KEYENCE

NEW **CMOS Multi-Function Analogue Laser Sensor**

New Sensor Heads Released IL Series

"Stable Detection" Perfected

Laser Differentiation Displacement Sensor

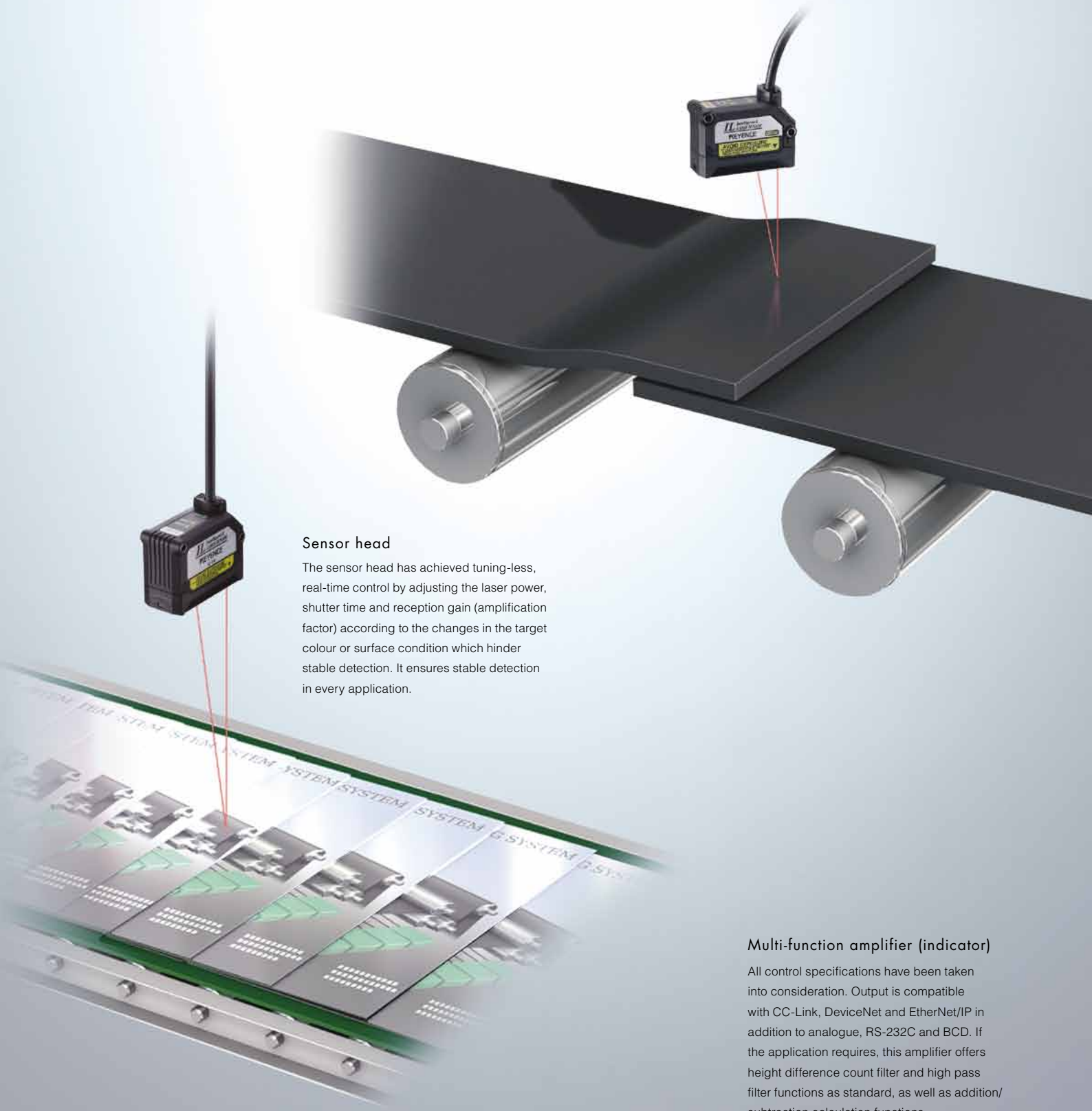
Achieving the highest performance in its class

Excellent differentiation ability at reasonable prices

Intelligent sensor

I-SERIES

Excellent differentiation ability at reasonable prices



Sensor head

The sensor head has achieved tuning-less, real-time control by adjusting the laser power, shutter time and reception gain (amplification factor) according to the changes in the target colour or surface condition which hinder stable detection. It ensures stable detection in every application.

Multi-function amplifier (indicator)

All control specifications have been taken into consideration. Output is compatible with CC-Link, DeviceNet and EtherNet/IP in addition to analogue, RS-232C and BCD. If the application requires, this amplifier offers height difference count filter and high pass filter functions as standard, as well as addition/subtraction calculation functions.

Intelligent sensor
I-SERIES

Easy stable detection

Tuning-less

No need for tuning according to the type or surface condition of detection targets. A dynamic range of x1.5 million for light quantity control has achieved stable detection for various applications.

Variation

Longest in its class

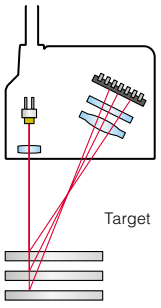
20 mm to 3.5 m

Sensor head lineup for every kind of applications. Wide detection range is covered from a short distance to an ultra-long distance of 3.5 m.

Repeatability from 1 µm

The sensor heads offer various repeatability levels from 1 µm. This enables a sufficient tolerance setting for applications which could not be detected stably with presence-detection sensors.

MEASUREMENT PRINCIPLE



These devices use the principle of triangulation for measurement.

When the position of targets is altered, the position of the beam spot on the CMOS moves. These devices measure the displacement of targets by detecting the position of the beam spot.

An abundance of head variations for all applications

Series	IL Series CMOS Multi-function Analogue Laser Sensor	
Head type	**IL-S Sharp-Line Sensor Heads**	**IL Wide Range Sensor Heads**

IL-S025

Reference distance: 25 mm
Measurement Range: 10 mm

Measuring Range from Head: 20 to 30 mm

Repeatability: 1 µm
Linearity: ±0.075% of F.S

IL-S065

Reference distance: 65 mm
Measurement Range: 20 mm

Measuring Range from Head: 55 to 75 mm

Repeatability: 2 µm
Linearity: ±0.05% of F.S

IL-030

Reference distance: 30 mm
Measurement Range: 25 mm

Measuring Range from Head: 20 to 45 mm

Repeatability: 1 µm
Linearity: ±0.1% of F.S

IL-065

Reference distance: 65 mm
Measurement Range: 50 mm

Measuring Range from Head: 55 to 105 mm

Repeatability: 2 µm
Linearity: ±0.1% of F.S

0 20 40 60 80 100 120 140 160 180 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500

Equipped with three functions that enable maximum stability:

Super-Resolution Algorithm included
SCAN (Sensitive-laser Control Analyser) included
Sharp-Line Beam

IL-100

Reference distance: 100 mm
Measurement Range: 55 mm

Measuring Range
from Head:
75 to 130 mm

Repeatability: 4 µm
Linearity: ±0.15% of F.S

IL-300

Reference distance: 300 mm
Measurement Range: 290 mm

Measuring Range
from Head:
160 to 450 mm

Repeatability: 30 µm
Linearity: ±0.25% of F.S

IL-600

Reference distance: 600 mm
Measurement Range: 800 mm

Measuring Range
from Head:
200 to 1000 mm

Repeatability: 50 µm
Linearity: ±0.25% of F.S

IL-2000 NEW

Reference distance: 2000 mm
Measurement Range: 2500 mm

Measuring Range
from Head:
1000 to 3500 mm

Longest
in its class
3.5m

Repeatability: 100 µm
Linearity: ±0.16% of F.S

Introducing a new high-performance head for the IL Series
Stable performance for the most demanding detection

IL-S Sharp-Line Sensor Heads

The transmitter is equipped with a cylindrical lens that enables sharp-line beams.
We have overhauled the signal processing inside the head and equipped the device with a Super-Resolution Algorithm so that it is the highest-functioning model in its class.

