

KEYENCE

NEW Multi-Purpose CCD Laser Micrometer

IG Series

NEW Thrubeam Type Laser Detection Sensor

IB Series



NEW LINEUP
Intelligent Sensor
I-SERIES



IG Series



IB Series

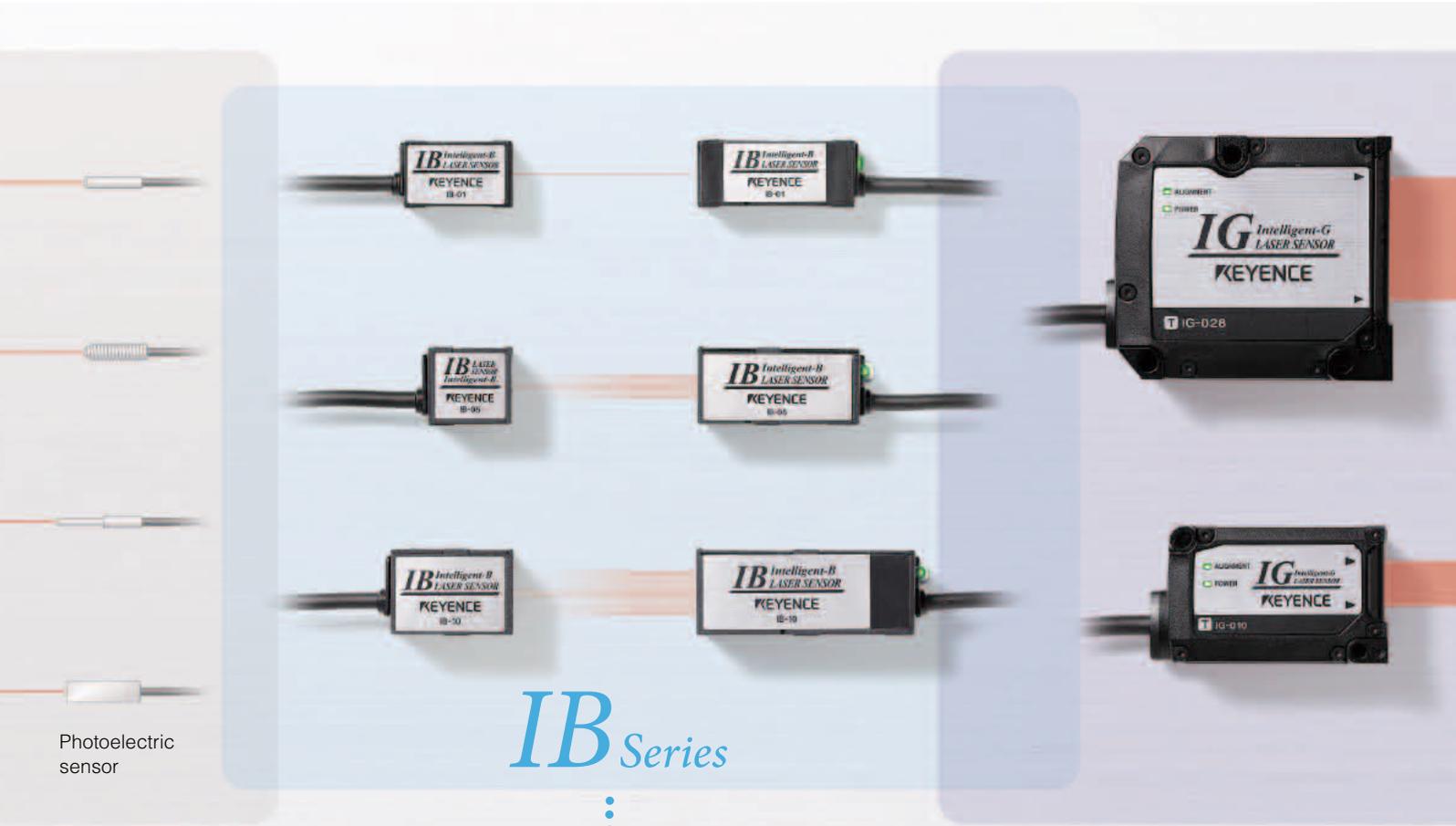


Make Sensing Easy:

FROM SIMPLE DIFFERENTIATION TO HIGH SPEED,
HIGHLY ACCURATE DETECTION

Low-cost
High
Performance

CHOOSE KEYENCE FOR ALL THRUBEAM TYPES



Photoelectric sensor

IB Series

- ◀ Detection of presence/absence
- ◀ Low cost

Thrubeam Type Laser Detection Sensor IB Series

Light volume differentiated with high-accuracy

Light-receiving element PD

Through high-accuracy differentiation of the volume of light received, the photoelectric sensor allows a multitude of previously impossible applications to be achieved.

A PD (Photo Diode) is used within the light-receiving element. Even very small changes in received light intensity are sensed, making this sensor incredibly versatile.

■ Main applications

Detecting cap tightness

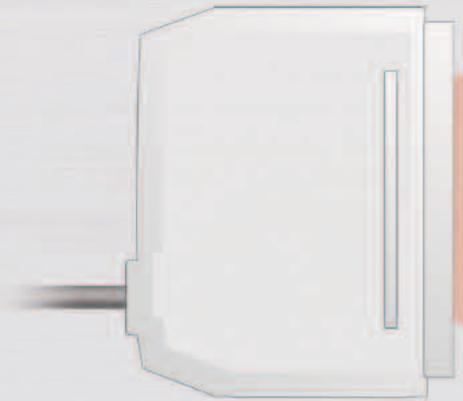
Differentiation of different films

Determining chip gradient

Liquid turbidity

*High-Accuracy Differentiation Made Easy
without being Influenced by the Target*

IG Series



Thru-beam measuring instruments

High-accuracy measurements ▶

High end ▶

Multi-Purpose CCD Laser Micrometer IG Series

High-accuracy differentiation using edge position

Light-receiving element **CCD**

Achieving high-accuracy differentiation without being influenced by the total light volume

A CCD (Charge Coupled Device) is used in the light-receiving element. High-accuracy differentiation is achieved by capturing the edge of the thru-beam laser light rather than the volume of received light.

■ Main applications

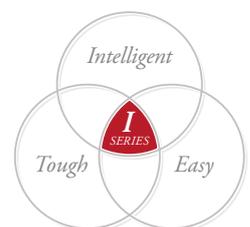
Transparent glass edge detection

Outer diameter high-accuracy differentiation

Sheet edge control

Roller gap measurement

Intelligent Sensor
I-SERIES



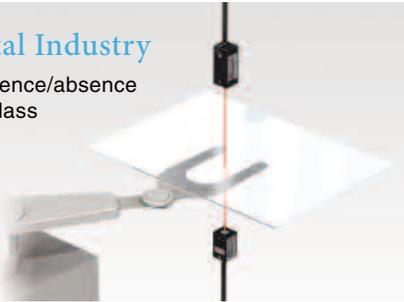
■ Supports everything from simple differentiation to high-accuracy detection

Industrial application examples

Liquid Crystal Industry

Detection of presence/absence of liquid crystal glass

IB

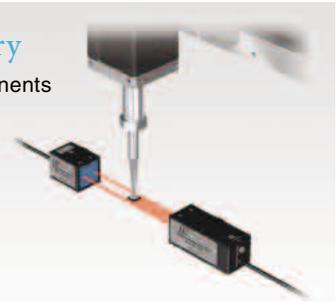


Within the various manufacturing processes of liquid crystal, the presence or absence of a glass plate is detected during transportation. As the light volume can be differentiated with high-accuracy, stable detection is possible.

Electronic Industry

Detection of chip components

IB

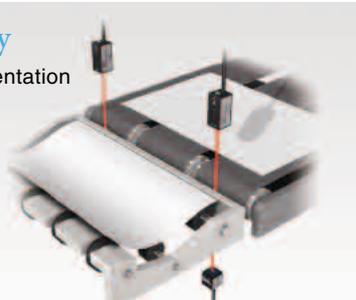


This device definitively detects the chip gradient and/or the presence of a chip on even minute targets during the mounting process. Furthermore, as the sampling occurs at 80 μ s, detections on high-speed lines are also possible.

