Super Precision/High Accuracy/Long Distance
Innovative CCD Laser Displacement Sensors

Fastest in its class: 50 kHz
Ultra high accuracy: ± 0.03%
Highest repeatability in its class: 0.0004 Mil (0.01µm)
Long range measurement: Max 39.37” (1,000mm)
LK-G Series Lineup

Overwhelming specifications achieve higher accuracy and solve previously impossible applications. Cutting-edge technology and a wide array of sensor heads offer stunning performance for any application.

Ultra long-range
LK-G502/507

250mm to 1000mm
9.87" to 39.37"

2μm 0.08Mil

Long-range
LK-G402/407

300mm to 500mm
11.81" to 19.69"

2μm 0.08Mil

Mid-range
LK-G152/157

110mm to 190mm
4.33" to 7.48"

0.5μm 0.02Mil

Multi-purpose
LK-G82/87

65mm to 95mm
2.56" to 3.74"

0.2μm 0.008Mil

Measuring range
Repeatability
Application

**SEMICONDUCTOR/LCD**

- Detecting displacement of a wafer
- Thickness inconsistency of a silicon wafer
- Focus adjustment of LCD board inspection machine

**ELECTRONIC/ELECTRIC COMPONENTS**

- Measuring the warpage of a PCB
- Measuring the height of solder jet
- Measuring sheet thickness

**OA/MEDIA**

- Focus adjustment of optical pickup
- Adjusting HDD arm assembly
- Measuring the vibration of a piezo actuator
AUTOMOTIVE/TRANSPORTATION

- Measuring the runout of a disc rotor
- Measuring the height of liquid sealant
- Adjusting toe-in/camber angle

METAL

- Detecting double-fed steel plates
- Height control of welding process
- Measuring the thickness/width of a steel plate

PLASTIC/RUBBER/FILM

- Thickness measurement/loop control of a rubber sheet
- Measuring the thickness of a film
- Measuring the height of urethane foam
High-accuracy
LK-G32/37

Super precision
LK-G10/15

25mm to 35mm
0.98" to 1.38"
0.05μm 0.002Mil

9mm to 11mm
0.35" to 0.43"
0.01μm 0.0004Mil

► P.6-7

Advanced Specifications
Unmatched technology has achieved specifications that are the best in the industry.

Fastest in its class
50 kHz

Highest accuracy in the industry
± 0.02%

Highest repeatability in its class
0.0004 Mil (0.01μm)

► P.8-9

Newly-developed Algorithms
Newly-developed algorithms ensure highly accurate measurement of targets that were difficult with conventional detection methods.

RPD algorithm
Translucent targets

Multi-ABLE control
Transparent targets

MRC algorithm
Multiple reflections

Newly designed multifunction controller with built-in display and data storage

All-in-one controller LK-G3001(P)V
Separate controller LK-G3001(P)
Display panel LK-GD500
ABLE
ABLE intelligently controls the three elements of laser emission time, laser power, and gain (CCD amplification factor). *ABLE= Active Balanced Laser control Engine

LI-CCD
Demonstrates higher accuracy, speed, and sensitivity.

HIGH ACCURACY LENS UNIT
The high-accuracy Ernostar lenses integrated with the sensor head achieves highly accurate and highly stable measurements.

LI-CCD*
Errors in pixel edges are reduced to achieve accuracy that is two times greater than conventional models.

Since a CCD has digital output characteristics for each pixel, the errors caused by gradual outputs generated at the edge of pixels was a barrier to higher accuracy. As a countermeasure, KEYENCE has developed an LI-CCD that outputs the position of reflected light in a pixel, achieving excellent accuracy that is two times higher than conventional models. In addition, the dedicated design of the sensor has achieved a speed that is 25 times faster and a sensitivity 10 times better than conventional models. * LI-CCD= Linearized CCD

DELTA CUT TECHNOLOGY
Accurate reception of reflected light from a long distance is the key to high precision. KEYENCE has reviewed the cabinet design and developed a delta cut technology that reduces reflection on a filter glass surface.

