



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

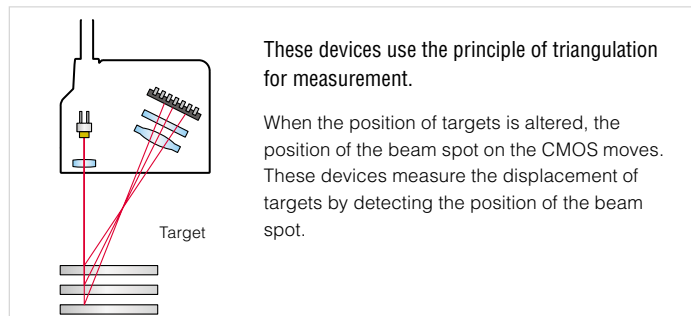
Sensor head lineup for every kind of applications. Wide detection range is covered from a short distance to an ultra-long distance of 3.5 m.

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

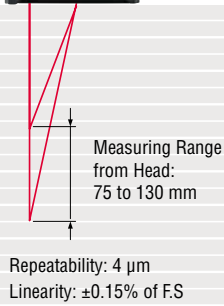


An abundance of head variations for all applications

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	Equipped with three functions that enable maximum stability: Super-Resolution Algorithm included SCAN (Sensitive-laser Control Analyser) included Sharp-Line Beam			
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				

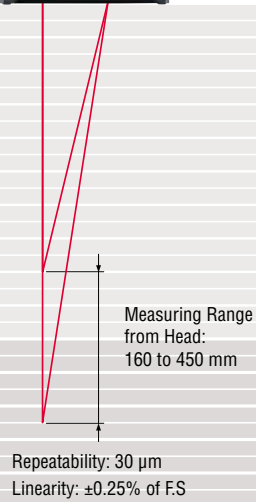
IL-100

Reference distance: 100 mm
Measurement Range: 55 mm



IL-300

Reference distance: 300 mm
Measurement Range: 290 mm



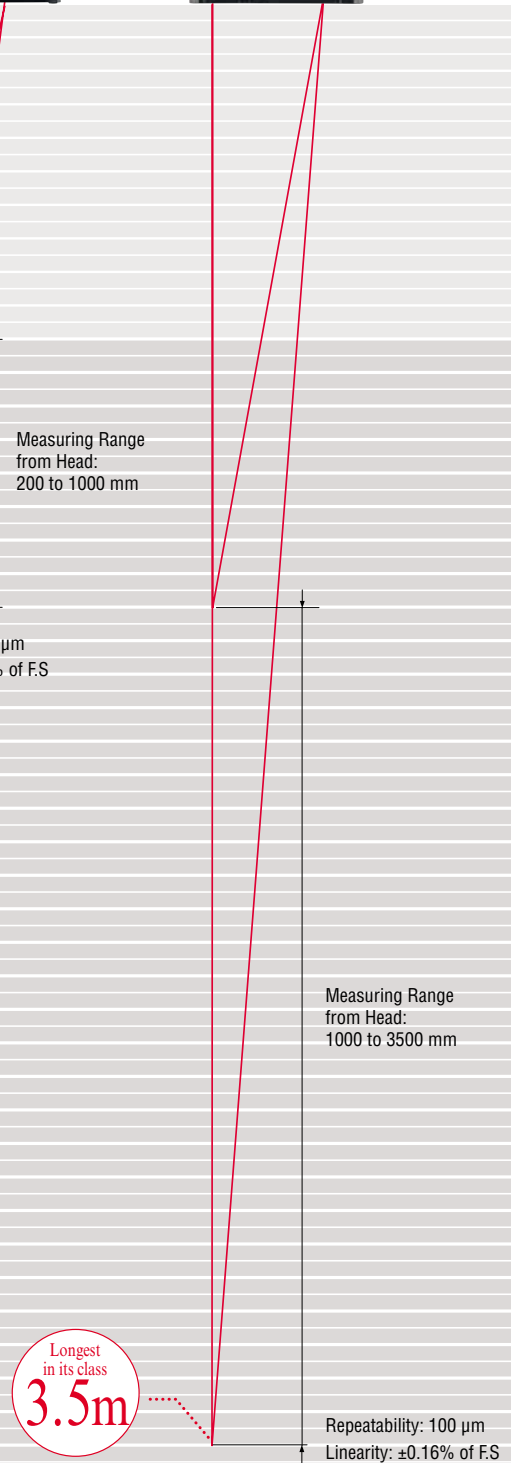
IL-600

Reference distance: 600 mm
Measurement Range: 800 mm



IL-2000 NEW

Reference distance: 2000 mm
Measurement Range: 2500 mm



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 $\pm 0.05\%$ of F.S. **Highest in its Class**

Dynamic Range (x1.5 million)

