



# Make Sensing Easy:

FROM SIMPLE DIFFERENTIATION TO HIGH SPEED, HIGHLY ACCURATE DETECTION



## CHOOSE KEYENCE FOR ALL THRUBEAM TYPES



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* 



#### Multi-Purpose CCD Laser Micrometer IG Series

# High-accuracy differentiation using edge position

#### 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 thrubeam laser light rather than the volume of received light.



#### Supports everything from simple differentiation to high-accuracy detection

Industrial application examples



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.



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.



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  $\mu s$ , detections on high-speed lines are also possible.



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.



By sensing the thrubeam 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.



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



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



By sensing thrubeam 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.



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



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



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



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



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.



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.



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



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*<sub>Series</sub>



## 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

····· L-CCD

Position monitor

···· I-DSP

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



Panel mount type IG-1500/1550



Measures a transparent edge like glass



## Inner Diameter/Gap Measurement Mode

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





DIN-rail mount type IG-1000/1050



## 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.



Best in its class



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

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





#### 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.

## 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.

### **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.



Although dirt reduces the total amount of light received, the measurement position is the same. The shadow of a target is shown.

#### 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.



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.)



## 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)



## 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.



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



## 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.

Piece

1 cable

ncluded

#### Option



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.

#### Specifications

#### Sensor heads

WOUEI		10-010	10-028				
Appearance							
Operation principle		CCD m	nethod				
		Visible light semiconductor laser (Wavelength:660 nm)					
Light source	FDA (CDRH) Part 1040.10	Class 1 <sup>1</sup>					
	IEC60825-1	Clas	ss 1				
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 f	or averaging is set to [hsp]: 490 μs)				
Minimum detectable	High sensitivity mode	ø0.1 mm (Setting o	listance: 100 mm)				
object <sup>2.</sup>	Standard mode	ø0.2 mm (Setting distance: 40 mm or less), ø0.5 mm (Setting distance: 500 mm)	ø0.2 mm (Setting distance: 50mm or less), ø0.5 mm (Setting distance: 500 mm)				
Repeatability <sup>3.</sup>		5 μm (Setting distance: 100 mm) 10 μm (Setting distance: 500 mm) 80 μm (Setting distance: 1000 mm)	5 μm (Setting distance: 100 mm) 10 μm (Setting distance: 500 mm) 80 μm (Setting distance: 1000 mm) 140 μm (Setting distance: 1500 mm)				
Linearity <sup>4.</sup>		±0.28 % of F.S. (±28 μm)	±0.1 % of F.S. (±28 μm)				
Temperature characteri	stics 5.	±0.03 % of F.S./°C (±3 µm/°C)	±0.01 % of F.S./°C (±3 µm/°C)				
Operation	Transmitter	Optical axis alignment indicator: Gre	en LED / Power indicator: Green LED				
indicator	Receiver	Optical axis alignment indicator: Green LED /	Position monitor: Dual bar LED (Red, Green)				
	Enclosure rating	IP(	67				
Faulterment	Ambient temperature	-10 to +45°C	(No freezing)				
Environment resistance Ambient temperature Ambient humidity Ambient light <sup>6,</sup>	35 to 85% RH (N	o condensation)					
	Ambient light 6.	Incandescent lamp: 5000 lux Sunlight: 5000 lux					
	Vibration	10 to 55 Hz Double amplitude 1	1.5 mm XYZ each axis: 2 hours				
	Case	Zinc die-cast (Lower case), PBT (Upper case), Polya	arylate (PAR) (Display part), SUS304 (Metallic part)				
Material	Lens cover	Glass					
	Cable	PVC					
Supplied item		Transmitter × 1, Receiver × 1, Sensor head cables (2 m) × 2					
Weight (including ound)	(and itema)	Amaron: 200 m	Approv. 500 p				

 Weight (including supplied items)
 Approx. 380 g
 Approx. 50

 1. The classification for FDA (CDRH) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No.50.
 Approx. 50

 2. When the measurement target object is measured at the centre position of the setting distance.
 Month and an analysis of the glass edge of C0.1 mm or more can be detected (Setting distance: 500 mm).

 3. 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.

 5. When the setting distance is 100 mm and light is shielded by half at 50 mm position from the receiver.
 6. Excluding when the average number of times is set to [hsp].