Electric Industry

Printer paper feed orientation detection

IB

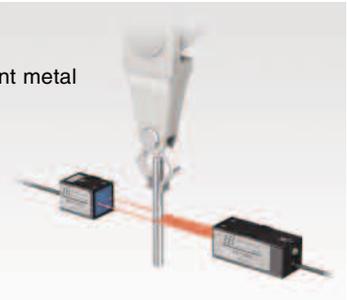


By sensing two locations simultaneously, the device detects the orientation of the paper feed and/or the skew angle during transportation. Continuous measurement is possible with the small type head and high-speed sampling.

Metal Industry

Differentiation of different metal shafts

IB

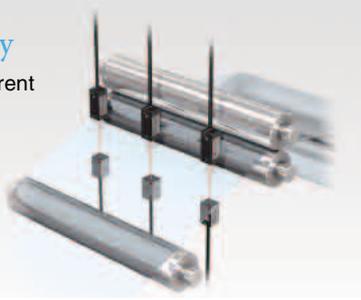


Detects differences in various shafts within metal workings or during the assembly process. By using the included Hold function, this can be determined without stopping the target.

Plastics Industry

Differentiation of different films

IB



By sensing the thru-beam volume of laser light, the device definitively captures any differences in the transparent film. Furthermore, by aligning multiple devices along the width, continuous detection of uneven coating over multiple points is possible.

Factories

Turbidity detection of factory waste water

IB



By sensing the thru-beam volume of laser light through glass, the turbidity of factory waste water can be determined. Furthermore, judgement values can be set between 0 and 100%.

Food and Pharmaceutical Industry

Bottle-neck diameter judgement and detection of cap tightness

IB

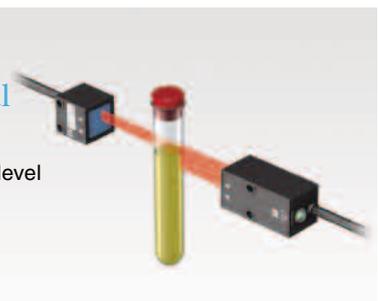


Detects the diameter and cap tightness when adding the caps onto the bottles. Due to high-speed sampling, detection can be conducted on the conveyor without stopping the target.

Food and Pharmaceutical Industry

Detecting the liquid level of test tubes

IB



By sensing thru-beam volumes of the laser light, the liquid level can be detected with high accuracy. Furthermore, by using a compact head the device can be positioned in even the narrowest of spaces.

Semi-conductor Industry

Wafer notch detection

IG

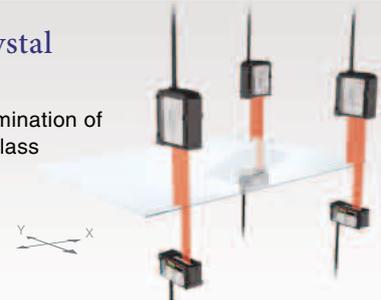


Detects the notch position of a wafer with high accuracy. The device exhibits a repeat accuracy of 5 μm and the differential ability that is top of its class.

Liquid Crystal Industry

Position determination of liquid crystal glass

IG



Conducts high-accuracy transport position determination of liquid crystal glass. Incorporating a new algorithm, stable detection of even transparent materials is possible.

Electrical Industry

Edge control of a lithium-ion electrode sheet

IG

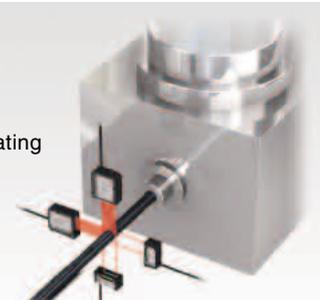


Conducts edge control during the winding process of electrode sheets, achieving uniform rolling.

Electric Cable Industry

External diameter differentiation during coating extrusion processes

IG

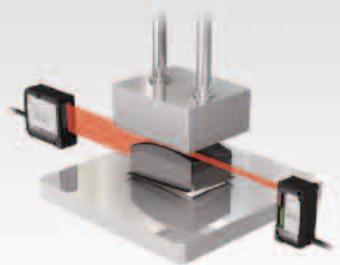


Differentiates the coating line diameter immediately after extrusion. By calculating the roundness differentiation between X-Y, this can be conducted simultaneously without external software.

Metal Industry

Target placement confirmation

IG



Differentiates the positioning of the target during pressing. The device is IP-67 rated, with the ability to withstand use in unfavorable environments over a long period of time.

Metal Industry

Internal diameter differentiation of punch press materials

IG

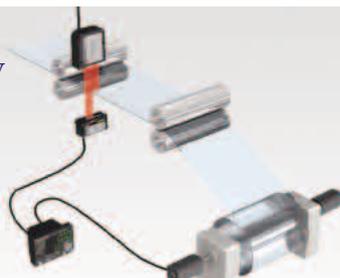


Measures the internal diameter or gaps of pressed parts. By using the various Hold functions you can also measure the maximum internal diameter.

Plastics Industry

Edge control of a transparent sheet

IG



Conducts the edge control of film during winding processes, and achieves a uniform roll. The level of shielded light can be changed at will, allowing for the high-accuracy determination of thin film.

Iron and Steel Industry

Roll gap measurement

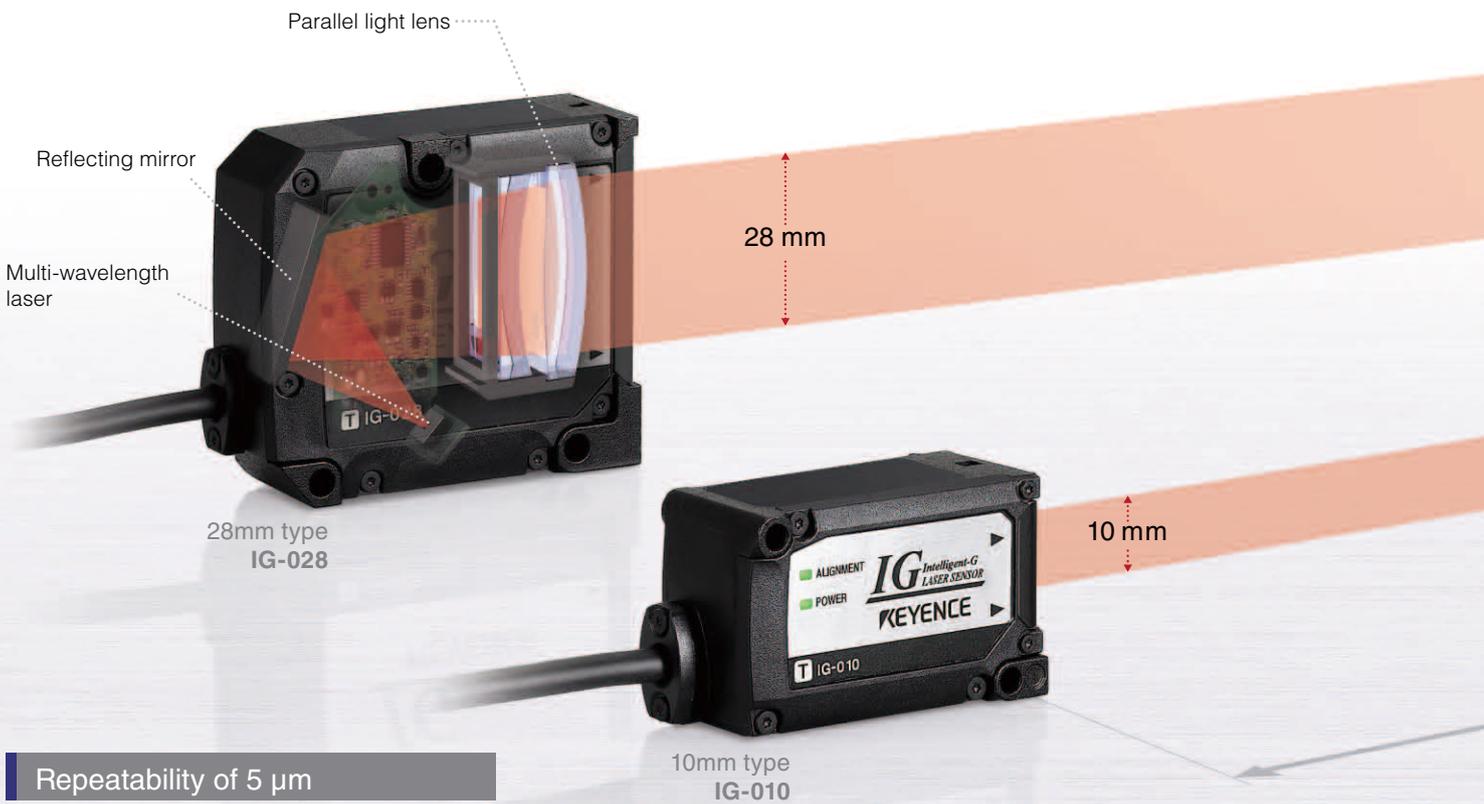
IG



Monitors the gap of thin plate cold rolling. Mounting in narrow spaces is also possible thanks to a compact head.