Comparison with conventional products
- Delta cut available (CCD on filter glass)
- Delta cut unavailable (CCD on Dela cut)
- Sharp focal point
- Displaced focal point
- Attenuation caused by surface reflection
- Reflection caused by the angles of filter glass and optical axis

*LK-G155/G405/G505 Series
Detecting the runout of a HDD

Measuring the thickness of a silicon wafer

Controlling the nozzle height of a dispenser

Measuring the shape of a tire

The LI-CCD features high-speed sampling rate 25 times faster than conventional models. High-speed digital processing of signals from the LI-CCD is performed by a special waveform-processor (Digital Signal Processor), satisfying both high-speed and high-accuracy measurements. Targets traveling, rotating, or vibrating at high speed can be measured reliably.

The CPU, which is integrated in the sensor head, digitizes all signals sent to the controller, dramatically reducing disturbance noise. A highly rigid die-cast body is used to reduce deviations caused by temperature changes, and a LI-CCD with 10 times better sensitivity than conventional models is used to reduce signal noise. These design revisions, targeting high accuracy applications, have successfully produced a repeatability that is 20 times better than conventional models.

Delta cut technology realizes high-accuracy measurement at a long detecting distance that is difficult with conventional models. Seven sensor heads meet a surprisingly wide measuring range from 0.98" (9mm) to 39.37" (1000mm) and a broad range of needs.
The LK-G Series eliminates measurement error due to diffused reflections inside the object.

ABLE technology senses the surface of a target and adjusts the intensity of laser light to an optimal level. ABLE intelligently controls the three elements of laser emission time, laser power, and gain (CCD amplification factor), achieving a wide adjustment range of light intensity that is up to 90 times wider than conventional models. In addition, speed is 120 times faster than conventional methods.

*ABLE=Active Balanced Laser control Engine.

The shift of laser emission time and laser power with a target

<table>
<thead>
<tr>
<th>Reflectance</th>
<th>Laser power</th>
<th>Emission time</th>
<th>Adjustment range</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Laser power: high</td>
<td>Emission time: short</td>
<td>1662x (0.6 to 997µs)</td>
</tr>
<tr>
<td>Low</td>
<td>Laser power: low</td>
<td>Emission time: long</td>
<td>150x (3.2 to 480µs)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sampling rate</th>
<th>Adjustment speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>LK-G Series</td>
<td>20µs</td>
</tr>
<tr>
<td>Conventional model</td>
<td>512µs</td>
</tr>
</tbody>
</table>

The LK-G Series cancels measurement error due to diffused reflections from metal surfaces.

The LK-G Series detects the reflectance of each layer in a transparent object and adjusts the light intensity to the optimum level.

The LK-G Series cancels measurement error due to diffused reflections from metal surfaces.

Up to 90 times the adjustment range of conventional models

Real-time control at 120 times the speed of conventional models
The newly-developed algorithms support various applications

**RPD* ALGORITHM**

Laser light enters the translucent targets, generating diffused reflections, which result in gradual broadening of the received light waveform. The RPD algorithm cancels the influence of the broadened waveform and detects the true peak (Real Peak).

**MULTI-ABLE CONTROL**

The reflected light at each layer is sensed to optimize the intensity of laser light. Highly accurate thickness measurements are enabled by synthesizing the waveform of each layer.

**M RC* ALGORITHM**

When two or more peaks are generated by multiple reflections, the algorithm compares the waveforms to the most recent received-light waveform and determines the one with the most similarity to the “correct waveform”.

*RPD=Real Peak Detect*
Advanced components provide superior measurements

**Cylindrical Lens**
- The wide CCD increases measurement stability.

**CCD Light Receiving Element**
- Special lens widens the beam spot.

**Wide Spot Lenses**
- High measurement stability
- Two types of laser beam spot diameters are available: wide-spot and small-spot. Select the type that best fits your application.

<table>
<thead>
<tr>
<th>Spot size</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>LK-G15</td>
<td>500µm</td>
<td>500µm</td>
</tr>
<tr>
<td>LK-G37</td>
<td>850µm</td>
<td>830µm</td>
</tr>
<tr>
<td>LK-G87</td>
<td>1100µm</td>
<td>1100µm</td>
</tr>
<tr>
<td>LK-G167</td>
<td>1700µm</td>
<td>1700µm</td>
</tr>
<tr>
<td>LK-G407</td>
<td>8300µm</td>
<td>8300µm</td>
</tr>
<tr>
<td>LK-G507</td>
<td>9500µm</td>
<td>9500µm</td>
</tr>
<tr>
<td>LK-G152</td>
<td>20µm</td>
<td>20µm</td>
</tr>
<tr>
<td>LK-G302</td>
<td>30µm</td>
<td>30µm</td>
</tr>
<tr>
<td>LK-G702</td>
<td>70µm</td>
<td>70µm</td>
</tr>
<tr>
<td>LK-G1202</td>
<td>120µm</td>
<td>120µm</td>
</tr>
<tr>
<td>LK-G2902</td>
<td>290µm</td>
<td>290µm</td>
</tr>
<tr>
<td>LK-G3002</td>
<td>300µm</td>
<td>300µm</td>
</tr>
</tbody>
</table>

**Field Proven Design Concepts**
- Flexible cables are available as standard. The product can be securely attached to a robot or other movable parts.