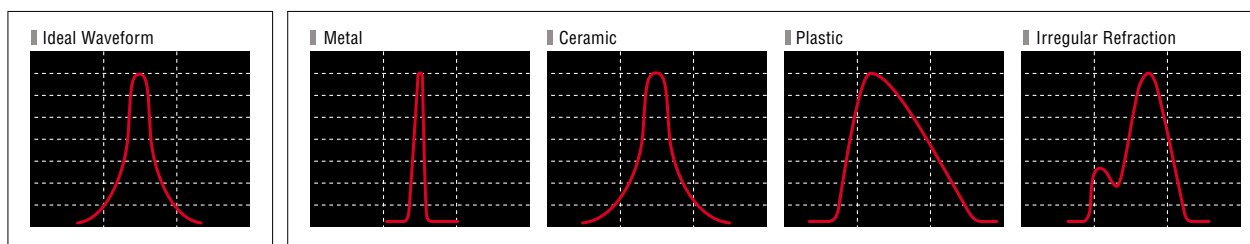
Equipped with three functions that enable maximum stability

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

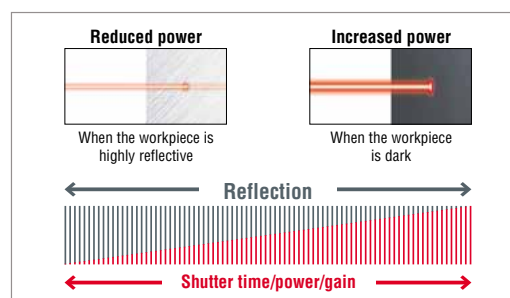
The shape of waveforms transmitted to CMOS depends on workpiece material and surface conditions. Before, stability also differed because the same setting was used on different workpiece. The Super-Resolution Algorithm identifies the width of waveforms and automatically performs the setting best suited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



SCAN Function with Wide Dynamic Range

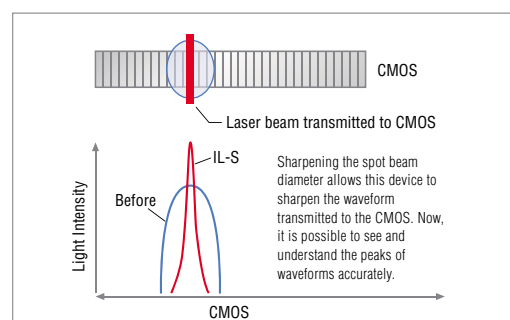
SCAN (=Sensitive-laser Control Analyser)

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



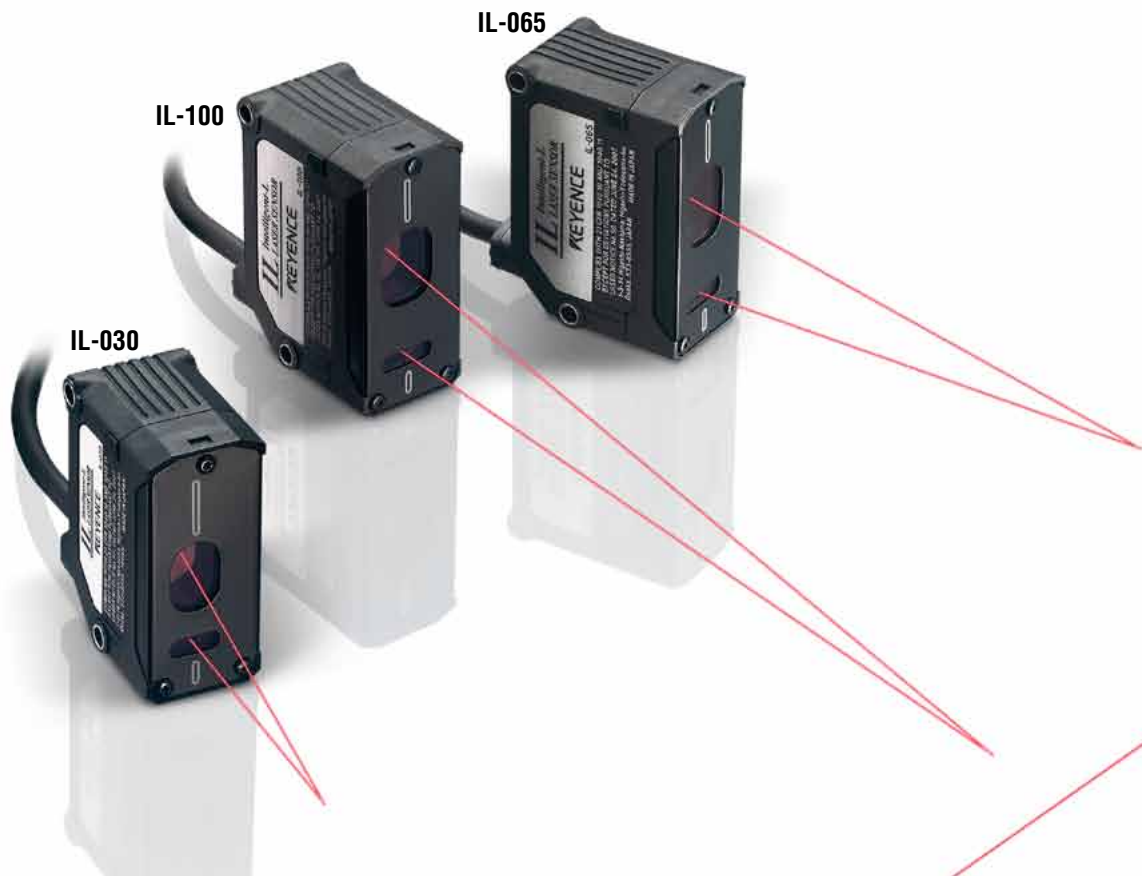
Measuring the height of a chip after bonding



