A wide lineup of measurement ranges capable of solving many applications, from part differentiation to high precision measurement.
Intelligent
High precision was achieved by using state-of-the-art technology and functions specifically developed for high-accuracy measurement instruments.

Rugged
Developed for use in harsh environments, the IL Series was designed with a robust structure.

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

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

Introducing the IL Series

I - SERIES

VARIETY OF USES AT LOW COST
Compact and lightweight laser displacement sensor
High-Precision Head + Multi-Function Amplifier

[Newly developed LSGC included] + [All-in-one design]

The stable measurement of any given target is possible by sensing the target surface and adjusting the 600,000 times dynamic range. Furthermore, in order to further streamline communication with process control systems we have installed application specific functions into the compact amplifier.

Rugged Head Structure

[Die cast metal used for IP67/optical base]

The head structure was redesigned to make it rugged enough to withstand almost any environment. In addition, the housing is made of die cast SUS304 for added strength and protection.

Compact Head Design + Easy Mounting

[Smallest body in its class] + [Hi-flex cable]

The IL Series has achieved the smallest head housing in its class by adopting the unique aspherical lens. The weight of the head is a mere 60g*. The sensor head cable is designed with a robot cable. This cable is specifically designed for high cycle service life and makes the sensor ideal for robotics or other high cycle applications.

*IL-030

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### IL-600
- Reference distance: 600 mm
- Measurement range: 200 to 1000 mm
- Display Resolution: 50 µm
- Repeatability: 300 µm

### IL-300
- Reference distance: 300 mm
- Measurement range: 160 to 450 mm
- Display Resolution: 10 µm
- Repeatability: 50 µm

### IL-100
- Reference distance: 100 mm
- Measurement range: 76 to 130 mm
- Display Resolution: 2 µm
- Repeatability: 10 µm

### IL-065
- Reference distance: 65 mm
- Measurement range: 55 to 105 mm
- Display Resolution: 2 µm
- Repeatability: 4 µm

### IL-030
- Reference distance: 30 mm
- Measurement range: 20 to 45 mm
- Display Resolution: 1 µm
- Repeatability: 3 µm
The multi-function amplifier with an all-in-one design

Direct connection with peripheral equipment

**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.

**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.
**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)

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**FUNCTION CHOICES**

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

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0FF</td>
<td>Not output</td>
</tr>
<tr>
<td>0-SOV</td>
<td>Analogue output after the judgement value is converted to the range from 0 to 5 V.</td>
</tr>
<tr>
<td>0&lt;s&lt;SOV</td>
<td>Analogue output after the judgement value is converted to the range of ±5 V.</td>
</tr>
<tr>
<td>1-SOV</td>
<td>Analogue output after the judgement value is converted to the range from 1 to 5 V.</td>
</tr>
<tr>
<td>RS&gt;SOV</td>
<td>Analogue output after the judgement value is converted to the range from 4 to 20 mA.</td>
</tr>
</tbody>
</table>

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

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### Communication Unit

**DL-RB1A**  
BCD output unit

Use this unit when retrieving numerical data from the IL Series to an external device as digital data. A single communication unit can retrieve data from up to 8 IL Series display units via BCD.

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

Use this unit when outputting digital data to an external device with RS-232C signals. In addition the unit can be used to externally program the amplifiers.

1. D-sub 9 pin connector cable (OP-81283) can be used for connection.
Applications

**Height difference measurements of a plastic extrusion**

Provides constant monitoring by measuring the height using 2 sensors simultaneously, then calculates the height difference using the calculation function in the amplifier. Reliable detection is possible even if the product type or colour changes.

**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.

**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.

**Packaging material counting**

Even in targets with a large amount of shape scatter, reliable counts can still be achieved by detecting rising edges.

**Accuracy checks on an automotive door assembly**

When assembling automotive doors, by simultaneously measuring multiple points, the assembly accuracy can be evaluated. Reliable detection is possible regardless of body colour.

**Positional control of welding beads**

Through external calculations of height data from the sensor, the device detects the position of the weld seam. Welding accuracy can be improved via measurement data feedback to the welder.

**Heat processing inspection of cans**

By observing the expansion displacement of a can after heat processing, the results of heat processing can be evaluated. Reliable differentiation can still be conducted even if there are colour changes in the cans.

**Height controls of a hoop material**

By using a long range type of sensor head, it is possible to control height of hoop materials such as steel plates and sheet materials even during transportation. The sensor head can be installed at a distance of up to 1000 mm.
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.

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.

Wire winding process

Prevents irregular winding by monitoring the traverser position. In addition, feedback control to the device is possible by measuring the volume wound into the bobbin at the same time.

Controls the PC board height in the mounting and drilling processes. Various kinds of targets can be reliably controlled without being affected by the surface colours of the PC boards.

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.

Wafer measurement inside an inspection machine

Measures the behaviour of each wafer in the machine. Due to the small head size, the IL Series can be installed in compact spaces. This means the IL Series can be installed even after the machinery has been set up.

Misalignment measurement and presence detection of a wafer/glass in a cassette.

