Panasonic
INDUSTRY

Got Questions?!
Ramco Innovations
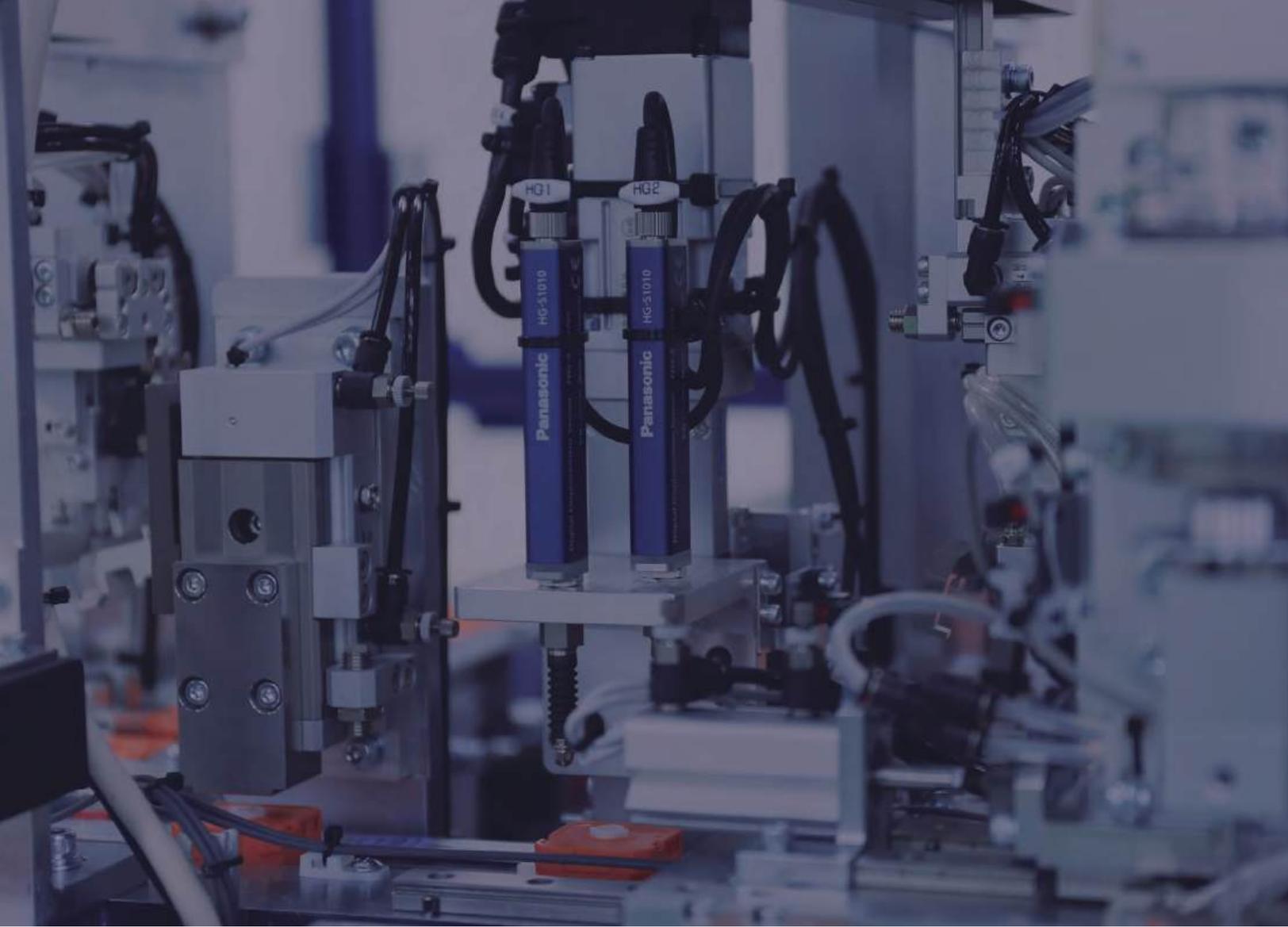nsales@ramcoi.com
Phone 800-280-6933

Industrial Automation

Key Product Guide

Panasonic offers a diverse portfolio of products and over 40 years of design expertise to provide integrated solutions that fits into various automation markets such as Automotive, Semiconductor, Packaging and Bio Medical. Boasting a strong reputation for quality, an established organization of highly experienced professionals and technically advanced products, Panasonic strives to be your trusted partner.

Industrial Automation Products

Digital Fiber Sensor — FX-550 series

1.6 times longer sensing range than conventional models
Significantly improved stability and usability

CE   UKCA
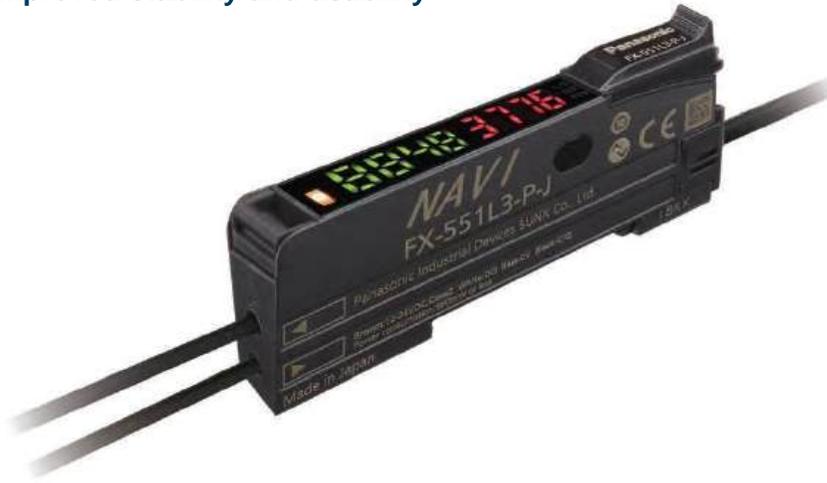
Ample sensing distance even with thin fiber

The sensing range of the thin reflective type fiber is about 1.6 times longer than that of a conventional product (the sensing range of the standard reflective type fiber is about 1.4 times longer). This adds extra flexibility to the sensor layout.

Fiber	Sensing range (STD mode)		Rate of increase in sensing range
	FX-551	FX-501	
FT-31	480 mm 18.898 in	315 mm 12.402 in	152 %
FT-42	1,470 mm 57.874 in	1,130 mm 44.488 in	130 %
FD-41	200 mm 7.874 in	125 mm 4.921 in	160 %
FD-61	620 mm 24.409 in	450 mm 17.717 in	138 %

FX-551 STD mode — FD-41 Tough
FX-501 STD mode — FD-41 Tough

1.6 times approx. longer than conventional models!

Stable detection

When the hysteresis is the same, the higher incident light intensity results in more stable detection.

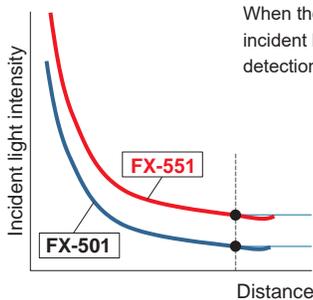Incident light intensity / Distance

FX-551
FX-501

Stable detection!

Easy adjustment of beam axis

Thanks to the high emission power, a slight deviation of beam axis causes no problem.
It is ideal for use in dusty areas* or for detection through an extremely small slit.

*Need to confirm proper operation in installed condition.

Equipped with a mode to minimize the effect of ambient light

When setting to activate the environment resistance mode in the emission frequency setting, the ambient illuminance for LED lights becomes about 2.5 times higher than that in the normal mode. This reduces erroneous detections caused by LED lights.

Amplifier Line-up

Type		Connector type (Note)	Cable type
Model No.	NPN output	FX-551	FX-551-C2
	PNP output	FX-551P	FX-551P-C2
Supply voltage		12 to 24 V DC $^{+10}_{-15}$ %	
Output		NPN open-collector transistor or PNP open-collector transistor	
Response time		FAST: 60 µs or less, STD: 250 µs or less, LONG: 2 ms or less, U-LG: 4 ms or less, HYPR: 24 ms or less, selectable	
Cable		—	0.2 mm² 3-core cabtyre cable, 2 m long

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

Built-in Lens Tough Fiber

The built-in micro-lens has achieved the small head size.
The compact head with the built-in lens measures only 1.5 mm 0.059 in in diameter.
Furthermore, the reflective type has an inner guide for a uniform layout of fiber cores to reduce the variation in the amount of light received.

Fiber head tip

- Inner guide
- Micro-lens
- Incident light fiber core

Conventional spot beam

Coaxial reflective type
Spot beam diameter:
ø2.5 mm ø0.098 in
(Setting distance:
10 mm 0.394 in)

Spot beam from Tough Fiber
with built-in lens
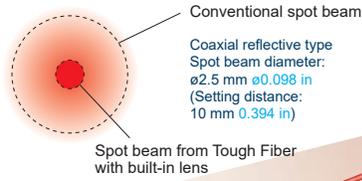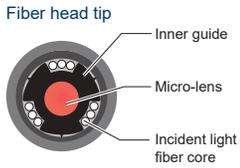
ø1.5 ø0.059 thru-beam
type: **FT-S22**
Aperture angle: 7°
Bending radius:
R1 mm R0.039 in

Tough

M3 thru-beam type:
FT-32
Aperture angle: 10°
Long sensing distance:
3,000 mm 118.11 in

Tough

ø3 ø0.118 coaxial
reflective type:
FD-S34G
Aperture angle 14°

Tough

M3 coaxial reflective
type: **FD-34G**
Aperture angle 14°

Tough

Extensive fiber head lineup

Square Head Fiber

Super Quality Fiber

Threaded Type Fiber

Cylindrical Type Fiber
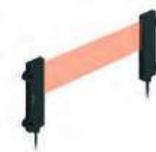
Sleeve Fiber

Flat Type Fiber

Small Spot Fiber

Narrow Beam Fiber

Wide Beam Fiber

**Convergent Reflective Type
Fiber**

Retro-reflective Type Fiber

**Chemical /
Oil-resistant Fiber**

Heat-resistant Fiber

Vacuum-resistant Fiber

The world's smallest* size

* Among photoelectric sensors with built-in amplifier, as of April 2023, in-company survey.

CE Conforming to EMC Directive

c ℞ US Recognition

EX-Z13□
Sensing range: 500 mm 19.685 in
Repeatability: 0.05 mm 0.002 in or less
Minimum sensing object:
ø1.0 mm ø0.039 in opaque object

EX-Z12□
Sensing range: 200 mm 7.874 in
Repeatability: 0.03 mm 0.001 in or less
Minimum sensing object:
ø0.5 mm ø0.020 in opaque object

EX-Z11□
Sensing range: 50 mm 1.969 in
Repeatability: 0.02 mm 0.001 in or less
Minimum sensing object:
ø0.3 mm ø0.012 in opaque object
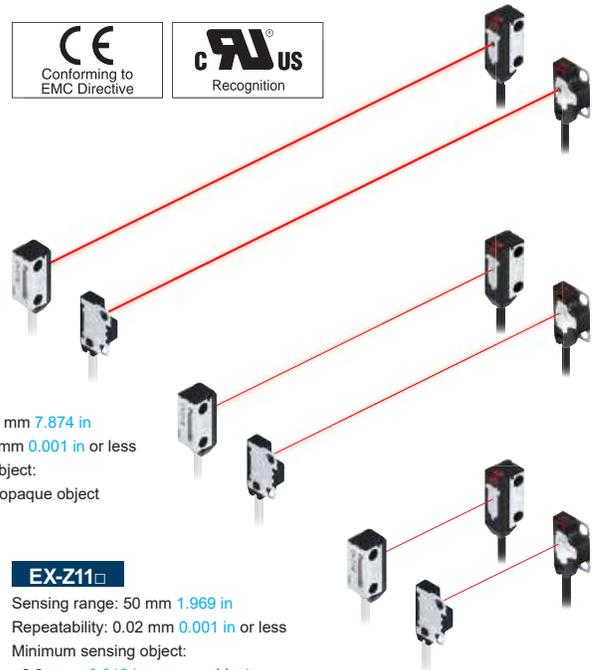
Capable of sensing an extremely small ø0.3 mm object without slit

A slit is provided on the front side of the main sensor body. The sensor can detect a ø0.3 mm object without using an optional slit.
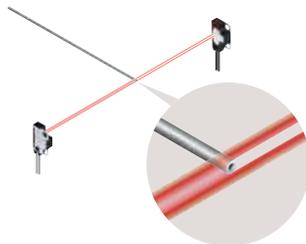
Sensing of end of thin pipe

IP67 protective structure

The sensors features an IP67 protective structure to allow their use in process lines where water is used or splashed.
Rust-resistant stainless steel sensor mounting brackets and screws are available.
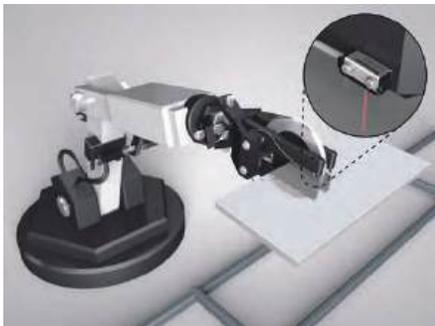
Workpiece detection with robot hand
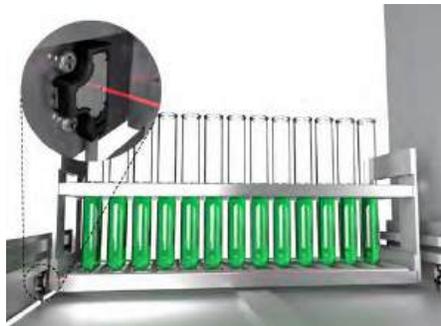
Detection of presence / absence of test tube tray

Detection of LED lead

Ultra-slim Photoelectric Sensor

Amplifer Built-in
EX-10 series

Small 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.

3.5 mm
10 mm
14.5 mm

Six types of mounting brackets, fixable with M3 screws, are available.
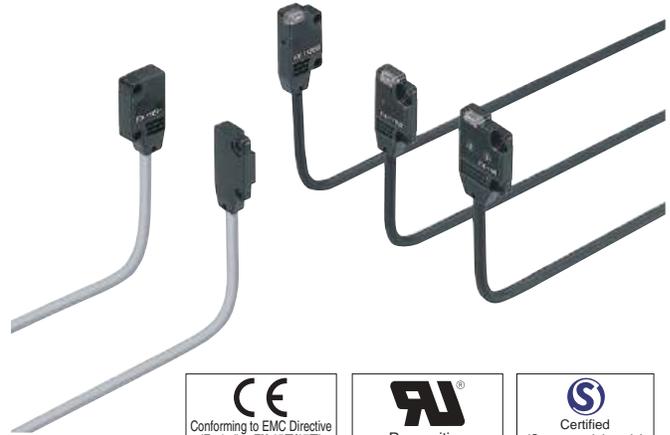
Long-range sensing at 1 m with a narrow-beam
EX-19S□ **EX-L221**

Narrow-beam models deliver long-range sensing at 1 m.

CE Conforming to EMC Directive (Excluding EX-15□/17□)
UL Recognition
S Certified (Some models only)

Ultra-compact Photoelectric Sensor

Amplifer Built-in
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.

10.5 mm
8.2 mm
19 mm

CE Conforming to EMC Directive
UL Recognition (Excluding 5 m cable length type)
S Certified (Some models only)

Threaded Miniature Photoelectric Sensor

Amplifer Built-in
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.

14 mm
(Reflective type: 18 mm)
M4 ▶
Thru-beam type (**EX-31□/33□**)
(Reflective type: M6)

CE Conforming to EMC Directive
UL Recognition (Excluding EX-33□-PN) and 5 m cable length type)

Amplifer Built-in
EX-L200 series

CE Conforming to EMC Directive

FDA

Built-in amplifier in this size
Ultra-compact Laser sensor

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.

General-purpose photoelectric sensor

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

EX-L211, EX-L212

Thru-beam type

Sensing range
Minute object detection type (EX-L211):
1 m 3.281 ft
Long sensing range type (EX-L212):
3 m 9.843 ft

EX-L221

Spot reflective type

Sensing range

Minute object detection type (EX-L221):
45 mm to 300 mm
1.772 in to 11.811 in

EX-L291

Reflective type

Sensing range

Long sensing range type (EX-L291):
4 m 13.123 ft

EX-L261, EX-L262

Convergent reflective type

Sensing range

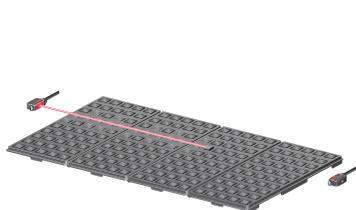**Spot type (EX-L261):**
20 mm to 50 mm
0.787 in to 1.969 in

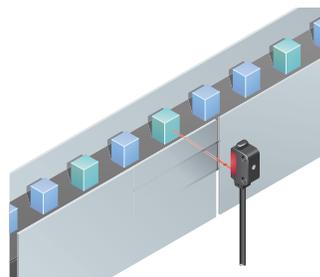**Line spot type (EX-L262):**
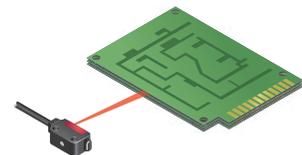**20 mm to 70 mm**
0.787 in to 2.756 in

Detecting misaligned ICs across multiple pallets

Detecting processed holes

Detecting workpieces with uneven coloration

Detecting thin workpieces like PCBs

Ramco Innovations Phone 800-280-6933   https://www.panasonicsensors.com   nsales@ramcoi.com

Industry's smallest*

* Smallest amplifier-separated type laser sensor head as of September 2014, in-company survey.