Achieving the Best Stability Multi-Purpose CCD Laser Micrometer

IG Series



Repeatability of 5 μm

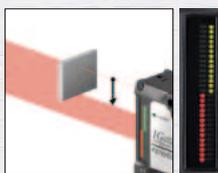
Linearity of $\pm 0.1\%$ (IG-028)

New function: Position Monitor

Wide Variety of Application Modes

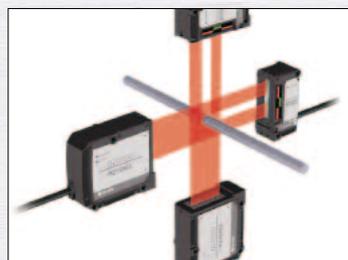
Edge Control Mode

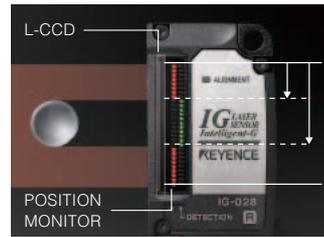
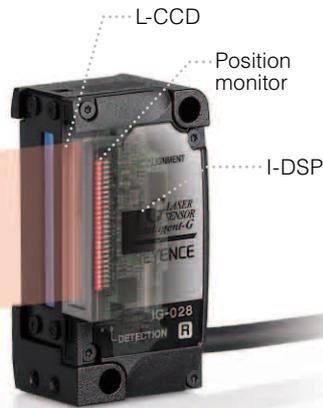
The distance from the end of the measurement range to the edge of a target is measured.



Outer Diameter Measurement Mode

The outer diameter or width of a target is measured.





POSITION MONITOR

Measurements are performed with up to 28,000 optical axes (IG-028), each of which monitors the amount of light received.



Large Distance between the Transmitter and Receiver

IG-028	Max. 1500 mm
IG-010	Max. 1000 mm



Panel mount type
IG-1500/1550



DIN-rail mount type
IG-1000/1050

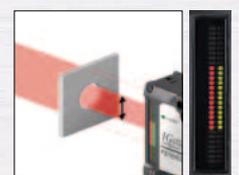
Edge Detection of Transparent Targets

Measures a transparent edge like glass



Inner Diameter/Gap Measurement Mode

The inner diameter of a target or a gap between targets is measured.



I-*Intelligent Sensor* -SERIES

THREE CONCEPTS



Intelligent

High accuracy was achieved by using the technology and functions developed for high-accuracy measuring instruments.

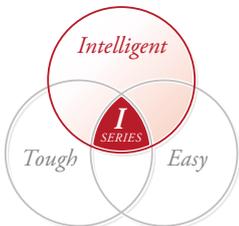
Tough

Developed for use in harsh environments, the I Series was designed with a strong structure.

Easy

Excellent usability makes it possible to quickly and easily perform stable measurements without any difficult adjustments and settings.

The intelligent I-Series consists of a high-accuracy sensor lineup that realises low-cost high performance with only the most advanced functions for on-site operations.



High stability and measurement accuracy are achieved with the newly developed optical system

Multi-Wavelength Laser + I-DSP

With conventional lasers, the transmission spot produces a patchy pattern (as shown in the figure to the right). This is a laser-specific interference problem caused by the laser having a single wavelength. The IG Series sensor overcomes this problem by using a multi-wavelength laser. Because shadows are formed on the CCD more clearly, the sensor remains highly stable, even with targets that are conventionally difficult to detect (e.g. transparent objects). With the I-DSP (a parallel computing chip) incorporated in the receiver, the sensor can perform data processing at high speed, reducing noise to a minimum.



SPOT IMAGE

Single-wavelength laser (conventional laser sensor)



A patchy pattern appears.

▼

Multi-wavelength laser (IG)



Due to the multi-wavelength laser used, the beam pattern has a more uniform intensity distribution.

Best in its class

Best in its class

Repeatability of 5 μm

Linearity of ±0.1%

STABLE DETECTION OF TRANSPARENT & MESH TARGETS

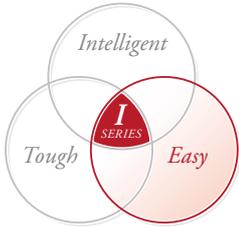
The L-CCD makes it possible to detect a target based on its position. Edge control and positioning of transparent and mesh targets can be performed stably.



Transparent target



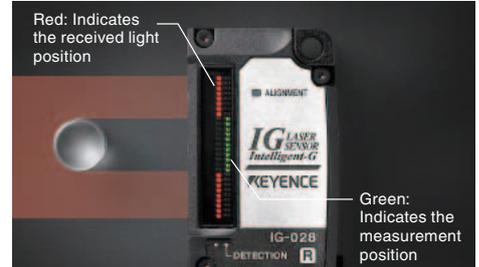
Mesh target



Extremely easy to use due to the built-in position monitor

Determining the Part of a Target to be Measured

The position monitor on the IG Series sensors makes it possible to visually check how a target is detected. The user can prevent mounting or setting errors by observing the red lights that indicate the received light position and the green lights that indicate the measurement position.



Easier Optical Axis Alignment

The position monitor makes it easier to align the optical axis. Easily perform optical axis alignment by adjusting the sensor head so that all of the position monitor lights turn red.



Optical axis alignment in progress

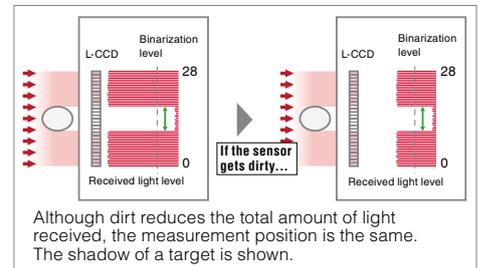
Optical axis alignment complete



Easy to maintain thanks to excellent environment resistance

Key Point: Less Sensitive to Dirt

Because it uses an L-CCD, the IG Series is less sensitive to materials such as dirt than a sensor that uses a photodiode (PD) as the light-receiving element.



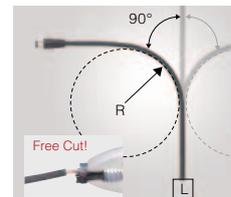
Edge Check Function

The user can check whether a measurement is performed correctly by verifying the number of edges in the field of view.

- Example**
- Prevent dust or oil from adhering to the measurement unit, which can cause an abnormal measurement value.
 - Detect the intrusion of a different type of target.
 - Check that a measurement target falls within the measurement range.

Flexible Free-Cut Cable

The sensor head cable is a robot cable that withstands repeated bending. The cable can be used safely in a position requiring repeated motion.



No break in the cable after 20 million bends (typical)
 Load (W): 250 g
 Bending radius: R50 mm
 Rate: 30 bends/minute
 (One bend is a cycle whereby the cable is bent from left to right and then from right to left.)

IP67 Protection

The enclosure satisfies the IP67 rating based on the IEC standards and remains watertight even after being held at a depth of one metre for 30 minutes. The enclosure is resistant to adverse environments and offers long-term durability.



EVEN MORE USEFUL WHEN CONNECTED TO A PC

The configuration software, IG Configurator, allows for a wide range of settings to be made including the monitoring of the waveforms of received light and the measurement modes.

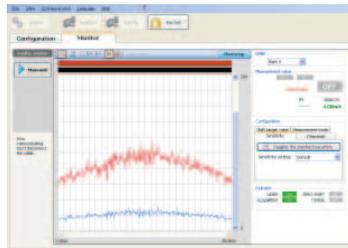
Reading and Writing Settings

The user can enter all settings including the measurement modes into a PC and then transfer them to the sensor. The management of setting data is simple and very convenient when two or more sensors are used.



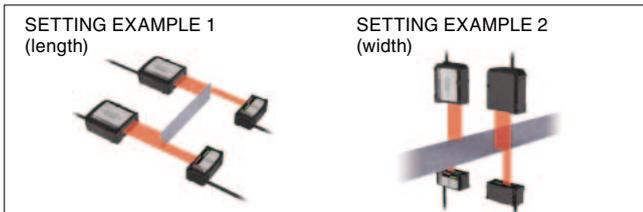
Monitoring Function

Measurement conditions such as the waveforms of received light can be displayed in real time. The mounting and sensitivity settings can also be adjusted more precisely.