**ND Filter (Option: LK-F1)**
- Diffused reflections caused by surface irregularities of a rough-surfaced target are averaged, preventing data fluctuations.
- When measuring a target with strong luster or a mirror surface, the ND filter attenuates the laser light to its optimal intensity, ensuring more accurate measurement.

**Cable Compatibility of Heads**
- The excellent water-proof construction enables using the product in processing sites or other locations where water splashes onto the product.
- *Measurements may become unstable due to light refraction when water or oil adheres to the front side of the lens.

**Flexible Cable**
- Can be attached to movable parts.

**Sensor Compatibility**
- Sensors of different types can be used with a single controller.
Newly designed multifunction controller with built-in display and data storage

Various functions with advanced specifications and unparalleled detection performance are concentrated into a compact controller.

<table>
<thead>
<tr>
<th>2 Ch</th>
<th>Large-size 2-color LED</th>
<th>Measurement</th>
<th>Judgment</th>
<th>Statistic</th>
</tr>
</thead>
</table>

Two channels are available for sensor head connection, display and judgment. In addition, seven measurement modes and statistic functions are featured to support a wide range of measurement requirements.

Easy-to-operate, simple setting
The current settings are displayed on a user-friendly display, which allows any user to configure the settings easily.

Featuring a large, easy-to-see 2-color LED
The ECO mode is featured to turn off the display when visual monitoring is not required.

DATA STORAGE FUNCTION

65,000-point memory is integrated internally in order to store the 50 kHz ultra-high-speed sampling data. Sometimes it is necessary to enhance the tact time in obtaining data from a target traveling at high speed or to mount the unit to a device. In this case, high-speed processing of all data items is enabled by temporarily storing the data to the internal memory and retrieving the data during the period before the next measurement.

SEPARATE INSTALLATION OF THE DISPLAY AND OPERATION PANEL

The display (LK-GD500) and operation unit can be mounted on the outside of a control panel and the separate controller (LK-G3001) can be mounted inside the control panel using a DIN-rail. The separate controller (LK-G3001) can also be operated without a display*. A system with multiple channels can now be constructed at low cost. (Patent pending)

* LK-GD500 or LK-Navigator software is required for setup.

MULTIPLE I/O REQUIRES NO OPTICAL PARTS

Five types of I/O including USB are available as standard. A wide range of needs are supported, from data gathering with a PC using USB to high-speed digital control with a PLC using binary outputs. High-speed output can be performed at 50 kHz. (Excluding the RS-232C)
Simple setting and analysis on a PC
Setting support software LK-Navigator

LK-Navigator supports optimal setting of the LK-G and data gathering from a PC. Settings can be made via USB.

**Hardware environment**

<table>
<thead>
<tr>
<th>Item</th>
<th>Hardware requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Pentium III 400MHz or higher</td>
</tr>
<tr>
<td>Support OS</td>
<td>Windows98/98SE/ME/XP</td>
</tr>
<tr>
<td>Memory capacity</td>
<td>64 MB</td>
</tr>
<tr>
<td>Resolution of display</td>
<td>800 x 600 pixels, 256 colors or more</td>
</tr>
<tr>
<td>Free disk space</td>
<td>10 MB min.</td>
</tr>
<tr>
<td>Interface</td>
<td>RS-232C (Serial port) or (USB Ver 1.1 or higher) should be featured.</td>
</tr>
</tbody>
</table>

- Windows is a registered trademark of Microsoft Corporation of America.
- Pentium is a registered trademark of Intel Corporation.

**EASILY PROGRAM OPTIMAL SETTINGS**

Simply follow the menu to select the settings. The navigator, with illustrations and explanations, allows any user to make settings easily.
Display of received-light waveform

The waveform of received-light intensity formed on the CCD can be displayed. This feature is highly effective for measuring transparent targets in which two or more received-light waveforms are generated.