- Equipped with Industry First Super-Resolution Algorithm
- Repeatability from 1 µm
- Linearity ±0.05% of F.S. Highest in its Class
- Dynamic Range (x1.5 million)

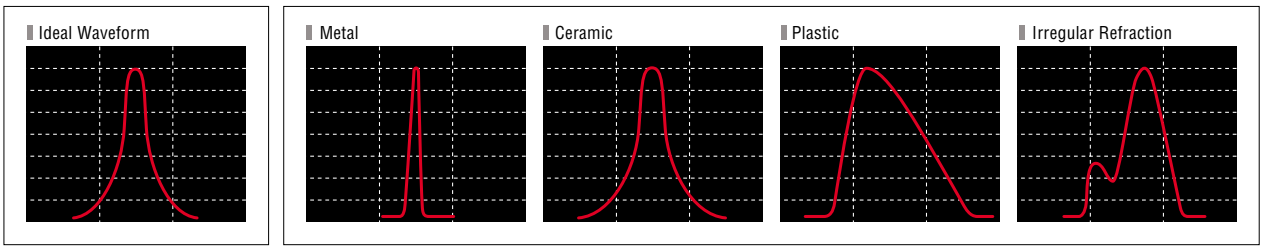
Equipped with three functions that enable maximum stability

Super-Resolution Algorithm included Industry First

This algorithm identifies differences in CMOS received light waveforms generated by changes in surface conditions of target workpiece and automatically processes waveforms in the best manner possible. Now, you can perform stable detection without tuning, even on metal hairlines, plastic, rubber and other workpiece that has always been difficult to detect.

SUPER-RESOLUTION DEFINED

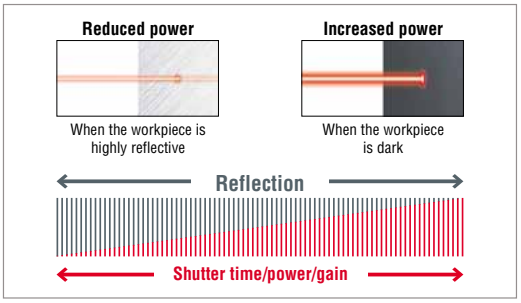
The shape of waveforms transmitted to CMOS depends on workpiece material and surface conditions. Before, stability also differed because the same setting was used on different workpiece. The Super-Resolution Algorithm identifies the width of waveforms and automatically performs the setting best suited for the shape of waveforms.



SCAN Function with Wide Dynamic Range

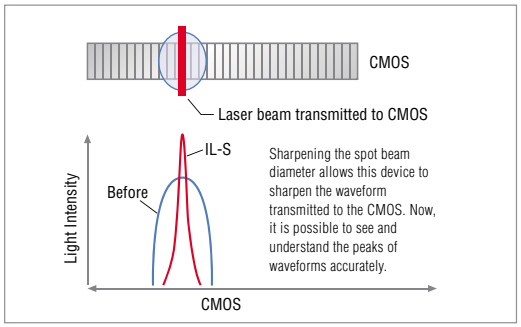
SCAN (=Sensitive-laser Control Analyser)

The laser power, shutter time and reception gain on this device are adjust in real-time in order to deliver stable detection faithfully for all targets. We also developed a new digital circuit that enables a dynamic range of x1.5 million, 2.5 times higher than past models. Real-time controls that suit targets and their surface conditions enable stable detection.



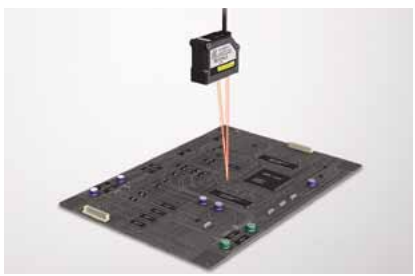
Sharp-Line Beam

KEYENCE's original optical system pushes the beam diameter to the limits (25 µm), and its sharpness enables the most excellent stability in history. We have overhauled and optimised our optical system for spot profiling for stability in applications that, until now, yielded very erratic results.



APPLICATION

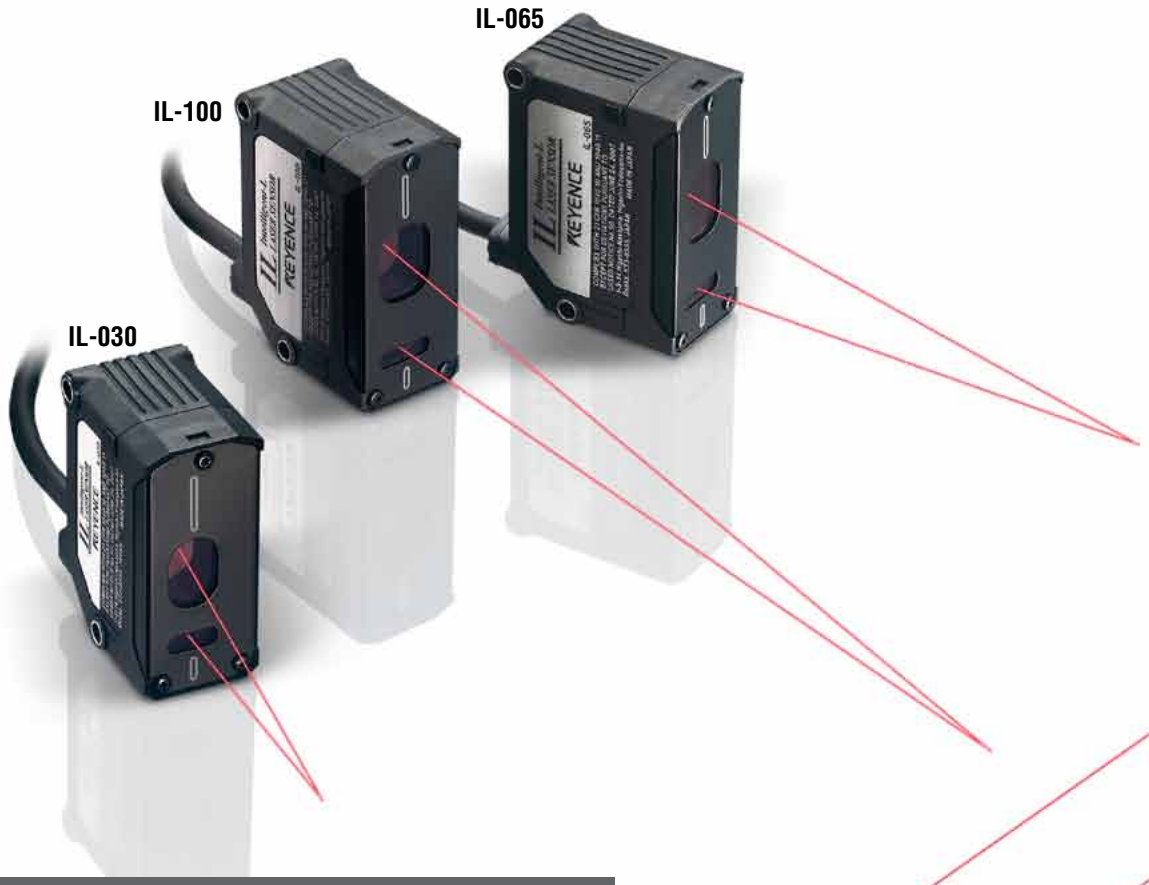
Measuring the height of a chip after bonding



Height controls of a PC board

Lineup of six sensor heads offering 20 mm to 3500 mm according to the application

IL Wide Range Sensor Heads

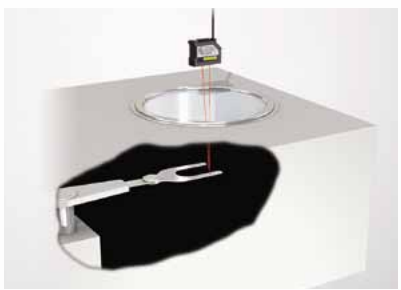


Repeatability from 1 µm

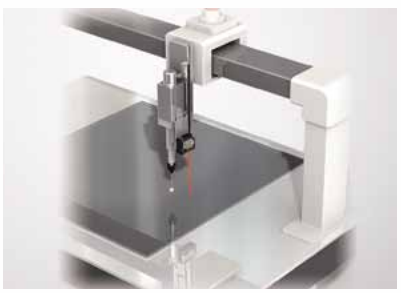
Dynamic range (x1 million)

Lineup of six sensor heads offering 20 mm to 3500 mm according to the application