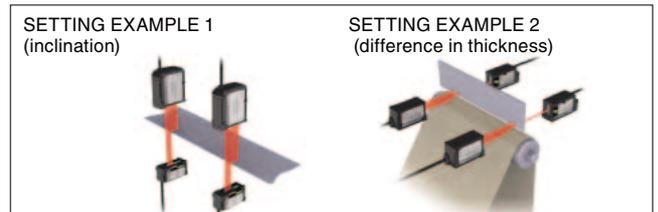


Calculation Function

Addition mode (if a measurement target is large)

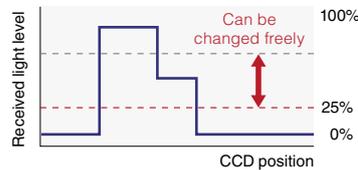


Subtraction mode (to measure the difference in level or inclination)



Sensitivity Setting

The set value used to judge whether light enters or is blocked, based on the amount of light received by the CCD, is called the binarization level. The amount of light received when the reference waveform is registered is regarded as the 100% level. The light is judged to be blocked if the amount of light is less than the specified binarization level. The IG Series initially sets a binarization level of 25% and the user can change the level according to the application.



Zero Shift Function

This function shifts an internal measurement value to 0 (to offset the value). When the target value is changed, this function can be used to shift an internal measurement value to the new target value.

Option

PC software ¹.
IG-H1



Sensor head mounting brackets for IG-010 ².
IG-TB01



Approx. 50 g

Sensor head mounting brackets for IG-028 ².
IG-TB02



Approx. 40 g

Sensor head cables ³.
Select when a longer cable is required.

Cable length	Model	Weight	Piece
2 m ⁴	OP-87056	Approx. 80g	1 cable included
5 m	OP-87057	Approx. 190g	
10 m	OP-87058	Approx. 360g	
20 m	OP-87059	Approx. 680g	

Connected connector with indicator

This connector is required if the cable is cut.



OP-84338
Connector used to connect to a display unit (2 pcs.)

1. The DL-RS1A communication unit is required. 2. The screws for connecting the sensor head and bracket are included. 3. The cable is common to the transmitter and receiver, and can be used with either of them. 4. Two cables are included with a sensor head.

Sensor heads

Model	IG-010	IG-028
Appearance		
Operation principle	CCD method	
Light source	Visible light semiconductor laser (Wavelength:660 nm)	
	Class 1 Laser Product ¹	
	Class 1 Laser Product	
Mounting distance	0 to 1000 mm	0 to 1500 mm
Measurement range	10 mm	28 mm
Sampling rate	980 μs (When the number of times for averaging is set to [hsp]: 490 μs)	
Minimum detectable object ²	High sensitivity mode	φ0.1 mm (Setting distance: 100 mm)
	Standard mode	φ0.2 mm (Setting distance: 40 mm), φ0.5 mm (Setting distance: 500 mm)
Repeatability ³	5 μm (Setting distance: 100 mm)	5 μm (Setting distance: 100 mm)
	10 μm (Setting distance: 500 mm)	10 μm (Setting distance: 500 mm)
	80 μm (Setting distance: 1000 mm)	80 μm (Setting distance: 1000 mm)
		140 μm (Setting distance: 1500 mm)
Linearity ⁴	±0.28 % of F.S. (±28 μm)	±0.1 % of F.S. (±28 μm)
Temperature characteristics ⁵	±0.03 % of F.S./°C (±3 μm/°C)	±0.01 % of F.S./°C (±3 μm/°C)
Operation indicator	Transmitter	Optical axis alignment indicator: Green LED / Power indicator: Green LED
	Receiver	Optical axis alignment indicator: Green LED / Position monitor: Dual bar LED (Red, Green)
Environment resistance	Enclosure rating	IP67
	Ambient temperature	-10 to +45°C (No freezing)
	Ambient humidity	35 to 85% RH (No condensation)
	Ambient light ⁶	Incandescent lamp: 5000 lux Sunlight: 5000 lux
	Vibration	10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours
	Pollution degree	2
Material	Case	Zinc die-cast (Lower case), PBT (Upper case), Polyarylate (PAR) (Display part), SUS304 (Metallic part)
	Lens cover	Glass
	Cable	PVC
Supplied item	Transmitter × 1, Receiver × 1, Sensor head cables (2 m) × 2	
Weight (including supplied items)	Approx. 380 g	Approx. 500 g

- The classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.
- When the measurement target object is measured at the centre position of the setting distance.
- When the measurement mode is set to the glass edge mode, a glass edge of C0.1 mm or more can be detected (Setting distance: 500 mm).
- When the light is shielded by half at the centre position of the setting distance. Vibration width when the average number of times is set to 16 and sampling is performed for 30 seconds. (When the analogue output is used, the margin of error of analogue output is added.)
- When the setting distance is 100 mm and light is shielded at 50 mm position from the receiver. Margin of error to the ideal line.
- When the setting distance is 100 mm and light is shielded by half at 50 mm position from the receiver.
- Excluding when the average number of times is set to [hsp].

Display unit (amplifier)

Model	IG-1000	IG-1050	IG-1500	IG-1550	
Appearance					
Amplifier type	DIN rail mount		Panel mount		
Main unit/Expansion unit	Main unit	Expansion unit	Main unit	Expansion unit	
Analogue output	Yes	No	Yes	No	
Power supply voltage	10-30 VDC, Ripple (P-P): 10% included, Class 2 or LPS				
Power consumption ⁴ (including analogue current output)	Normal	2700 mW or less (at 30 V: 90 mA or less)		2880 mW or less (at 30 V: 96 mA or less)	
	Power saving function (HALF)	2300 mW (at 30 V: 77 mA or less)			
	Power saving function (ALL)	2200 mW (at 30 V: 74 mA or less)			
Digital display method	Dual 7-seg display Upper level: Red, 5 digits Lower level: Green, 5 digits		Dual 7-seg display Upper level: Red/Green, 2 colours, 5 digits Lower level: Green, 5 digits		
Display range	-99.999 to +99.999, -99.99 to +99.99, -99.9 to +99.9, -99 to +99 (selectable)				
Display resolution	1 μm, 10 μm, 100 μm, 1000 μm (selectable)				
Judgement output (selectable between NPN and PNP)	NPN (PNP) open collector x3ch, 30 VDC (Power supply voltage) or less, residual voltage 1 V (2 V) or less, N.O./N.C. selectable Max. 50 mA/ch ¹				
	Response time (judgement output)	1.96 to 4031.72 ms ²			
Edge check output (selectable between NPN and PNP)	NPN (PNP) open collector x1ch, 30 VDC (Power supply voltage) or less, residual voltage 1 V (2 V) or less, N.O./N.C. selectable Max. 50 mA, ¹ response time 20 ms				
Output			Voltage output	Current output	
	Analogue output (selectable among ±5V, 1-5 V, 0-5 V, 4-20 mA)		Output range	±5 V (full scale 10 V)	4-20 mA (full scale 16 mA)
			Output resistance	100 Ω	-
			Maximum load resistance	-	350 Ω
			Repetition accuracy	±1 mV	±1.5 μA
			Display accuracy	±0.05 % of F.S.	±0.25 % of F.S.
			Temperature characteristics	±0.005 % of F.S./°C	±0.01% of F.S./°C
			Update cycle	Same as sensor head sampling cycle	
			Response time	Same as Response time (judgement output)	
			Time constant³	10 μs (90 % response)	30 μs (90 % response)
Input	Gain input	Input time: 20 ms or more, Response delay time: 120 ms or less (Nonvolatile memory (EEPROM) 1.5 s or less)			
	Reset input	Input time: 20 ms or more, Response delay time: 20 ms or less			
	Timing input	Input time: 2 ms or more, Response delay time: 2 ms or less			
	Zero shift input	Input time: 20 ms or more, Response delay time: 20 ms or less ²			
	Bank A input/Bank B input	Input time: 20 ms or more, Response delay time: 20 ms or less ²			
Laser emission stop input	Input time: 2 ms or more, Response delay time: 2 ms or less				
Environment resistance	Ambient temperature	-10 to +50°C (No freezing)			
	Ambient humidity	35 to 85%RH (No condensation)			
	Vibration	10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours			
	Pollution degree	2			
Material	Case/Front sheet: Polycarbonate, Key top: Polyacetal, Cable: PVC				
Supplied item	Main body × 1, Instruction manual × 1 (only for main unit)	Main body × 1, Panel mounting bracket × 1, Front protection cover × 1, Power supply and input/output cable (2 m) × 1, Expansion cable (50 mm) × 1 (only for expansion unit), Instruction manual × 1 (only for main unit)			
Weight (including supplied items)	Approx. 150 g	Approx. 140 g	Approx. 170 g	Approx. 165 g	

- When expansion units are added: Max. 20 mA/ch
- For more details, refer to the User's Manual.
- Delay time that occurs from the analogue output circuit after the judgement is output.
- When adding an expansion unit, the consumed electrical power is equal to the total value of the consumed electrical power of all amplifiers.