CE Conforming to EMC Directive

FDA

LS-501□

LS-H101

Stainless steel (SUS) body

Featuring stainless steel (SUS) enclosure that won't break when bumped during installation or maintenance.

One-point M6 installation

The **LS-H101** features an easy-to-install design.

Body: Stainless steel (SUS)
Operation indicator (receiver only)
M6
30 mm
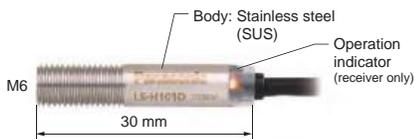
LS-H201/H901

Thinnest design

Size just as thin as W8 × H23 (excluding indicators) × D18 mm.

18 mm
23 mm
8 mm

LS-H102

Waterproof IP67

Featuring waterproof IP67 to allow use in the presence of large amounts of water or dust.

Simple positioning

Check the optimal receiving location at a glance while watching the red spot on the beam axis adjustment screen.

Coaxial design LS-H201

By using a laser with high linearity in a coaxial design, the **LS-H201** is able to deliver stable sensing in confined spaces as well as simple installation.

Reflective surface
Laser light
Emitting element
Sensing object
Reflected light
Receiving lens
Receiving element
Coaxial principle

Reflective photoelectric sensor
Emitting part
Receiving part

Coaxial design
Receiving part
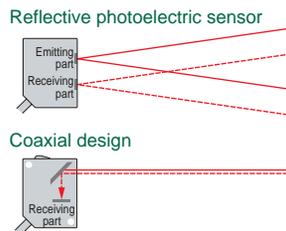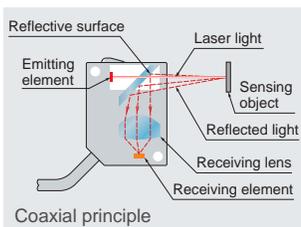
Horizontal symmetry LS-H901

The light source is positioned in the center of the sensor head, which helps to design easier.
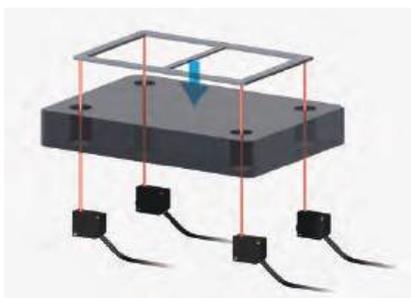
Detection of workpieces through a workbench
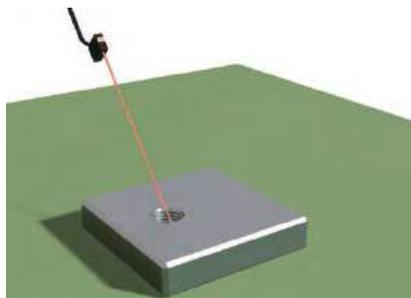
Detecting processed holes
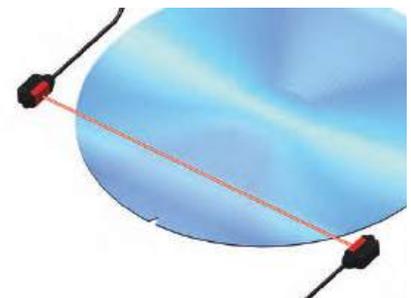
Wafer inclination detection

Optical Reagent Level Detector

Amplifer Built-in
BE-R series

Solve problems of liquid level detection by optical method

Safety liquid level detection by optical method

No malfunction caused by crystallization or corrosion.

Due to maintenance free, no risk of exposure to reagent.

Contactless to container

No need to remove or readjust the sensor when replacing containers.

Full level detection of waste tank

serum / plasma level detection in the test tube
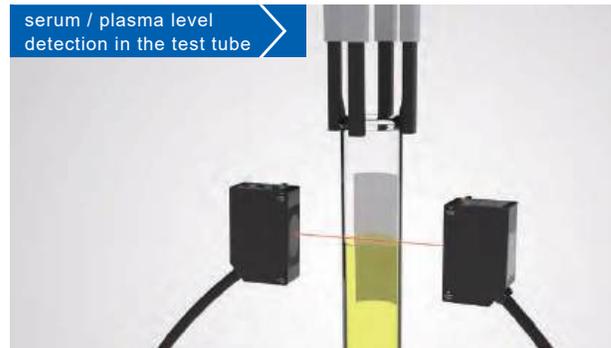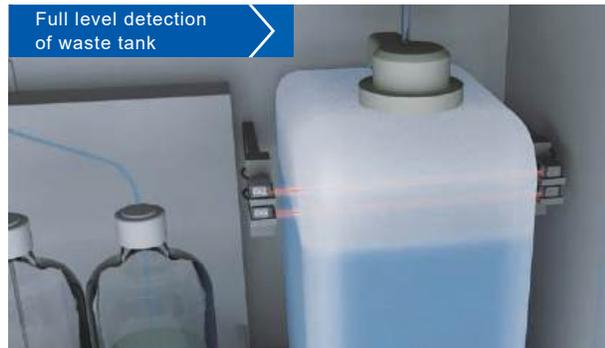
| Item	Type	NPN output	PNP output
	Model No.	BE-R1	BE-R1-P
Sensing range		5 m 16.404 ft (without container or pipe)(Note 2)	
Sensing object		ø12 mm ø0.472 in or more liquid which contains water, or opaque object (Note 3)	
Supply voltage		12 to 24 V DC ±10 % Ripple P-P 10 % or less	
Current consumption		Emitter: 25 mA or less, Receiver: 25 mA or less	

Output		NPN open-collector transistor
		• Maximum sink current: 100 mA
		• Applied voltage : 30 V DC or less
		  (between output and 0 V)
		• Residual voltage: 1.5 V or less (at 100 mA sink current)
		  0.4 V or less (at 16 mA sink current)
			PNP open-collector transistor
			• Maximum source current: 100 mA
			• Applied voltage : 30 V DC or less
			  (between output and +V)
			• Residual voltage: 1.5 V or less (at 100 mA source current)
			  0.4 V or less (at 16 mA source current)

	Output operation	Switchable either Light-ON or Dark-ON	

For small diameter tubes
Optical Bubble Sensor

Amplifer Built-in
BE-A series

Detects liquid and air bubbles without fail

Simply attach the sensor with your hand.

Hassle-free one-touch attachment without using tools!

In the case of BE-A201(P) / BE-A301(P)

In the case of BE-A401(P)

Empty detection inside the tank

Air bubble detection after pumping

BE-A series

BE-A series

Reagent/ cleaning fluid tank

To dispensing nozzle

Application: Clinical laboratory instrument

CE Conforming to EMC Directive

c**UR**us Recognition

(S) Certified (Some models only)

Ultra-small / Cable type **PM-25** SERIES

PM-K25 **PM-L25** **PM-U25** **PM-F25** **PM-R25**

Compact / Cable type **PM-45** SERIES

PM-K45 **PM-T45** **PM-L45** **PM-Y45** **PM-F45** **PM-R45**

Compact / Connector built-in type **PM-65** SERIES

PM-K65 **PM-T65** **PM-T65W** **PM-L65** **PM-Y65** **PM-F65** **PM-F65W** **PM-R65** **PM-R65W**

Three protection circuits standard on all models

All models are standardly equipped with the following protection circuits in their compact bodies. These protection circuits minimize the possibility of sensor malfunctions caused by erroneous wiring.
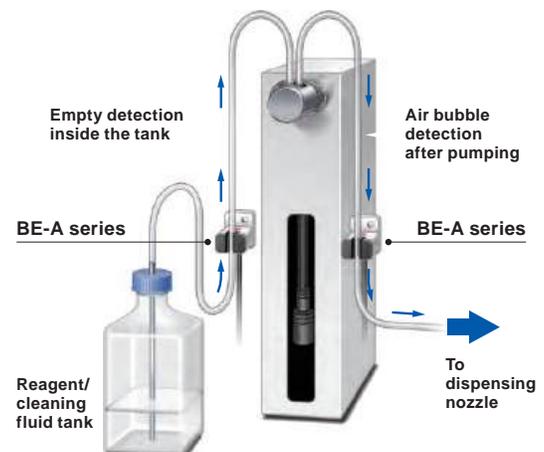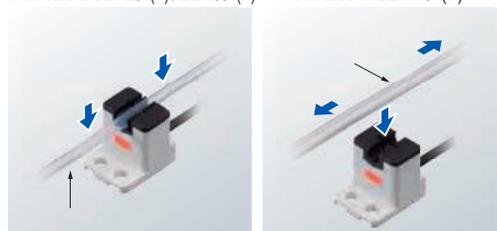
1 **Reverse supply polarity protection circuit**

2 **Reverse output polarity protection circuit**

3 **Output short-circuit protection circuit**

Compact size
PM-45 SERIES

All new models require significantly less mounting space than our conventional models when mounted with the same pitch. What's more, the new models can directly replace our conventional models currently in use.

PM-L45

14.6   26   **10**

Conventional model (L type)

15.5   26   18.5

(Unit: mm)
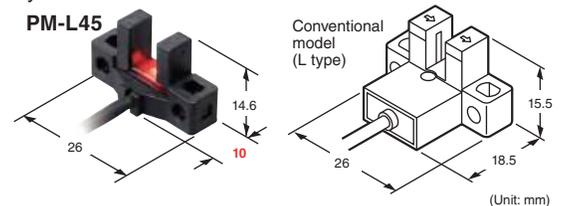
IP64 rating
PM-25 SERIES **PM-45 SERIES**

Type		Ultra-small / Cable type	Compact / Cable type	Compact / Connector built-in type
Model No.	NPN output	**PM-□25 (-C3)**	**PM-□45 (-C3)**	**PM-□65 (W)**
	PNP output	**PM-□25-P**	**PM-□45-P (-C3)**	**PM-□65 (W)-P**
Sensing range		6 mm (fixed)		
Minimum sensing object		0.8 × 1.2 mm opaque object		
Repeatability		0.01 mm or less		
Supply voltage		5 to 24 V DC ± 10%		
Output		NPN output type: NPN open-collector transistor PNP output type: PNP open-collector transistor		
Response time		Under light received condition: 20 μs or less Under light interrupted condition: 80 μs or less (Maximum response frequency: 3 kHz)		
Ambient temperature		−25 to +55 °C		

Notes: 1) **PM-□-C3** is 3 m cable length type. **PM-□65W** and **PM-□65W-P** are mounting-compatible with conventional models.
2) Bending-resistant cable type (**PM-□25-R**) is available.

Simpler and easier to use

CE   UK CA

Conforming to
EMC Directive

Simple & easy operation
Two levels of setting mode for easy operation of essential functions

The "RUN mode" is for threshold value setting, zero point adjustment and key lock setting / release setting, and the "detailed setting mode" allows for basic settings for sensor operation. The two-level setting mode configuration enables easy and immediate use of the product.

Detailed setting mode

- Pressure unit setting mode
- Operation setting mode
- NO / NC setting mode
- Response time setting mode
- Display color setting mode
- Settings initializing mode

RUN mode

- 39.4 kPa

• Threshold value setting
• Zero point adjustment
• Key lock setting / release
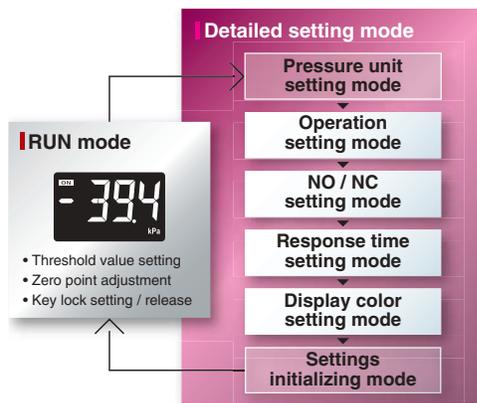
Compact & light weight design
Extra-short depth and light weight

The unit body measures only 24.9 mm in depth to allow installation in a narrow space. The main unit weighs only about 25 g. The lightweight unit means minimal load when mounted on a moving part such as a robot arm.

| **DP-0** series | Previous model (**DP-100** series standard pressure port type) |

Approx. **25** g

24.9 mm

< Actual size >

Approx. **40** g

42.5 mm
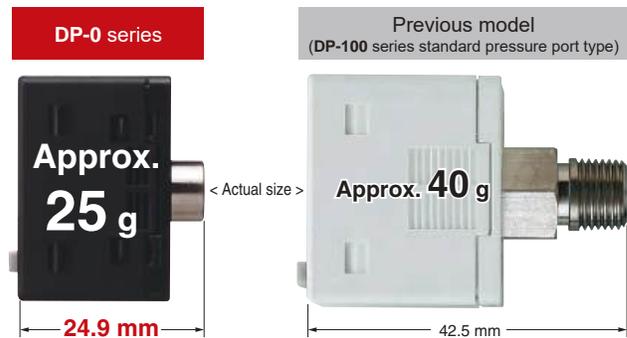
Main menu for detailed setting mode

Operation setting mode
oPE
Select from EASY mode, hysteresis mode or window comparator mode.

NO / NC setting mode
No.c
Set the comparative output operation to NO or NC.

Response time setting mode
SPd
Select the response time from 2.5 ms, 25 ms or 250 ms.

Display color setting mode
coL
Select the comparative output ON / OFF display color and the normal display color from red or white.

Suction confirmation for electronic parts
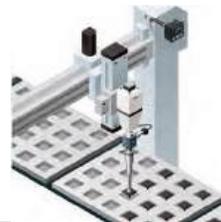
Reference pressure check

Type		Low pressure	High pressure
Model No.	NPN output	**DP-001**	**DP-002**
	PNP output	**DP-001-P**	**DP-002-P**
Rated pressure range		−100.0 to +100.0 kPa	0.000 to +1.000 MPa
Pressure withstandability		500 kPa	1.5 MPa
Applicable fluid		Air, non-corrosive gas	
Ambient temperature		0 to +50 °C	
Dimensions		W30 × H30 × D24.9 mm	

Dual 3-color display makes operation easier!

'Current value' and 'threshold value' can be checked at the same time!

CE · UKCA · c UL us Recognition · S Certified [DP-101(A)/102(A) only]

Comparative Output 1 operation indicator
Comparative Output 2 operation indicator
(Work as analog voltage output operation indicator in Multi-function type)

Main display (current value)
Sub display (threshold value)

Mode selection key
Increment key
Decrement key
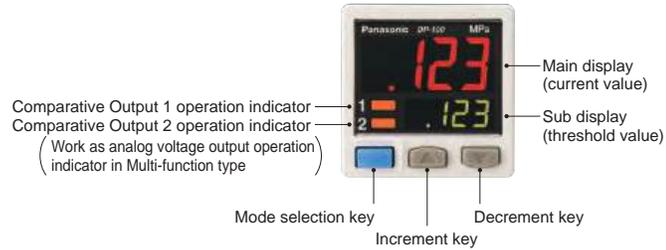
3-color display (Red, Green, Orange)

The main display changes color in line with changes in the status of output ON / OFF operation, and it also changes color while setting is in progress. The sensor status can therefore be understood easily, and operating errors can be reduced.

Main Display

| OFF: Green (or Red) | ON: Red (or Green) | SET: Orange |

During normal operation | During setting

Copy function reduces man-hours and human error

Sensors can be connected to a master sensor one by one, and a copy of the setting details for the master sensor can be transmitted as data to other sensors. If making the same settings for multiple sensors, this prevents setting errors among other sensors and in addition, when machinery design are changed, there would be less change in work orders.

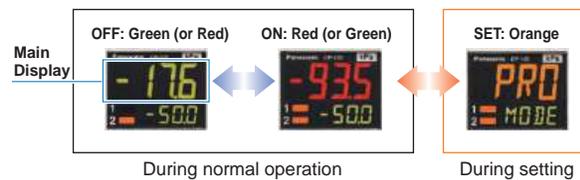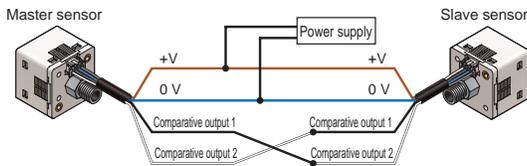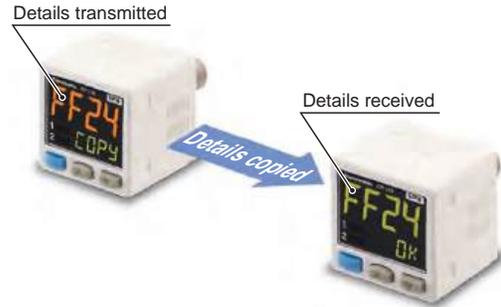### Copying via wiring

Master sensor | Power supply | Slave sensor
+V | +V
0 V | 0 V
Comparative output 1 | Comparative output 1
Comparative output 2 | Comparative output 2

Details transmitted
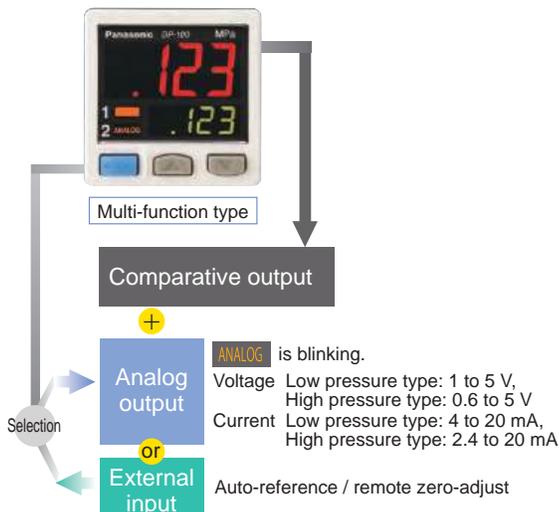Details received
Details copied

Note: Settings cannot be copied from the new version (Ver. 2) to the old version.
However, settings can be copied from the old version to the new version (Ver. 2).