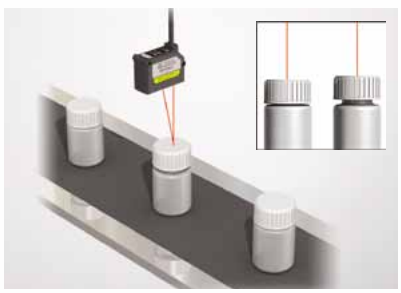
APPLICATION



Detecting the arm height through a view port



Detecting the height of a workpiece for a cutting machine

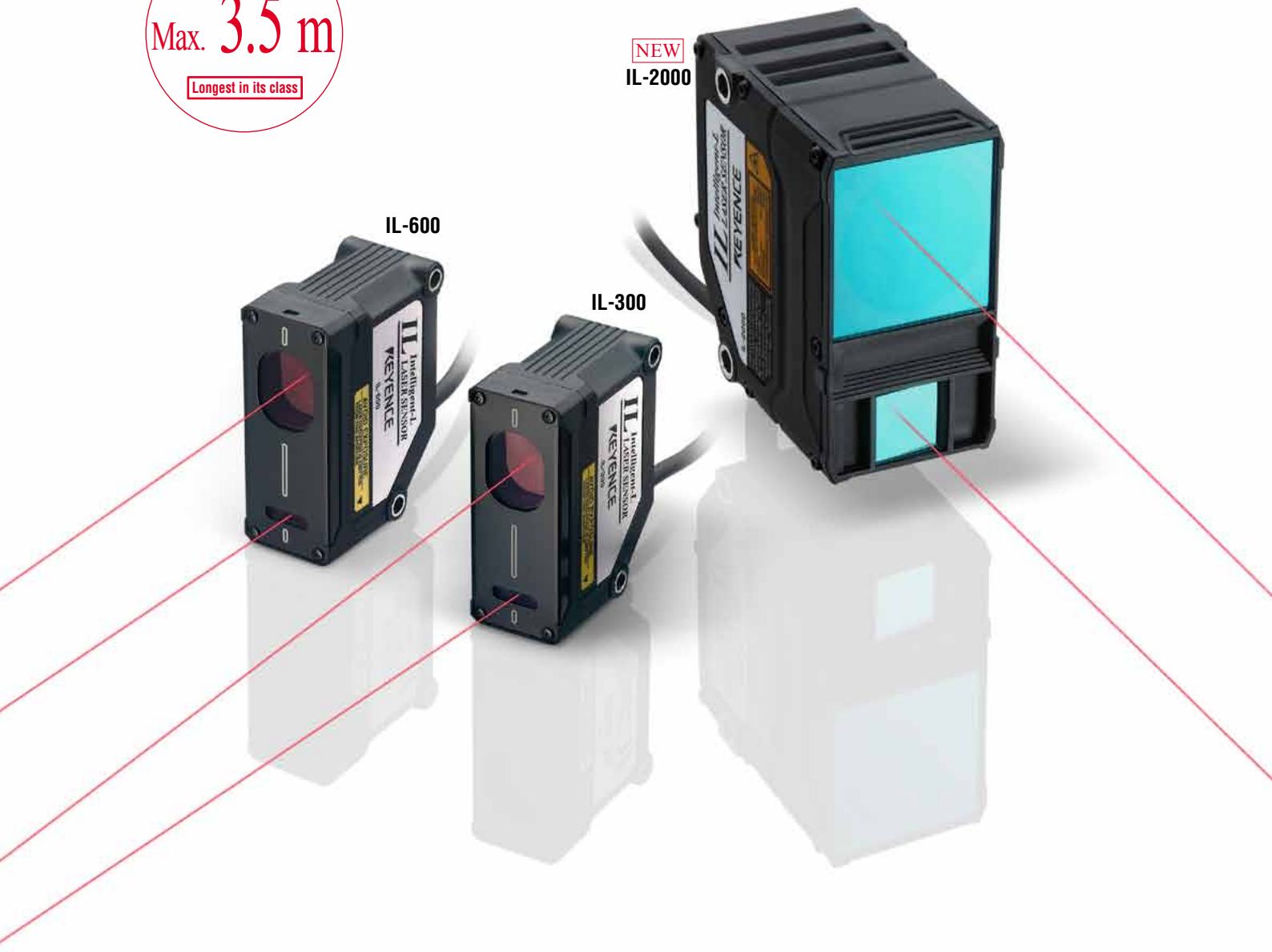


Detecting loose caps

Excellent stability even in long range detection

Max. 3.5 m

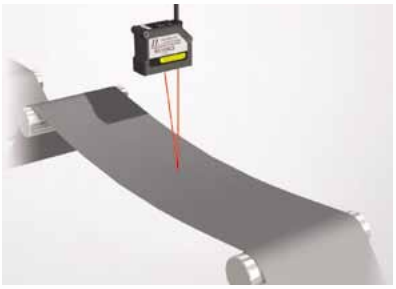
Longest in its class



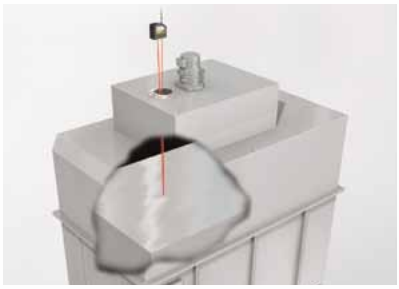
Excellent angle characteristics

Unaffected by target colours or materials

APPLICATION



Tension control of a sheet material



Detecting the level of molten aluminium

Detecting a remaining workpiece in a mould

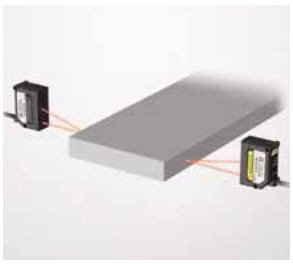
The multi-function amplifier

Calculation Function

Addition mode

SETTING EXAMPLE 1
(thickness measurement)

SETTING EXAMPLE 2
(width measurement)



Subtraction mode

SETTING EXAMPLE 1
(Measurement of height difference)

SETTING EXAMPLE 2
(Measuring tilt)

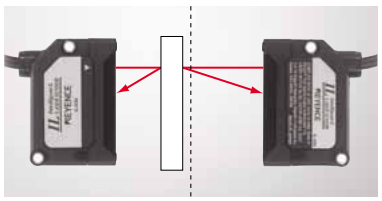
Internal calculations are possible for all kinds of applications.
This device is equipped with an all-in-one add/subtract function that focuses PLC data and reduces programming hours.

NEW MODE – Thickness Calibration Function Included

3-step easy calibration

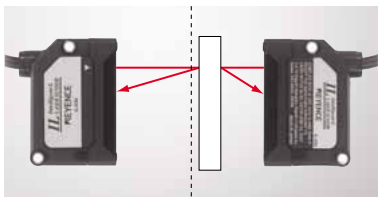
With conventional devices, calibration had to be conducted on every individual sensor head, however, the IL Series has a dedicated mode that allows calibration to be completed in 3 simple steps.

Step 1



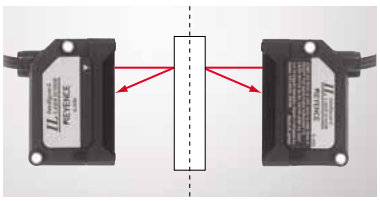
Bring the target close to one sensor head and input the thickness data, then push the set button.

Step 2



Bring the same target used in Step 1 close to the opposing sensor head and push the set button.

Step 3



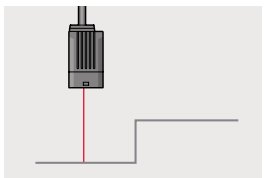
Insert a target thicker than the target used in Step 2. Input the thickness data. Then pushing the set button completes calibration.

When bringing the target closer to the sensor head in Steps 1 and 2, you are compensating for the misalignments that occur during installation.
To set, you can begin with either one of the sensor heads.

Height difference count filter function included NEW

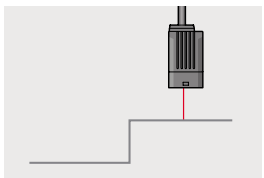
This function identifies step edges automatically and delivers one-shot output for each step. Create settings for count and seam detection applications easily, without the programming hours.

Step 1



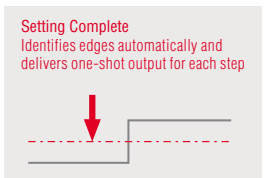
Press the SET button for the lower step.

Step 2



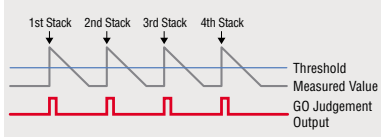
Press the SET button for the upper step.