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

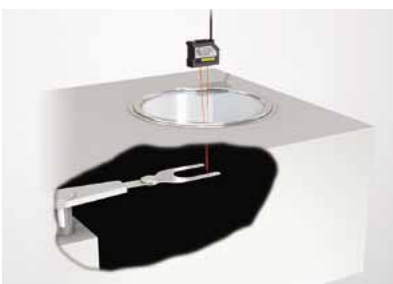


Repeatability from 1 μ m

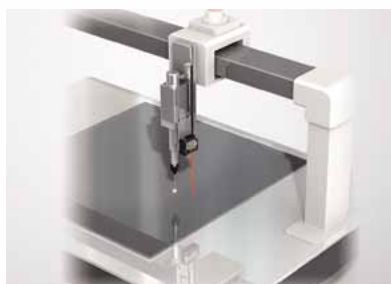
Dynamic range (x1 million)

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

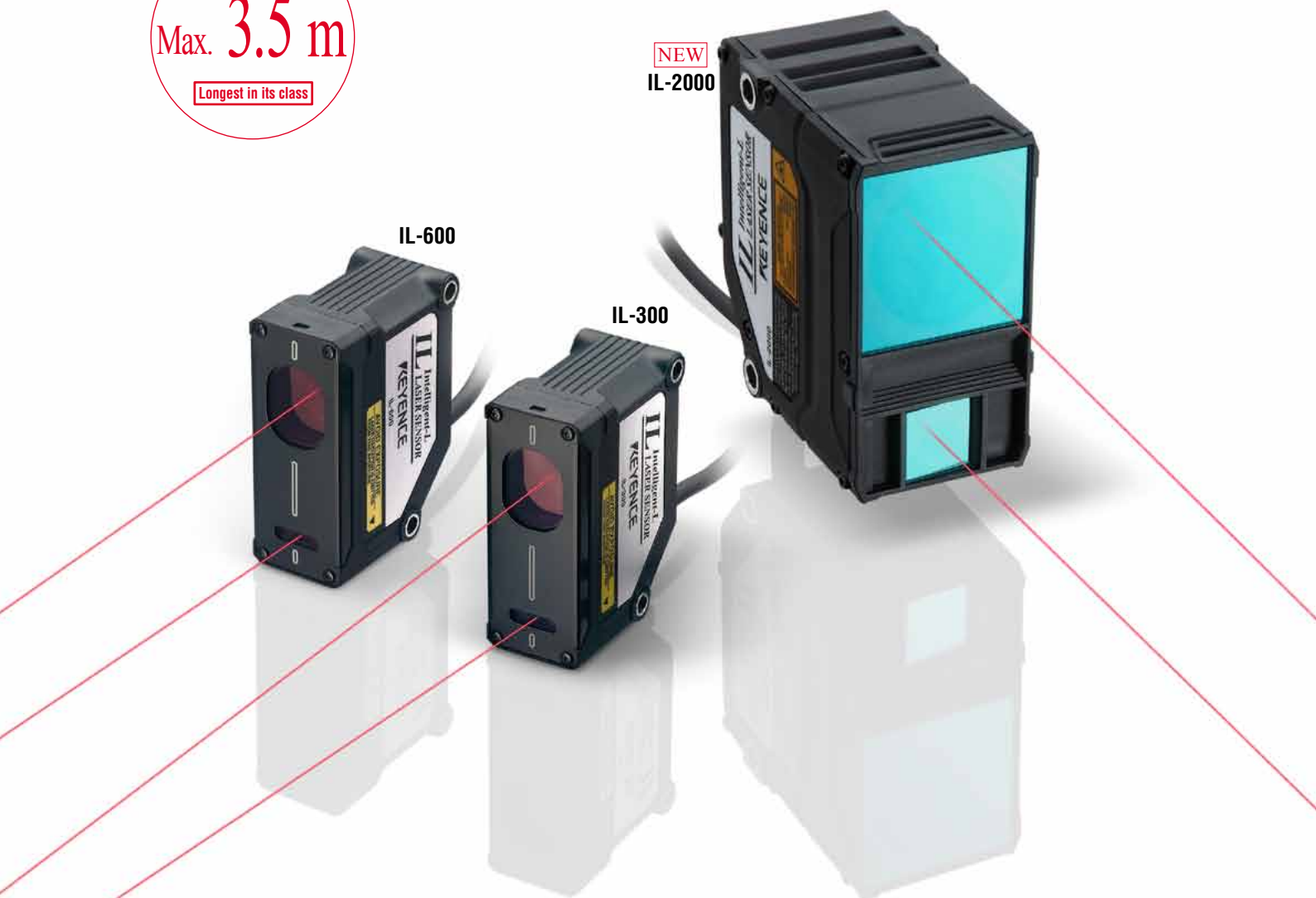
Max. 3.5 m

Longest in its class

NEW
IL-2000

IL-600

IL-300



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

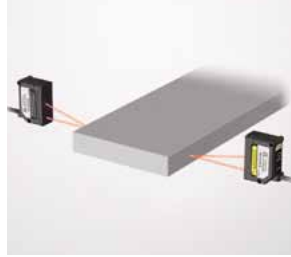
Calculation Function

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)