TRANSLUCENT TARGET

Height measurement of PCB resin

TRANSPARENT TARGET

Thickness measurement of glass plate

DATA STORAGE FUNCTION

The data stored in the internal memory of the LK-G can be displayed visually and acquired by a PC. It features enlarging, reducing, and overlapping of the display, reading of measurements using the cursor, and other functions for data analysis.

DISPLAY OF MEASUREMENT & STATISTICS VALUES

The controller’s display can be reproduced on a PC. The measurement condition can be monitored in real time while configuring the settings. Using the statistic function allows the user to check the status of the system.

Measurement data and statistics for both outputs 1 and 2
### Selection guide

#### Sensor Heads

<table>
<thead>
<tr>
<th>TYPE</th>
<th>MODEL</th>
<th>MEASURING RANGE</th>
<th>REPEATABILITY</th>
<th>SPOT DIAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Super Precision</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small spot</td>
<td>LK-G10</td>
<td>0.39”±0.04” (10mm) Measuring range</td>
<td>0.0004Mil</td>
<td>0.79Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.39”±0.04” (10mm)</td>
<td>0.01 µm</td>
<td>20µm</td>
</tr>
<tr>
<td>Wide beam</td>
<td>LK-G15</td>
<td>1.18”±0.2” (30mm) Measuring range</td>
<td>0.002Mil</td>
<td>1.18Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.18”±0.2” (30mm)</td>
<td>0.05 µm</td>
<td>30µm</td>
</tr>
<tr>
<td><strong>High Accuracy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small spot</td>
<td>LK-G32</td>
<td>1.18”±0.2” (30mm) Measuring range</td>
<td>0.002Mil</td>
<td>1.18Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.18”±0.2” (30mm)</td>
<td>0.05 µm</td>
<td>30µm</td>
</tr>
<tr>
<td>Wide beam</td>
<td>LK-G37</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Multi-Purpose</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small spot</td>
<td>LK-G82</td>
<td>3.15”±0.59” (80mm) Measuring range</td>
<td>0.008Mil</td>
<td>2.76Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.15”±0.59” (80mm)</td>
<td>0.2 µm</td>
<td>70µm</td>
</tr>
<tr>
<td>Wide beam</td>
<td>LK-G87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Long Distance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small spot</td>
<td>LK-G152</td>
<td>5.91”±1.57” (150mm) Measuring range</td>
<td>0.02Mil</td>
<td>4.72Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.91”±1.57” (150mm)</td>
<td>0.5 µm</td>
<td>120µm</td>
</tr>
<tr>
<td>Wide beam</td>
<td>LK-G157</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High-speed Long Distance</strong></td>
<td></td>
<td>11.31”±3.94” (400mm) Measuring range</td>
<td>0.08Mil</td>
<td>11.31Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.31”±3.94” (400mm)</td>
<td>2 µm</td>
<td>290µm</td>
</tr>
<tr>
<td>Wide beam</td>
<td>LK-G407</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ultra Long Distance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small spot</td>
<td>LK-G502</td>
<td>19.69”±9.84” (500mm) Measuring range</td>
<td>0.08Mil</td>
<td>11.70Mil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.69”±9.84” (500mm)</td>
<td>2 µm</td>
<td>300µm</td>
</tr>
<tr>
<td>Wide beam</td>
<td>LK-G507</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Controllers

<table>
<thead>
<tr>
<th>TYPE</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NPN</td>
</tr>
<tr>
<td>ALL-in-one</td>
<td>LK-G3001V</td>
</tr>
<tr>
<td>Separate Display</td>
<td>LK-G3001</td>
</tr>
</tbody>
</table>
### Controller

<table>
<thead>
<tr>
<th>Model</th>
<th>All-in-one model</th>
<th>Separate model 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LK-G3001(P)V</td>
<td>LK-G3001(P)/GD500</td>
</tr>
</tbody>
</table>