Measures the presence and protrusion of glass in a cassette. Stable detection is possible even if positional misalignments occur in the cassette itself by utilising analogue processing.

Measuring the height of a chip after bonding

Measures the height of the board pre-bonding and the chip post-mounting, allowing control of the post-processing suction nozzle and dispenser nozzle feedback.
### Sensor heads

<table>
<thead>
<tr>
<th>Model</th>
<th>IL-630</th>
<th>IL-665</th>
<th>IL-100</th>
<th>IL-300</th>
<th>IL-600</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="OP-87059" alt="Image" /></td>
<td><img src="OP-87057" alt="Image" /></td>
<td><img src="OP-87056" alt="Image" /></td>
<td><img src="OP-87058" alt="Image" /></td>
<td><img src="OP-87056" alt="Image" /></td>
</tr>
<tr>
<td><strong>Reference distance</strong></td>
<td>30 mm</td>
<td>65 mm</td>
<td>100 mm</td>
<td>300 mm</td>
<td>600 mm</td>
</tr>
<tr>
<td><strong>Measurement range</strong></td>
<td>20 to 45 mm</td>
<td>55 to 105 mm</td>
<td>75 to 130 mm</td>
<td>160 to 450 mm</td>
<td>200 to 1600 mm</td>
</tr>
<tr>
<td><strong>Light source</strong></td>
<td>Red semiconductor laser, wavelength: 655 nm (visible light)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>220 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spot diameter (at standard distance)</strong></td>
<td>Approx. 200 × 750 µm</td>
<td>Approx. 550 × 1750 µm</td>
<td>Approx. 400 × 1350 µm</td>
<td>Approx. ø10 µm</td>
<td>50 µm</td>
</tr>
<tr>
<td><strong>Linearity</strong></td>
<td>±0.1% of F.S.</td>
<td>±0.1% of F.S.</td>
<td>±0.15% of F.S.</td>
<td>±0.25% of F.S.</td>
<td>±0.25% of F.S. (200 to 600 mm)</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>2 µm</td>
<td>4 µm</td>
<td>10 µm</td>
<td>50 µm</td>
<td></td>
</tr>
<tr>
<td><strong>Sampling rate</strong></td>
<td>0.33/1/2/5 ms (4 levels available)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operation status indicators</strong></td>
<td>Laser emission warning indicator: Green LED, Analogue range indicator: Orange LED, Reference distance indicator: Red/Green LED</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Amplifier unit

<table>
<thead>
<tr>
<th>Model</th>
<th>IL-1000</th>
<th>IL-1500</th>
<th>IL-1050</th>
<th>IL-1550</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>DIN-rail mount</td>
<td>Panel mount</td>
<td>DIN-rail mount</td>
<td>Panel mount</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Compatible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Head compatibility</strong></td>
<td>Main unit</td>
<td>Expansion unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>Minimum displayable unit</td>
<td>IL-030: 1 µm, IL-065/IL-100: 2 µm, IL-300: 10 µm, IL-600: 50 µm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Display range</strong></td>
<td>IL-030/IL-065/IL-100: ±99.999 mm ±99 mm (4 levels selectable), IL-300/IL-600: ±999.99 mm ±99 mm (3 levels selectable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Analog output voltage</strong></td>
<td>±5 V, 1 to 5 V, 0 to 5 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Analog output current</strong></td>
<td>±20 mA Maximum load resistance of 500 Ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control input</strong></td>
<td>Bank switch input</td>
<td>Zerow switch input</td>
<td>Stop emission input</td>
<td>Timing input</td>
</tr>
<tr>
<td><strong>Control output</strong></td>
<td>Open collector output (NPN, PNP changeover possible)</td>
<td>Non-voltage input</td>
<td>Open collector output (NPN, PNP changeover possible)</td>
<td>None</td>
</tr>
<tr>
<td><strong>Current</strong></td>
<td>Power voltage</td>
<td>10 to 30 VDC ipple (P-P) 10% included, Class 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental resistance</strong></td>
<td>Power consumption</td>
<td>2300 mA or less (at 30 V: 77 mA or less)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>≤ 50°C (No condensation or freezing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
<td>10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pollution degree</strong></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. See 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 measuring the KEYENCE standard target (white diffuse object). 3. F.S. of each model is as follows. IL-030: ±5mm IL-065: ±10mm IL-100: ±20mm IL-300: ±140mm IL-600: ±400mm 4. Value when measuring the KEYENCE standard target (white diffuse object) at the reference distance, sampling rate: 1 ms, and average number of times: 16. For the IL-300/IL-400, the sampling rate is 2 ms.