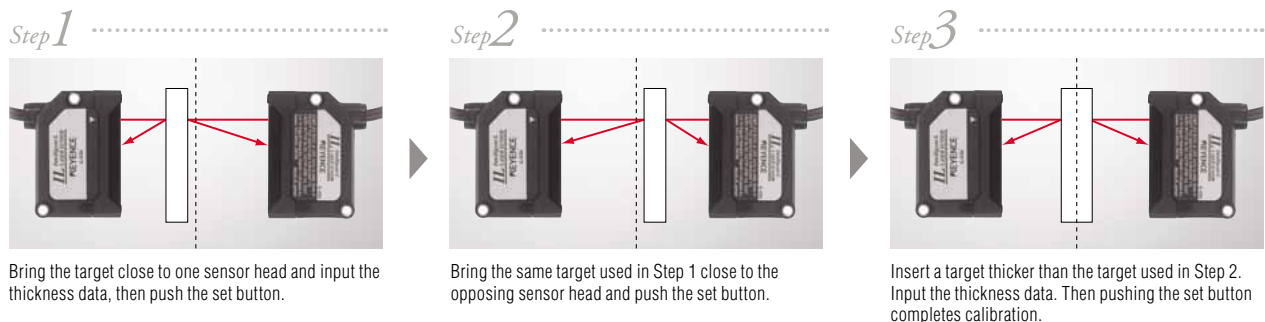
Internal calculations are possible for all kinds of applications.

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

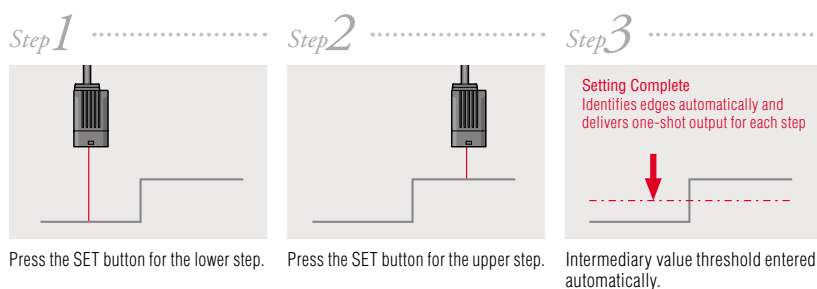
With conventional devices, calibration had to be conducted on every individual sensor head, however, the IL Series has a dedicated mode that allows calibration to be completed in 3 simple steps.



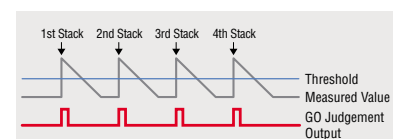
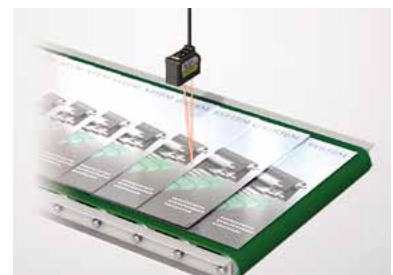
When bringing the target closer to the sensor head in Steps 1 and 2, you are compensating for the misalignments that occur during installation. To set, you can begin with either one of the sensor heads.

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.

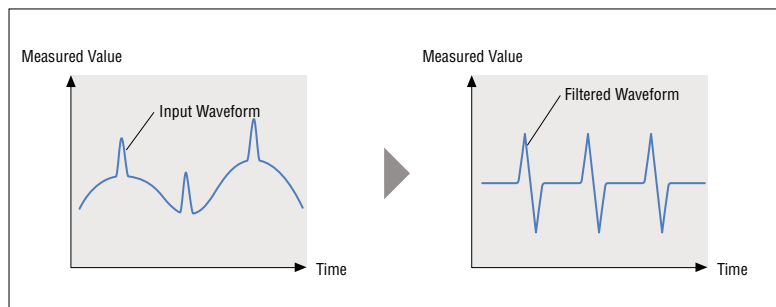


Count the number of sheets of printed material



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.

