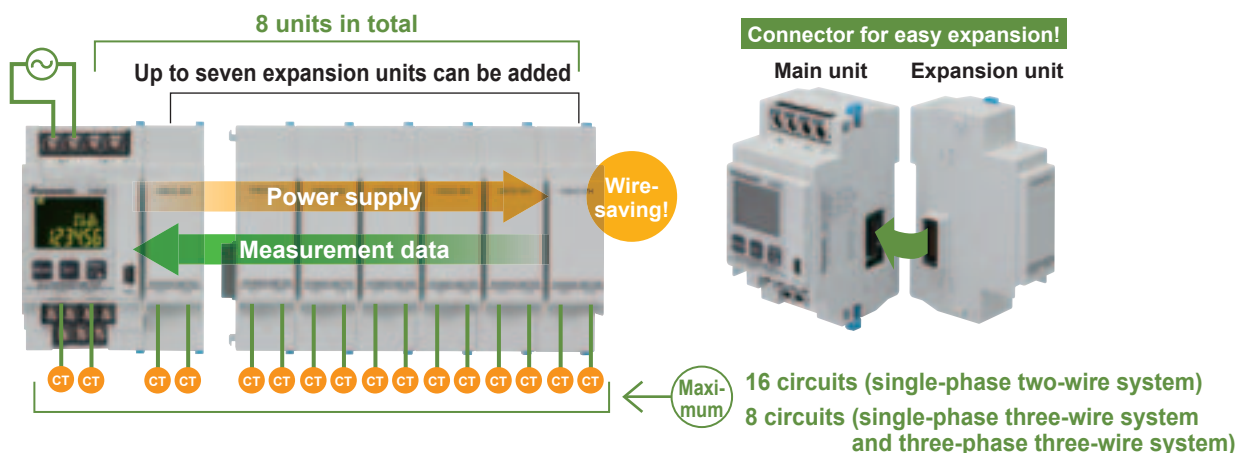
## KW2G

**NEW**

**Up to 16 Circuits! Expandable and Efficient!**

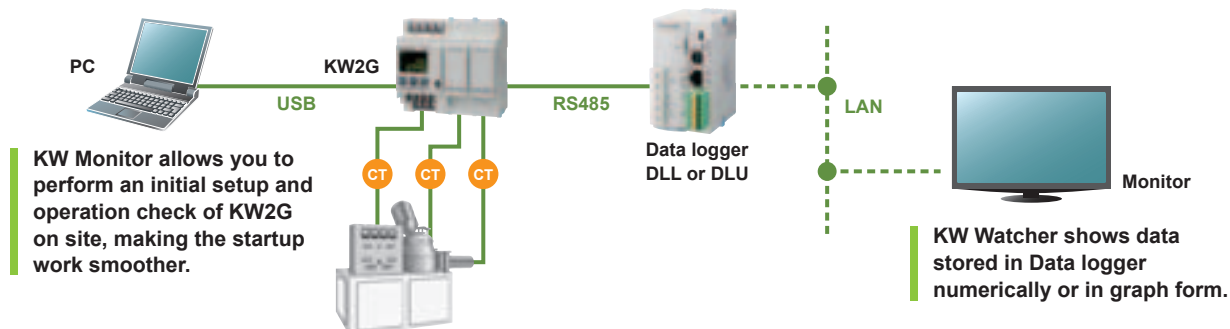
### Easy wire-saving expansion

Eliminate excess wiring by using up to seven expansion units to add on the required number of CT inputs for your application.



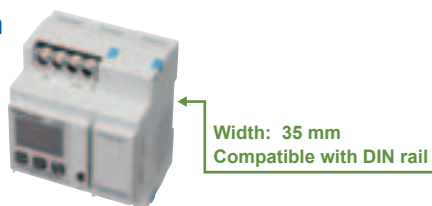
### Quick initial setting via USB

The unit can be connected to a PC via USB. KW Monitor, an operation setting and check tool, allows you to perform initial setting and operation check of KW2G on site, reducing the time required for startup.



### Quick installation

The units fit DIN rails.



### A variety of measurements are possible.

- Capable of simultaneously measuring the electric power and pulse input (e.g. flow amount)
- Measurement of inverter power supplies (primary side) is also available.