### Sensor head cables (sold separately)

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

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Cable length</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cable included</td>
<td>2 m</td>
<td>OP-87956</td>
</tr>
<tr>
<td></td>
<td>5 m</td>
<td>OP-87957</td>
</tr>
<tr>
<td></td>
<td>10 m</td>
<td>OP-87958</td>
</tr>
<tr>
<td></td>
<td>20 m</td>
<td>OP-87959</td>
</tr>
</tbody>
</table>

This connector is required if the cable is cut.
### Communication unit

<table>
<thead>
<tr>
<th>Model</th>
<th>DL-RB1A</th>
<th>DL-RS1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>20 to 30 VDC, including ripple. Ripple (P-P): 10% max. Class 2 (Supplied via connected sensor amplifier)</td>
<td>20 to 30 VDC, including ripple. Ripple (P-P): 10% max. Class 2 (Supplied via connected sensor amplifier)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>27 mA max.</td>
<td>25 mA max.</td>
</tr>
<tr>
<td>Number of connectable sensor amplifiers</td>
<td>Up to 8 units (including main unit)</td>
<td>Up to 8 units (including main unit)</td>
</tr>
<tr>
<td>Indicator</td>
<td>Alarm indicator lamp (red), Power indicator lamp (green)</td>
<td>Communication indicator lamp (green × 2), Alarm indicator lamp (red), Power indicator lamp (green)</td>
</tr>
<tr>
<td>Communication method</td>
<td>–</td>
<td>Full duplex</td>
</tr>
<tr>
<td>Synchronization method</td>
<td>–</td>
<td>Start-stop</td>
</tr>
<tr>
<td>Transmission code</td>
<td>–</td>
<td>ASCII</td>
</tr>
<tr>
<td>Baud rate</td>
<td>–</td>
<td>2400/4800/9600/19200/38400 bps selectable (Factory-setting: 9600 bps)</td>
</tr>
<tr>
<td>Data bit length</td>
<td>–</td>
<td>8 bits/7 bits selectable (Factory-setting: 8 bits)</td>
</tr>
<tr>
<td>Parity check</td>
<td>–</td>
<td>None/Even/Odd selectable (Factory-setting: None)</td>
</tr>
<tr>
<td>Stop bit length</td>
<td>–</td>
<td>1 bit</td>
</tr>
<tr>
<td>Data delimiter</td>
<td>–</td>
<td>Data reception: automatically recognizes CR or CR+LF</td>
</tr>
</tbody>
</table>

**Environment**

<table>
<thead>
<tr>
<th>Resistance</th>
<th>Temperature</th>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-10 to +55°C</td>
<td>35 to 85%RH (No condensation)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 to 55 Hz Double amplitude 1.5 mm XYZ each axis: 2 hours</td>
<td></td>
</tr>
</tbody>
</table>

**Material**

<table>
<thead>
<tr>
<th></th>
<th>Case/Polycarbonate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Approx. 46 g</td>
</tr>
</tbody>
</table>

### Optional

<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Model</th>
<th>Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>End unit (Optional)</td>
<td><img src="image3.png" alt="Image" /></td>
<td>OP-26751</td>
<td>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.)</td>
<td>Approx. 15 g</td>
</tr>
<tr>
<td>Panel front protection cover</td>
<td><img src="image4.png" alt="Image" /></td>
<td>OP-87876</td>
<td>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.</td>
<td>Approx. 6 g</td>
</tr>
<tr>
<td>Panel mounting bracket</td>
<td><img src="image5.png" alt="Image" /></td>
<td>OP-4122</td>
<td>Extension cable used for panel mount type amplifier. Use this cable if the standard cable is not long enough.</td>
<td>Approx. 7 g</td>
</tr>
<tr>
<td>Expansion cable: 300 mm</td>
<td><img src="image6.png" alt="Image" /></td>
<td>OP-35361</td>
<td>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.</td>
<td>Approx. 12 g</td>
</tr>
</tbody>
</table>

### Wiring Diagram

1. The brown, blue, and light blue cables are not provided in an IL-1050/IL-1550 unit (expansion unit).
2. The power is supplied to the expansion unit from the IL-1000/IL-1500 unit (main unit).
3. 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.
4. 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.
5. If there are over 6 additional expansion units, please use a power voltage of 20 to 30 V.
Dimensions

Sensor heads
IL-030

 IL-065/100

 IL-300/600

Mounting bracket (supplied)

Unit: mm

Material: SUS304

Material: SUS304

Material: SUS304

Material: SUS304

Material: SUS304

Material: SUS304

Material: SUS304
Options

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

Amplifier unit (Panel mount type)
IL-1500/IL-1550

Communication unit (BCD output type)
DL-RB1A

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

Unit: mm

Material: SPCC Steel
Total Solution Lineup

**CCD LASER MICROMETRE**

**Multi-Purpose CCD Laser Micrometre**

**IG Series**

- Repeatability of 5 µm
- Linearity of ±0.1% (IG-028)
- Built-in position monitor

**CONTACT SENSOR**

**High-precision Contact Digital Sensor**

**GT2 Series**

- High accuracy in the entire measurement range
- Good temperature characteristics
- No tracking errors
- Absolute position detection

**INDUCTIVE DISPLACEMENT**

**Digital Inductive Displacement Sensor**

**EX-V Series**

- Resolution of 0.02% of F.S.
- Linearity of ±0.3% of F.S.
- Ultra high-speed sampling of 25 µs

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Please visit: [www.keyence.com](http://www.keyence.com)

**SAFETY INFORMATION**

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