Multi-function type

Possible to switch over analog output and external input

Multi-function type of ver.2 is newly equipped with analog current output, in addition to analog voltage output. Multi-function type that enables the selection of analog output (voltage / current) or external input (auto-reference / remote zero-adjustment) is available. It complies a wide range of applications.

Multi-function type

Comparative output
+
Analog output
ANALOG is blinking.
Voltage Low pressure type: 1 to 5 V,
High pressure type: 0.6 to 5 V
Current Low pressure type: 4 to 20 mA,
High pressure type: 2.4 to 20 mA
Selection
or
External input Auto-reference / remote zero-adjust

Type		Compound pressure			
				Multi-function	
		For low pressure	For high pressure	For low pressure	For high pressure
Model No.	Asia	**DP-101(-M)**	**DP-102(-M)**	**DP-101A(-M)**	**DP-102A(-M)**
	Europe	**DP-101-E-P**	**DP-102-E-P**	**DP-101A-E-P**	**DP-102A-E-P**
	M8 plug-in connector type	**DP-111-E-P-J**	**DP-112-E-P-J**	**DP-111A-E-P-J**	**DP-112A-E-P-J**
	North America	**DP-101-N(-P)**	**DP-102-N(-P)**	**DP-101A-N(-P)**	**DP-102A-N(-P)**
Rated pressure range		−100.0 to +100.0 kPa	−0.100 to +1.000 MPa	−100.0 to +100.0 kPa	−0.100 to +1.000 MPa
Applicable fluid		Non-corrosive gas			
Supply voltage		12 to 24 V DC ±10 %			
Output		NPN output type: NPN open-collector transistor PNP output type: PNP open-collector transistor			
Response time		2.5 ms, 5 ms, 10 ms, 25 ms, 50 ms, 100 ms, 250 ms, 500 ms, 1,000 ms, 5,000 ms, selectable by key operation			
Display		4 digits + 4 digits 3-color LCD display			
Pressure port		Asia: M5 female thread + R (PT) $1/_8$ male thread (excluding **DP-10□-M**), Europe: M5 female thread + G $1/_8$ male thread, North America: M5 female thread + NPT $1/_8$ male thread			
Connecting method		Connector			
Accessories		**CN-14A-C2** (Connector attached cable 2 m): 1pc. (excluding **DP-11□-E-P-J**)			
Dimensions		W30 × H30 × D42.5 mm (**DP-10□-M**: D30 mm, **DP-11□-E-P-J**: D47.5 mm)			

Note: Types without connector attached cable are also available.

DC 3-wire Type
Cylindrical Inductive Proximity Sensor

Amplifer Built-in
GX-300 series

Response frequency of 5 kHz* allows the use of high-speed application
* In the case of GX-303S

The GX-303S boasts a response frequency of 5 kHz and realizes high speed response.The response frequency of other sensor models has been also improved by up to 4 times as compared to our conventional models.
Since the GX-300 series responds quickly to sensor ON/OFF judgement, it works well with a high-speed application and contributes to the reduction of equipment cycle time.
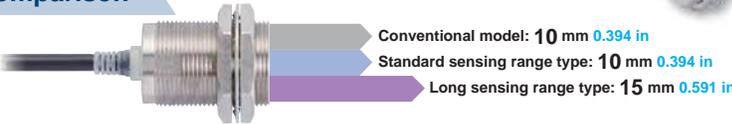
Enhanced a degree of the detection margin

Sensing over long distance

The M8 / M12 / M18 / M30 threaded type sensors are available in standard sensing range type or long sensing range type ("K" at the end of model No.). The long sensing range means reliable detection with plenty of performance margin to spare.

Sensing range comparison

M30 threaded type, shielded type

Conventional model: **10** mm **0.394 in**
Standard sensing range type: **10** mm **0.394 in**
Long sensing range type: **15** mm **0.591 in**

M30 threaded type, non-shielded type

Conventional model: **22** mm **0.866 in**
Standard sensing range type: **18** mm **0.709 in**
Long sensing range type: **30** mm **1.181 in**

* The indicator light may appear differently depending on ambient environments and brightness.
* On the M8 and larger threaded type sensors, the indicator light is visible at 2 locations on one side.
* The operation indicators of the M8 and larger threaded type sensors flash in green during IO-Link communication.

Indicator with significantly improved visibility

In the small-diameter type sensors, the indicator light is visible at 4 locations. In the M8 and larger threaded type sensors, the high-brightness indicator and the resin containing dispersing agent provide clear and highly visible light to facilitate the cumbersome adjustment of installation position.

Indicator light visible at 4 locations

Small-diameter type

M8 / M12 / M18 / M30 threaded type

IO-Link compatibility

Evolution from ON/OFF judgment sensors to sensors capable of transmitting the detection level and sensor status information

◆ IO-Link

* Only the M8 / M12 / M18 / M30 threaded type, PNP output, normally open type models are compatible with IO-Link.
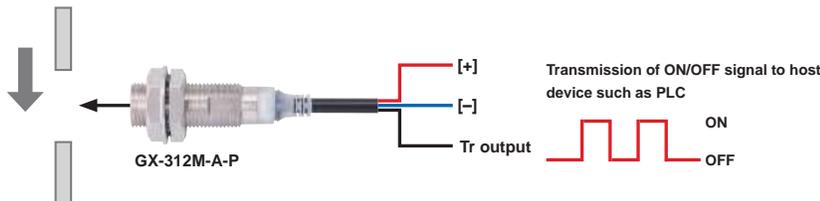
GX-312M-A-P

[+]
[−]
Tr output

Transmission of ON/OFF signal to host device such as PLC

ON
OFF

Dog
GX-308MK

Positioning processing equipment

Flexible Installation in Tight Spaces

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.

Maximum operation distance
Stable sensing range

GX-F/H series

Conventional model
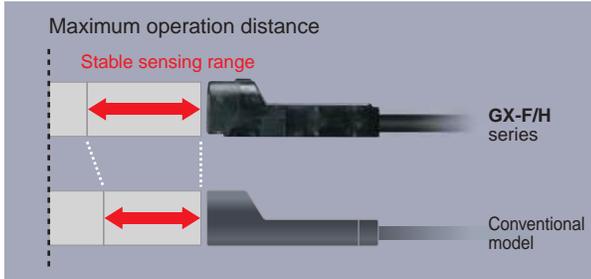
Type		Maximum operation distance	Stable sensing range	
			GX-F/H series	Conventional model
GX-□6		1.6 mm 0.063 in	0 to 1.3 mm 0.051 in	0 to 1.2 mm 0.047 in
GX-□8		2.5 mm 0.098 in	0 to 2.1 mm 0.083 in	0 to 1.8 mm 0.709 in
GX-□12		4.0 mm 0.157 in	0 to 3.3 mm 0.130 in	0 to 3.0 mm 0.118 in
GX-□15		5.0 mm 0.197 in	0 to 4.2 mm 0.165 in	0 to 4.0 mm 0.157 in
	Long sensing range	8.0 mm 0.315 in	0 to 6.7 mm 0.264 in	0 to 6.4 mm 0.252 in

* With standard sensing object

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.

Variation at the maximum operation distance is within ±8 %

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

Example: GX-□8

0.4 mm 0.016 in or less
Operation distance variation: 0.4 mm 0.016 in or less*
Standard sensing object
60% less
For the GX-□8
Maximum operation distance: 2.5 mm 0.098 in ± 8 % (2.3 to 2.7 mm 0.091 to 0.106 in)

1.0 mm 0.039 in or less
Operation distance variation: 1.0 mm 0.039 in or less
Standard sensing object
Conventional model
Image
Maximum operation distance: 2.5 mm 0.098 in ± 20 % (2.0 to 3.0 mm 0.079 to 0.118 in)

* Not including temperature characteristics.

Muting control of light curtains

Positioning processing equipment
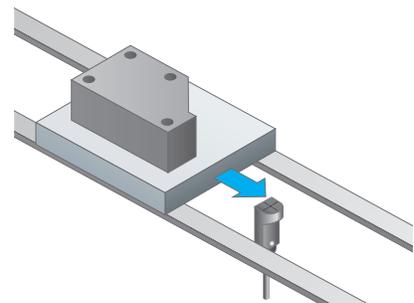
Positioning metal pallets

High-precision Displacement Sensors Made Easier to Use

CE | UKCA | **FDA** Conforming to FDA regulations | TÜV SÜD Certified by NRTL

Resolution
0.5 µm 0.020 mil

Class-top[1] Linearity[2]
±0.05 % F.S.

Class-top[1] Sampling Period
100 µs

Temperature Characteristic
0.03 % F.S./°C

Measuring Range[2]
25 to 400 mm
0.984 to 15.748 in

*1: According to our company's survey, as of February 2024.
*2: Specifications vary depending on models.

## Built-in controller and communication unit
Easy-to-use Integrated Models

The integrated models feature built-in controllers to facilitate model selection and reduce installation space and cost. The communication type models have built-in communication units for easy connection to a PLC, while the analog output type models are suitable for applications that require continuous acquisition of measurement data from sensors.

Setting tool software

HL-G2 unit
HL-G2 unit
HL-G2 unit
HL-G2 unit

Hub

EtherNet/IP
SLMP
Seamless Message Protocol

Modbus TCP

PC

PLC

* Up to 16 units can be connected via RS-485.

* Communication function is provided only in the communication type models.
* EtherNet/IP is a registered trademark of ODVA (Open DeviceNet Vendor Association).
* SLMP is a registered trademark of Mitsubishi Electric Corporation.
* Modbus is a registered trademark of Schnelder Electric USA Inc.
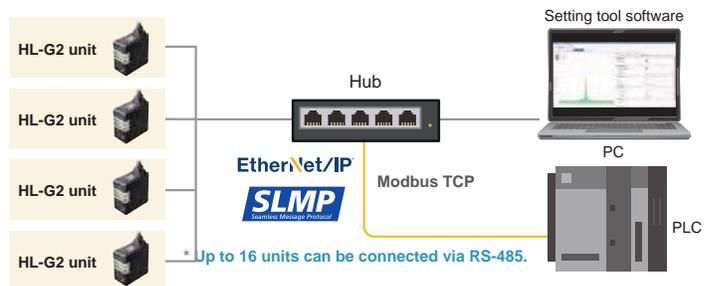
Simple and intuitive operations
Setting Tool Software

By using the PC installed with the "HL-G2 Configuration Tool" configuration tool software (free to download), parameters can be set easily and simultaneously in multiple HL-G2 units. Since settings can be made in real time while confirming actual data, the time required for adjustment can be reduced

Inspection of battery shape

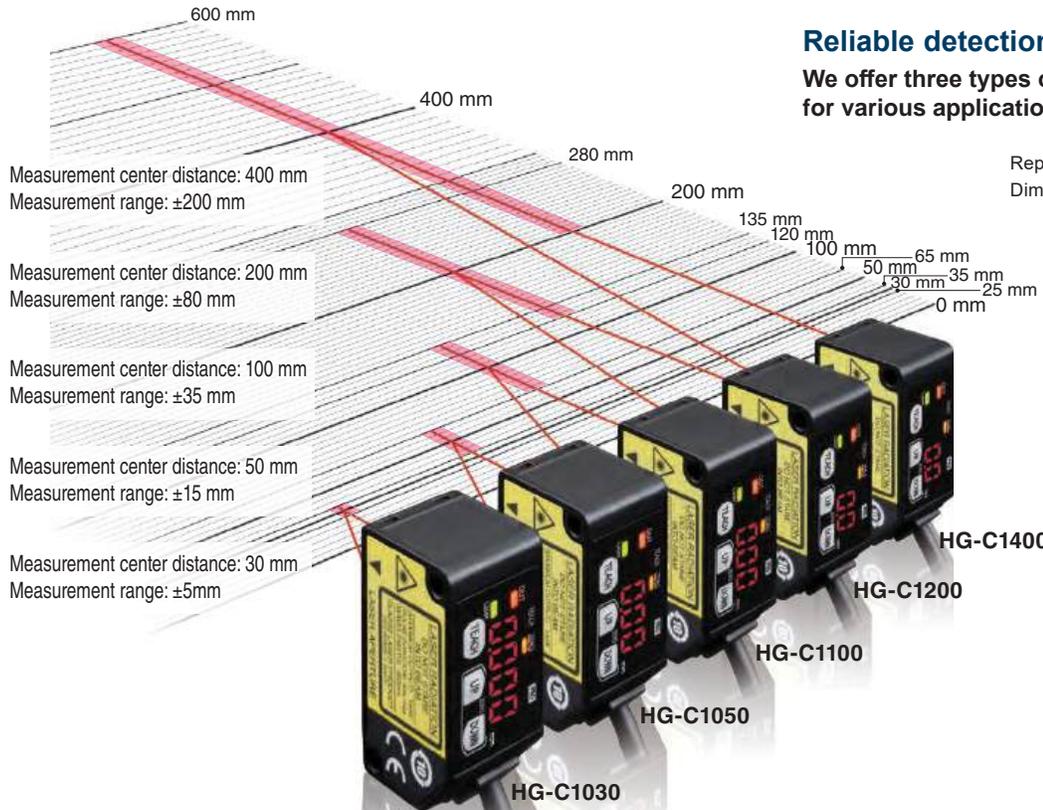Inspection of camera actuator operating amount
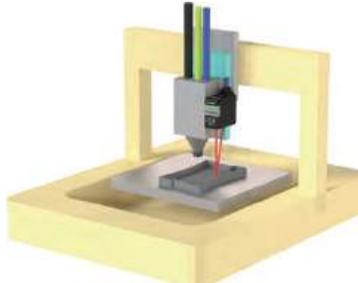
Control of dispenser height
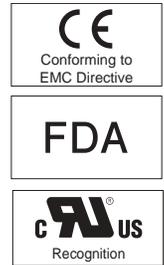
Correction of robot arm position

Reliable detection in 10 μm precision
We offer three types of laser sensor heads for various applications

Repeatability: 10 μm (for **HG-C1030**)
Dimensions : W20 ✕ H44 ✕ D25 mm

600 mm
400 mm
280 mm
200 mm
135 mm
120 mm
100 mm
65 mm
50 mm
35 mm
30 mm
25 mm
0 mm

Measurement center distance: 400 mm
Measurement range: ±200 mm

Measurement center distance: 200 mm
Measurement range: ±80 mm

Measurement center distance: 100 mm
Measurement range: ±35 mm

Measurement center distance: 50 mm
Measurement range: ±15 mm

Measurement center distance: 30 mm
Measurement range: ±5mm

HG-C1400
HG-C1200
HG-C1100
HG-C1050
HG-C1030

CE Conforming to EMC Directive

FDA

c (UL) us Recognition

Fitted with a precise CMOS image sensor and an original algorithm

Thanks to a precise CMOS image sensor, it is now possible to perform highly precise measurements in the order of 1/100 mm. The existing adjustable range reflective sensors cannot achieve such accuracy.

Example: **HG-C1030**
CMOS sensor
Emitting element
Lens
20 μm
Conveyor
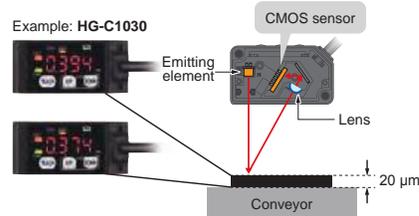
Equipped with 0-5 V analog output and 4 to 20 mA analog current output

Linearity: ±0.1 % F.S.
Temperature characteristics: 0.03 % F.S./°C

The value can be measured with a distance measurement sensor.

The sensor not only indicates measured values in mm but also produces analog voltage outputs. Various calculations and storage (logging) can be performed when output is taken into a PLC + analog unit.