Step 3



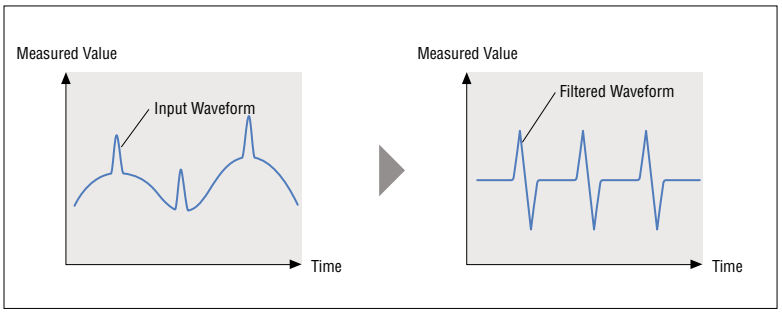
Intermediary value threshold entered automatically.

Count the number of sheets of printed material



High pass filter function included NEW

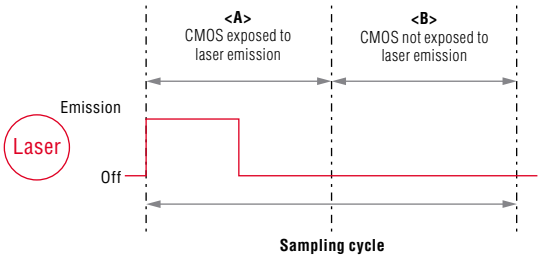
This function displays frequencies above the adjustable cutoff frequency and ignores changes below that cutoff.
It is effective for discarding smooth fluctuations and looking only at rapid changes.

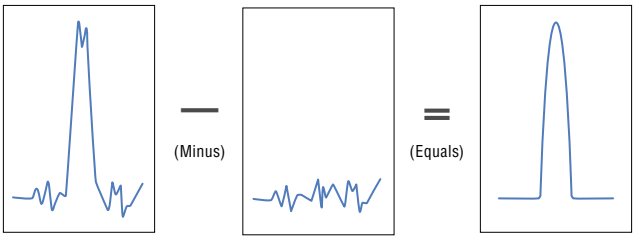


Detection on the edge of a sheet

Ambient light elimination function included

In order to counteract any ambient light interference, the IL Series automatically activates the ambient light elimination function when the sampling cycle is set to '2 ms' or '5 ms', reducing the effects of ambient light.





The CMOS waveform of A
Ambient light is present

The CMOS waveform of B
Ambient light only

CMOS waveform (difference)
Waveform where the ambient light has been removed

Function Choices

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.

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, shift value, analogue output scaling setting

Analogue Output Selection

The following five 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
0-5u	Analogue output after the judgement value is converted to the range from 0 to 5 V.
-5-5u	Analogue output after the judgement value is converted to the range of ±5 V.
1-5u	Analogue output after the judgement value is converted to the range from 1 to 5 V.
4-20r	Analogue output after the judgement value is converted to the range from 4 to 20 mA.

The setting can be changed.

Mounting method options

Both panel and DIN-rail mount units are available.

IL-1500/1550
Panel mount type

IL-1000/1050
DIN-rail mount type

Variety of heads enables abundance of applications

POSITIONING

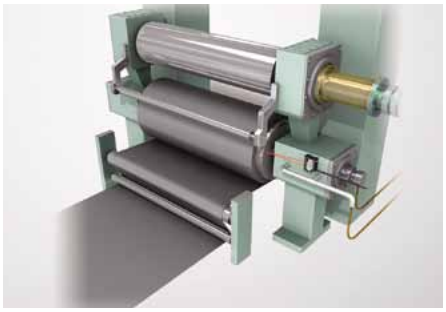
Robot arm positioning

Detect robot arm chuck precision on the X-, Y- and Z-axes. The long range head enables detection from long distances.

Vision system CCD height positioning

Position the vision system on the Z-axis during substrate inspection. This device delivers stable detection, even for different target workpiece materials.

Roll chuck position detection



Detect the position of roll chucks for film winding. Save a huge amount of adjustment time, even for different equipment.

Position detection of a carton on a pallet

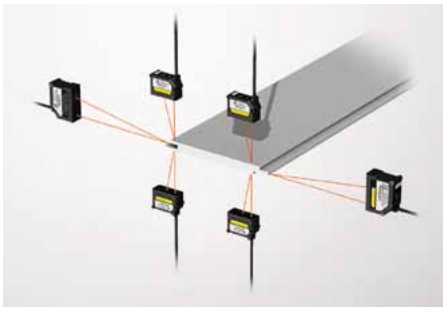
The position of a carton on a pallet transferred by a palletizer is detected. The detection is stable regardless of the changes in colours or the inclination of cartons.

THICKNESS

Press processing thickness differentiation

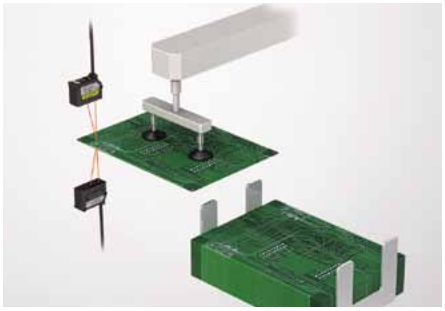
Differentiate between steel plates or catch two sheets going through at once with thickness differentiation in the press process. The long range head enables differentiation from long distances, even for large-sized pressing.

Thickness/width measurements of building material boards



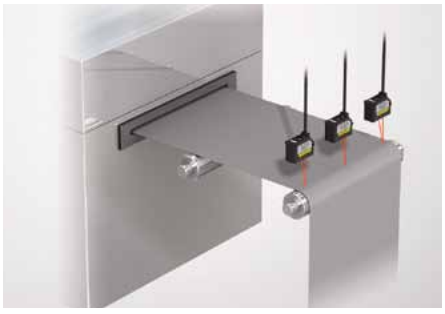
Thickness and width can be simultaneously measured immediately after the extrusion process. In addition, man-hours for setup and product changeovers are reduced using the thickness calibration function.

Single/double-sheet substrate differentiation



Differentiate single/double sheets when transferring substrates. This device enables stable detection, even for different substrate material.

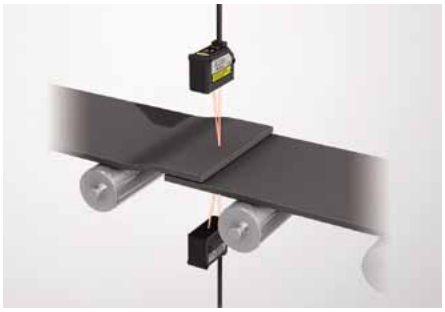
Sheet material thickness detection



This device constantly monitors thickness differentiation of sheet material. The multi-point head allows you to detect irregularities in the thickness of edges and in the bodies of materials.

SEAM/COUNT

Rubber sheet seam detection



Detect seams in rubber sheets. Sensors above and below the workpieces enable stable detection, even when the sheets flip-flop.

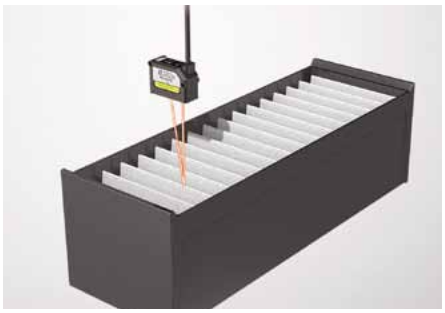
Detecting welding seams

Detect welding seams on steel plates. The Height Difference Count Filter Function enables stable detection.

Stacker counting & uneven checks

The IL Series counts how many items are being transported along a conveyer, in addition to the non-contact detection of uneven stacking in the stacker. Reliable detection regardless of colour changes in the targets.

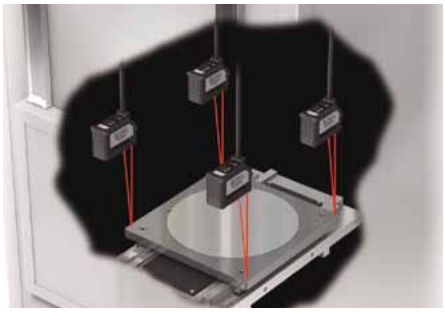
Counting air conditioner filter sheets



Count the number of air conditioner filter sheets. The High Pass Filter Function enables stable detection, even for workpiece whose height is not constant.

