

Ultra-high Accuracy Laser Displacement Meters

LC Series

Features

- Resolution of 0.01 μm
- Linearity: $\pm 0.05\%$ of F.S.
- 12 μm diameter beam spot
- 50 kHz sampling rate

Measuring Range

Specular-reflective – 30 mm ± 0.5 mm

Diffuse-reflective – 50 mm ± 8 mm



Description

Advanced optics and triangulation measurement system

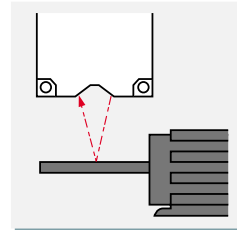
The LC Series uses a triangulation measurement system making it the world's most accurate laser displacement metre.

Visible laser beam spot

The beam spot is only 12 μm in diameter. Even when measuring minute targets, you can easily position the sensor head with the beam spot.

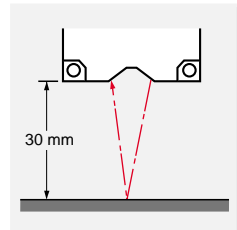
50 kHz sampling rate

Utilising a high-speed processing circuit developed by KEYENCE, you can more accurately measure the eccentricity of a motor shaft rotating at high speeds.



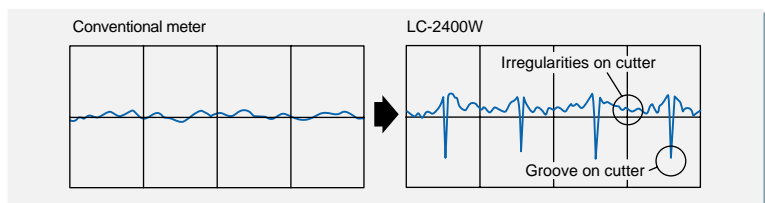
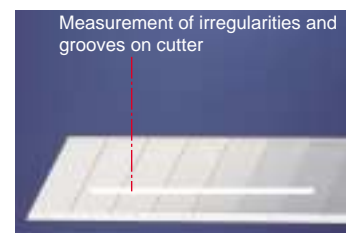
Superior operating distance

The LC-2430 has an operating distance of 30 mm, a distance unmatched in specular-reflective sensor heads. The LC Series can be used in situations where the sensor head cannot be mounted in close proximity to the target.

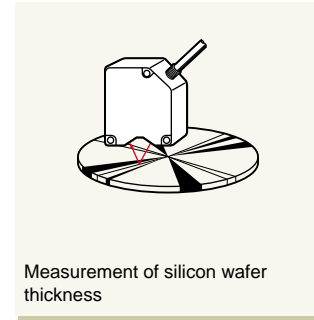
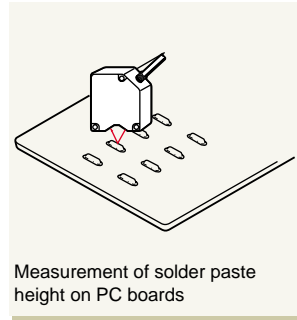
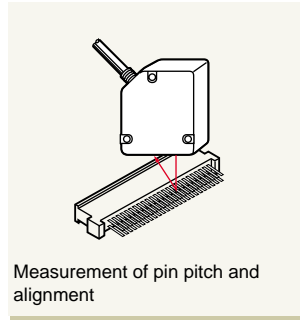
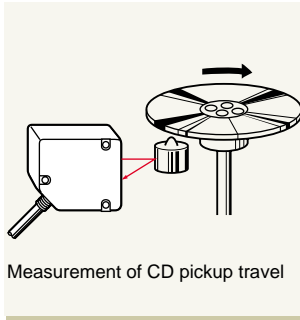


Target surface measurement

The LC Series can measure irregularities or groove depth on a surface that cannot be measured with conventional displacement metres.