+V
0 V
External inputs
Control outputs
Analog outputs
Selectable either
analog voltage output 0 to +5V or
analog current output 4 to 20 mA
Analog ground
(shielded)
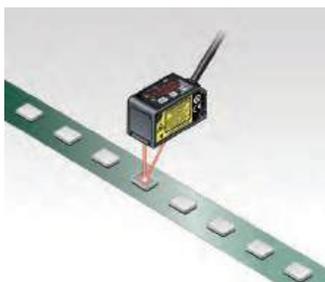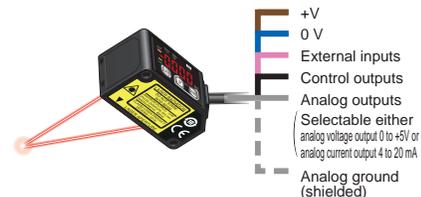
Judging front or back of cover of electric parts
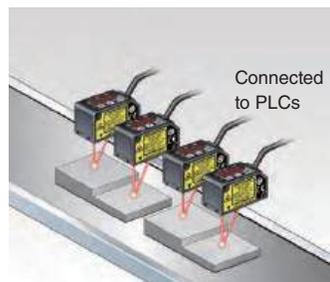
Measuring the thickness of a part
Connected to PLCs

Controlling the parallel link robot height

Detecting on-vehicle seats

Capable of long-range sensing of up to 3 m 9.843 ft

CE UKCA   FDA Conforming to FDA regulations   TÜV Certified by NRTL

The laser distance sensor **HG-F1** series features a lightweight and high-strength aluminum die-cast case with a built-in TOF sensor module.
Determines distance by measuring the time for the emitted beam to be reflected and return so that a single model can cover a measurement range of 250 to 3,000 mm 9.843 to 118.110 in.

Illustrated image of beam diameter

HG-F1 series	Panasonic's Adjustable Range Reflective Photoelectric Sensor EQ-500 series

0 m

0.5 m
1.640 ft
ø4.7 mm ø0.185 in   ø20 mm ø0.787 in

1 m
3.281 ft

1.5 m
4.921 ft

2 m
6.562 ft

2.5 m
8.202 ft
ø70 mm ø2.756 in

3 m
9.843 ft
ø20.8 mm ø0.819 in

* The above beam diameters are typical values. Confirm the appropriateness of the beam diameter in actual installation condition.
* The beam diameter may be affected by the materials of surrounding objects and their distances.
* The typical beam diameter of the **EQ-501** / **EQ-511** is used as the diameter of the **EQ-500** series.

Narrow field sensing

The spot beam is smaller than that of a conventional adjustable-range distance sensor so that pinpoint detection is possible.

Possible to detect small workpieces
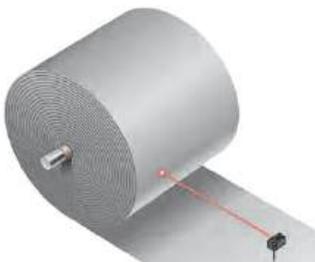
Detection of remaining amount of sheet
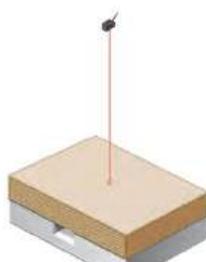
Detection of vertically stacked objects
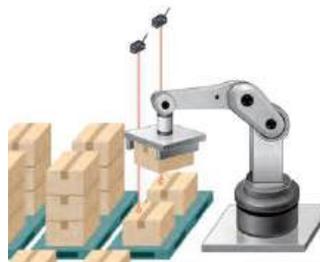
Confirmation of delivery of workpiece / quantity of stacked objects at transfer robot section

Load presence confirmation

Digital Displacement Sensor | HG-T series

Industry's highest*1 measurement accuracy

CE | UKCA | **FDA** Conforming to FDA regulations

The **HG-T** series boasts repeatability*2 of 1 μm 0.039 mil and offers the highest*1 measurement accuracy in the industry.

*1 As of November 2020, in-company survey
*2 This is the P-P value of digital measurement value with half shading at the middle position of the installation distance.

Emitter | **Receiver**

Repeatability*2

Installation distance **20 mm 0.787 in**
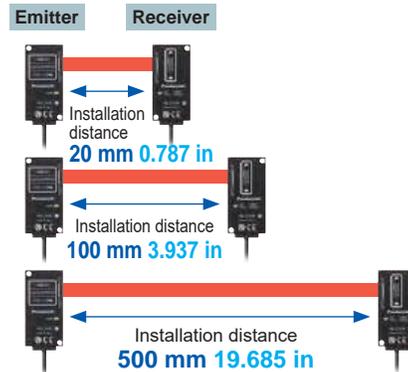
1 μm
0.039 mil
• Linearity: ±0.12 % F.S. (±12 μm 0.472 mil)
• Average count: 16 times

Installation distance **100 mm 3.937 in**

2.5 μm
0.098 mil
• Linearity: ±0.28 % F.S. (±28 μm 1.102μm)
• Average count: 16 times

Installation distance **500 mm 19.685 in**

5 μm
0.197 mil
• Average count: 16 times

● Sampling cycle setting can be selected from two options.
 Standard: 1 ms, High speed: 0.5 ms.
● Average count setting can be selected from 11 options.
  1 time, 2 times, 4 times, 8 times, 16 times, 32 times, 64 times, 128 times, 256 times, 512 times, 1,024 times

Ultra-slim sensor head

Standard type HG-T1010	Slim type HG-T1110

Standard type HG-T1010:
8 mm 0.315 in
30 mm 1.181 in
60 mm 2.362 in

Slim type HG-T1110:
8 mm 0.315 in
20 mm 0.787 in
60 mm 2.362 in

Side view attachment is available (optional). HG-T1010

Side view attachment (optional) is available for the standard type sensor head HG-T1010. This attachment can bend the laser beam at a right angle to allow flexible installation of the sensor head.

Side view attachment HG-TSV10

Two M2 (length 4 mm 0.157 in) screws with washers are attached.

■**Application example: Lithium-ion battery winding section**

Conventional sensor head

Sensor head mounted with side view attachment HG-T1010
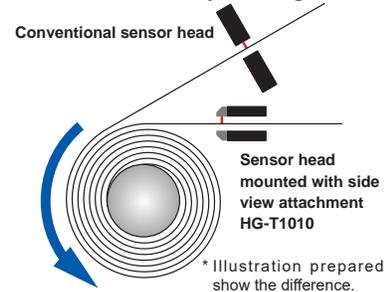
* Illustration prepared to show the difference.

Use of the side view attachment enables the installation of the sensor head closer to the winding section than when a conventional sensor head is used, thus contributing to the improvement of winding accuracy.

Detection of lifted bearing parts

Measurement of meandering on lithium-ion battery winding machine

Glass substrate positioning

Measurement of motor shaft eccentricity
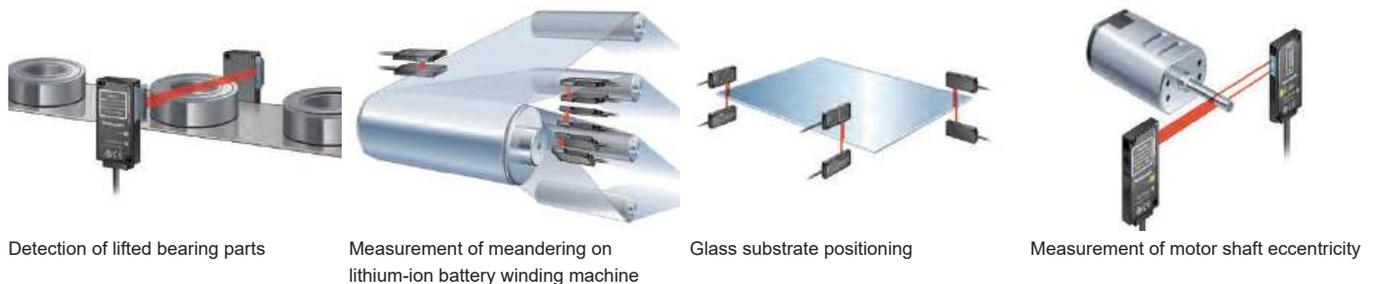
Slim & robust sensor unit

The slim unit body contains plain bearings with 2-point support structure disperses load and achieves superb durability. The sensor head offers long life and reduces maintenance costs dramatically.

CE   UKCA

High-precision sensor head (HG-S1110□)

Resolution	Indication accuracy
0.1 μm	Full range: **1 μm** or less
	Narrow range: **0.5 μm** or less

Resolution **No. 1*** in class | Indication accuracy **No. 1*** in class

* As of August 2019, in-company survey.

10 mm type — Air-driven type

10 mm type | **32 mm type** | **50 mm type** — General type

2-point support structure

Glass scale

Optical absolute method

Displacement is measured by reading a glass scale with a different slit pattern at each reading position using a high-resolution sensor. This eliminates "value skipping" even when measuring at high speed, and there is no concern of "unset zero point".

Equipped with intuitive circle meter

Values between allowable maximum and minimum values are indicated in green. Values outside of the allowable range are indicated in orange. This provides at-a-glance understanding of the margin to the tolerance limits.
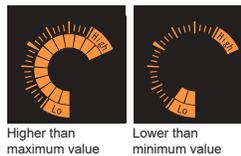
Higher than maximum value

Lower than minimum value

High-speed response

High-speed response of 3 ms in combination with any sensor head.

Automotive parts dimension measurement

Transmission parts height measurement

Management of press-fit points of press-fit parts

Motor shaft eccentricity measurement

Self-monitoring sensor

FX-550L / DP-100L / HG-C1000L

Small Step IoT Starts with IO-Link

⊘ IO-Link

Using Panasonic's self-monitoring sensors, incident light intensity, pressure values, and distance measurement values can be sent as digital data with certitude to a host controller.
The sensors diagnose their own state and inform you of the result, making it easy to identify the cause of problems.

CE | FDA Conforming to FDA regulations | c ⏻ US Recognition

CMOS Type Micro Laser Distance Sensor
HG-C1000L SERIES

CE

Digital Fiber Sensor
FX-550L SERIES

CE | c ⏻ US Recognition

Dual Display Digital Pressure Sensor
DP-100L SERIES

PLC   PLC

Industrial network

⊘ IO-Link

IO-Link master

▼ State information

| Normal | Caution | Fault |

Incident light intensity | Pressure value | Distance measurement value

With the Panasonic's Self-Monitoring Sensor, you can let the sensor to diagnose its own state!
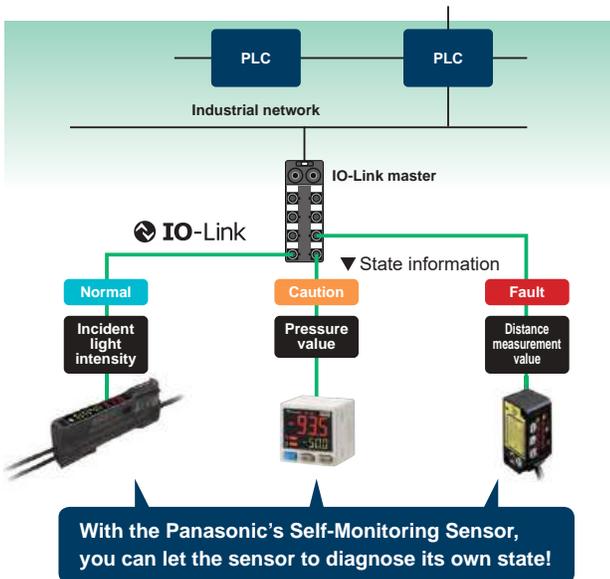
Let the sensor handle its own diagnostics.

● Your role is simply to monitor the sensor's status.
● The PLC can focus solely on device control.
● Detailed information can be accessed whenever needed.

For resetting replaced sensors, rely on the higher-level master system.

● Automatically written from the connected master.
● This not only saves time but also reduces the risk of human error.

Fully utilize the benefits of the IO-Link output.

● It is possible to read from or write to sensor settings through an external interface.
● Multiple sensors can be configured in batch mode.
● Sensor settings can be saved to an external medium.
● It is possible to detect and distinguish individual sensors.

	State information		
Normal	Notification	Operation is normal.	* Recover to the normal state through checking installation and settings. Reduction in the incident light intensity.
		Check the settings. Detected state is faulty.	
Caution		Getting close to the end of service life. Reached the state where the device should be replaced.	* Limitation in the writing frequency into the memory or in the operation hours, etc.
Fault		Short-circuited or broken. Reached the state where it is impossible to control as a device.	* Short-circuited output, damaged EEPROM, etc.

Downsized internal unit, increased case thickness

The internal unit was redesigned and downsized extensively. The internal unit was downsized to less than 40% (volume ratio) as compared to the conventional model while achieving higher performance.

28 mm   30 mm

Internal unit

28 mm   30 mm

Internal unit

Conventional model*

SF4D series

* **SF4B** series **Ver. 2** (excluding robust type **SF4B-□G□<V2>**)

CE — Conforming to Machine & EMC Directive

TÜV SÜD — Certified

cTÜVus — Certified by NRTL

Conforming to OSHA / ANSI

GB — Conforming to GB/T 4584

S — Certified [Excluding **SF4D-□-01**]
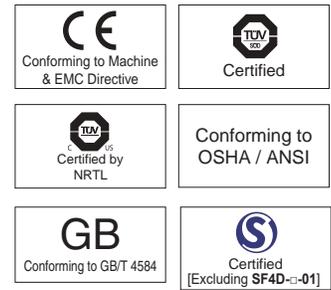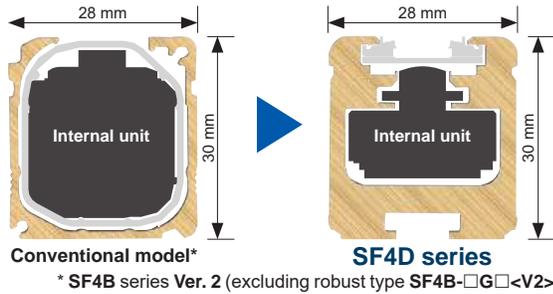
New high power optical system offering stable operation even for long distance setup

Increased power of emitter element

The power of the emitter has been increased significantly. The high resistance to dust and dirt contributes to the reduction of maintenance frequency.

Operating range

■Short mode (factory setting)

• Finger protection type	• Hand protection type • Arm / Foot protection type
0.2 to 7 m 0.656 to 22.966 ft	0.2 to 9 m 0.656 to 29.528 ft

■Long mode

• Finger protection type	• Hand protection type • Arm / Foot protection type
0.8 to 12 m 2.625 to 39.370 ft	0.8 to 15 m 2.625 to 49.213 ft

Shuts out liquids and dust

The **SF4D** series complies with IP67 and IP65 (IEC) as well as NEMA Type 13 (NEMA 250).
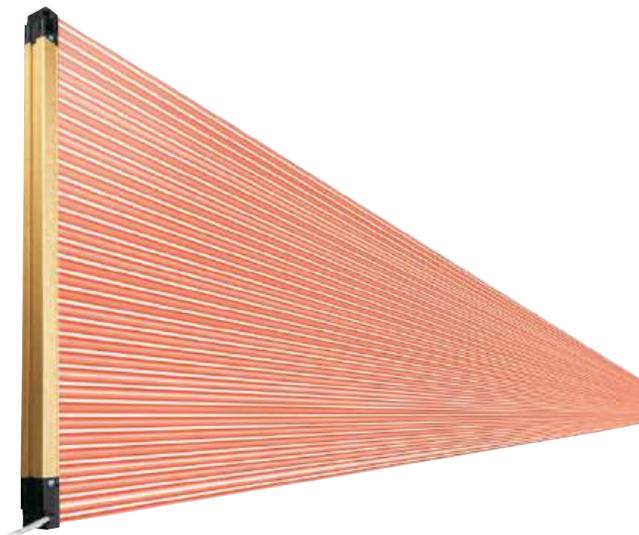The unit structure prevents the entry of not only water but also coolant and other liquids to protect the internal unit.

Digital indicator with a numeric display of light incidence margin

The light incidence margin is indicated by the "stable light incidence indicator" and "digital indicator". This function enables appropriate beam adjustment and work quality control during installation of the device.

Stable light incidence indicator

• **Stable light incidence: Lights green**
• **Unstable light incidence: Lights orange**
• **Light blocked: Off**

Digital indicator

• **Incident light level 3: Lights green "3"**
• **Incident light level 2: Lights green "2"**
• **Incident light level 1: Lights green "1"**
• **Light blocked: Off**

Unstable light incidence   **Stable light incidence**

Low   Margin of incident light intensity   High

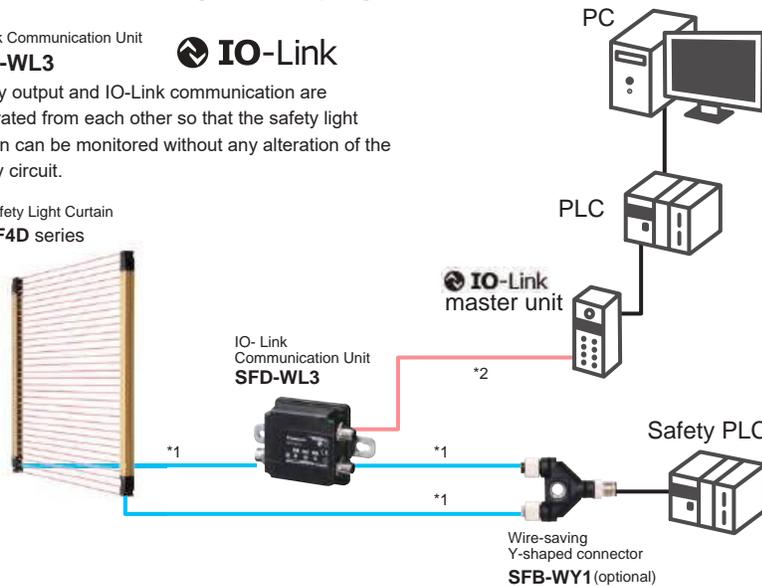## Remote monitoring of safety light curtain status
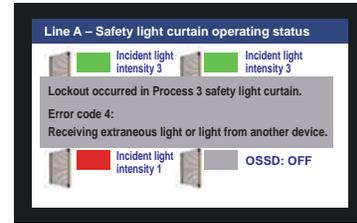
IO-Link Communication Unit
SFD-WL3

Safety output and IO-Link communication are separated from each other so that the safety light curtain can be monitored without any alteration of the safety circuit.