Achieving an Endless Amount of Applications Unable to be Detected by Using a Fibre Sensor

Thrubeam Type Laser Detection Sensor

IB Series

High-speed sampling of 80 μ s

High-accuracy differentiation of 5 μ m

New function: Auto adjustment included



Panel mount type
IB-1500/1550



DIN-rail mount type
IB-1000/1050



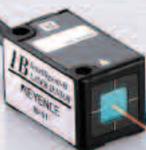
IB-30



IB-10



IB-05

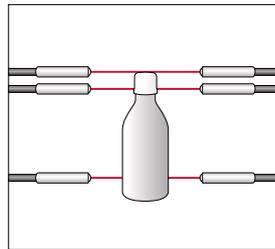


IB-01

1 device, 3 roles. 3 step output of presence and size

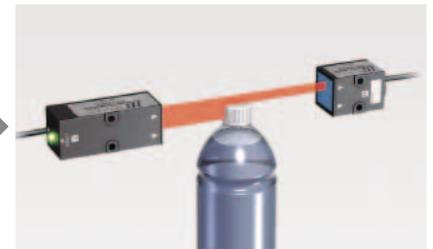
Upper/lower output-equipped as standard. Not only presence/absence is detected, but size judgement can also be conducted using this single device. A timing sensor is also not required due to the presence of the Auto timing function.

Photoelectric sensor



3 devices are required each for presence/absence, height and timing detections

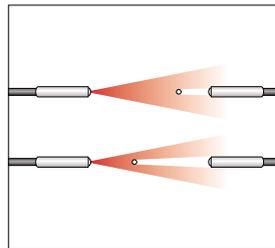
Digital laser sensor



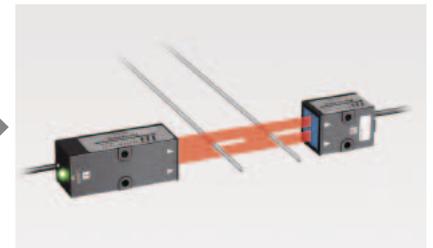
All detections conducted using a single device

Not influenced by passage position

According to the parallel laser light, no matter where the target is positioned, the judgement values will remain the same. This makes high-accuracy differentiation possible anywhere on the detection area.



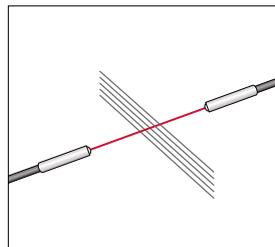
As the position changes, the thru-beam light volume changes



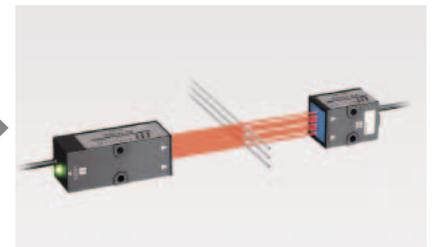
Regardless of position, the thru-beam light volume remains the same

No concern of position misalignment even in wide areas

As the maximum width of the optical axis is 30 mm, stable detection is possible even if the target is shaking.



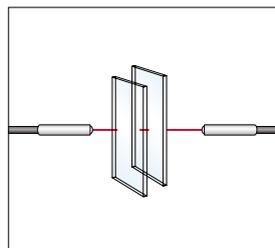
Detection is not possible when strayed off the linear optical axis



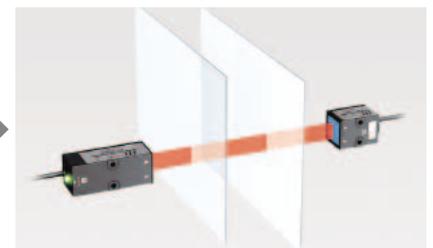
Definitive detection in a wide detection area

High-accuracy detection even in transparent bodies

In addition to detecting the presence of transparent targets, detections such as those of single/double transparent films, density differentiation, and the turbidity of liquids is also possible. Furthermore, using the percentage display function the thru-beam rate judgement is also possible.



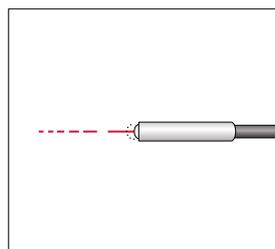
Does not stabilise due to the subtle difference in thru-beam light volume



Definitive determination of even the most minute thru-beam light volume difference

Not affected by dirt or temperature changes

By incorporating a Light intensity correction function, the numerical margin of error caused by aging variation can be cancelled. Possible to always achieve stable, high-accuracy judgement.



Sensitivity changes according to the influence of dirt, etc



Dirt is eliminated using the Light intensity correction function

I-*Intelligent Sensor* -SERIES

THREE CONCEPTS



Intelligent

High accuracy was achieved by using the technology and functions developed for high-accuracy measuring instruments.

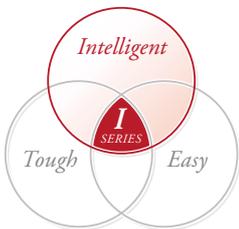
Tough

Developed for use in harsh environments, the I Series was designed with a strong structure.

Easy

Excellent usability makes it possible to quickly and easily perform stable measurements without any difficult adjustments and settings.

The intelligent I-Series consists of a high-accuracy sensor lineup that realises low-cost high performance with only the most advanced functions for on-site operations.



Adopting the newly developed optical system used in the IG Series

Multi-Wavelength Laser Beam + High-sensitivity PD

Normal lasers are single wavelength, therefore due to interference, the pattern becomes patchy, as shown in the diagram on the right. This problem is rectified in the IB Series by utilising laser light with multiple wavelengths. Targets with a high level of difficulty can still be detected with a high degree of stability. Furthermore, by incorporating a high-sensitivity PD within the light receiving section data can be processed at high speeds, reducing the extraneous fluctuations to the absolute limit.

High-accuracy differentiation
of 5 μm

Ultra-long distance
of 2 m

Mechanism behind stable detection

SPOT IMAGE

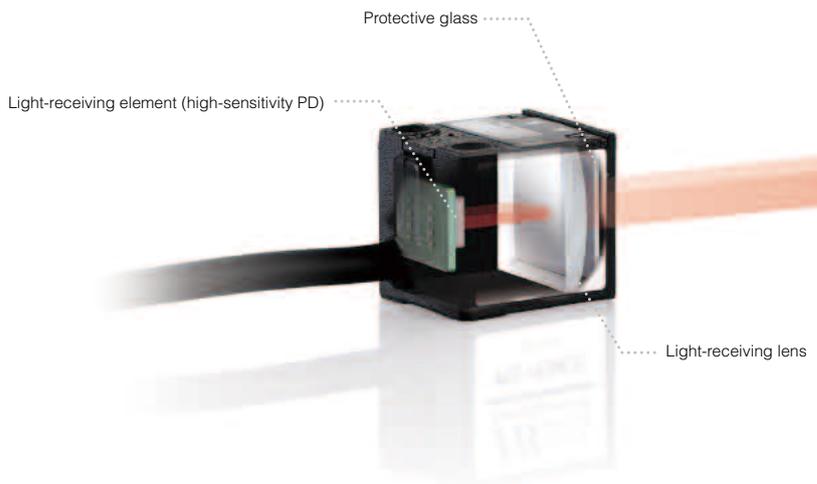
Single-wavelength laser (conventional laser sensor)

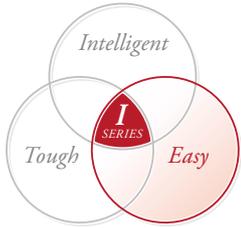
A patchy pattern appears.