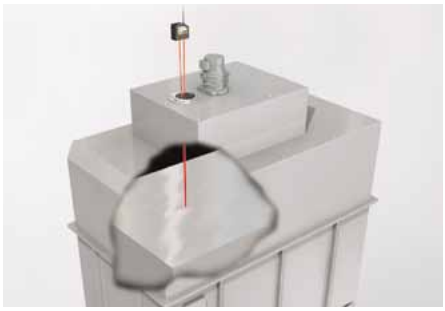
HEIGHT

Detection of stage inclination prior to furnace transportation



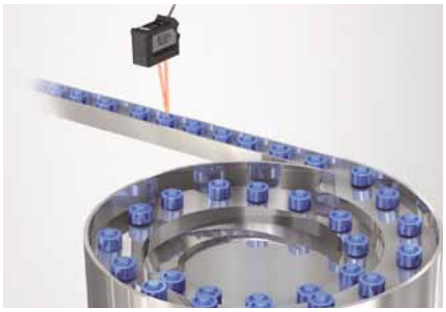
Calculates the inclination by measuring multiple points on the stage prior to transferring to the furnace. Transferring the product after correcting the inclination allows for consistent temperature control.

Detecting the level of molten aluminium



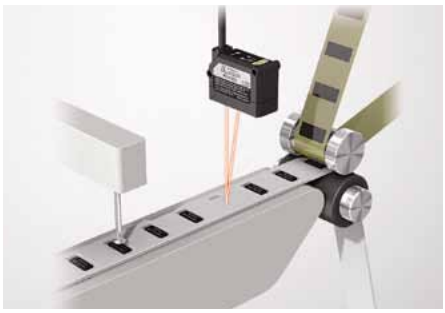
The ultra-long range type can be installed at a distance of 3500 mm at maximum from the target, eliminating worries for the ambient temperature.

Differentiation of different types of plastic components



Reliable differentiation, even in highly variable small parts, using a high-precision sensor head. Even when the variety changes, external changeover of up to 4 patterns is possible by setting items in the bank function.

Double-chip prevention/ chip presence detection



Check whether chips are present or not, or if two are present by mistake during chip transfer. This device enables stable detection, even during high-speed transfers.

Variety of heads enables abundance of applications

CONTROL

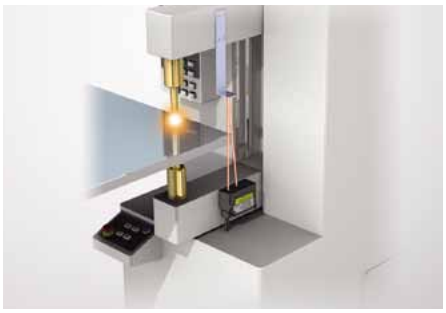
Control marking height

Control the distance between the head of marking instruments and workpiece. This device enables stable detection, even for different target workpiece.

Control sheet roll diameter

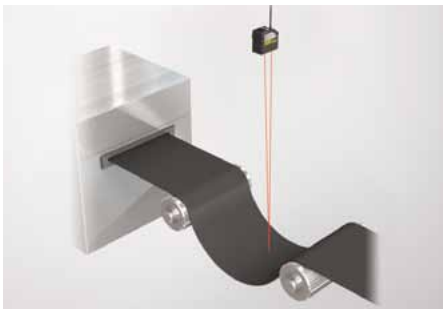
Control feed speed and tension rolling with constant monitoring of sheet diameter during rolling and unrolling processes.

Control welding torch height



Control the height of welding torches. Boost welding precision through constant, exhaustive monitoring.

Height control of a hoop material



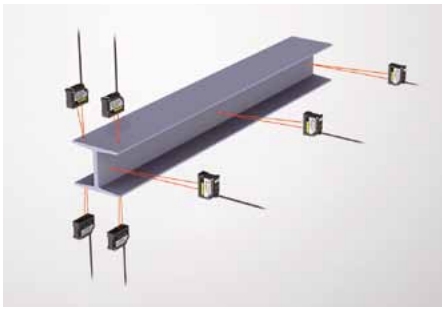
The ultra-long range type can be installed at a distance of 3500 mm at maximum from the target, which allows hoop control of steel plates or sheet materials being transferred.

SHAPE-WARP

Warpage detection in ceramic boards

As the sensor head is compact, multiple point measurements of small-scale boards are possible. By calculating the measurement data externally, simultaneous measurements of positioning and warpage are possible.

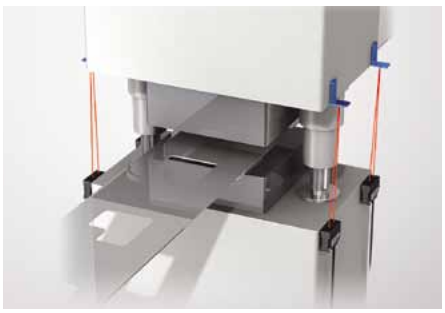
Detect H-beam flange warp



Detect the warp of H-beam flanges at multiple points before using a correction mechanism. Use a long range head for compatibility with many different kinds of workpiece.

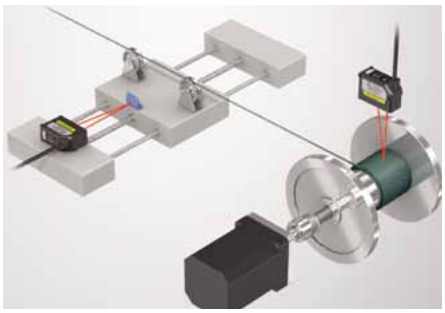
STROKE/VIBRATION

Press stroke control



Proactively prevent press defects by constantly monitoring the amount of press strokes and the bottom dead centre of presses. Use a long range head to enable compatibility with large-sized pressing machine.

Traverser stroke control



Prevent rolling disorders by controlling traverser strokes while measuring the amount that bobbins roll to provide feedback to the instrument.

OPTIONAL LINEUP

Communication Unit Variations

NEW

DL-EP1
EtherNet/IP Unit

EtherNet/IP

Cyclic communication makes live data acquisition easy. In addition, message communications allows easy setting changes.

NEW

DL-DN1
DeviceNet Unit

DeviceNet

Cyclic I/O Communication makes status monitoring simple. In addition, Explicit Messaging capability allows easy setting changes.

DL-RS1A
RS-232C Unit

RS-232C communication protocol allows universal compatibility with any device capable of decoding ASCII communications.

DL-RB1A
BCD Output Unit

The measured value can be synchronised with a trigger input or updated via a timer. Output values are synchronised with the strobe output.

Optional

Type	Appearance	Model	Description	Weight
End unit (Optional)		**OP-26751**	To connect an additional expansion unit, use the end units to secure the display units on both ends. When connecting additional units, be sure to use the end units. (2 pcs.)	Approx. 15 g
Panel front protection cover [Included in panel mount type amplifier]		**OP-87076**	The panel front protection cover and panel mounting bracket are included in the panel mount type amplifier. If the supplied cover or bracket is lost or damaged, purchase a new one.	Approx. 6 g
Panel mounting bracket [Included in panel mount type amplifier]		**OP-4122**		Approx. 7 g
Expansion cable: 300 mm		**OP-35361**	Extension cable used for panel mount type amplifier. Use this cable if the standard cable is not long enough.	Approx. 10 g
DIN-rail mounting bracket		**OP-60412**	The mounting bracket is used when the expansion cable is used to connect to the panel mount type display unit, in which case a DIN rail is not provided.	Approx. 12 g
Mounting bracket		**OP-87606**	Special mounting bracket for IL-2000	Approx. 338 g

Sensor head cables (sold separately)

The cable does not come attached with the sensor head and must be purchased separately.

Type	Appearance	Cable length	Model	Weight
Straight	1 cable included 	2 m	OP-87056	Approx. 80 g
		5 m	OP-87057	Approx. 190 g
		10 m	OP-87058	Approx. 360 g
		20 m	OP-87059	Approx. 680 g
L-shaped	1 cable included 	2 m	OP-87660	Approx. 80 g
		5 m	OP-87661	Approx. 190 g
		10 m	OP-87662	Approx. 360 g
		20 m	OP-87663	Approx. 680 g

This connector is required if the cable is cut.