Safety Light Curtain
SF4D series

IO- Link Communication Unit
SFD-WL3

Wire-saving Y-shaped connector
SFB-WY1 (optional)

PC

PLC

IO-Link master unit

Safety PLC

*1

*1

*1

*2

*1 8-core cable for safety light curtain (optional)
*2 4-core cable with M12 connector (commercially available product) (Note)

Line A – Safety light curtain operating status

Incident light intensity 3   Incident light intensity 3

Lockout occurred in Process 3 safety light curtain.

Error code 4:
Receiving extraneous light or light from another device.

Incident light intensity 1   OSSD: OFF

Confirmation of light intensity margin

Incident light intensity information enables the determination of whether maintenance is necessary or not. This helps prevent shut-down of the line due to light beam deviation or dirty sensor. The information is also useful in conducting remote inspection or the like at the start of work.

Confirmation of error history

If an error occurs, the source of the error and its detail can be checked remotely, thus facilitating the identification of the problem location and analysis of the cause.

> ⚠ Use the safety light curtain monitoring information obtained via IO-Link only for diagnostic purposes.
> Do not use it for safety control purposes.

Experience the ease of setting! Simple setup of complex safety control

Setting software
Configurator Light Curtain

The handy controller software, which was well-received by users of our previous models, has evolved. The new setting software, **Configurator Light Curtain**, allows visually intuitive operation. It provides powerful support to maintaining stable operation and troubleshooting by allowing the internal setup of the **SF4D** series product, collection of error history, planning of corrective measures and real-time monitoring of light incidence condition.
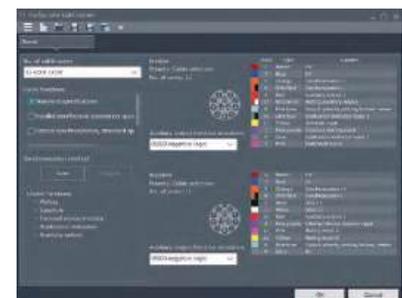
Main functions
- Operation monitoring function
  - • Monitoring of received light intensity / extraneous light of individual beam
  - • I/O monitoring
- Error history display
- Light blockage history, unstable light incidence history

- Muting setting function
- Override setting function
- Blanking setting function
  - • Fixed blanking setting function
  - • Floating blanking setting function
- External device monitoring setting function
- Auxiliary output setting function

* Note that the usable functions vary depending on the synchronization method (optical synchronization, line synchronization) and the type of cables (5-core, 8-core, 12-core) used.
  For details, refer to the manual. The manual can be downloaded from our website.

Type	Finger protection type	Hand protection type	Arm / Foot protection type
Model No.	**SF4D-F□**(-01)	**SF4D-H□**(-01)	**SF4D-A□**(-01)
Beam pitch	10 mm	20 mm	40 mm
Operating range	Short mode: 0.2 to 7 m Long mode: 0.8 to 12 m (selectable by DIP switch)	Short mode: 0.2 to 9 m Long mode: 0.8 to 15 m (selectable by DIP switch)	
Protective height (Note)	150 to 1,270 mm	150 to 1,910 mm	150 to 1,910 mm
Min. sensing object	ø14 mm opaque object	ø25 mm opaque object	ø45 mm opaque object
Supply voltage	24 V DC ±10 %		
Control output	PNP open-collector transistor / NPN open-collector transistor (selectable)		
Response time	OFF response: 10 ms or less (Not connected in series / parallel), 18 ms or less (Connected in series / parallel) ON response: 50 ms or less		
Degree of protection	IP67, IP65 (IEC), NEMA Type 13 (NEMA 250)		
Dimensions	W 28 × H protective hight × D 30 mm		

Note: When using as a safety device for a press machine in China or when using SF4D-□-01 as a safety device for a press machine or paper shearing machine in Japan, the protective height is different. Please refer to our website.

None-Contact
Safety Door Switch

SG-P series

Large and Bright Indicators Show the Open / Close Conditions of All Equipment Doors.

CE   UKCA   Certified   Certified by NRTL

Indicator lights in red when the door is open.

Bright indicator ensures high visibility.

Visible type

Compact type

Indicators are located on both sides to allow visual confirmation even from the back side of the equipment.
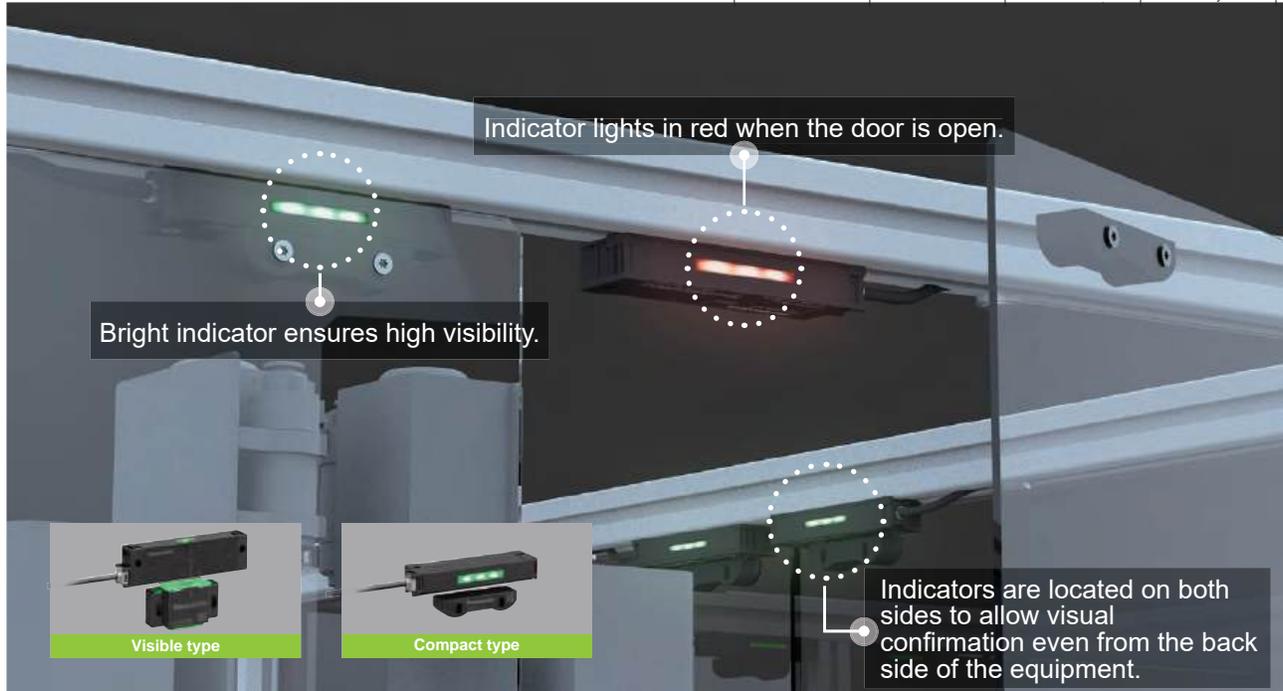
The **SG-P** series offers visible type and compact type safety door switch models for installation on various types of doors. The visible type and compact type models can be used together and interlocked so that the most suitable models can be selected according to the types of equipment doors. Even if there are many equipment doors, up to 30 units can be connected in series and the standard unit used as a master unit can output safety signals from all doors at once.

Helps Prevent Intentional Deactivation of Safety Function

The ISO 14119:2013* international standard stipulates a design requirement that deactivations of safety functions shall be minimized. Export of equipment sometimes requires to meet this standard. The SG-P series products are available with two different coding levels: High-code models and Low-code models. The High-code models are compatible with ISO 14119

* coding level (high level coded actuators) and prevent intentional deactivation of their safety function.

* ISO 14119: Safety of machinery – Interlocking devices associated with guards – Principles for design and selection

Inoperable

Safety switch does not operate if the actuator is not paired.
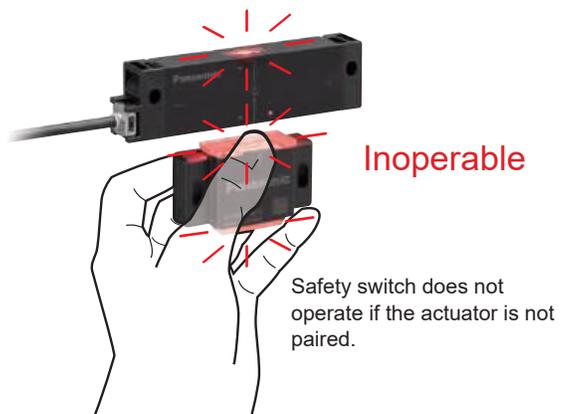
Installation example
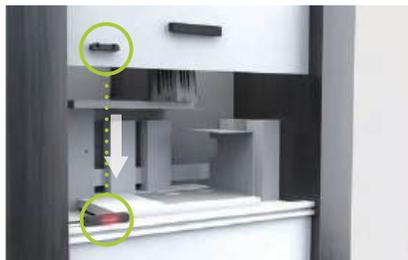
Lifting door for laser marker

Sliding door on electronic parts inspection machine

Glass substrate positioning

Application-based customization is easy

One SF-C21 can do the work of four safety relay units.

Combining multiple units together requires complicated wiring and time-consuming checking!!

Just one **SF-C21** does the job!

CE
Conforming to Machine &
EMC Directive

TÜV SÜD
Certified

TÜV US
Certified by NRTL
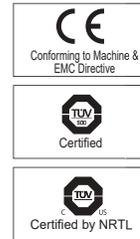
Easy setting from a PC

USB connection
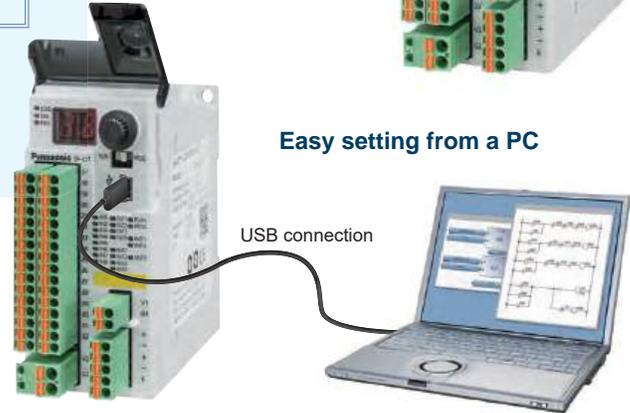
Easy to create a reliable safety circuit

Use our "Configurator SF-C" software to build your own safety circuits of connected devices, control logic, output modes, etc. No programming skills required!

No programming skills required. Just select a preset logic.

Eight preset logics, safety-certified and compatible up to control category 4 PLe, can be selected by simply turning the rotary switch.

Circuits are configured in three easy steps!

(1) Select a device to connect to

(2) Select an operation logic

(3) Connect

Example of System Configuration

Safety door switch

Safety door switch with solenoid interlock

Ultra-slim safety light curtain

Emergency stop switch

Safety control unit

Safety relay

Servo motor
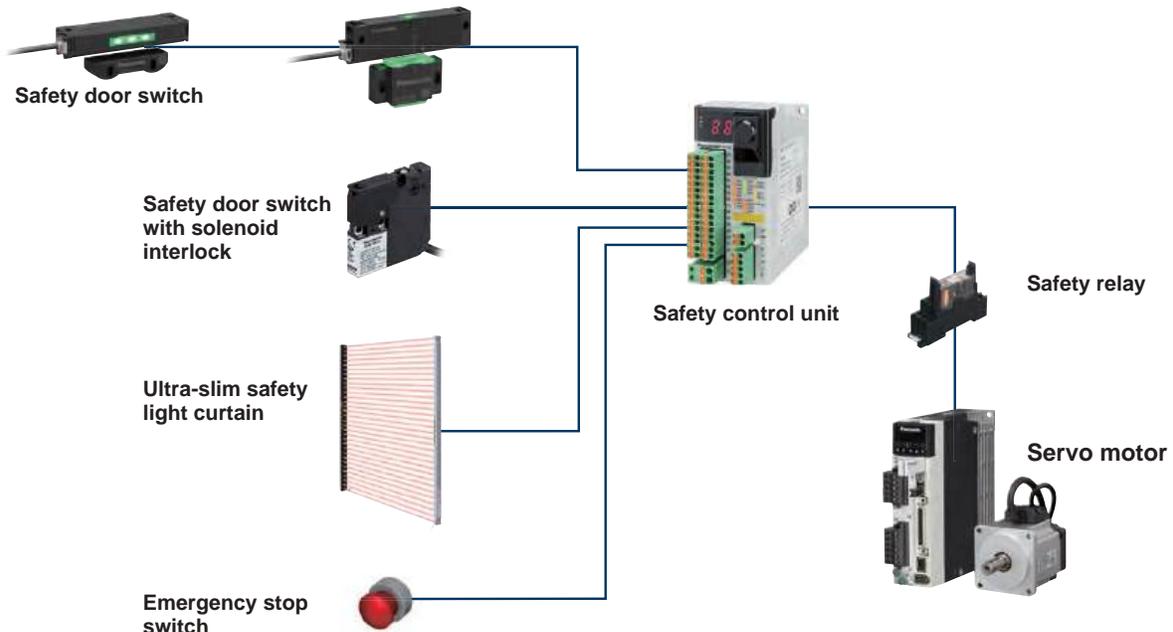
High-speed, Wide area charge removal

CE $UK CA$ Certified by NRTL

Three charge removal modes for diverse application coverage

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

Fast charge removal

Massive ion discharge when using air reduces charge removal time.

Airless or low-pressure

Resolves target movement issues in the presence of compressed air.

Low-pressure (Air pressure: Less than 0.05MPa)
Prevents dust dispersion and cleanliness degradation!

Dual head connections to increase charge removal area and layout expandability

The ER-X series has adopted the pulse AC method that alternately applies positive and negative voltages to each discharge needle. This enables generation and discharge of a large amount of ions, resulting in faster charge removal. Select from eight pulse frequencies according to your application, from 100 Hz for charge removal on nearby or moving workpieces to 1 Hz for charge removal on far-away workpieces or in a threedimensional space.
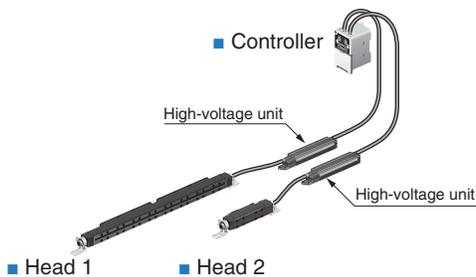
Charge removal time characteristics (TYPICAL)

Measured at a charge removal distance of 100 mm 3.937 in using a 150 × 150 mm 5.906 × 5.906 in CPM (at center of CPM).

Legend:
- Conventional type, with airflow, 0.05 MPa
- **ER-X032**, airless
- **ER-X032**, with airflow, 0.05 MPa

Conventional type

ER-X

X axis: Charge removal time (sec.) — 0, 1, 2, 3, 4
Y axis: Charge voltage (V) — 0, 200, 400, 600, 800, 1,000

■ Controller

High-voltage unit

High-voltage unit

■ Head 1   ■ Head 2
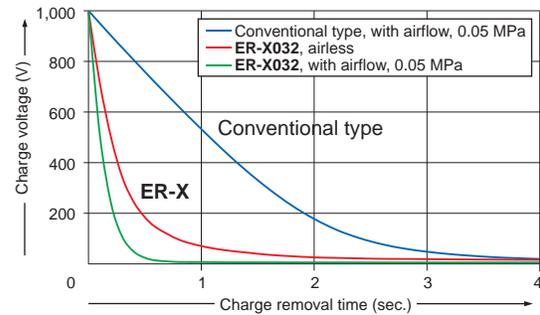
Dual head connections to increase charge removal area and layout expandability

• Different heads can be combined.
• Charge removal is possible with a layout that places heads on either side of the workpiece.
• The charge removal efficiency can be increased by synchronizing the two heads.