Applications



Specifications

Model	Sensor head		Specular-reflective		Diffuse-reflective		
	Controller		LC-2420	LC-2430	LC-2440	LC-2450	
		LC-2400W					
Measuring range		±0.2 mm		±0.5 mm		±3 mm	
Operating distance		10 mm		30 mm		30 mm	
Light source		Red semiconductor laser				Red semiconductor laser	
		Wavelength		670 nm		670 nm	
		Class		IEC		Class 2	
				FDA		Class II	
Minimum spot diameter		20 x 12 μm		30 x 20 μm		35 x 20 μm	
Resolution ¹		0.01 μm		0.02 μm		0.2 μm	
Linearity ¹		±0.05% of F.S.		±0.05% of F.S.		±0.05% of F.S.	
Sampling frequency		50 kHz		50 kHz		50 kHz	
Response frequency		20 kHz (-3dB, Averaging measurements: 1)					
Response time		100 μs		100 μs		100 μs	
Averaging measurements		1 to 131072 (18 selectable settings)				1 to 131072 (18 selectable settings)	
OFFSET range		±199.99 μm		±499.98 μm		±2.9998 μm	
Gain adjustment		AUTO/MANUAL (4 settings)				AUTO/MANUAL (4 settings)	
Analog output		Displacement data output		±10 V, Output impedance: 0 Ω, 6 settings		±10 V, Output impedance: 0 Ω, 6 settings	
		Intensity data output		0 to 5 V, Output impedance: 0 Ω		0 to 5 V, Output impedance: 0 Ω	
Control I/O		Control input		HOLD timing, AUTO-ZERO ON/OFF, Program selection, LASER REMOTE			
				Non-voltage (contact, solid state)		Non-voltage (contact, solid state)	
		Control output		Upper/lower limit, Intensity alarm, AREA OVER alarm			
				NPN: 100 mA max. (30V)		NPN: 100 mA max. (30V)	
Interface		RS-232C		Displacement data output and control input (baud rate: 75 to 19200 bps selectable)			
Measurement stability (20 ±5°C) ²		±0.2% of F.S.		±0.2% of F.S.		±0.03% of F.S.	
Power supply		100 to 240 VAC ±10%, 50/60 Hz (when using the control unit separately: ±15 VDC ±3%, 0.5 A, +5 V ±5%, 3A)					
Power consumption		70 VA max.		70 VA max.		70 VA max.	
Ambient temperature		0 to +40°C		0 to +40°C		0 to +40°C	
Weight		Sensor head		Approx. 500 g		Approx. 250 g	
		Controller		Approx. 6.8 kg		Approx. 6.8 kg	

1. Using a standard specular-reflective object (LC-2420/LC-2430) or white diffuse-reflective object (LC-2440/LC-2450) as a target with the averaging measurements set to 512.
2. Data was obtained when the standard target and the sensor head were fixed to a steel plate (LC-2420/LC-2430) or an aluminum plate (LC-2440/LC-2450) at a temperature of 20°C.

- 1 Photoelectric Sensors
- 2 Safety Light Curtains
- 3 Proximity Sensors
- 4 Pressure Sensors
- 5 Programmable Logic Controllers
- 6 Counters/Control Units
- 7 High-Precision Sensors
- 8 Vision Systems
- 9 Bar Code Readers
- 10 Displacement Sensors
- 11 Tribeam Measuring Instruments
- 12 Analog Sensor Controllers
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Functions

Data processing modes

Each of the four modes can be set by simply pressing a key.

Data processing mode	Function
NORMAL	Measures displacement from reference position.
PEAK TO PEAK (P-P)	Measures displacement between maximum and minimum values.
PEAK	Measures maximum value.
BOTTOM	Measures minimum value.

Analog voltage output range selectable

You can select from six analog voltage output ranges. By selecting the analog voltage output range based on the measuring range, a minute change in measured values can be monitored with high accuracy without being affected by noise interference.

Output range of LC-2420 sensor head (µm/ V)

2.5	5	10	25	50	100
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Analog voltage output (intensity)

Analog voltage (0 to 5 V) proportional to the intensity level is continuously output. The analog voltage output is useful for monitoring changes in intensity level over a period and for setting upper/lower intensity limits.

AUTO GAIN

The controller can be set to automatically switch between 4 gain levels. Receiving sensitivity will automatically adjust to different target colours and materials.

Five program storage capability

Up to five sets of parameters can be stored in EEPROM. All of the settings, including preset tolerance and calibration, can be easily switched depending on the workpiece.



Light intensity limits

If the measured value is inaccurate because of excessive or insufficient reflected light or ambient light, setting upper and lower limits for received light intensity will eliminate this problem.

AUTO ZERO

Pressing this button sets the current measured value to "0", regardless of target position. This simplifies offset target positioning.

Output hold

The displayed value and output value are retained by simply pressing a key.

Easy confirmation of reference distance

When the target is in the centre area of the measuring range, the LED indicator lights orange. When it is outside the centre area but in the measuring range, the LED indicator lights green. This allows you to easily find the reference distance (position where the laser beam spot is smallest) and mount or adjust the sensor head.