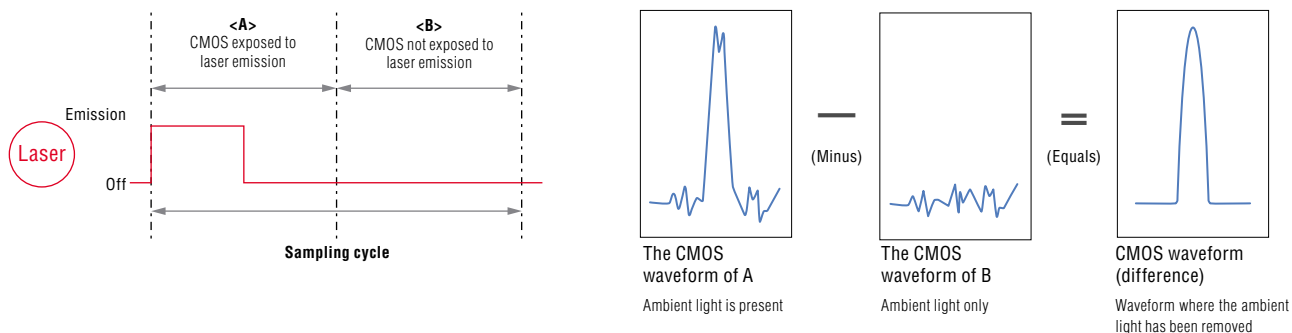


Detection on the edge of a sheet



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.



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.

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	No 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, shift value, analogue output scaling setting

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



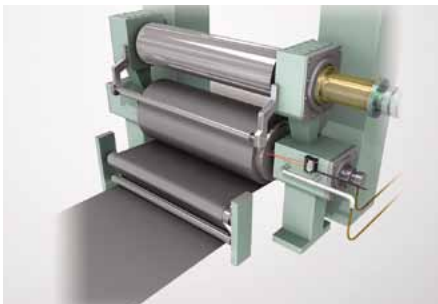
Detect robot arm chuck precision on the X-, Y- and Z-axes. The long range head enables detection from long distances.

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



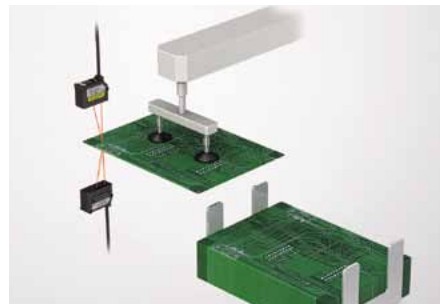
Differentiate between steel plates or catch two sheets going through at once with thickness differentiation in the press process. The long range head enables differentiation from long distances, even for large-sized pressing.

Thickness/width measurements of building material boards



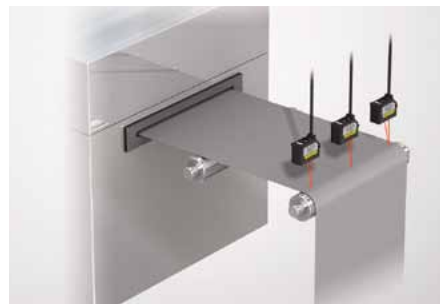
Thickness and width can be simultaneously measured immediately after the extrusion process. In addition, man-hours for setup and product changeovers are reduced using the thickness calibration function.

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



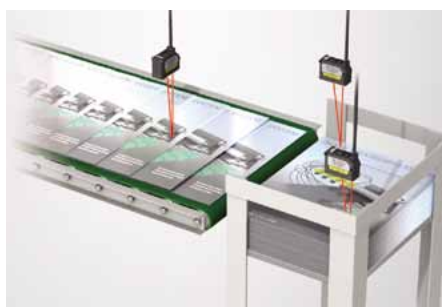
Detect seams in rubber sheets. Sensors above and below the workpieces enable stable detection, even when the sheets flip-flop.

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 conveyor, in addition to the non-contact detection of uneven stacking in the stacker. Reliable detection regardless of colour changes in the targets.

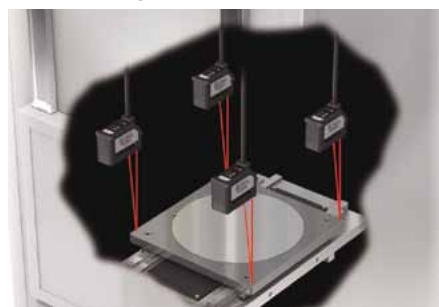
Counting air conditioner filter sheets



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



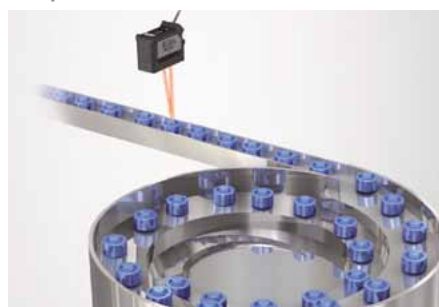
Calculates the inclination by measuring multiple points on the stage prior to transferring to the furnace. Transferring the product after correcting the inclination allows for consistent temperature control.

Detecting the level of molten aluminium



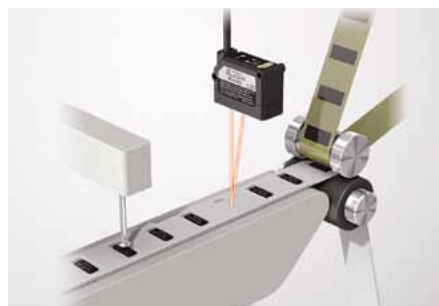
The ultra-long range type can be installed at a distance of 3500 mm at maximum from the target, eliminating worries for the ambient temperature.