Preventing electrostatic damage during bonding

Removing dust during instrument panel assembly

Removing dust during food product cup transport

Preventing adhesion of molded parts to molds
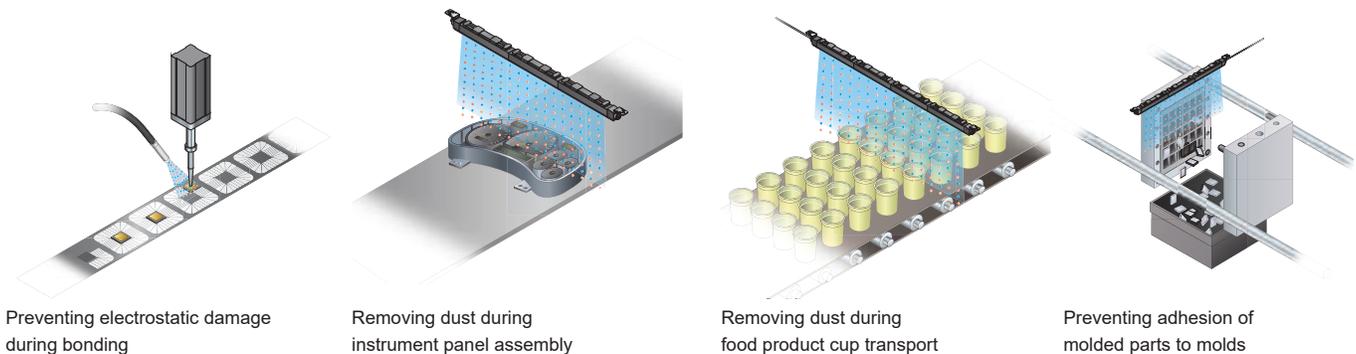
Multiple interfaces that connect with various devices

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- EtherNet/IP, Modbus-TCP and MC protocol compatibility
- Easy connection with all kinds of robots and PLCs
- Cassette system reduces unit cost and installation space

- Basic instruction: 10 ns to (up to 10 k steps)
- Program capacity: 64 k / 40 k / 32 k / 24 k Step variable
- Data capacity: 12 k / 24 k / 32 k / 64 k Step variable

*Ethernet is a registered trademark of Fuji Xerox Co., Ltd. and Xerox Corporation.

SD

PLC, etc.

Ethernet

Touch panel, etc.

Ethernet

RS-232C

Communication cassette
RS-232C / RS-485

I/O Input: 16 points,
Output: 16 points
(High speed counter input
4 channels
Pulse output / PWM output
4 channels)

Dual port
(Single IP address)

USB   PC
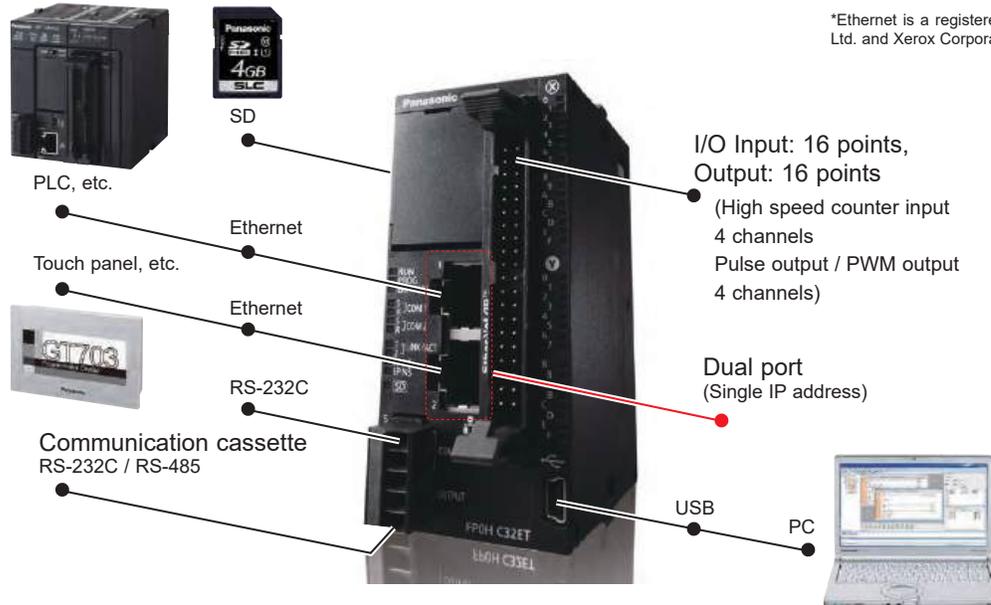
FTP server function (SSL/TLS-compatible)

Allows the PC to read the logging data in the **FP0H**'s SD memory card and to write setting values and other parameters.

Read from FP0H
Data file
Write to FP0H

FTP client function (SSL/TLS-compatible)

The **FP0H** can generate and write data files to an FTP server on a PC as well as read data files from the FTP server.

Write to PC (server)
Data file
Read from PC (server)
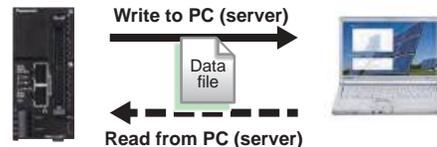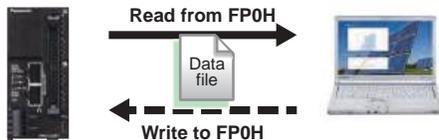
Capable of performing motion control through a high-speed network and supporting an open network with a small PLC

Positioning RTEX unit   Control unit

Ethernet

EtherNet/IP
* EtherNet/IP is a trademark of ODVA, Inc.

PLC of each company   Robo cylinder   Remote I/O

RTEX
Realtime Express
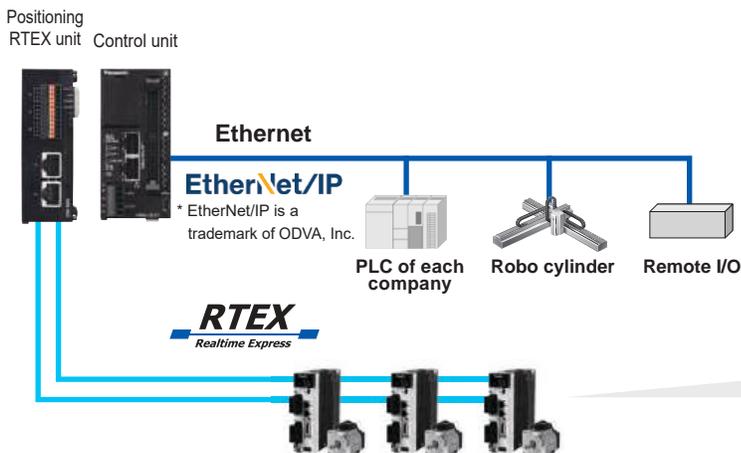
Features

Support of network servo drivers MINAS A6N significantly reduces the man-hours in wiring.

A maximum of 16 axes.
Up to two 8-axis units can be installed.
*Synchronous control
4-axis type: Up to six axes including virtual axes (virtual axis: 2 axes)
8-axis type: Up to eight axes including virtual axes

Check the MINAS data on Web sever

- **Basic information**
  Monitor position, speed, torque, driver part No., motor part No.

- **Status display**
  Servo drive inside temperature
  Encoder inside temperature
  Deterioration diagnosis

- **Error information**
  Error code
  Error history

Panasonic PLCs also control information

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Web server function

Monitor and control the FP7 without the use of custom software. Users can check the accumulated data in the FP7 with a browser.

System configuration

Build into your local network with no need for joining a cloud service.

Easy to implement centralized information management.

Hubs, Wi-Fi, etc.

Ethernet

Web server

FP7 ① Serial

PLC

FP7 ② Serial

Serial communication equipment RS-233C, RS-485 and RS-422

FP7 ③ Serial

Analog equipment Temperature input equipment

* Wi-Fi is a registered trademark of Wi-Fi Alliance.
* Ethernet is a registered trademark of Fuji Xerox Co., Ltd. and Xerox Corporation.

HTTP(S) client function (SSL-compatible)

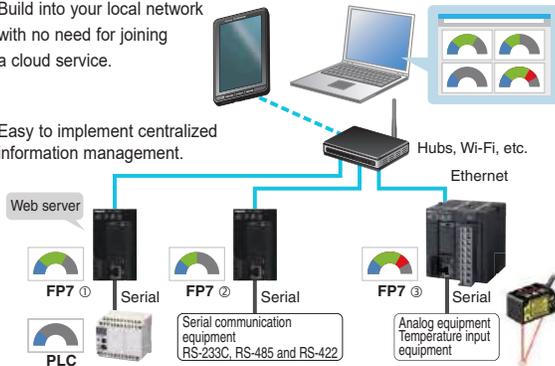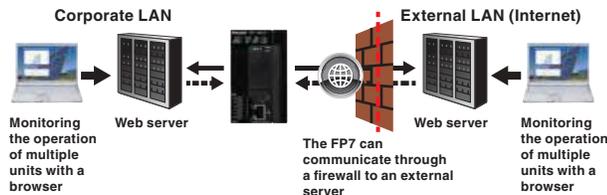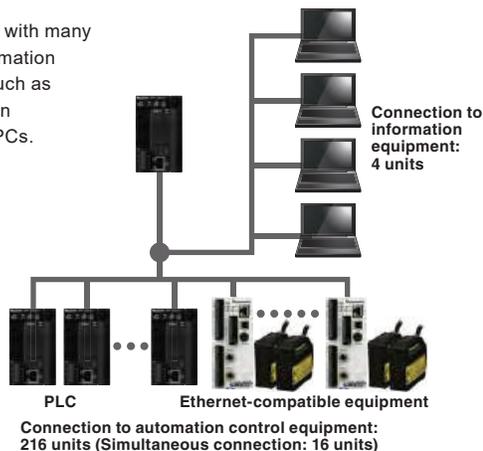Transfer data from the FP7 to a web server for easy viewing with a browser. Send and receive data from multiple FP7 units on a schedule controlled by the FP7.
Communicate both inside the firewall on an intranet and outside the firewall to the wider world through the Internet.

Corporate LAN

Monitoring the operation of multiple units with a browser

Web server

External LAN (Internet)

The FP7 can communicate through a firewall to an external server

Web server

Monitoring the operation of multiple units with a browser

Communicating with up to 220 equipment units

Communicate easily with many units, including automation control equipment such as PLCs and information equipment such as PCs.

Connection to information equipment: 4 units

PLC　　Ethernet-compatible equipment

Connection to automation control equipment: 216 units (Simultaneous connection: 16 units)

| Operation speed 11 ns | Max. I/O points: 8,192 | Program capacity 196 k steps | Tool port USB | Ethernet | EtherCAT |

Cassette system reduces unit cost and footprint

With ease and at low cost, extend the serial communication and analog functionality of CPU units.

Serial communication cassettes
- RS-232C
- RS-422 / RS-485
- 2 channels

Function cassettes
- Analog input
- Analog input and output
- Thermocouple input

Ethernet communication cassette

*Ethernet is a registered trademark of Fuji Xerox Co., Ltd. and Xerox Corporation.

No communication unit
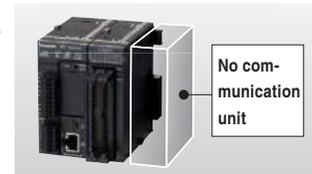
Use program and data register sharing to resolve data space shortage. No need repurchase expensive upgrade models.

Example: 196 k steps type CPU unit AFP7CPS4RE(S)

Initial state

Program: 196 k steps

Data register: 256 k words

Data-driven setting

Program: 145 k steps

Data register: 512 k words

E.g. for large amount of log data

Program-driven setting

Program: 221 k steps

Data register: 128 k words

E.g. for large amount operation program
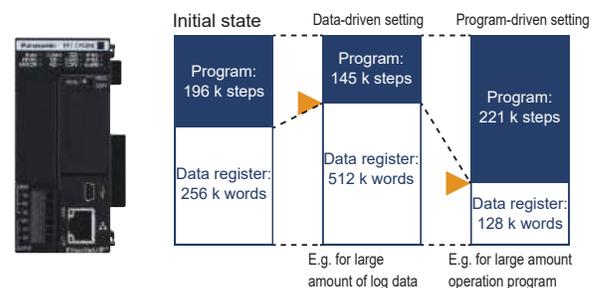
Program	234 k steps	221 k steps	196 k steps	145 k steps	52 k steps
Data register	64 k words	128 k words	256 k words	512 k words	976 k words

Compact terminal block type controller.
Superior basic performance and wealth of functions.

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Input terminals

Power terminals

Battery box

mini USB port
Analog potentiometer 1-ch

I/O LED

*For the backup battery, you are recommended to use the **FP-XH** exclusive product (**AFPABAT001**).

RS-232C communication port

Power for transistor output (24 V DC)
*Only included with AC power supply type

Add-on cassette mounting portion

Add-on cassette mounting connector

Expansion unit mounting portion

Output terminals

*Image shows **C60R**

High-speed operation

• Basic instruction (ST instruction): 0.04 μs/step
Up to 7 k steps (ratio to convention: 8 times)

Multi-axis positioning control

• On up to 6 axes, built-in 100 kHz high-speed pulse output function
(Transistor output type has a built-in pulse output function for 3 axes for **C14**, 4 axes for **C30** and 6 axes for **C60**)

X-Y table + Machining head | Semiconductor wafer take-out blade

C14: 3-axis control | **C30** / **C60**: 4-axis control

Large capacity program memory

• Program capacity: Max. 40 k steps (For **C14**: 16 k steps)
24 k / 32 k / 40 k steps selectable

Expandability

• Max. I/O points: 300 points
One control unit connectable to up to 8 expansion units
(382 points when using **FP0R** expansion units and add-on cassettes)
• Up to 4 add-on cassettes can be added (for **C30, C60**)

C60 | E30 | E30 | E30 | **Max. 300 points**

Max. 8 units

382 points when using **FP0R** expansion units and add-on cassettes

Network

• Communication port: Max. 5 channels
Support for up to 5 channels including 2 communication cassettes (2 channels type) and tool port.
• Compatible with Modbus-RTU
Compatible with master / slave of Modbus-RTU, industry standard
• PLC link
Bit data and word data can be shared (linked) via connection with **FP-XH** (up to 16 units).

Motion Controller

GM1

For complex motion control applications

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With the space-saving Motion Controller from Panasonic Industry you can master your challenges with your multi-axes machines: The GM1 offers control of up to 32 axes, standardized communication via EtherCAT, easy network integration via EtherNet/IP, and sophisticated programming with CODESYS.

CODESYS

Positioning | Torque control | Speed control **Improves high-speed and high-accuracy**

Motion control

RTEX type Real axes: **16**
EtherCAT type Real axes: **32**

Ethernet: 2 ports

EtherNet/IP* (1 port)
Modbus-TCP
General-purpose communication

RS-232C

Modbus-RTU
General-purpose communication

SD memory card

Selectable network

High-speed network for servo
RTEX Realtime Express
EtherCAT

General-purpose I/O: 16 points each

Input: 16 points/output: 16 points
NPN/PNP transistor
Expansion unit (64 points) ×
Up to 15 units

High-speed counter input: 2 channels

4-multiple, 16 MHz

PWM output: 4 channels

Up to 100 kHz

System configuration

GM Programmer

• PLC programming
• Motion programming
• Various setting
• CODESYS support

*Realtime Express and RTEX are registered trademarks of Panasonic Corporation.
 Realtime Express is a high-speed and synchronous motion network exclusively developed by our company.
*The EtherCAT is a registered trademark of patented technology licensed from Beckhoff Automation GmbH in Germany.
*CODESYS is a trademark of CODESYS Development GmbH.

PLC | Various sensor

Various I/O PWM
High-speed counter

Motion Controller
GM1

High-speed network for servo
RTEX Realtime Express
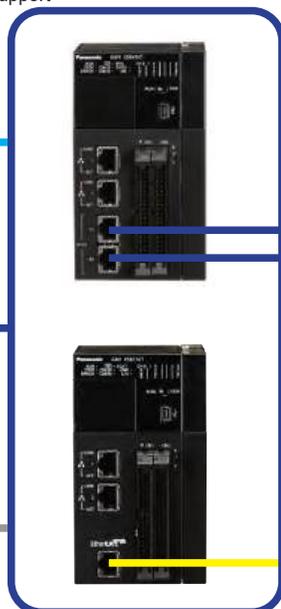
AC servo motor
MINAS A6N
Max. 16 ax

EtherCAT

AC servo motor
MINAS A6B
Max. 32 a

Communication Unit FP-I4C

The Panasonic Industrial Communicator FP-I4C

The newly developed unit FP-I4C is the communicator for automation. Working like a data collector, the FP-I4C connects programmable controllers to the distributed control system and thus enables remote access even for small systems. Thanks to its wide range of functions, such as an integrated web server and FTP client, and thanks to its compact design, the communication unit is the ideal complement for programmable controllers without Ethernet capability.