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

### Dedicated current transformer (CT) (Dedicated CT cannot be used with the AKW8115.)

Primary side rated current		Model No.
Clamp-on type	5 A / 50 A (common)	AKW4801C
	100 A	AKW4802C
	250 A	AKW4803C
	400 A	AKW4804C
Through type	50 A / 100 A	AKW4506C
	250 A / 400 A	AKW4507C
	600 A	AKW4508C (Note 2)

Notes: 1) For except AKW8115, please order in accordance with the type of power distribution system you will be measuring. (Even if you will use a secondary side 5 A CT, you will need an AKW4801C.)

2) AKW4508C is available for Eco-POWER METER which can be used with 600 A CT.

# Energy Consumption Visualization Components

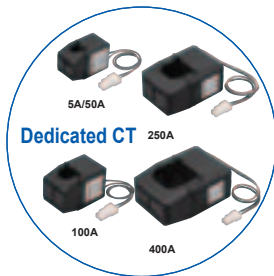
## Eco-POWER METER KW1M/KW1M-H

**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 CO<sub>2</sub> 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.

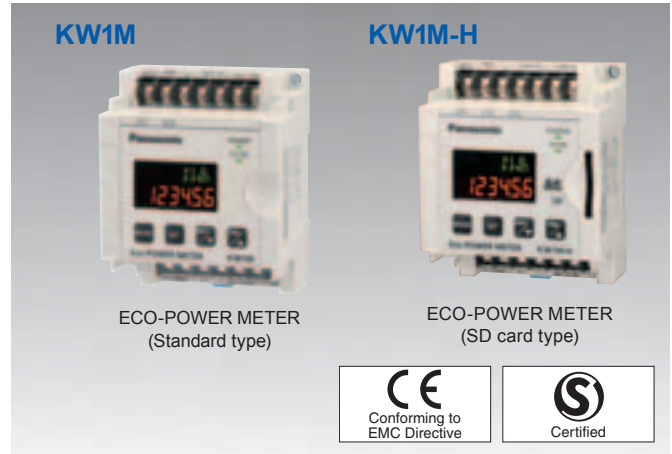
### Features of KW1M-H (SD card type)

- 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)



### Main unit

Product name	Measured voltage input	Model No.
KW1M	100/200 VAC	AKW1110
	100/200/400 V AC (Select with setting mode)	AKW1111
KW1M-H	100/200/400 VAC (Select with setting mode)	AKW1121



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 operations where visualization is being implemented.

## 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

Log function	Terminal type	Model No.
Not available	Screw terminal	AKW8111
Available		AKW8111H
Not available		AKW8115

### 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

## Eco-POWER METER KW4M/KW7M

On the lookout for wasted electricity Simple, compact power meter that's easy to read and full of features.

### Save space and install more easily

DIN 48 x 48 size. Easily installs in existing facilities and machines. (KW4M)  
Installable on DIN rail, slim design makes it suited for installation inside control panels. (KW7M)

### Power measurement function

Instantaneous electrical power, Integrated electrical energy and each phase voltage and current

### Multiple inputs

Support 5 A CT of secondary current input. \*When inputting a 5 A secondary current, use 2-stage configuration by combining with a dedicated CT.  
Support for 400 V AC \*Use with external voltage transformer (VT).

### Supports networking (RS485 communications port comes standard)

#### KW4M Eco-power meter main unit

Communication protocol	Terminal type	Model No.
MEWTOCOL	Screw terminal	AKW5111
MODBUS (RTU)		AKW5112
MEWTOCOL	11-pins	AKW5211
MODBUS (RTU)		AKW5212

#### KW7M Eco-power meter main unit

Model No.	Terminal type
AKW7111	Screw terminal

#### Options

Product name	Descriptions	Model No.
Mounting frame	For KW4M	AKW4822
Terminal protective cover	For screw terminal type KW4M	AKW4823
Mounting rail	For KW4M/KW7M/KW1M	ATA48011

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



## KW Monitor

Download free of charge from the website. Please use for the data collection of Eco-Power Meter.

(Data collection software for Eco-Power Meter)



Can be used with Eco-Power Meter.

\* Product type setting can be done at the station number connection setting screen.

Monitoring of measurement value possible.

Set value can be changed from a PC.

Help function eliminates need for manual.

\* Please download from our website.

\* Since it is only MEWTOCOL compatible, it cannot be used with MODBUS (RTU) products AKW5112 and AKW5212.