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



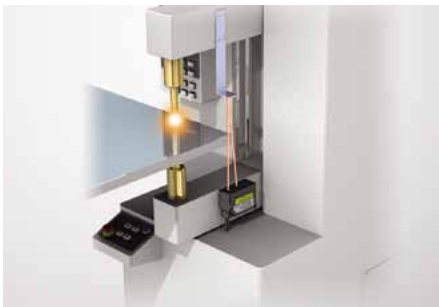
Control the distance between the head of marking instruments and workpiece. This device enables stable detection, even for different target workpiece.

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.

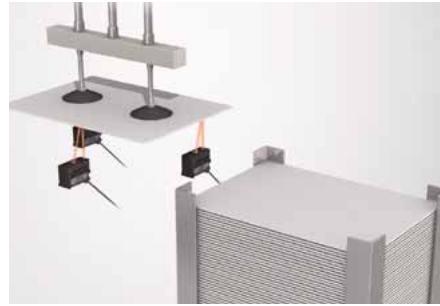
Height control of a hoop material



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.

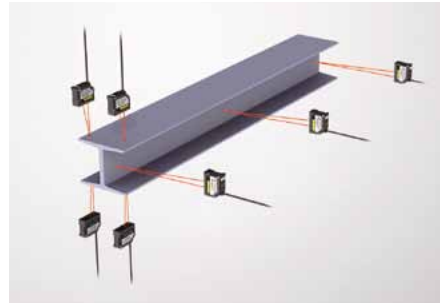
SHAPE-WARP

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.

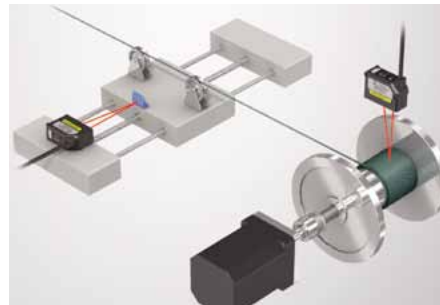
STROKE/VIBRATION

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


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

NEW


DL-DN1
 DeviceNet Unit


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)	
	Class 2 laser product (FDA (CDRH) Part 1040.10 ¹ IEC 60825-1)	
	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	
	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

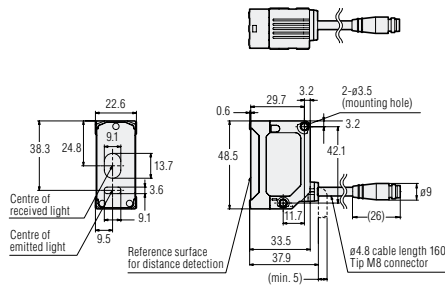
1. The laser classification for FDA (CDRH) is implemented based on IEC 60825-1 in accordance with the requirements of Laser Notice No. 50.
2. Value when the KEYENCE standard target (white diffuse object) is measured.
3. F.S. of each model is as follows: IL-030: ±5 mm, IL-065: ±10 mm, IL-100: ±20 mm, 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.

DIMENSIONS

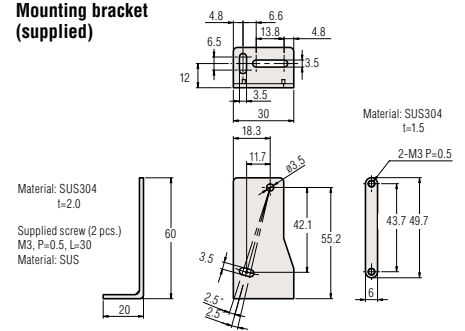
Unit : mm

Sensor heads

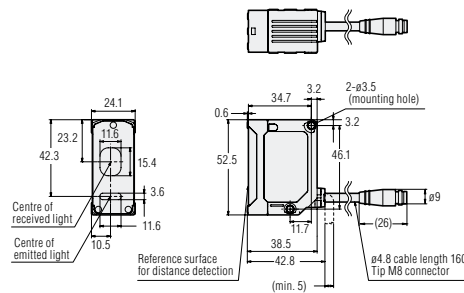
IL-S025/IL-030



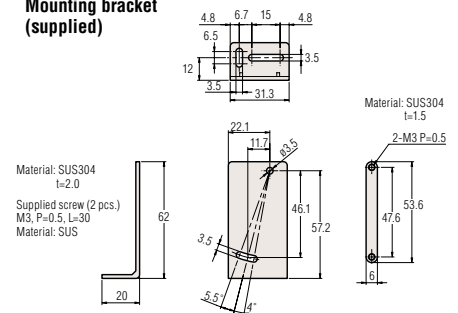
Mounting bracket (supplied)