Sensor head	Range the LED lights orange
LC-2420	±0.02 mm
LC-2430	±0.05 mm
LC-2440	±0.3 mm
LC-2450	±0.8 mm

Error message

The LC displays an error message to indicate that a problem has occurred. Since the displayed error message reveals the cause of the problem, you can act to prevent further errors from occurring.

Interface

Analog voltage output

Analog voltage is output in proportion to the measured value, enabling quick data processing and analysis. The output range can be changed to 6 steps.

RS-232C

The RS-232C interface enables communication with a computer. Thus, data transfer and remote operation for changing settings are possible.

Control output

This displacement metre is equipped with the HIGH and LOW comparator outputs as the standard function. In addition, the LIGHT INTENSITY alarm output (DARK, BRIGHT) and the AREA OVER alarm output (FAR, NEAR) are provided.

Hints on Correct Use

Operating environment

Keep the ambient temperature at a constant level. Fluctuations in ambient temperature may cause measurement error.

[Note]

If the ambient temperature changes by 10°C, it takes approximately 60 minutes for the temperature distribution in the LC-2400W to become uniform.

Compatibility

With the LC Series, the controller and sensor head are calibrated in pairs. Therefore, to meet specifications, be sure to combine a controller and sensor head having the same serial number.

Measures to reduce noise interference

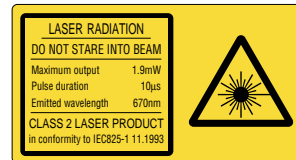
- Keep the wiring or connection cable away from high-voltage lines or power lines to prevent the LC-2400W from malfunctioning due to noise. Be sure to keep wiring separate.
- Be sure to earth-ground the LC-2400W through the earth ground terminal. Insulating the sensor head is also effective in reducing noise.

Warning

The LC Series conforms to IEC and FDA standards as follows:

Model	LC-2420	LC-2430	LC-2440	LC-2450
IEC	Class 2			
FDA	Class II			

IEC Class 2



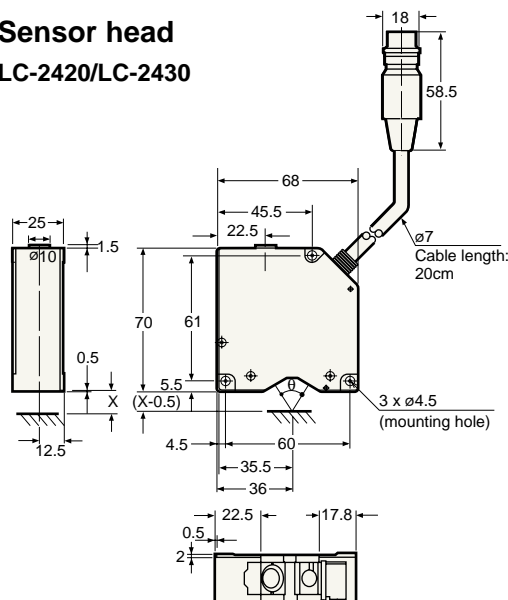
FDA Class II



Dimensions

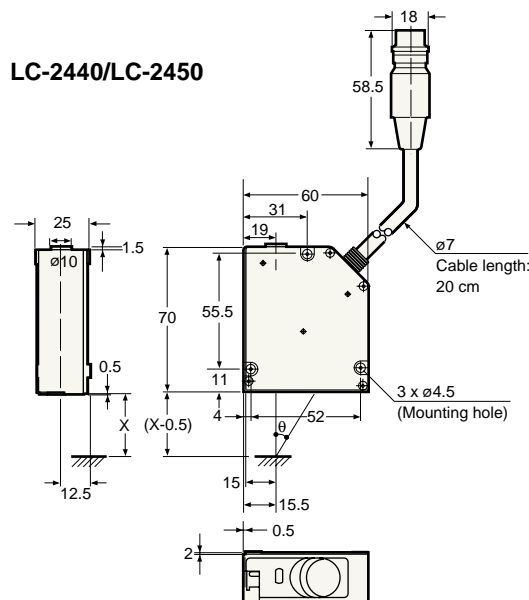
Sensor head

LC-2420/LC-2430



Model	θ	X
LC-2420	63°	10.5
LC-2430	45°	30.5

LC-2440/LC-2450



Model	θ	X
LC-2440	30°	30.5
LC-2450	22°	50.5

Unit: mm

Controller

LC-2400W