#### **Display unit (amplifier)**

Model		IG-1000	IG-1050	IG-1500	IG-1550				
Appearance		A COL		0000	2800				
Amplifier type		DIN rai	i 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): 1	0% included, Class 2 or LPS					
Power consumption 4.	Normal	2700 mW or less (at	30 V: 90 mA or less)	2880 mW or less (at 30 V: 96 mA or less)					
(including analogue current	Power saving function (HALF)		2300 mW (at 30	V: 77 mA or less)					
output)	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, 3	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 x3c	ch, 30 VDC (Power supply voltage) or less	, residual voltage 1 V (2 V) or less, N.O./N	C. selectable Max. 50 mA/ch <sup>1.</sup>				
	Response time (judgement output)		1.96 to 40	031.72 ms <sup>2.</sup>					
	Edge check output (selectable between NPN and PNP)	NPN (PNP) open collector x1ch, 30 VD	C (Power supply voltage) or less, residual	voltage) or less, residual voltage 1 V (2 V) or less, N.O./N.C. selectable Max. 50 mA, <sup>1,</sup> resp					
		Voltage o		output Cu	rrent output				
		Output range ±5 V		ale 10 V) 4-20 mA	(full scale 16 mA)				
Output		Output resistance		Ω	-				
		Maximum load resistance			350 Ω				
	Analogue output (selectable among ±5V, 1-5 V, 0-5 V, 4-20 mA)	Repetition accuracy	±1 n	١V	±1.5 μA				
		Display accuracy	±0.05 %	of F.S. ±0	.25 % of F.S.				
		Temperature characteristics	±0.005 % c	f F.S./°C ±0.0	11% of F.S./°C				
		Update cycle Same as sensor head sampling cycle							
		Response time		Same as Response time (judgement outp	ut)				
		Time constant <sup>3.</sup>	10 µs (90 %	response) 30 µs	(90 % response)				
	Gain input	Input time: 2	0 ms or more. Response delay time: 120 r	ns 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							
to and	Timing input	Input time: 2 ms or more, Response delay time: 2 ms or less							
Input	Zero shift input		Input time: 20 ms or more, Re	t time: 20 ms or more, Response delay time: 20 ms or less					
	Bank A input/Bank B input	Input time: 20 ms or more, Response delay time: 20 ms or less <sup>2</sup> .							
	Laser emission stop input	Input time: 2 ms or more, Response delay time: 2 ms or less							
	Ambient temperature		-10 to +50°C	-10 to +50°C (No freezing)					
F	Ambient humidity		35 to 85% RH (	35 to 85% RH (No condensation)					
Environment resistance	Vibration		10 to 55 Hz Double amplitude	) to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours					
	Pollution degree								
Material		Case/Front sheet: Polycarbonate, Key top: Polyacetal, Cable: PVC							
Supplied item		Main body $\times$ 1, Instruction manual $\times$ 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
 Z. For more details, refer to the User's Manual.
 J. Delay time that occurs from the analogue output circuit after the judgment 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



# 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 judgments 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 judgment values will remain the same. This makes high-accuracy differentiation possible anywhere on the detection area.



As the position changes, the thrubeam light volume changes



Regardless of position, the thrubeam 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 thrubeam rate judgment is also possible.

# 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 judgments.



Does not stabilise due to the subtle difference in thrubeam light volume



Definitive determination of even the most minute thrubeam light volume difference



Sensitivity changes according to the influence of dirt, etc



Dirt is eliminated using the Light intensity correction function



## 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 friction, 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





#### Simple positioning according to the alignment LED

## Easy to align the optical axis

As the optical axis of the laser align, 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