#### Display
- **Head compatibility**: All LK-G sensor heads are compatible
- **Number of connectable sensors**: maximum of 2 units
- **Minimum display unit**: 0.0004 mm 0.01 µm
- **Display range**: ±9999.99 mm ±9999.99 µm (Selectable from six levels)
- **Refresh rate**: 10 times/sec
- **Analog voltage output**: ±10 V x 2 outputs, output impedance: 1000 Ω
- **Analog current output**: 4 to 20 mA x 2 outputs, maximum load resistance: 350 Ω
- **Timing input 1**: For OUT1, non-voltage input
- **Reset input 2**: For OUT1, NPN or PNP open-collector input
- **Auto-zero input 3**: Non-voltage input
- **Comparator output 4**: For OUT1, NPN or PNP open-collector output
- **Alarm output 5**: For OUT1, NPN or PNP open-collector output (N.C.)
- **Timing input 1**: For OUT2, non-voltage input
- **Reset input 2**: For OUT2, non-voltage input
- **Auto-zero input 3**: Non-voltage input x 3 inputs
- **Comparator output 4**: For OUT2, NPN or PNP open-collector output
- **Alarm output 5**: For OUT2, NPN or PNP open-collector output (N.C.)
- **Binary output 6**: Measured data output (21 bits), OUT1/OUT2 selectable, NPN or PNP open-collector output
- **Strobe output 7**: NPN or PNP open-collector output
- **Binary selector output 8**: NPN or PNP open-collector output
- **Binary selector input 9**: Non-voltage input

#### Terminal block
- **Binary output**: Measured data output and control input/output (Maximum baud rate: 115200 bit/s, selectable)

#### USB interface
- In conformity with USB Revision 2.0 Full speed (USB1.1 compatible)

#### Major functions
- 2 OUT simultaneous measurement, Operation, Averaging, Filter, Calibration, Measurement, AUTO ZERO, Sampling frequency setting, Mutual interference prevention, Data storage, 8-program memory, ECO mode, ABLE setting, Target setting, ABLE tuning, Selection of measurement surface of transparent target, Statistics processing, Connection of setting support software, Selectable head-mounting, etc.

#### Power supply voltage
- 24 VDCs 10%, Ripple: 10% (P to P) or less

#### Current consumption
- 500 mA or less with 1 head 600 mA or less with 2 heads

#### Ambient temperature
- 0 to +50°C (32 to 122°F), No condensation

#### Relative humidity
- 35 to 85%, No condensation

#### Weight
- Approx. 480g (LK-G3001V), Approx. 370g (LK-G3001), Approx. 60g (LK-GD500)

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1. LK-G3001 can be operated by itself. The measured value display and setting modifications can be performed on the display panel (LK-GD500) or via the setting support software (LK-H1W).
2. The rating of the NPN open-collector: 50 mA max (30V max.), residual voltage of 0.5 V max.
3. The rating of the PNP open-collector: 50 mA max (30V max.), residual voltage of 0.5 V max.
4. Expansion connector not included with controller. Part # is OP-51657.
### Specification

**Sensor head**

<table>
<thead>
<tr>
<th>Model</th>
<th>LK-G10/G15</th>
<th>LK-G32/G37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference distance</td>
<td>0.39* 10 mm</td>
<td>1.18* 30 mm</td>
</tr>
<tr>
<td>Measuring range</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>±0.04* ±1 mm</td>
<td>±0.2* ±5 mm</td>
</tr>
<tr>
<td>Spot diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(at reference distance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>±0.18* ±4.5 mm</td>
<td>±0.18* ±4.5 mm</td>
</tr>
<tr>
<td>Light source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wavelength</td>
<td>650 nm (visible light), Class II (FDA)</td>
<td>650 nm (visible light), Class II (FDA)</td>
</tr>
<tr>
<td>Output</td>
<td>0.3 mW max.</td>
<td>0.95 mW max.</td>
</tr>
<tr>
<td>Linearity 2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±0.03% of F.S. (F.S.= ±0.04* ±1 mm)</td>
<td>±0.05% of F.S. (F.S.= ±0.2* ±5 mm)</td>
<td></td>
</tr>
<tr>
<td>Repeatability 3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±0.05% of F.S. (F.S.= ±1.57* ±40 mm)</td>
<td>±0.05% of F.S. (F.S.= ±1.54* ±39 mm)</td>
<td></td>
</tr>
<tr>
<td>Sampling frequency</td>
<td>20/50/100/200/500/1000 µs (Selectable from 6 levels)</td>
<td>20/50/100/200/500/1000 µs (Selectable from 6 levels)</td>
</tr>
<tr>
<td>LED display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near the center of the measurement: Green lights</td>
<td>Outside the measurement area: Orange flashing</td>
<td></td>
</tr>
<tr>
<td>Temperature characteristics</td>
<td>0.01% of F.S./°C (F.S.= ±0.04* ±1 mm)</td>
<td>0.01% of F.S./°C (F.S.= ±0.2* ±5 mm)</td>
</tr>
<tr>
<td>Environmental resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective construction</td>
<td>IP67 (IEC60529)</td>
<td>IP67 (IEC60529)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Incandescent lamp or fluorescent lamp: 10,000 lux max.</td>
<td>Incandescent lamp or fluorescent lamp: 10,000 lux max.</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to +50°C (32 to 122°F), No condensation</td>
<td>0 to +50°C (32 to 122°F), No condensation</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>35 to 85%, No condensation</td>
<td>35 to 85%, No condensation</td>
</tr>
<tr>
<td>Material</td>
<td>Aluminum die-cast</td>
<td>Aluminum die-cast</td>
</tr>
<tr>
<td>Weight (including the cable)</td>
<td>Approx. 190 g</td>
<td>Approx. 280 g</td>
</tr>
</tbody>
</table>