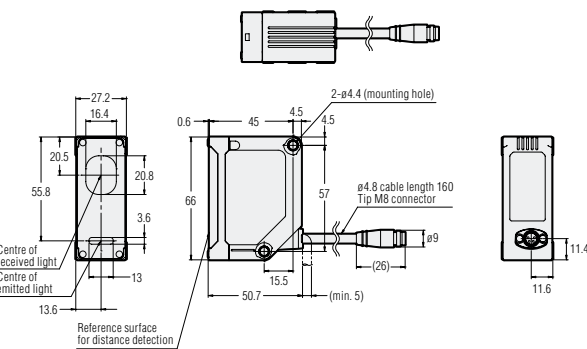
IL-S065/IL-065/100



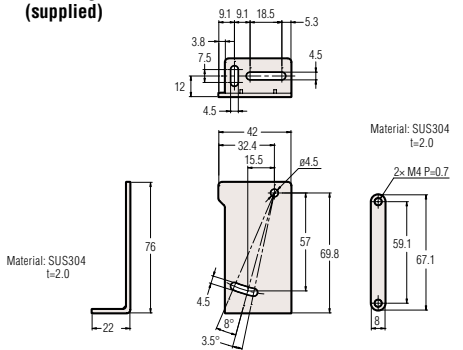
Mounting bracket (supplied)



IL-300/600



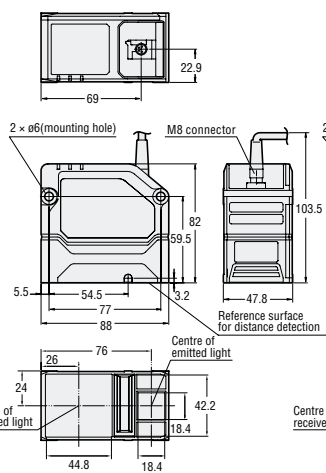
Mounting bracket (supplied)



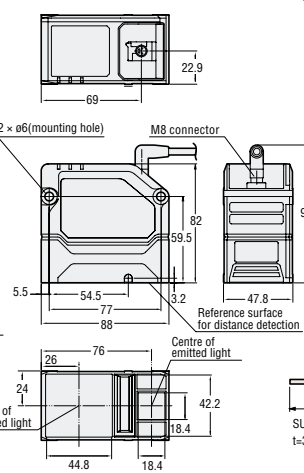
IL-2000



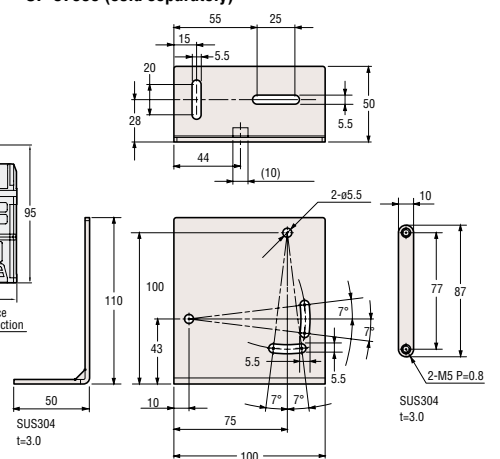
When a straight cable is used



When an L-shaped cable is used



Mounting bracket OP-87606 (sold separately)



Amplifier unit

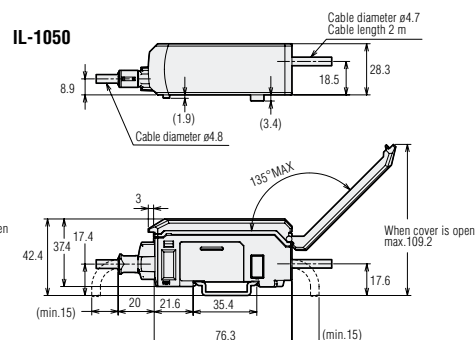
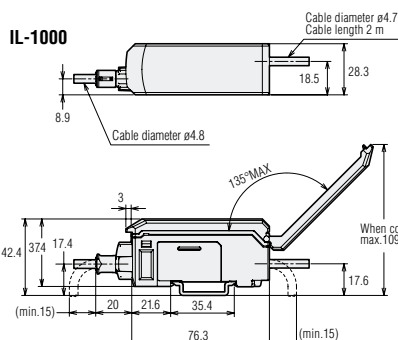
1. Select and use one of $\pm 5\text{ V}$, 1 to 5 V, 0 to 5 V or 4 to 20 mA. 2. Assign an input of your choice to the 4 external input lines before using.

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.

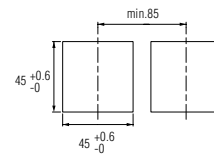
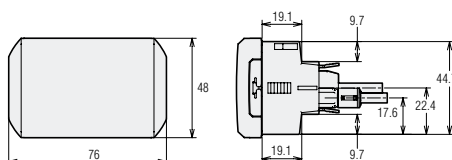
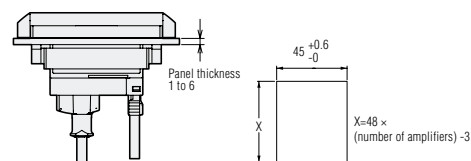
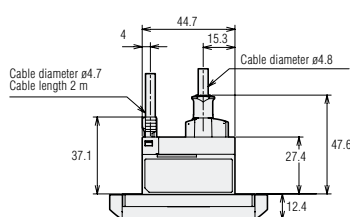
5. Use Class 2 or LPS power supply with the overcurrent protection device rated 2.5 A or less.