▼

Multi-wavelength laser (IB)

Due to the multi-wavelength laser used, the beam pattern has a more uniform intensity distribution.





Simple positioning according to the alignment LED

Easy to align the optical axis

As the optical axis of the laser aligns, the flash frequency of the laser transmitter indicator quickens. Even without looking at the amplifier unit, the optimum position can be achieved easily.



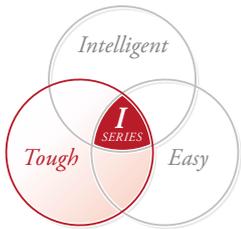
If the optical axis is not aligned the LED turns off



When the optical axis begins to align, the flashing frequency of the LED quickens



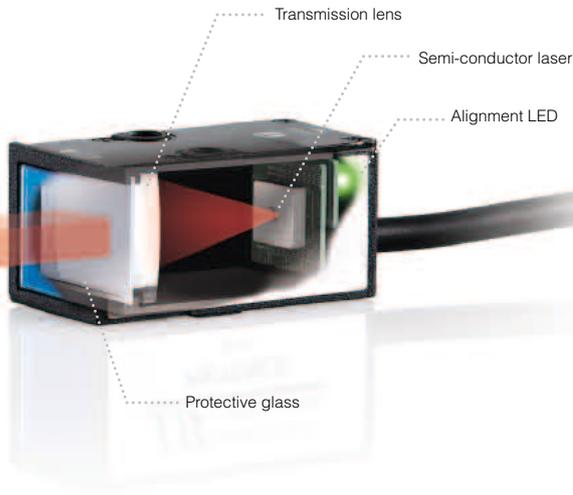
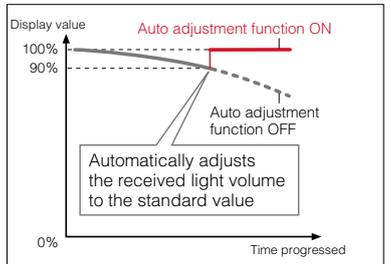
High-speed flashing when the optical axis is aligned



Maintenance-saving according to the Auto adjustment function

Long-term, stable detection even in environments where the device becomes dirty easily

In the IB Series, should the received light volume decrease according to such things as dirt on the front of the sensor head, by using the adjustment input, the received light volume is adjusted to standard values during input. In addition, the Auto adjustment function recognises that this adjustment input has no measurement target, and therefore is executed regularly automatically. Even when used in environments where the device becomes dirty easily, stable measurements and a high degree of maintenance-saving has been achieved by the device automatically correcting itself.



Using the transmission lens, after the laser light emitted as a parallel beam passes through the light receiving lens, the light is then converged to the light-receiving element (high-sensitivity PD). When the measurement target interrupts this parallel beam, this beam is in proportion to the volume of interrupted light and the light entering the received light element reduces. When this occurs, by capturing the light volume in the light-receiving element (high-sensitivity PD), the size and transparency of the target can be measured.

Specifications



Sensor head

Model	IB-01	IB-05	IB-10	IB-30
Appearance				
Light source	Visible semiconductor laser Wavelength: 660 nm Class 1 Laser Product (IEC60825-1, FDA (CDRH) Part1040.10 ¹)			
Mounting distance	0 to 2000 mm		0 to 300 mm	
Measurement range	ø1 mm (Installation distance 0 to 300 mm) ø1 to 2.5 mm (Installation distance 300 to 2000 mm)	5 mm	10 mm	30 mm
Sampling rate	12,500 times/sec. (80 µs)			
Minimum detectable object ²	ø8 µm (Installation distance 0 to 300 mm) ø8 to 50 µm (Installation distance 300 to 2000 mm)	ø0.05 mm	ø0.1 mm	ø0.2 mm
Repeatability ³	5 µm (distance 0 to 300 mm)	5 µm	5 µm	10 µm
Temperature characteristics ⁴	±0.2% of F.S./°C	±0.1% of F.S./°C (±5 µm)	±0.1% of F.S./°C (±10 µm)	±0.1% of F.S./°C (±30 µm)
Operation indicator	Laser emission warning indicator: green LED			
Environmental resistance	Ambient luminance	Incandescent lamp: 5000 lux Solar light: 10000 lux	Incandescent lamp: 5000 lux Solar light: 5000 lux	Incandescent lamp: 10000 lux Solar light: 10000 lux
	Ambient temperature	0 to +40°C (no freezing)	0 to +50°C (no freezing)	
	Ambient humidity	35 to 85%RH (no condensation)		
	Vibration	10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours		
Material	Case	PBT	Zinc die-cast	
	Lens cover	Glass		
	Cable	PVC		
Weight	Approx. 140 g	Approx. 180 g	Approx. 220 g	Approx. 510 g

- The classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.
- Value when measuring the target (white diffuse object) at the middle of the transmitter and receiver position, and at the centre of the measurement range.
- When distance between transmitter and receiver is set to 300 mm, and light is half-shielded at a position 150 mm from receiver. Deflection width (±2σ) when sampled for 30 seconds with an average number of times set to 64 times.
- When distance between transmitter and receiver is set to 100 mm and full light is received.

Amplifier unit

Model	IB-1000	IB-1500	IB-1050	IB-1550	
Appearance					
Amplifier type	DIN rail mount	Panel mount	DIN rail mount	Panel mount	
Main unit/Expansion unit	Main unit		Expansion unit		
Head compatibility	Yes				
Display	Display resolution	0.01%, 0.1%, 1% (switchable)			
	Display range	-99.999 to 99.999, -99.99 to 99.99, -99.9 to 99.9, -99 to 99 (switchable)			
	Digital display method	Dual 7-segment display Upper level: 5 red digits Lower level: 5 green digits	Dual 7-segment display Upper level: 2-colour (green/red) 5 digits Lower level: 5 green digits	Dual 7-segment display Upper level: 5 red digits Lower level: 5 green digits	Dual 7-segment display Upper level: 2-colour (green/red) 5 digits Lower level: 5 green digits
	Operation indicator	Judgement indicator: 2-colour (green/red) LED (HI, GO, LO), Bank indicator: Green LED x 4, Laser emission warning indicator: Green LED, Others: Green LED x 8, red LED x 3			
Analogue voltage output ¹	±5 V, 1 to 5 V, 0 to 5 V Output impedance 100Ω		No		
Analogue current output ¹	4 to 20 mA Maximum load resistance 350Ω				
Control input ²	Bank switch input	Non-voltage input			
	Zero-shift input				
	Laser emission stop input				
	Timing input				
	Reset input				
	Adjust input				
Control output ³	Judgement output	Open collector (NPN/PNP switchable, N.O./N.C. switchable)			
	Check output				
Power supply	Power voltage	10 to 30 VDC, including ripple (P-P) 10% Class 2 or LPS		Supplied from main unit	
	Power consumption ⁴	1950 mW or less (at 30 V, 65 mA max.)	2100 mW or less (at 30 V, 70 mA max.)	1950 mW or less (at 30 V, 65 mA max.) 2100 mW or less (at 30 V, 70 mA max.)	
Environmental resistance	Ambient temperature	-10 to +50°C (No freezing)			
	Ambient humidity	35 to 85% RH (No condensation)			
	Vibration	10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours			
	Pollution degree	2			
Material	Case/Front panel: polycarbonate, keytop: polyacetal, cable: PVC				
Weight (including supplied items)	Approx. 150 g	Approx. 170 g	Approx. 140 g	Approx. 165 g	

- ±5 V, 1 to 5 V, 0 to 5 V, or 4 - 20 mA should be selected.
- The four external input wires are assigned with desired inputs.
Rated no-voltage input: ON voltage 2 V or less, OFF current 0.05 mA or less
Rated voltage input: Max. input rating 30 V or less, ON voltage 7.5 V or more, OFF current 0.05 mA or less
- Rated NPN open collector output: Max. 50 mA/ch (20 mA/ch when expansion units are connected), 30 V or less, residual voltage 1 V or less
Rated PNP open collector output: Max. 50 mA/ch (20 mA/ch when expansion units are connected), 30 V or less, residual voltage 2 V or less
- The power consumption with slave units installed is the total of each amplifier unit's power consumption.
Example: When using one master unit (IB-1000) with two slave units (IB-1050) (1950 mW X 1) + (1950 mW X 2) = 5850 mW

DATA COMMUNICATION (Common to IG/IB)

Amplifier Function

NPN/PNP Output Selection (judgement selection)

Both NPN and PNP outputs are supported. The outputs are set the first time the user turns on the power. These settings can subsequently be changed. Judgements are output as HIGH, GO, or LOW.