## Data Logger

NEW

## 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)

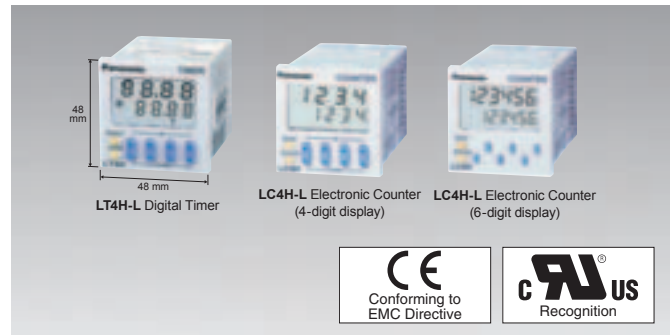


# Timers and Counters

## Digital Timer Electronic Counter LT4H-L/LC4H-L

### Economically priced digital time and electronic counter

- Display is a bright reflective-type LCD.
- IP66 compliant for resistance against negative environmental influences (only when panel surface uses rubber packing)
- Short Body of 70.1 mm (pin type) or 64.5 mm (screw terminal type)
- Replaceable panel cover
- Panel design can be changed from standard (ash gray) to black (sold separately).



### Typical model number

Product name	Output	Operating voltage	Power down insurance	Terminal type	Model No.
LT4H-L Digital Timer	Relay output (1 Form C)	100 to 240 V AC	Available	8 pins	LT4HL8-AC240V
		12 to 24 V DC			LT4HL8-DC24V
	Transistor output (1 Form A)	100 to 240 V AC			LT4HLT8-AC240V
		12 to 24 V DC			LT4HLT8-DC24V

Product name	Digit	Output	Operating voltage	Power down insurance	Terminal type	Model No.
LC4H-L Electronic Counter	4	Relay output (1 Form A)	100 to 240 V AC	Available	8 pins	LC4HL8-R4-AC240V
		Relay output (1 Form C)			11 pins	LC4HL-R4-AC240V
		Relay output (1 Form A)			Screw terminal	LC4HL-R4-AC240VS
	6	Relay output (1 Form A)			8 pins	LC4HL8-R6-AC240V
		Relay output (1 Form C)			11 pins	LC4HL-R6-AC240V
		Relay output (1 Form C)			Screw terminal	LC4HL-R6-AC240VS

## Digital Timer QM4H

### Possible to set and change the time with front digit switches easily during the power off.

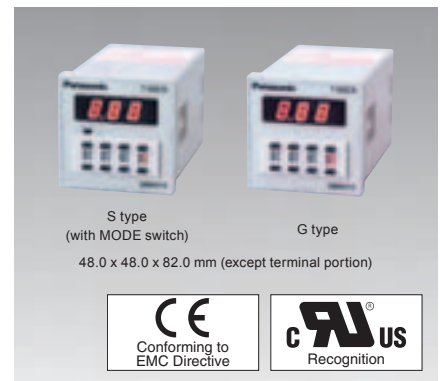
### Furthermore single unit has a time range of 0.01 s to 9990 hrs.

- Possible to set and change the time and the time range even when the power is off.
- Selectable 8 different time ranges with time range switches.
- [S type]: It can select the mode with MODE switch.  
"Timed-out 2 Form C, Timed-out 1 Form C and Instantaneous 1 Form C"
- [G type] Reset and stop signal input enable to external control.

### Typical model number

Product name	Operating mode	Time range	Contact arrangement	Operating voltage	Model No.
QM4H Digital Timer S type	Power ON delay	0.01 s / 0.1 s / 1 s / 0.1 min / 1 min /	T.D. mode: Timed-out 2C INST. mode: Timed-out 1C and Instantaneous 1C (Use MODE switch on front)	12 to 48 V AC/DC	AQM4215
		0.1 h / 1 h / 10 h (8 time ranges)		100 to 240 V AC/DC	AQM4225
QM4H Digital Timer G type	Power ON delay (with reset and stop terminals)	0.1 h / 1 h / 10 h (8 time ranges)	Timed-out 1C	12 to 48 V AC/DC	AQM4315
				100 to 240 V AC/DC	AQM4325

Note: Time delay directional subtraction types are also available by order.



## Multi-range Timer S1DXM-A/M

### Multiple functions built in compact analog timer

- Compact type, 4 different time ranges and 4 different operation modes selectable
- Model number consolidation (The lineup consists of 64 easy-to-choose models.)