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

OP-84338

SPECIFICATIONS

Sensor heads (IL-S)

Model		IL-S025	IL-S065
Shape			
Reference distance		25 mm	65 mm
Measurement range		20 to 30 mm	55 to 75 mm
Light source		Red semiconductor laser, wavelength: 655 nm (visible light)	
	Laser class	Class 2 laser product (FDA (CDRH) Part 1040.10[1.] IEC 60825-1)	
	Output	560 µW	
Spot diameter (at reference distance)		Approx. 25 x 1200 µm	Approx. 55 x 1700 µm
Linearity[2. 3.]		±0.075% of F.S. (when used at 20 to 25 mm)	±0.05% of F.S. (when used at 55 to 65 mm)
		±0.1% of F.S. (when used at 20 to 30 mm)	±0.075% of F.S. (when used at 55 to 75 mm)
Repeatability[4.]		1 µm	2 µm
Sampling cycle		0.33/1/2/5 ms (4 levels selectable)	
Operation indicator		Laser emission warning indicator: Green LED, Analogue range indicator: Orange LED, Reference distance indicator: Red/Green LED	
Temperature characteristics[3.]		0.03% of F.S./°C	0.02% of F.S./°C
Environmental resistance	Enclosure rating	IP67	
	Ambient light[5.]	Incandescent lamp: 10000 lux	
	Ambient temperature	-10 to +50°C (No condensation or freezing)	
	Relative humidity	35 to 85% RH (No condensation)	
	Vibration	10 to 55 Hz, 1.5 mm double amplitude in X, Y and Z directions, 2 hours respectively	
	Pollution degree	3	
Material		Housing: PBT, Metal parts: 304 stainless steel, Packing: NBR, Lens cover: Glass, Cable: PVC	
Weight		Approx. 60 g	Approx. 75 g

1. The laser classification for FDA (CDRH) is implemented based on IEC 60825-1 in accordance with the requirements of Laser Notice No. 50.
2. Value when the KEYENCE standard target (white diffuse object) is measured.
3. F.S. of each model is as follows: IL-S025: ±5 mm, IL-S065: ±10 mm
4. Value when the KEYENCE standard target (white diffuse object) is measured at the reference distance, sampling cycle of 1 ms, and average number of times of 128.
5. Value when the sampling cycle is set to 2 ms or 5 ms.

Sensor heads (IL)

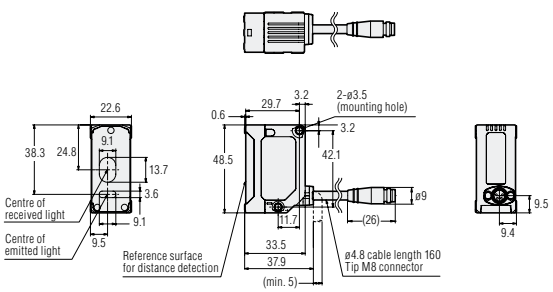
Model		IL-030	IL-065	IL-100	IL-300	IL-600	NEW IL-2000
Shape							
Reference distance		30 mm	65 mm	100 mm	300 mm	600 mm	2000 mm
Measurement range		20 to 45 mm	55 to 105 mm	75 to 130 mm	160 to 450 mm	200 to 1000 mm	1000 to 3500 mm
Light source		Red semiconductor laser, wavelength: 655 nm (visible light)					
	Laser class	Class 1 laser product (FDA (CDRH) Part 1040.10[1.] IEC 60825-1)	Class 2 laser product (FDA (CDRH) Part 1040.10[1.], IEC 60825-1)				
	Output	220 µW	560 µW				
Spot diameter (at reference distance)		Approx. 200 x 750 µm	Approx. 550 x 1750 µm	Approx. 400 x 1350 µm	Approx. ø500 µm	Approx. ø1600 µm	Approx. 1400 x 7000 µm
Linearity[2. 3.]		±0.1% of F.S. (when used at 25 to 35 mm)	±0.1% of F.S. (when used at 55 to 75 mm)	±0.15% of F.S. (when used at 80 to 120 mm)	±0.25% of F.S. (when used at 160 to 440 mm)	±0.25% of F.S. (when used at 200 to 600 mm) ±0.5% of F.S. (when used at 200 to 1000 mm)	±0.16% of F.S. (when used at 1000 to 3500 mm)
Repeatability[4.]		1 µm	2 µm	4 µm	30 µm	50 µm	100 µm
Sampling cycle		0.33/1/2/5 ms (4 levels selectable)					
Operation indicator		Laser emission warning indicator: Green LED, Analogue range indicator: Orange LED, Reference distance indicator: Red/Green LED					
Temperature characteristics[3.]		0.05% of F.S./°C	0.06% of F.S./°C	0.06% of F.S./°C	0.08% of F.S./°C		0.016% of F.S./°C
Environmental resistance	Enclosure rating	IP67					
	Ambient light[5.]	Incandescent lamp: 5000 lux	Incandescent lamp: 7500 lux		Incandescent lamp: 5000 lux		Incandescent lamp: 10000 lux
	Ambient temperature	-10 to +50°C (No condensation or freezing)					
	Relative humidity	35 to 85% RH (No condensation)					
	Vibration	10 to 55 Hz, 1.5 mm double amplitude in X, Y and Z directions, 2 hours respectively					
	Pollution degree	3					
Material		Housing: PBT, Metal parts: 304 stainless steel, Packing: NBR, Lens cover: Glass, Cable: PVC					
Weight		Approx. 60 g	Approx. 75 g		Approx. 135 g		Approx. 350 g

1. The laser classification for FDA (CDRH) is implemented based on IEC 60825-1 in accordance with the requirements of Laser Notice No. 50.
2. Value when the KEYENCE standard target (white diffuse object) is measured.
3. F.S. of each model is as follows: IL-030: ±5 mm, IL-065: ±10 mm, IL-100: ±20 mm, IL-300: ±140 mm, IL-600: ±400 mm, IL-2000: +1000 mm to -1500 mm
4. Value when the KEYENCE standard target (white diffuse object) is measured at the reference distance, sampling cycle of 1 ms, and average number of measurements of 128.
   (2 ms for IL-300/600, 5 ms for IL-2000)
5. Value when the sampling cycle is set to 2 ms or 5 ms.

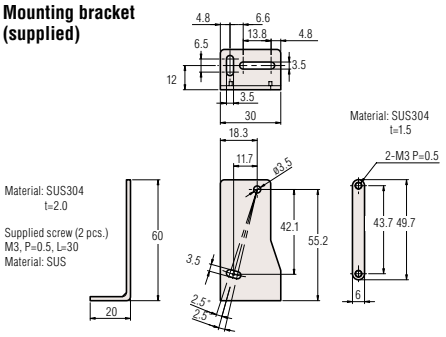
Unit : mm

Sensor heads

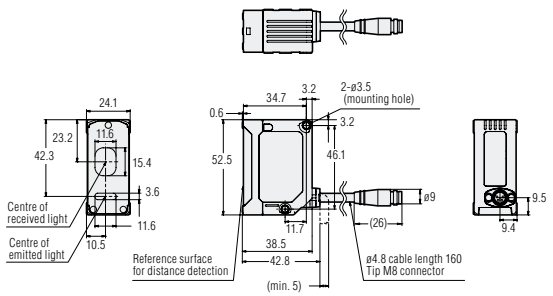
IL-S025/IL-030



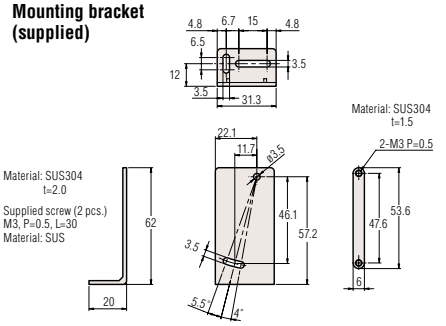
Mounting bracket (supplied)



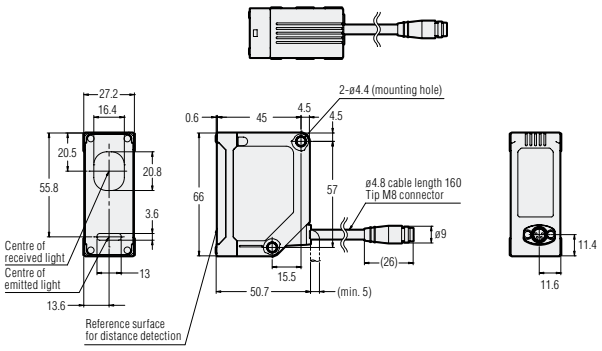
IL-S065/IL-065/100



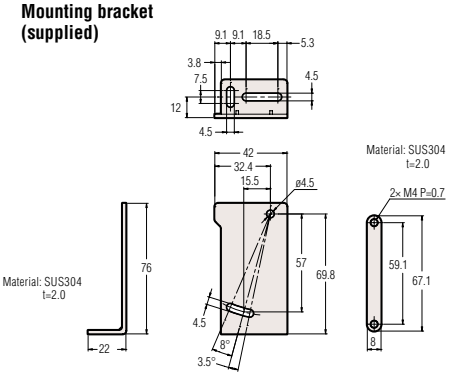
Mounting bracket (supplied)