Analogue Output Selection

The following four types of analogue outputs can be selected. The output is selected the first time the user turns on the power.

Setting value	Description
OFF	Not output
0-5V	Analogue output after the judgement value is converted to the range from 0 to 5 V.
-5-5V	Analogue output after the judgement value is converted to the range of ± 5 V.
1-5V	Analogue output after the judgement value is converted to the range from 1 to 5 V.
4-20mA	Analogue output after the judgement value is converted to the range from 4 to 20 mA.

The setting can be changed.

Bank Function

The bank function can register up to four patterns of specific settings.* For example, in response to a measurement target changeover, this function allows the user to easily switch between the patterns of registered settings.

* HIGH setting value, LOW setting value, binarization level, shift target value, etc.



Communication Unit

LINEUP

Models	Communication method	Connection device	Judgement result readout	Measurement value readout	Control input	Control output	KV SENSOR NETWORK	Remarks
NEW DL-EP1	EtherNet/IP	PLCs	◎	◎	◎	◎	◎	Use the cyclic communication. Not necessary to create a communication program. Use message communication to change settings.
NEW DL-DN1	DeviceNet	PLCs	◎	◎	◎	◎	X	Use I/O Communication. Not necessary to create a communication program. Use Explicit Messages to change settings.
DL-RS1A	RS-232C	PLCs Computers	○	○	○	○	X	Use RS-232C Protocol Communication. Communicate after creating a Communication Program.
DL-RB1A	BCD Output	PLCs Computers	X	○	X	X	X	The measured value can be synchronized with a trigger input or updated via a timer. Output values are synchronized with the strobe output.

The ◎ mark indicates that wire reduction and the creation of a Communication Program is not necessary.