1. The range is obtained by measuring KEYENCE's standard target (ceramic). LK-G10/G15: When the sampling rate is 20 µs, the range becomes +0.37(FAR side) to -1 mm (NEAR side).
2. The range is obtained by measuring KEYENCE's standard target (ceramic) with the Standard mode.
3. The range is obtained by measuring KEYENCE's standard target(SUS) with 4096 times of averaging at the reference distance. The range in parenthesis is the typical linearity obtained by measuring the target with 16384.

### Specification

** SENSOR head**

<table>
<thead>
<tr>
<th>Model</th>
<th>LK-G82/G87</th>
<th>LK-G152/G157</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference distance</td>
<td>3.15* 80 mm</td>
<td>5.91* 150 mm</td>
</tr>
<tr>
<td>Measuring range</td>
<td>±0.59* ±15 mm</td>
<td>±1.57* ±40 mm</td>
</tr>
<tr>
<td>Light source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wavelength</td>
<td>650 nm (visible light), Class II (FDA)</td>
<td>650 nm (visible light), Class II (FDA)</td>
</tr>
<tr>
<td>Output</td>
<td>0.95 mW max.</td>
<td>0.95 mW max.</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to +50°C (32 to 122°F), No condensation</td>
<td>0 to +50°C (32 to 122°F), No condensation</td>
</tr>
<tr>
<td>Ambient temperature</td>
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</tr>
<tr>
<td>Relative humidity</td>
<td>35 to 85%, No condensation</td>
<td>35 to 85%, No condensation</td>
</tr>
<tr>
<td>Material</td>
<td>Aluminum die-cast</td>
<td>Aluminum die-cast</td>
</tr>
<tr>
<td>Weight (including the cable)</td>
<td>Approx. 380 g</td>
<td>Approx. 290 g</td>
</tr>
</tbody>
</table>

1. The range is obtained by measuring KEYENCE's standard target (ceramic). LK-G10/G15: When the sampling rate is 20 µs, the range becomes +0.37(FAR side) to -1 mm (NEAR side).
2. The range is obtained by measuring KEYENCE's standard target(SUS) with 4096 times of averaging at the reference distance. The range in parenthesis is the typical linearity obtained by measuring the target with 16384.

### Model Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting mode</td>
<td>Diffused reflection</td>
<td>Specular reflection</td>
</tr>
<tr>
<td>Reference distance</td>
<td>15.75&quot; 400 mm</td>
<td>15.67&quot; 398 mm</td>
</tr>
<tr>
<td></td>
<td>19.69&quot; 500 mm</td>
<td>19.59&quot; 497.5 mm</td>
</tr>
<tr>
<td>Measuring range¹</td>
<td>3.94&quot; ±100 mm</td>
<td>3.90&quot; ±99 mm</td>
</tr>
<tr>
<td></td>
<td>-250 to +500 mm</td>
<td>-249 to +498 mm</td>
</tr>
</tbody>
</table>

### Light Source

- **Model**: LK-GC2, LK-GC5, LK-GC10, LK-GC30
- **Cable Length**: Extension cable [Cable between the head and controller]
- **Weight**: Approx. 200 g, Approx. 400 g, Approx. 750 g, Approx. 2000 g
- **Cable Length**: Extension cable [Cable for display panel]
- **Weight**: Approx. 200 g, Approx. 400 g, Approx. 750 g, Approx. 2000 g

### Additional Specifications

- **Model**: OP-51654, OP-51655, OP-51656
- **Cable Length**: 0.98" 0.3 m, 9.8" 3 m, 32.8" 10 m

---

¹ The range is obtained by measuring KEYENCE’s standard target (ceramic).