### Typical model number

Product name	Operation mode	Time range	Operating voltage	Model No.
S1DXM-A	Fixed (Power ON-delay)	0.05 s to 10 min	100 to 120 V AC	S1DXM-A2C10M-AC120V
S1DXM-M	Switchable (4 different operation modes)	0.05 s to 10 min	100 to 120 V AC	S1DXM-M2C10M-AC120V



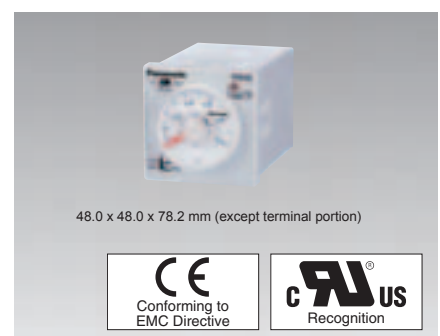
## Multi-range Timer PM4S

### Economically priced multi-range timer

- Output contacts switchable between timed out 2C and timed out 1C/ Instantaneous 1C. The output contact enables the efficient addition of self-maintenance circuits.
- 4 different time ranges selectable on a single unit. Set the dial all the way to "0" for instantaneous operation, so circuit testing can be easily accomplished.

### Typical model number

Product name	Operation mode	Time range	Operating voltage	Model No.
PM4S Multi-range Timer A type	Power ON-delay	1 s/10 s/1 min/10 min (4 time ranges selectable)	100 to 120 V AC	PM4S-A2C10M-AC120V
			200 to 240 V AC	PM4S-A2C10M-AC240V
			12 V DC	PM4S-A2C10M-AC12V
			24 V DC	PM4S-A2C10M-AC24V



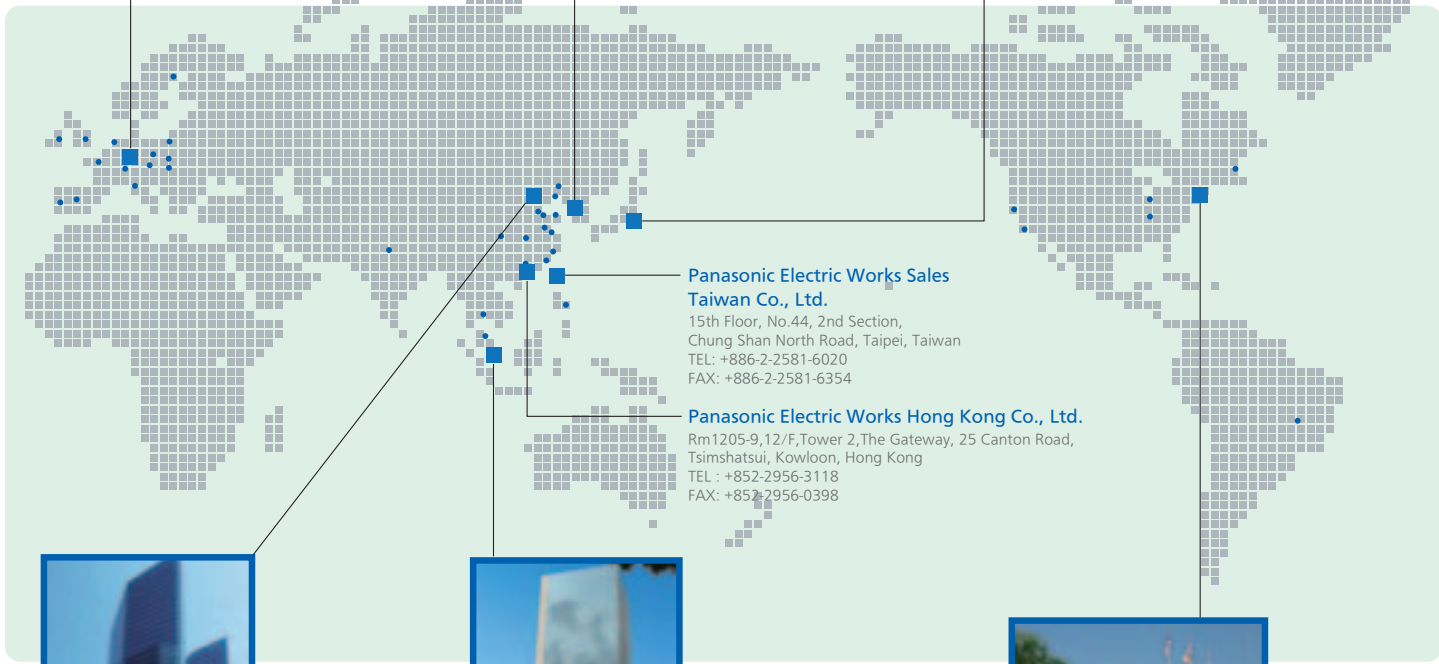
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