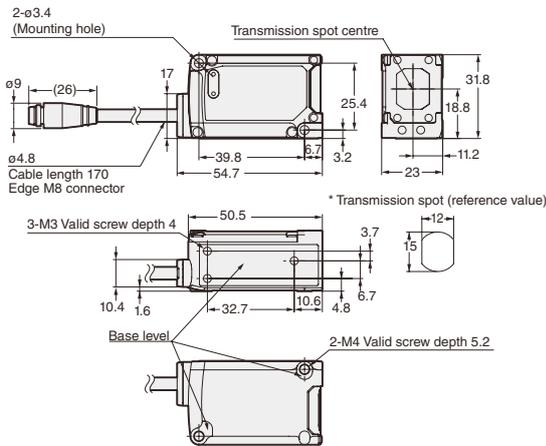
Dimensions

IG Series Sensor head

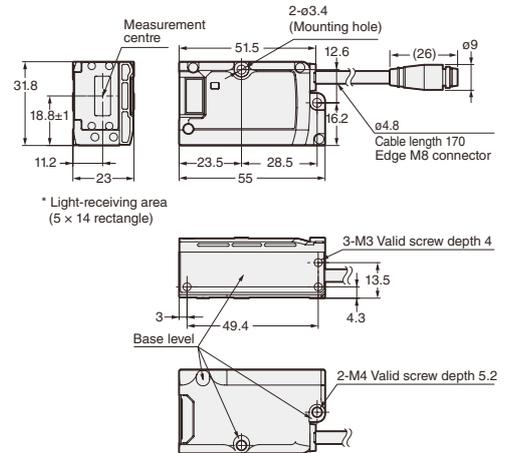
IG-010



Transmitter



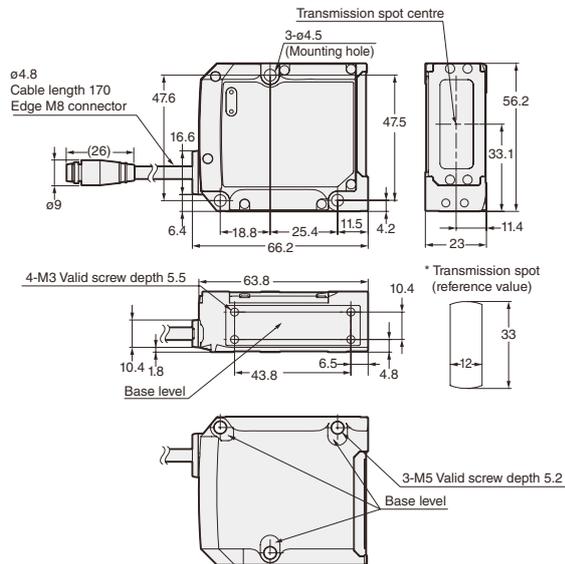
Receiver



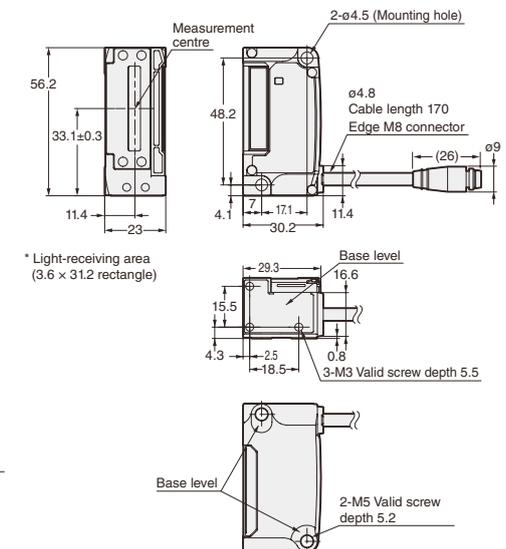
IG-028



Transmitter

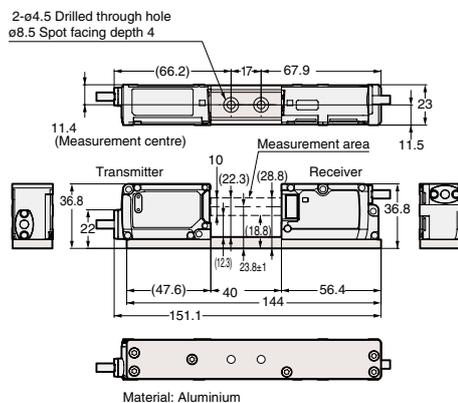


Receiver

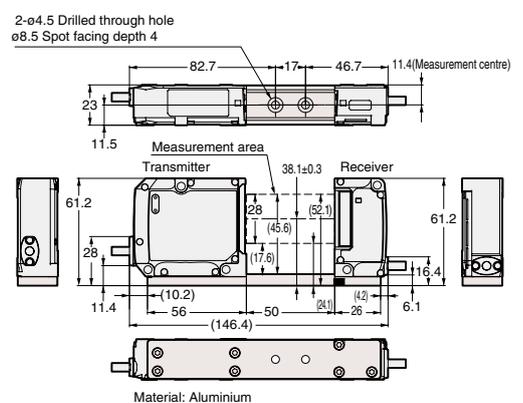


IG Series Sensor head mounting bracket

IG-TB01 + IG-010



IG-TB02 + IG-028



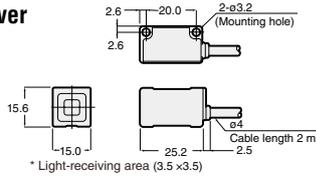
Dimensions

IB Series Sensor head

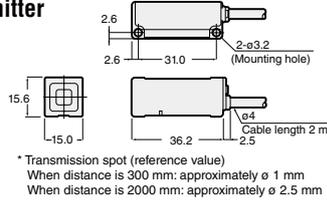
IB-01



Receiver



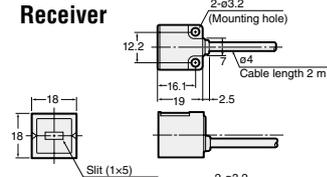
Transmitter



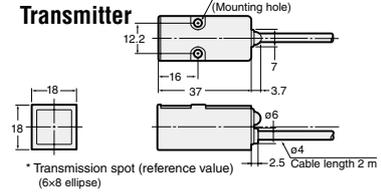
IB-05



Receiver



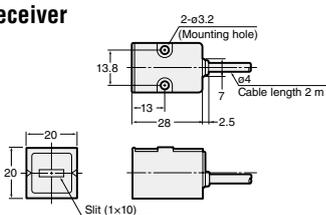
Transmitter



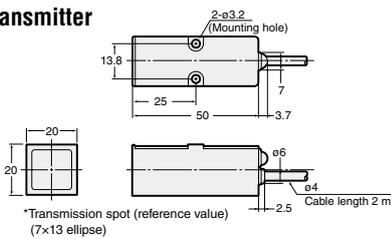
IB-10



Receiver



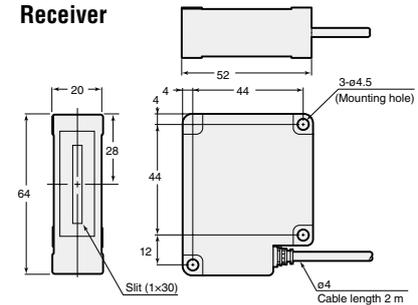
Transmitter



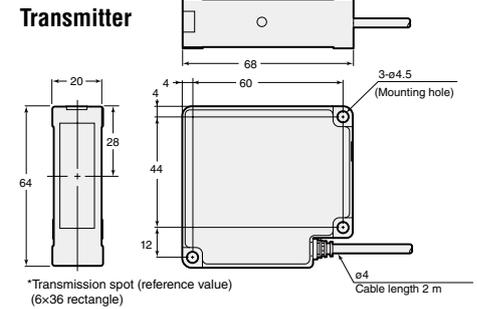
IB-30



Receiver



Transmitter

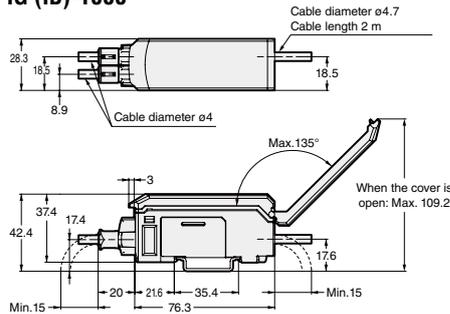


Sensor amplifier (DIN rail mount type)

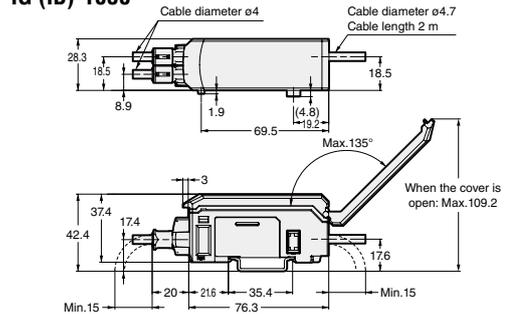
IG (IB)-1000/IG (IB)-1050



IG (IB)-1000

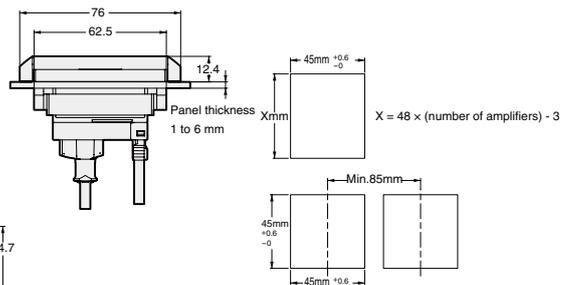
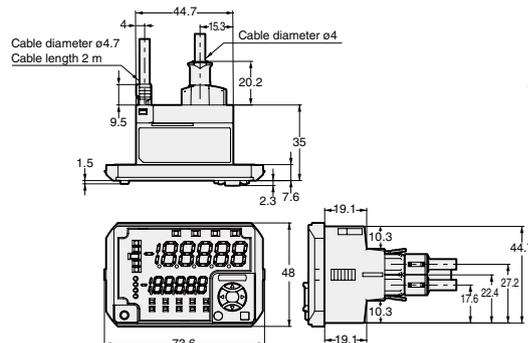


IG (IB)-1050



Sensor amplifier (Panel mount type)

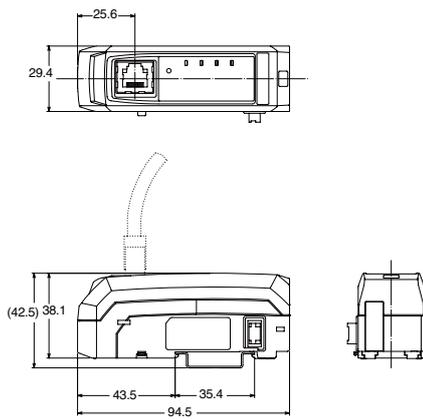
IG (IB)-1500/IG (IB)-1550



Dimensions

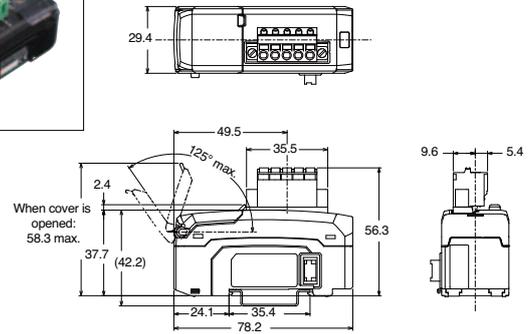
Communication unit (EtherNet/IP unit)

DL-EP1



Communication unit (DeviceNet unit)

DL-DN1

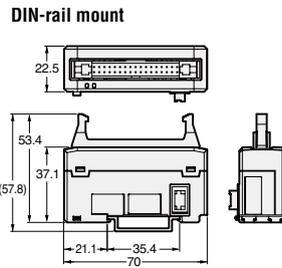


Communication unit (BCD output unit)

DL-RB1A

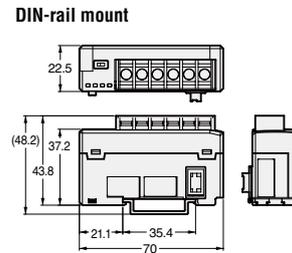


34-pin MIL connector



Communication unit (RS-232C unit)

DL-RS1A



Please visit: www.keyence.com



SAFETY INFORMATION

Please read the instruction manual carefully in order to safely operate any KEYENCE product.

KEYENCE CORPORATION

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku, Osaka, 533-8555, Japan Phone: +81-6-6379-2211

AUSTRIA
Phone: +43 22 36-3782 66-0 Fax: +43 22 36-3782 66-30
BELGIUM
Phone: +32 1 528 1222 Fax: +32 1 520 1623
BRAZIL
Phone: +55-11-3045-4011 Fax: +55-11-3045-5219
CANADA
Phone: +1-905-366-7655 Fax: +1-905-366-1122
CHINA
Phone: +86-21-68757500 Fax: +86-21-68757550
CZECH REPUBLIC
Phone: +420 222 191 483 Fax: +420 222 191 505
FRANCE
Phone: +33 1 56 37 78 00 Fax: +33 1 56 37 78 01

GERMANY
Phone: +49 61 02 36 89-0 Fax: +49 61 02 36 89-100
HONG KONG
Phone: +852-3104-1010 Fax: +852-3104-1080
HUNGARY
Phone: +36 1 802 73 60 Fax: +36 1 802 73 61
INDIA
Phone: +91-44-4299-4192 Fax: +91-44-4299-4302
ITALY
Phone: +39-02-6688220 Fax: +39-02-66825099
JAPAN
Phone: +81-6-6379-2211 Fax: +81-6-6379-2131
KOREA
Phone: +82-31-789-4300 Fax: +82-31-789-4301

MALAYSIA
Phone: +60-3-2092-2211 Fax: +60-3-2092-2131
MEXICO
Phone: +52-81-8220-7900 Fax: +52-81-8220-9097
NETHERLANDS
Phone: +31 40 20 66 100 Fax: +31 40 20 66 112
POLAND
Phone: +48 71 36861 60 Fax: +48 71 36861 62
ROMANIA
Phone: +40 269-232-808 Fax: +40 269-232-808
SINGAPORE
Phone: +65-6392-1011 Fax: +65-6392-5055
SLOVAKIA
Phone: +421 2 5939 6461 Fax: +421 2 5939 6200

SLOVENIA
Phone: +386 1-4701-666 Fax: +386 1-4701-699
SWITZERLAND
Phone: +41 43-45577 30 Fax: +41 43-45577 40
TAIWAN
Phone: +886-2-2718-8700 Fax: +886-2-2718-8711
THAILAND
Phone: +66-2-369-2777 Fax: +66-2-369-2775
UK & IRELAND
Phone: +44-1908-696900 Fax: +44-1908-696777
USA
Phone: +1-201-930-0100 Fax: +1-201-930-0099