² When the sampling rate is 20 µs, the range becomes -2.76" (-70 mm) (NEAR side) to -3.94" (-100 mm) (NEAR side) for diffuse reflection.

³ When the sampling rate is 20 µs, the range becomes -5.60" (-140 mm) (NEAR side) to -9.84" (-250 mm) (NEAR side) for specular reflection.

4. All are calculated at F.S. = ±9.84" (±250 mm).

5. "High accuracy range" and "long range" refer to the linearity when those ranges are used.
Dimensions

LK-G15/G10

Diffused reflection type mounting

Specular reflection type mounting

LK-G32/G37

Diffused reflection type mounting

Specular reflection type mounting

LK-G15/G10/LK-G15/G10

Data in ( ) applies to LK-G407/LK-G402

Diffused reflection type mounting

Specular reflection type mounting

*Measurement reference position

Unit: inch mm
Measurement Sensors Line Up

LT Series  Surface-Scanning Laser Confocal Displacement Meter

- Advanced Active Confocal Measurement
- 2-μm 0.08Mil beam spot
- Resolution of 0.01μm 0.0004 Mil
- Linearity of ±0.5% of F.S.

Height
Profile
Shape
Thickness

Measuring the height of bonding wire
Measuring the profile of solder paste on a PCB
Measuring the score depth of a pull-tab
Measuring the thickness of an optical disc

LS Series  High-speed, High-accuracy Optical Micrometer

- High repeatability ± 0.06 μm ±0.002Mil
- High speed 2400 samples/second
- Maintenance-free design
- Easy set-up, target viewer

Thickness
Diameter
Shape
Vibration

Measuring the thickness of transparent film
Measuring the outer diameter of a piston
Measuring the outer diameter of a ceramic shaft
Measuring the eccentricity of a roller

High-speed sampling of 2400 samples/second

<table>
<thead>
<tr>
<th>HL-CCD method</th>
<th>Laser-scanning method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast-moving target</td>
<td>Void in detection</td>
</tr>
<tr>
<td>Exposure time</td>
<td>Scan line</td>
</tr>
<tr>
<td>Measured value</td>
<td>A change that occurs between the laser scans cannot be detected.</td>
</tr>
</tbody>
</table>

The measurement uses the average value during the exposure time. Instantaneous change can be reliably detected.
LK Series
Long-Range CCD Displacement Sensor

- Linearity of ±0.1% of F.S. (LK-031/036, LK-081/086, LK-503)
- Resolution of 1μm 0.04Mil (LK-031/036)
- 30μm 1.2Mil diameter beam spot (LK-031)
- Ultra long measuring distance up to 750mm 29.53" (LK-503)
- Measurement unaffected by color, surface texture or stray light

EX Series
High-Accuracy Inductive Displacement Sensor

- High-accuracy inductive sensor
- Resolution of 0.02% of F.S.
- Linearity of ±0.3% of F.S.
- Ultra-high speed sampling of 25μs
- Versatile measurement modes

Stable measurement of various target surfaces

- Mirrored surface plate
- Black Rubber
- Reflected light intensity: High
- Reflected light intensity: Low
- Laser emission time: Short
- Laser emission time: Long

The patent-pending LFTC circuit enables measurement of multicolored or patterned targets. Low reflective targets, such as black rubber, can be measured without additional adjustment.

Thickness
Measuring board thickness

Height
Positioning glass plate

Shape
Profiling molding die surface

Vibration
Measuring the vibration of an architectural miniature model

Harsh environments

- IP-67 rated
- All models are rated as IP-67, offering resistance against both water and oil, providing reliable operation even in harsh environments.

Space saving

- Compact type
- Low-profile type
- Select the optimal sensor head according to the application and available mounting space.

Thickness
Measuring the gap between rollers

Position
Detecting improper crimping

Shape
Measuring the elongation of a tie bar

Vibration
Measuring the eccentricity of ATC tools
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- PRO DUCT FIN DER

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