Amplifier unit (DIN-rail mount type)
IL-1000/IL-1050



Amplifier unit (Panel mount type)

IL-1500/IL-1550



Wiring Diagram

The diagram shows a PicoLog 1000 device with various pins on its right side. Lines connect these pins to a list of functions and voltage levels. The connections are as follows:

- Brown¹: 10 to 30 VDC⁴
- Blue¹: 0 V
- Black: HIGH judgement output
- White: LOW judgement output
- Grey: GO judgement output
- Green: Alarm output
- Light blue¹: Analogue output +
- Orange²: Analogue output GND
- Shield²: (connected to the shield)
- Pink³: External input 1 (zero shift input)
- Yellow³: External input 2 (reset input)
- Pink/purple³: External input 3 (timing input)
- Purple³: External input 4 (not used)

1. The brown, blue, and light blue cables are not provided in a IL-1050/L-1550 unit (expansion unit).
The power is supplied to the expansion unit from the IL-1000/L-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)
EtherNet/IP specifications	Maximum number of connectable hubs	4 (10BASE-T)/2 (100BASE-TX)
	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
		250 kbps
		125 kbps
Sensor connection specifications	Network power supply	11 to 25 VDC (supplied from DeviceNet communication power supply)
	Connectable sensors	Sensor amplifiers with D-bus support ¹
Indicators		8 units max.
Power voltage		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 consumption		20 to 30 VDC, including ripple (P-P) 10% (supplied from the connected sensor amplifiers)
Environmental resistance	Operating ambient temperature	660 mW or less (at 30 V, 22 mA max.)
	Operating ambient humidity	-20 to +55°C (no freezing)
	Vibration resistance	35 to 85% RH (no condensation)
	Pollution degree	10 to 55 Hz, compound amplitude 1.5 mm, 2 hours each in X, Y, Z directions
Materials		2
Weight (including connectors)		Main unit case and dust cover: Polycarbonate, DeviceNet connector: Polyamide (plug), PUT (socket)
		Approx. 80 g

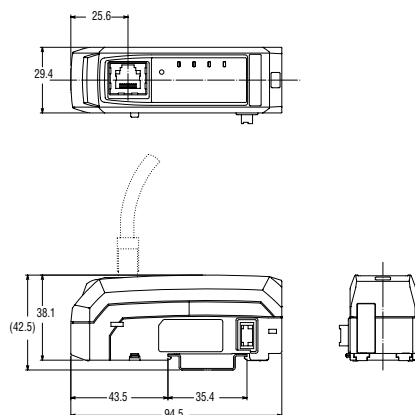
1. "D-bus" is the name of KEYENCE's wiring-saving system for sensor amplifiers.

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

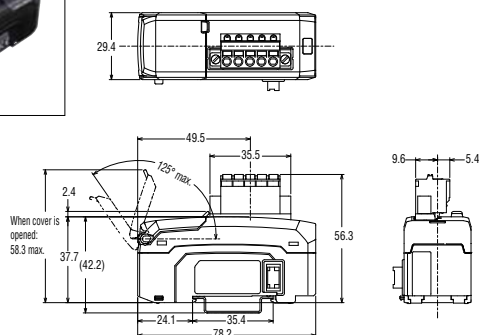
Communication unit (EtherNet/IP Unit)

DL-EP1



Communication unit (DeviceNet Unit)

DL-DN1

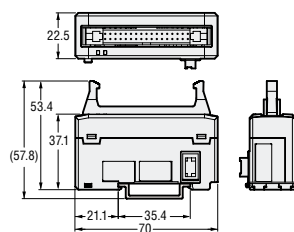


Communication unit (BCD Output Unit)

DL-RB1A



DIN-rail mount



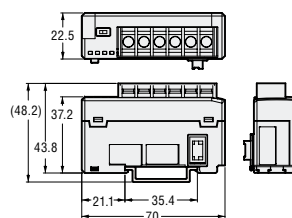
34-pin MIL connector

Communication unit (RS-232C Unit)

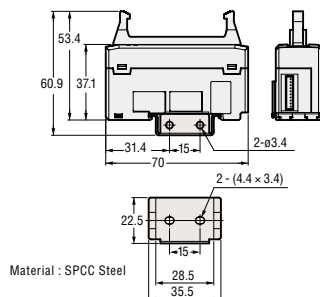
DL-RS1A



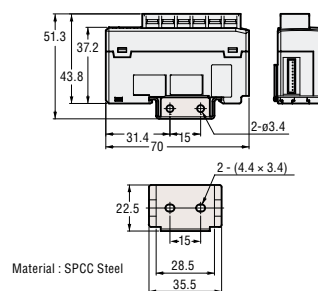
DIN-rail mount



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



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


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