FP-I4C enables easy and secure creation of Industrial Internet of Things (IIoT) applications thanks to the standard OPC-UA and MQTT protocols
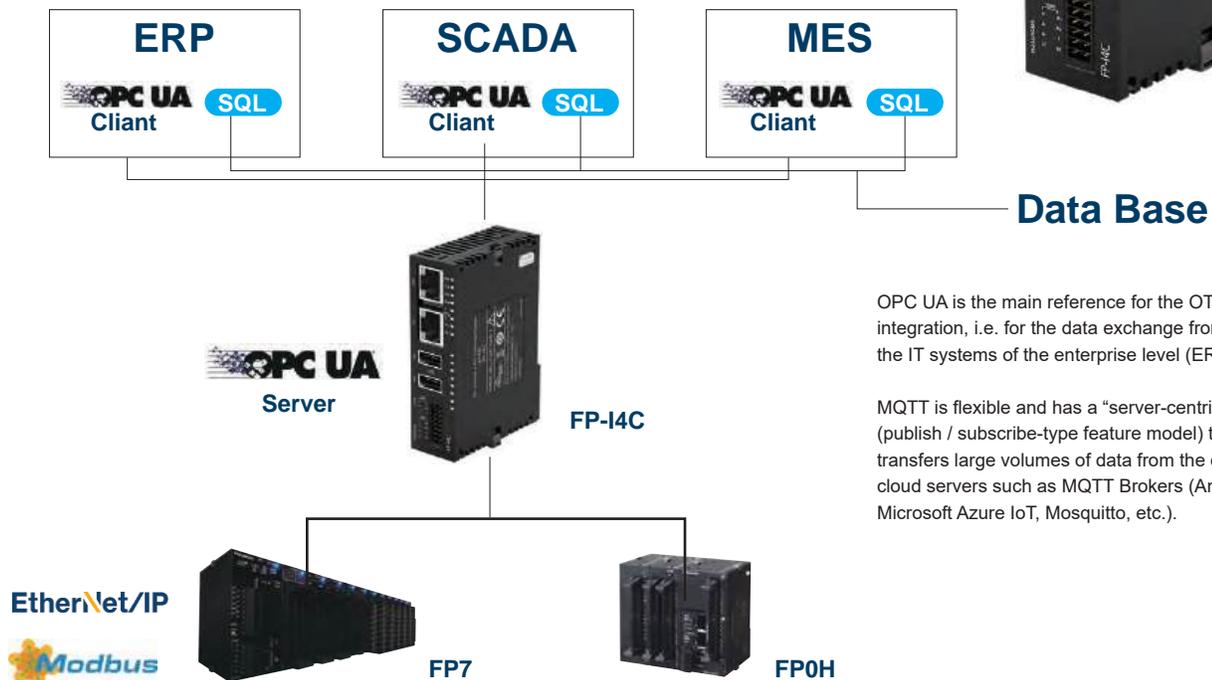
OPC UA is the main reference for the OT / IT integration, i.e. for the data exchange from the field to the IT systems of the enterprise level (ERP, MES, etc.).

MQTT is flexible and has a "server-centric" structure (publish / subscribe-type feature model) that quickly transfers large volumes of data from the devices to cloud servers such as MQTT Brokers (Amazon AWS, Microsoft Azure IoT, Mosquitto, etc.).

Item	FP-I4C
PLC connection 1	PLC COM1: RS232C via 16-pin spring force plug: Phoenix contact product: MC 0.5/8-ST-2,5
PLC connection 2	PLC COM2: RS232C/RS485 via 16-pin spring force plug: Phoenix contact product: MC0.5/8-ST-2,5
Power supply	24 V DC. Connection with the power supply cable (AFPG805) supplied with the unit.
2x Ethernet connection	10BASE-T / 100BASE-TX autoneg via RJ45 female connector
USB 1	USB 2.0 full speed, 500mA (power supply)
USB 2	USB 2.0 full speed, 100mA (power supply)
Protocols and standards	TCP/IP, UDP/IP, DHCP, FTP, FTPS, SSH, HTTP, HTTPS; SMTP, ESMTP-Auth, POP3; NTP, Modbus, DNS, SNMP, VPN, VNC, MQTT, SQL, OPC UA
Operating voltage	24 V DC (21.6–26.4 V DC supplied by class 2 circuit only)
Current consumption	Approx. 75 mA at 24 V DC (without expansion unit, USB stick,...)
Dimensions	Height 90 mm, width 25 mm, depth 64 mm

Human Machine Interface

WH series

Gateway with Touch Panel Accelerate DX in Manufacturing!
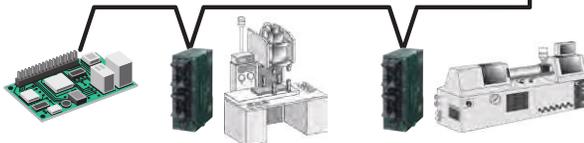
CE   UKCA   c(UL)us LISTED   KC

The **WH** series supports OPC UA client/server, MQTT and SQL, etc., and can be connected to higher-level systems such as databases, file servers and various cloud services without programming. The **WH** series can be used as a gateway to existing equipment for data communication with high security using OPC UA and data analysis using various cloud services.
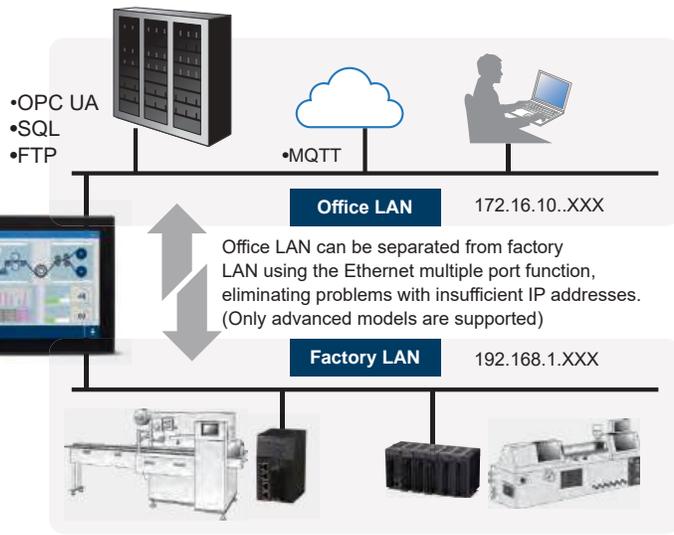
Collection and storage of production site data

International standard IEC 61131-3 compliant, Global variable imports
By importing a PLC's global variable file, there is no need to set tags in WH, making loading data simple.

- OPC UA
- SQL
- FTP
- MQTT

Office LAN   172.16.10..XXX

Office LAN can be separated from factory LAN using the Ethernet multiple port function, eliminating problems with insufficient IP addresses. (Only advanced models are supported)

Factory LAN   192.168.1.XXX

Data can be collected from existing PLC without the Ethernet via RS-232C or RS-485 serial communication.

Data can be collected from the microcomputer board using general-purpose serial communication and JavaScript program.

Supports the protocol of major PLC manufacturers
Data collection is performed without program coding.

Standard model

Standard model with mid-sized, wide resistive film type for users with focused needs.

Ethernet port

Serial port   USB
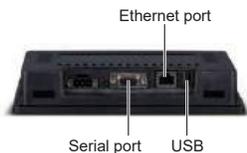
Advanced model

Equipped with 3 Ethernet ports* and a capacitive type, the large, high end model enables gesture control.

SD card slot   Ethernet port × 3

Serial port   USB port × 2
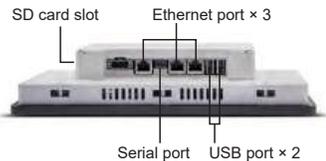
*AWHA1C050 is equipped with two Ethernet ports.

Standard model

	AWHS1R101	AWHS1R070	AWHS1R043
Screen size	10.1 inch wide	7 inch wide	4.3 inch wide
Resolution	WSVGA	WVGA	WQVGA
	1024 × 600	800 × 480	480 × 272
Memory (RAM)	512 MB	512 MB	512 MB

Advanced model

	AWHA1C215	AWHA1C156	AWHA1C101	AWHA1C070	AWHA1C050
Screen size	21.5 inch wide	15.6 inch wide	10.1 inch wide	7 inch wide	5 inch wide
Resolution	Full HD	HD	WXGA	WVGA	WVGA
	1920 × 1080	1366 × 768	1280 × 800	800 × 480	800 × 480
Memory (RAM)	2 GB	2 GB	1 GB	1 GB	512 MB

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Wide screen, small body
7 inch width in space of a 5.7 inch!

Since 7 inch type can fit in a 5.7 inch type space,
the screen shows more and the product looks greater.

7 inch

■ Body dimensions comparison

Installation space is almost the same!

Conventional model **5.7 inch**
GT32T-R
Body dimensions:
W163.2 × H128.8 mm
W6.425 × H5.071 in

NEW 7 inch
GT707
Body dimensions:
W186.0 × H122.0 mm
W7.323 × H4.803 in

■ Usable screen comparison

Shows much more!

Conventional model **5.7 inch**
GT32T-R
Screen dimensions:
W115.2 × H86.4 mm
W4.535 × H3.402 in

NEW 7 inch
GT707
Screen dimensions:
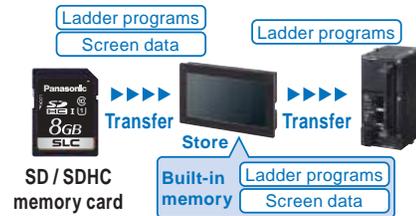W153.8 × H85.6 mm
W6.055 × H3.370 in

Resolution: 800 × 480 dots — **5 times over previous**
Display color: 65,536 colors — **16 times over previous**

Built-in SD / SDHC memory card slot

Easy to copy, back up, and restore screen data. Data logging possible.

Transfer programs from Programmable Display to PLC

Transfer of PLC ladder programs and Programmable Display screen data is possible from a SD / SDHC memory card without using a PC.
Also, PLC ladder programs can be backed up inside the Programmable Display and restored at any time (except FP7).

Ladder programs | Screen data | Ladder programs

Panasonic 8GB SLC

Transfer | **Transfer**
Store

SD / SDHC memory card

Built-in memory | Ladder programs | Screen data

Device monitor shows PLC status without a PC

You can directly check PLC devices from the Programmable Display without having to use a PC (FPWIN GR / FPWIN GR7).
The device monitor is easily viewed from the system menu, which eliminates the bother of screen creation (except FP7).

Device information

Easier to use with upgraded user interface.
Terminal GTWIN Ver.3

Toolber

File manager window

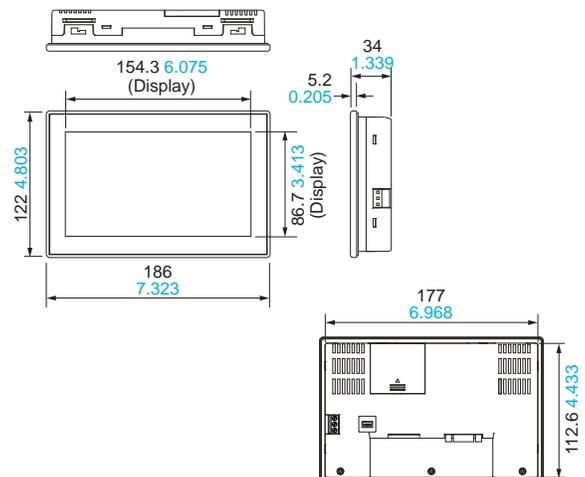**Part library window**

Search results and text string list window

Screen edit window

Part edit screen

DIMENSIONS (Unit: mm in)

154.3 6.075 (Display)
122 4.803
186 7.323
34 1.339
5.2 0.205
86.7 3.413 (Display)
177 6.968
112.6 4.433

AC servo system

MINAS A7 family

Servo system boasting industry-leading motion performance*

*As of September 2023, according to in-house research

CE   UKCA   UL CERTIFIED   KC

*There are conditions for standard compliance. Please refer to the product catalog.

Smoother and more precise. To realize high response control that improves machining quality

Velocity speed response frequency has been increased to 125 % compared to conventional models. As gain can be increased, an immediate response to both commands and disturbances is possible, improving machining quality.

MINAS A7

Improving basic performance

Speed response frequency — Industry-leading*

4.0 kHz or more

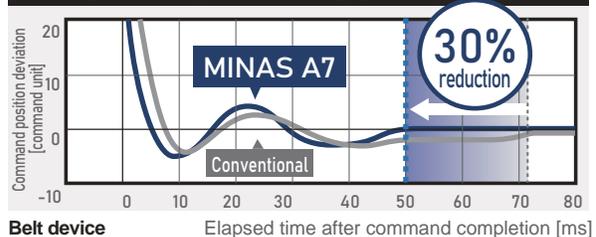Encoder resolution — Industry-leading*

27 bit

*As of September 2023, according to In-house reserch.

To further improve positioning accuracy as parts get smaller

In addition to improved motor and encoder performance and an evolution of our proprietary positioning algorithm, resonance and mechanical vibration are automatically removed for highly accurate positioning.

Improved positioning performance

MINAS A7
Conventional
30% reduction

Command position deviation [command unit]

Elapsed time after command completion [ms]

Belt device

To increase the maximum rotation speed without changing the motor size

MINAS A7 is smaller than conventional models, and the operation range has beenexpanded to 110 %. By expanding output to the high speed range, equipment speed has been improved without changing to a larger motor.

Increased power output to high speed

MINAS A7
Output range moved into the high speed range
Conventional
110% expansion

Torque (N·m)

Rotation speed (r/min)
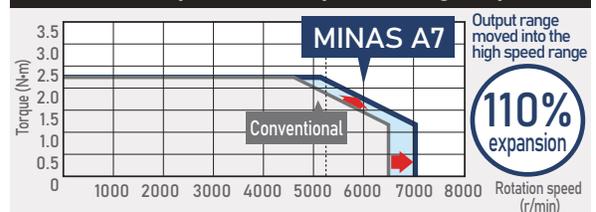
Speed - torque characteristics   *Compared to 200 W motor

To ensure stable operation of equipment in the high load area with a long operating time

MINAS A7 is smaller than conventional models, and the operation range has beenexpanded to 110 %. By expanding output to the high speed range, equipment speed has been improved without changing to a larger motor.

Extending overload operation time

Time(sec)	0	0.5	1	1.5	2	2.5
Conventional		1.1				
MINAS A7		2.1				

1.9x

*Example of 350 % load (while rotating) with a 200 W motor

Servo intelligence realize optimal man-machine coordination

To reduce start-up engineering man-hours with automatic tuning according to requirements

TUNE COMPASS

Three tuning settings can be selected according to whether you wish to prioritize tuning time or control precision

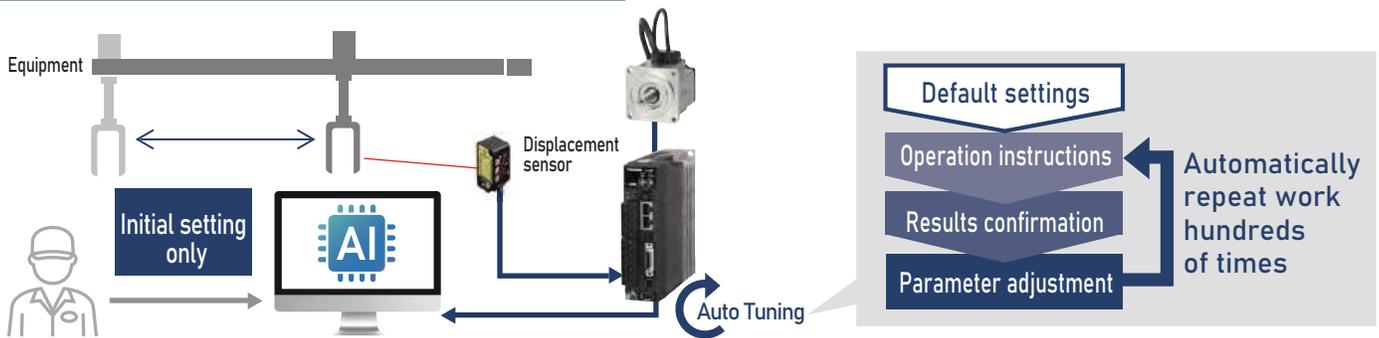|	
Ultra-high precision	Ultra-high precision automatic tuning that exceeds the abilities of experts
High precision	High precision automatic tuning according to equipment characteristics
Immediate operation	Simple real-time automatic tuning according to equipment load

Using AI to easily achieve ultra-high precision tuning at the µm level

precAIse TUNING

Complex tuning that take several days even for expert engineers are automatically optimized by AI just by setting the conditions, making µm level ultra-high precision tuning easily achievable

Equipment

Displacement sensor

Initial setting only

AI

Auto Tuning

Default settings

Operation instructions

Results confirmation

Parameter adjustment

Automatically repeat work hundreds of times

To easily achieve high-precision control with a dedicated driver specialized for the application.
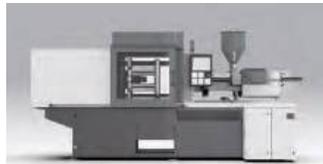
Sensor direct feedback
Displacement control

Accurate position correction according to workpiece variation.

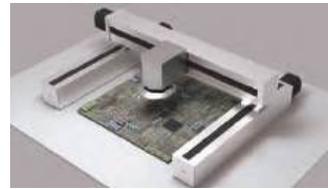**Sensor direct feedback**
Pressure control
*Under development

Simplifies complex control programs for stable, highly precise pressure control.

High-precision gantry control
*Under development

Advanced coordination control, ease of use and safety functions ideal for gantry mechanisms.

MINAS A7 family Line-up   Lineup will expanded sequentially.

Servo motor

High inertia
MHMG

200W, 400W

Servo driver

Coming soon
EtherCAT type
MINAS A7B

A7BE Standard type

A7BF Multi-function type

A7BR Application specialized type

RTEX type
MINAS A7N

A7NE Standard type

A7NF Multi-function type

A7NR Application specialized type

*RTEX is a registered trademark of Panasonic Holdings Corporation.
*EtherCAT is a patented technology and registered trademark licensed by Beckhoff Automation GmbH in Germany

*There are conditions for standard compliance. Please refer to the product catalog.