IL-300/600

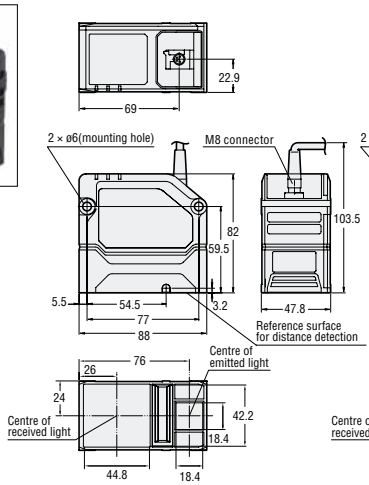


Mounting bracket (supplied)

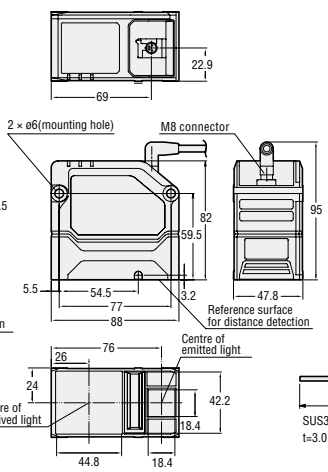


IL-2000

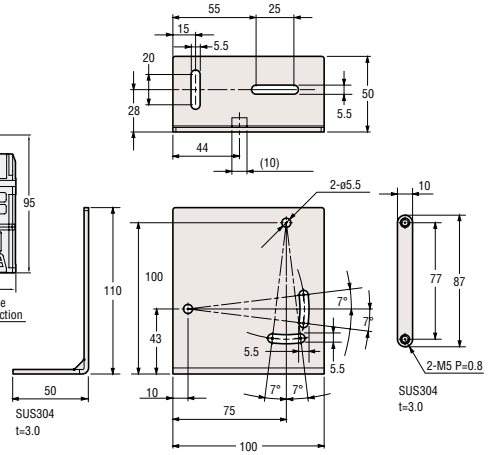
When a straight cable is used



When an L-shaped cable is used



Mounting bracket OP-87606 (sold separately)



SPECIFICATIONS

Amplifier unit

Model		IL-1000	IL-1500	IL-1050	IL-1550
Shape					
Type		DIN-rail mount	Panel mount	DIN-rail mount	Panel mount
Main unit/expansion unit		Main unit		Expansion unit	
Head compatibility		Compatible			
Display	Minimum displayable unit	IL-S025/IL-030: 1 µm, IL-S065/IL-065/IL-100: 2 µm, IL-300: 10 µm, IL-600: 50 µm, IL-2000: 100 µm			
	Display range	IL-S025/IL-030/IL-S065/IL-065/IL-100: ±99.999 mm to ±99 mm (4 levels selectable), IL-300/IL-600: ±999.99 mm to ±999 mm (3 levels selectable), IL-2000: ±9999.9 mm to ±9999 mm (2 levels selectable)			
	Display rate	Approx. 10 times/sec.			
Analogue voltage output [1.]		±5 V, 1 to 5 V, 0 to 5 V Output impedance 100 Ω		None	
Analogue current output [1.]		4 to 20 mA Maximum load resistance of 350 Ω			
Control input [2.]	Bank switch input	Non-voltage input			
	Zero-shift input				
	Stop emission input				
	Timing input				
	Reset input				
Control output [3.]	Judgement output	Open collector output (NPN, PNP changeover possible/N.O., N.C. changeover possible)			
	Alarm output	Open collector output (NPN, PNP changeover possible/N.C.)			
Current	Power voltage [4.]	10 to 30 VDC ripple (P-P) 10% included, Class 2or LPS[*5]		Supplied by main unit	
	Power consumption	2300 mW or less (at 30 V: 77 mA or less)	2500 mW or less (at 30 V: 84 mA or less)	2000 mW or less (at 30 V: 67 mA or less)	2200 mW or less (at 30 V: 74 mA or less)
Environmental resistance	Ambient temperature	-10 to +50°C (No condensation or 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 tops: Polyacetel; Cable: PVC			
Weight (including attachments)		Approx. 150 g	Approx. 170 g	Approx. 140 g	Approx. 160 g

1. Select and use one of ±5 V, 1 to 5 V, 0 to 5 V or 4 to 20 mA. 2. Assign an input of your choice to the 4 external input lines before using.
3. – The NPN open collector rated output is: 50 mA max./ch (20 mA when adding an expansion unit) less than 30 V, residual voltage less than 1 V (less than 1.5 V when adding over 6 units including the main unit)
   – The PNP open collector rated output is: 50 mA max./ch (20 mA/ch when adding expansion units), less than power voltage, and less than 2 V residual voltage (less than 2.5 V when adding over 6 units including the main unit)
4. If there are over 6 additional expansion units, please use a power voltage of 20 to 30 V.
5. Use Class 2 or LPS power supply with the overcurrent protection device rated 2.5 A or less.

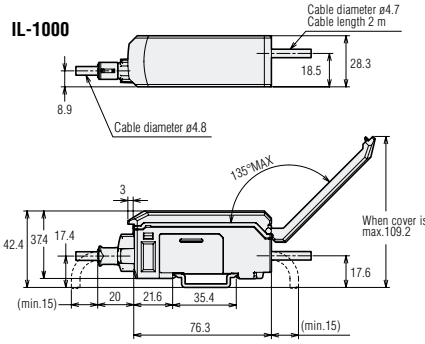
DIMENSIONS

Unit : mm

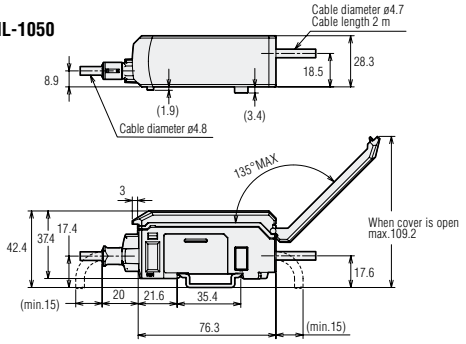
Amplifier unit (DIN-rail mount type)

IL-1000/IL-1050

IL-1000

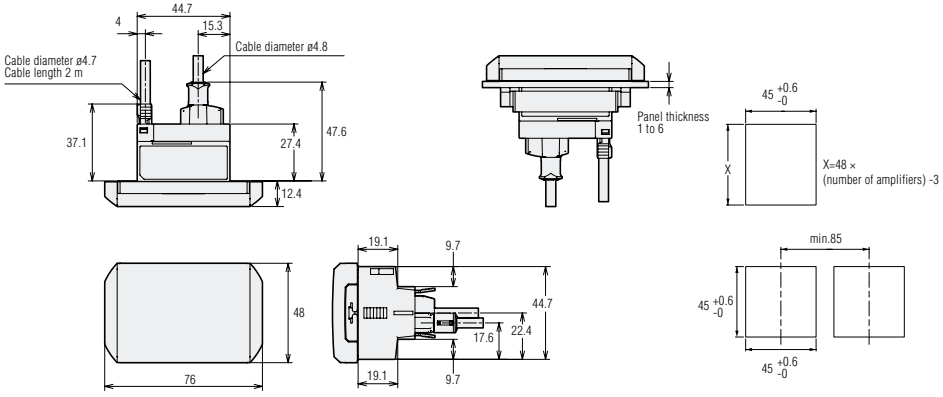


IL-1050

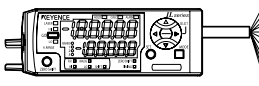


Amplifier unit (Panel mount type)

IL-1500/IL-1550



WIRING DIAGRAM



Brown [1.]	10 to 30 VDC [4.]
Blue [1.]	0 V
Black	HIGH judgement output
White	LOW judgement output
Grey	GO judgement output
Green	Alarm output
Light blue [1.]	Analogue output +
Orange [2.]	Analogue output GND
Shield [2.]	External input 1 (zero shift input)
Pink [3.]	External input 2 (reset input)
Yellow [3.]	External input 3 (timing input)
Pink/purple [3.]	External input 4 (not used)
Purple [3.]	