#### 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						
	Laser Class	Class 1 (IEC60825-1, FDA (CDRH) Part1040.10 <sup>1</sup> )						
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 <sup>2.</sup>		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 <sup>3.</sup>		5 μm (distance 0 to 300 mm)	5 μm 5 μm 10 μm					
Temperature characteristics <sup>4.</sup>		±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)			±0.1% of F.S./°C (±30 µm)			
Operation indicator	Laser emission warning indicator: green LED							
	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				
Environmental resistance	Ambient temperature	0 to +40°C (no freezing)	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				
	Case	PBT	Galvanized die cast					
Material	Lens cover	Glass						
	Cable	PVC (2 m)						
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 (±20) 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		<b>A</b>	<b>10000</b>		10000			
Amplifier type		DIN rail mount	Panel mount	DIN rail mount	Panel mount			
Main unit/Expansion unit		Mair	1 unit	Expansion unit				
Head compatibility			Y	es				
	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)				
Display	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		Judgment indicator: 2-colour Bank indicator: Laser emission warnin Others: Green LE	(green/red) LED (HI, GO, LO), Green LED x 4, g indicator: Green LED, Dx 8, red LED x 3				
Analogue voltage output <sup>1.</sup>		±5 V, 1 to 5 V, 0 to 5 V 0	Dutput impedance 100Ω					
Analogue current output <sup>1.</sup>		4 to 20 mA Maximum load resistance 350Ω			10			
	Bank switch input							
	Zero-shift input							
Control	Laser emission stop input	Non-voltage input						
input <sup>2.</sup>	Timing input		Non Voit	ago mpor				
	Reset input							
	Adjust input							
Control	Judgment output		Open collector (NPN/PNP swi	tchable, N.O. /N.C. switchable)				
output <sup>3.</sup>	Check output			······································				
P	Power voltage	10 to 30 VDC, including ripp	ile (P-P) 10% Class 2 or LPS	Supplied fro	om main unit			
Power supply	Power consumption <sup>4.</sup>	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.)			
	Ambient temperature		-10 to +50°C (No freezing)					
Environmental registeres	Ambient humidity		35 to 85% RH (N	lo condensation)				
Environmental resistance	Vibration		10 to 55 Hz Double amplitude	1.5 mm XYZ each axis: 2 hours	axis: 2 hours			
	Pollution degree			2				
Material		Case/Front panel: polycarbonate, keytop: polyacetal, cable: PVC						
Peight (including supplied items) Approx. 150 g Approx. 170 g Approx. 140 g A			Approx. 165 g					

1 ±5 V, 1 to 5 V, 0 to 5 V, or 4 - 20 mA should be selected.
2. The four external input wires are assigned with desired inputs. Rated on-voltage input: Max. Input rating 30 V or less, OFF current 0.05 mA or less
3. 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 PN 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
3. 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
4. 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 (judgment 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. Judgments 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
٥٢٦	Not output
0-50	Analogue output after the judgement value is converted to the range from 0 to 5 V.
-5-50	Analogue output after the judgement value is converted to the range of $\pm 5$ V.
I-Su	Analogue output after the judgement value is converted to the range from 1 to 5 V.
85Pr	Analogue output after the judgement value is converted to the range from 4 to 20 mA.

The setting can be changed.

## **Communication Unit**

#### DL-RB1A BCD output unit

Use this unit when retrieving numerical data from the IG/IB Series to an external device as digital data. A single communication unit can retrieve data from up to four IG/IB Series display units in BCD.



#### **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.



#### DL-RS1A RS-232C communication unit

Use this unit when outputting digital data to an external device with RS-232C signals. It is necessary to connect it to a PC when using the startup support software, IG Configurator. A single communication unit can retrieve data from up to four IG/IB Series display units.



Models		Communication method	Connection device	Read judgment results	Read measurement values	Control input	Change tolerance values	Comments
DL-RS1A	STRATE ST	RS-232C	PLC PCs of various companies	\$	V	1	1	Uses no control sequence communication. Communicates by using a communication program.
DL-RB1A		BCD output	PLC PCs of various companies	Х	<i>√</i>	Х	X	Measurement values are updated by synchronising with the input terminals. Furthermore, updates automatically occur using a timer. Readouts are created by synchronising with the strobe output.

### Dimensions

#### **IG Series Sensor head**















#### IG Series Sensor head mounting bracket

#### IG-TB01 + IG-010



### Dimensions

#### **IB Series Sensor head**





Transmission spot (reference value) When distance is 300 mm: approximately ø 1 mm When distance is 2000 mm: approximately ø 2.5 mm



Receiver







Transmission spot (reference value)

(7×13 ellipse)



IB-05



Sensor amplifier (DIN rail mount type) IG (IB)-1000/IG (IB)-1050

Transmitter





- 2.5

le lenath 2 m

Sensor amplifier (Panel mount type)













#### Dimensions

#### Communication unit (BCD output type) DL-RB1A



34-pin MIL connector



Communication unit (RS-232C communication type) DL-RS1A





# KEYENCE

## Please visit: WWW.keyence.com



SAFETY INFORMATION

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

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