High capacity (7.5 kW to 22 kW)
A6 G-Frame, H-Frame
motor / driver

Modbus

400 V AC input type
Servo motor / driver

Modbus

Small / light DC input type
A6 V-Frame
Thin type driver

Modbus

RTEX and EtherCAT supports are planned.

Battery-less absolute encoder motor

* EtherCAT is registered trademark and patented technology, licensed by Beckhoff Automation Gmbh, Germany.

■Battery-less absolute encoder motor line-up

	80 mm sq. or less Leadwire type						100 mm sq. or more Encoder connector (Small size JN2) type					
	50 W	100 W	200 W	400 W	750 W	1000 W	1.0 kW	1.5 kW	2.0 kW	3.0 kW	4.0 kW	5.0 kW
Low inertia **MSMF**	100V/200V	100V/200V	100V/200V	100V/200V	200V	200V	200V/400V	200V/400V	200V/400V	200V/400V	200V/400V	200V/400V
Middle inertia **MQMF**		100V/200V	100V/200V	100V/200V								
Middle inertia **MDMF**							200V/400V	200V/400V	200V/400V	200V/400V	200V/400V	200V/400V
Middle inertia **MGMF**							850 W 200V/400V	1.3 kW 200V/400V	1.8 kW 200V/400V	2.4 kW 200V/400V	2.9 kW 200V/400V	4.4 kW 200V/400V
High inertia **MHMF**	100V/200V	100V/200V	100V/200V	100V/200V	200V	200V	200V/400V	200V/400V	200V/400V	200V/400V	200V/400V	200V/400V

〈Table description〉
Voltage specifications — 100V (On sale) / 200V (On sale)
Voltage specifications — 200V (Coming soon) / 400V (On sale)

▌Motor Line-up   New high power models from 5.5 kW to 22 kW

Inertia	Series	Motor rated output	Voltage specifications (V)	Rated rotational speed (r/min)
Low inertia	MSMF	50 W to 5 kW	100 / 200	3000
		1 kW to 5 kW	400	
Middle inertia	MQMF	Motors with gear reducers are also available. 100 W to 400 W	100 / 200	3000
Middle inertia	MDMF	1 kW to 22 kW	200	2000(1 kW-5 kW) 1500(7.5 kW-22 kW)
		1 kW to 5 kW	400	
Middle inertia	MGMF	850 W to 5.5 kW	200	1500
		850 W to 4.4 kW	400	
High inertia	MHMF	Motors with gear reducers are also available [100 W to 750 W]. 50 W to 7.5 kW	100 / 200	3000(50 W-750 W) 2000(1 kW-5 kW) 1500(7.5 kW)
		1 kW to 5 kW	400	

Motor Line-up

	Rotary motor			Linear motor / DD motor	
	Basic type *1 A6SE series	RS485 communication type A6SG series	Multifunction type A6SF series	Basic type A6SL series (Special order product)	Multifunction type A6SM series (Special order product)
Position control	●	●	●	●	●
Block operation	(External contact signal only)	(External contact signal or Modbus communication)	(External contact signal or Modbus communication)	(External contact signal or Modbus communication)	(External contact signal or Modbus communication)
Speed control			●		●
Internal velocity command *2	(External contact signal only)	(External contact signal or Modbus communication)	(External contact signal or Modbus communication)	(External contact signal or Modbus communication)	(External contact signal or Modbus communication)
Torque control			●		●
Full-close control			●		
Block operation			(External contact signal or Modbus communication)		
Pulse	●	●	●	●	●
Analog			●		●
Modbus		●	●	●	●
External scale			●		●
RS-232/RS-485		●	●	●	●
STO (Safety Torques Off)			●		●

*1 A6SE series driver (Position control only) does not correspond to the absolute system of using the serial communication with the host device. It supports incremental system only.
*2 When using internal speed command with Modbus, external servo ON is required.

High speed communication For Realtime Express Network servo driver

		Rotary motor		Linear motor / DD motor	
RTEX Realtime Express		Standard type A6NE series	Multifunction type A6NF series	Standard type A6NL series (Special order product)	Multifunction type A6NM series (Special order product)
Control mode	Position/Speed/Torque control	●	●	●	●
	Full-close control		●		●
Interface	External scale		●	●	●
	STO (Safety Torques Off)		●		●

Servo drivers with EtherCAT open network

		Rotary motor		Linear motor / DD motor	
EtherCAT		Standard type A6BE series (Special order product)	Multifunction type A6BF series (Special order product)	Standard type A6BL series (Special order product Under development)	Multifunction type A6BM series (Special order product Under development)
Control mode	Position/Speed/Torque control	●	●	●	●
	Full-close control		●		●
Interface	External scale		●	●	●
	STO (Safety Torques Off)		●		●

Enhanced position detecting resolution enables smoother and more precise positioning

Encoder
23 bits
(8388608 Pulse / rotation)

8 times higher resolution
(A5 Family *1 20 bits)

+

Communication speed
5 Mbps

Improved
(A5 Family 2.5 Mbps)

=

Low vibrations High speed and high precision positioning

*1: Incremental encoder

High-speed, high-torque, compact and lightweight

Max. speed 6500 r/min — **Fast** (A5 Family 5000 r/min)

Max. torque Approx. 350 % — **High** (A5 Family Approx. 300 %)

Overall length 67.5 mm — **Short** (A5 Family 99.0 mm)

**Weight** 750 g — **Light** (A5 Family 960 g)

*2: Middle and high inertia types only

Multifunctional software for quick adjustment support

PANATERM set-up support software

The PANATERM set-up support software, with many added features. The PANATERM assists users in setting parameters, monitoring control conditions, setup support, and analyzing mechanical operation data on the PC screen, when installed in a commercially available personal computer, and connected to the MINAS A6 Family through the USB interface. Choose either English, Japanese, Chinese, Korean-language display.

Setup wizard
This wizard supports fundamental settings in each control mode step by step, including reading of default setting. In On-line condition, Input data related to each step can be monitored in real time.
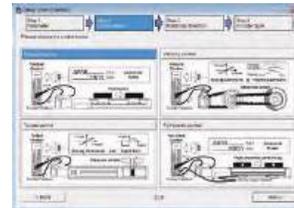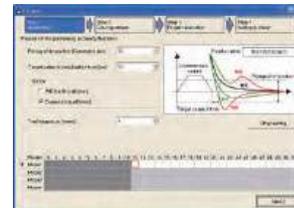
The fit gain function for setting Two-degree-of-freedom control
1) Select the adjustment method
2) Load measurement
3) Confirming results Adjust gain to meet your needs
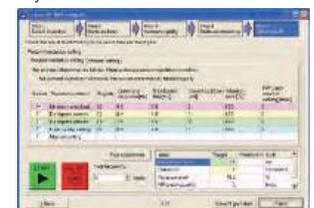
Fit gain
This function automatically searches the best suitable stiffness setting and mode and adjusts the gain once the target in-position range and setting time are set.

Service life prediction
The service life prediction function considers the internal temperature for main components such as the fan and condenser. If the rated value is exceeded, an alarm is displayed. This approach prevents unexpected suspension of operation and allows for planning of systemized maintenance.
Note: The life span prediction value should be considered as a guide only.
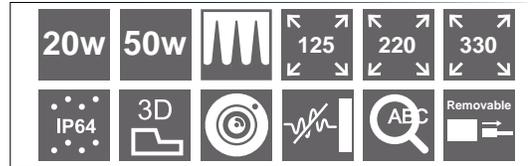
Block operation
255 block patterns can be created. Control is easy. Instruction is made to block number by Modbus or I/O signal.
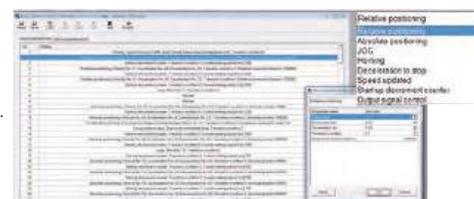
LP-ZV series

Short-pulse fiber laser marker boasting high marking definition and sustainability to meet future needs

FDA Conforming to FDA regulations **CE** **UKCA** **GB** Conforming to GB 7247.1

| 20w | 50w | | 125 | 220 | 330 |
| IP64 | 3D | | | ABC | Removable |

Detachable fiber unit
Easy setup and maintenance

Equipped with 3D module
Z-axis' variable range: 50 mm 1.969 in

Built-in camera
Sharp and clear color image for accurate setup positioning

Short-pulse laser
High marking definition thanks to 1-ns pulse width
(LP-ZV200P / LP-ZV205P / LP-ZV206P)

## Wide marking field of 330 × 330 mm 12.992 × 12.992 in
(LP-ZV206P / LP-ZV506P)

Conventionally, markings on large workpieces or on workpieces made with multi-cavity molds required multiple marking operations. The wide marking field enables large size marking in a single marking operation. This not only improves productivity but also reduces the number of required units or simplifies the facility construction to contribute to cost reduction.

50 mm 1.969 in

330 mm 12.992 in

330 mm 12.992 in
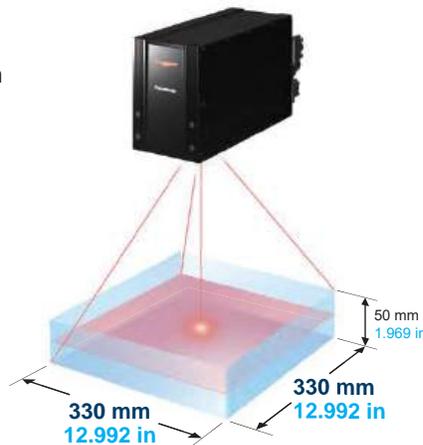
Clear marking with sharp edges

The short-pulse laser minimizes thermal effect while the high-frequency oscillation achieves clear marking of extremely small and fine characters. Shallow engraving results in easy-to-see white markings and code sections with sharp and clear edges.
This contributes to the excellent visibility of small characters and stable scanning of two-dimensional codes.

Two-dimensional code marking

Sharp edge

Enlarged view

Marking of extremely small characters

A B C D E F G H I J

0.15 mm
0.006 in
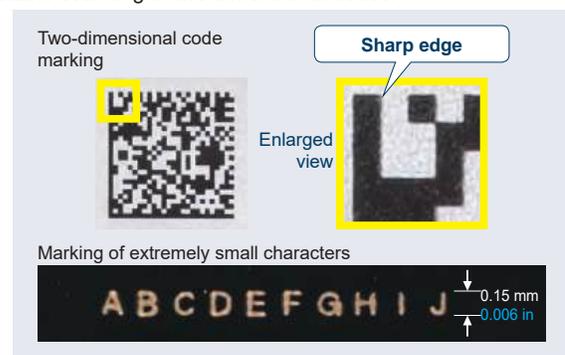
Examples of marking / processing applications

Automotive secondary battery

Automotive sensor

E-Axle
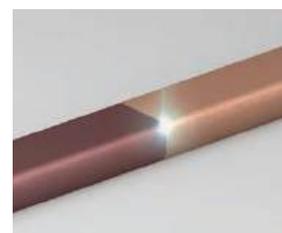
Enamel coating removal

Improved speed and precision

FDA
Conforming to
FDA regulations

CE

UKCA

c(UL)us
Recognition

GB
Conforming to
GB 7247.1

Rotating head | Tower | 〰 | **9.3** μm | **10.6** μm | **55** | **110** | **160**

- High speed marking Laser marker
- Resolution of instruction signals to the galvano improved by four times
- Controller offering high resistance to noise
- Simplifies facility designs
- Interchangeable with previous Panasonic Industry head
- Safety design "interlock redundancy"

**Standard model (horizontal type)**   **Tower head models (vertical type)**

VPE* ## High-speed vector processing engine (VPE*)

The dedicated engine (VPE*) for the generation of vector data for marking and processing achieves high-speed marking. The resolution of positioning data for laser scan control has been increased fourfold and the communication speed for galvano mirror positioning control has also been made four times faster. The new engine realizes quicker and more precise engraving as compared to our previous models (**LP-400** series).
*: Vector Processing Engine.

Resolution of instruction signals to the galvano improved by four times

| Previous **LP-400** series | **LP-RH** series |
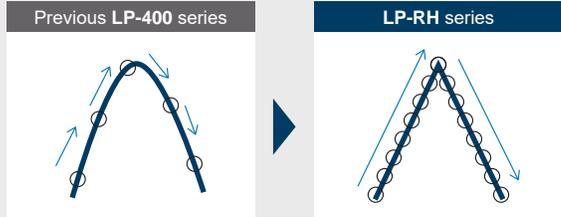
Smoother values of coordinates for interpolation of lines

○ : Coordinate instruction value

Startup time reduced by about 80%*

The time from the startup of the laser marker system to the startup of laser oscillation is reduced by about 80% as compared to our previous model (**LP-400** series). The shorter startup time significantly reduces the waiting times at the time of facility startup, at the time of reset from power OFF triggered by safety circuit, etc.
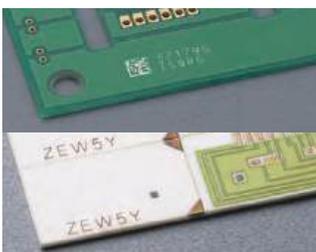* When compared to previous model (**LP-400** series)

■ Comparison of system startup time and laser excitation time

	Previous **LP-400** series	**LP-RH** series
System startup time	Approx. 75 sec.	**Approx. 10 sec.**
Laser excitation time	Approx. 15 sec.	**Approx. 5 sec.**

Significant reduction of system startup time and laser excitation time

---

Examples of marking / processing applications

Circuit boards   Cosmetic products   Retort pouches   Aluminum packaging materials

Gobal Network

Panasonic Industry has collected together the device technologies refined by the company so far, to engage on a challenge to transform the world you see from places you can't see.
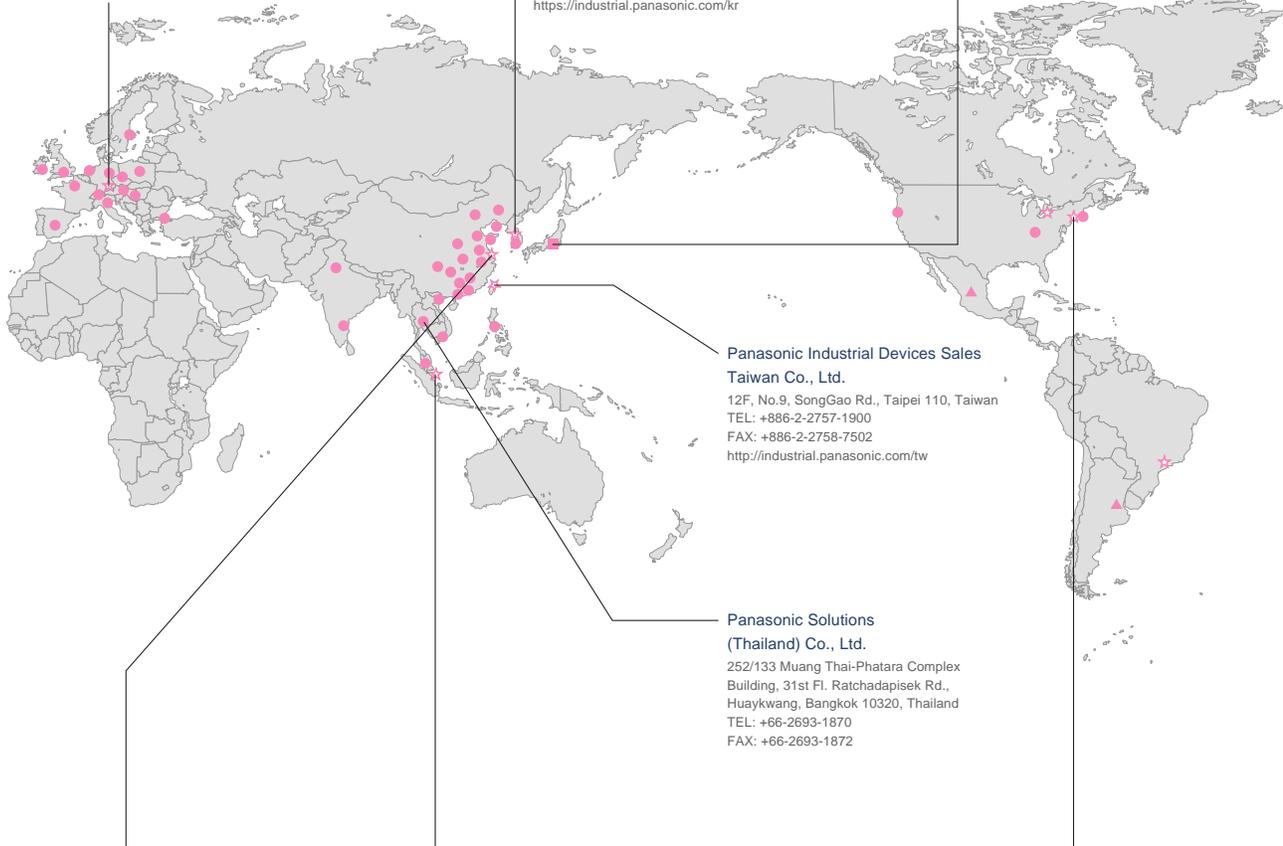
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Panasonic
INDUSTRY

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