1. The brown, blue, and light blue cables are not provided in a IL-1050/IL-1550 unit (expansion unit). The power is supplied to the expansion unit from the IL-1000/IL-1500 unit (main unit).
2. For an analogue output, OFF (not used), 0 to 5 V, ±5 V, 1 to 5 V, or 4 to 20 mA can be selected.
3. For an external input, bank A input, bank B input, laser emission stop input, or OFF (not used) can also be selected. For details, refer to the User's Manual.
4. If there are over 6 additional expansion units, please use a power voltage of 20 to 30 V.

SPECIFICATIONS

Communication unit (EtherNet/IP)

Model		DL-EP1
Ethernet specifications	Compliant standards	IEEE802.3 (10BASE-T)/IEEE802.3u (100BASE-TX)
	Transmission rate	10Mbps (10BASE-T)/100Mbps (100BASE-TX)
	Transmission medium	STP cable or Category 3 or higher UTP cable (10BASE-T)/STP cable or Category 5 or higher UTP cable (100BASE-TX)
	Maximum cable length	100 m (Distance between DL-EP1 and Ethernet switch)
	Maximum number of connectable hubs	4 (10BASE-T)/2 (100BASE-TX)
EtherNet/IP specifications	Compatible functions	Cyclic communication (Implicit messaging)
		Message communication (Explicit messaging) Compatible with UCMM and Class 3
	Number of connections	64
	RPI (Transmission cycle)	0.5 to 10000 ms (0.5 ms unit)
	Tolerable communication bandwidth for cyclic communication	6000pps
	Conformance test	Compatible with Version A7
Sensor connection specifications	Connectable sensors	Sensor amplifiers with D-bus support [1]
	Number of connectable sensor units	Up to 8 units
Indicators		Link/activity indicator (LINK/ACT): Green LED, Module status indicator (MS): 2-colour (green/red) LED, Network status indicator (NS): 2-colour (green/red) LED, Sensor communication indicator (D-bus) 2-colour (green/red) LED
Power voltage		Including 20 to 30 VDC ripple (p-p) 10% (This voltage is supplied from the connected sensor amplifier)
Power consumption		1500 mW or less (at 30 V 50 mA max)
Environmental resistance	Operating ambient air temperature	-20 to +55°C (no freezing)
	Operating ambient air humidity	35 to 85% RH (no condensation)
	Vibration resistance	10 to 55 Hz compound amplitude 1.5 mm, 2 hours each in X, Y, Z directions
	Pollution degree	2
Materials		Main unit case: Polycarbonate
Weight		Approx. 70 g

Communication unit (DeviceNet)

Model			DL-DN1
Communication method			DeviceNet compliant
DeviceNet specifications	Compliant functions		Remote I/O communication (polling) Explicit messaging
	Address setting		0 to 63 (PGM compatible).
	Baud rate (automatically switched)		500 kbps/250 kbps/125 kbps
	Maximum cable length	500 kbps	100 m for thick cable; 100 m for thin cable
		250 kbps	250 m for thick cable; 100 m for thin cable
		125 kbps	500 m for thick cable; 100 m for thin cable
	Network power supply		11 to 25 VDC (supplied from DeviceNet communication power supply)
Sensor connection specifications	Connectable sensors		Sensor amplifiers with D-bus support [1]
	Number of connectable sensor units		8 units max.
Indicators			Network status indicator: 2-colour (green/red) LED, Module status indicator: 2-colour (green/red) LED, Sensor communication indicator: 2-colour (green/red) LED
Power voltage			20 to 30 VDC, including ripple (P-P) 10% (supplied from the connected sensor amplifiers)
Power consumption			660 mW or less (at 30 V, 22 mA max.)
Environmental resistance	Operating ambient temperature		-20 to +55°C (no freezing)
	Operating ambient humidity		35 to 85% RH (no condensation)
	Vibration resistance		10 to 55 Hz, compound amplitude 1.5 mm, 2 hours each in X, Y, Z directions
	Pollution degree		2
Materials			Main unit case and dust cover: Polycarbonate, DeviceNet connector: Polyamide (plug), PUT (socket)
Weight (including connectors)			Approx. 80 g

1. “D-bus” is the name of KEYENCE’s wiring-saving system for sensor amplifiers.

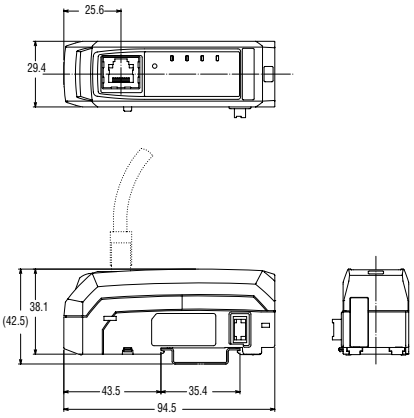
Communication unit (BCD output: DL-RB1A/RS-232C: DL-RS1A)

Model		DL-RB1A	DL-RS1A
Power supply voltage		20 to 30 VDC, including ripple, Ripple (P-P): 10% max. Class 2 (Supplied via connected sensor amplifier)	
Power consumption		27 mA max.	25 mA max.
Number of connectable sensor amplifiers		Up to 8 units (including main unit)	
Indicator		Alarm indicator lamp (red), Power indicator lamp (green)	Communication indicator lamp (green × 2), Alarm indicator lamp (red), Power indicator lamp (green)
Communication method		–	Full duplex
Synchronisation method		–	Start-stop
Transmission code		–	ASCII
Baud rate		–	2400/4800/9600/19200/38400 bps selectable (Factory-setting: 9600 bps)
Data bit length		–	8 bits/7 bits selectable (Factory-setting: 8 bits)
Parity check		–	None/Even/Odd selectable (Factory-setting: None)
Stop bit length		–	1 bit
Data delimiter		–	Data reception: automatically recognises CR or CR+LF Data transmission: Fixed to CR+LF
Environment resistance	Ambient temperature	-10 to +55°C	
	Ambient humidity	35 to 85%RH (No condensation)	
	Vibration resistance	10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours	
Material		Case/Polycarbonate	
Weight		Approx. 46 g	Approx. 53 g

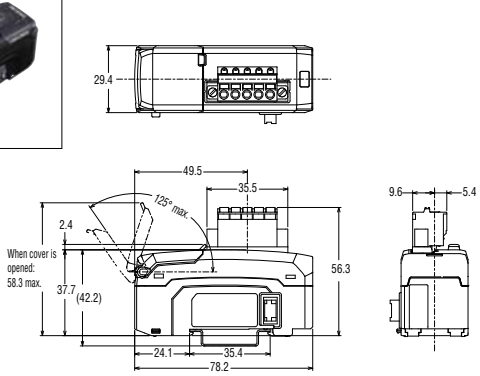
DIMENSIONS

Unit : mm

Communication unit (EtherNet/IP Unit)
DL-EP1



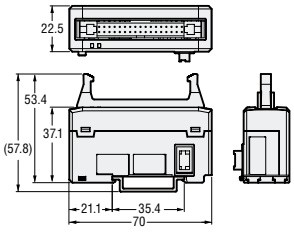
Communication unit (DeviceNet Unit)
DL-DN1



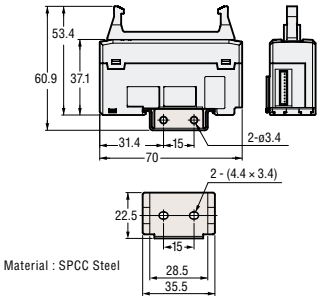
Communication unit (BCD Output Unit)
DL-RB1A

34-pin MIL connector

DIN-rail mount

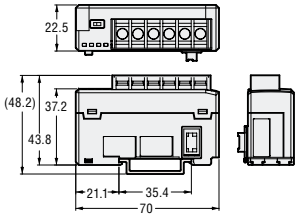


When the mounting bracket is attached
OP-60412 (Optional)

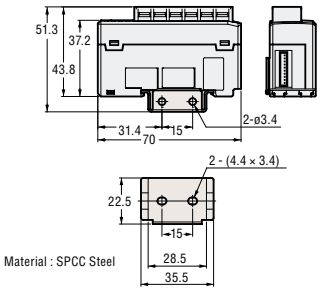


Communication unit (RS-232C Unit)
DL-RS1A

DIN-rail mount



When the mounting bracket is attached
OP-60412 (Optional)



KEYENCE

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: +91-44-4963-0900 Fax: +91-44-4963-0901
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

WW1-1062

IL-WW-C3-GB 1102-1 600B40 Printed in Japan