KEYENCE

3D Laser Snapshot Sensor

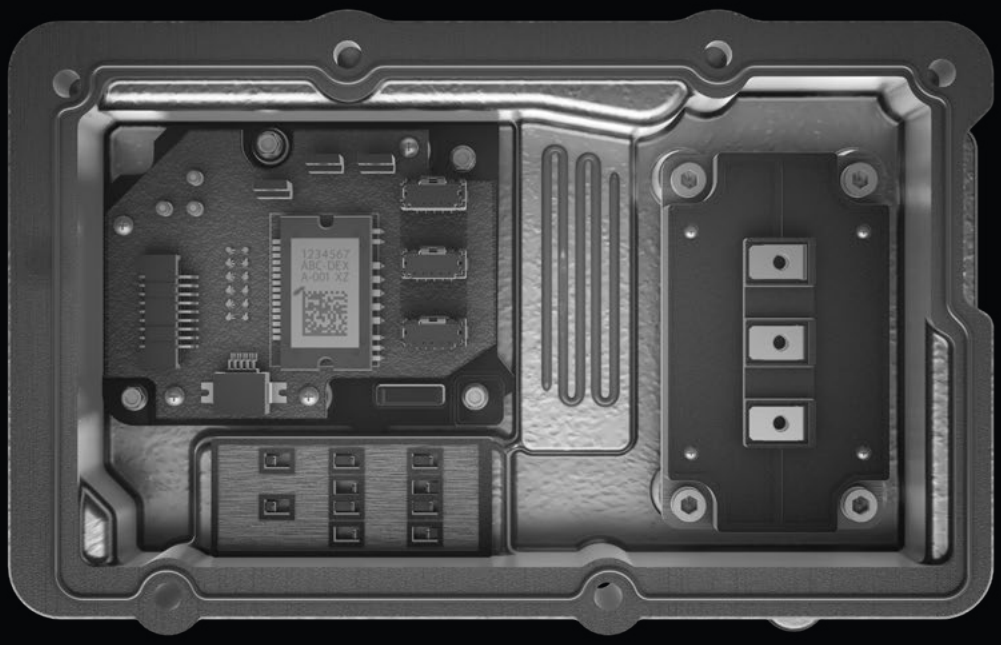
NEW LJ-S8000 Series

3D Inspection with Hassle-Free Integration

LJ-S8000 Series

Taking Visual Inspection into the Next Dimension

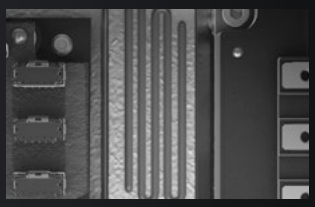
Flat Contrast-Based Visual Inspection



With two-dimensional XY inspections

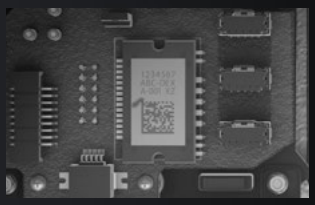
No height or depth measurements

Without height information, it is impossible to properly measure or inspect parts in the z-direction. This makes things like checking sealant volume or shape impossible with just 2D information.



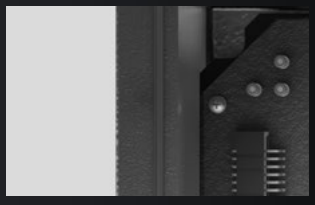
Results are affected by focus and background patterns

Out-of-focus images and images with background patterns—including markings on the surface of components—result in false detections.



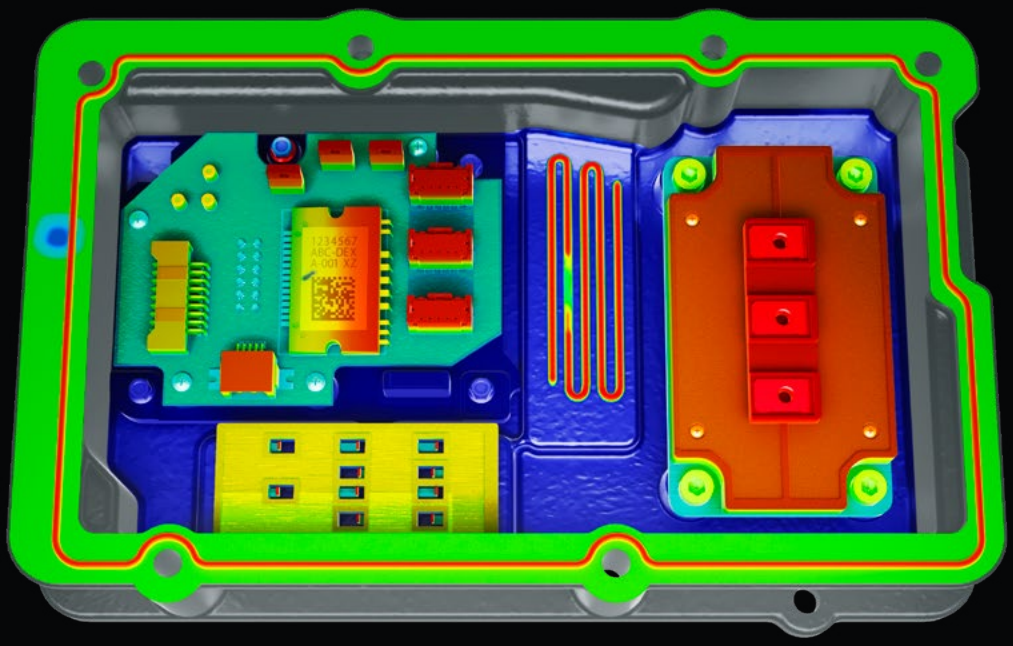
Unstable inspection when there are subtle variations in shading

Subtle irregularities/defects with no clear difference in brightness do not result in a sufficient change in shading, making stable detection impossible.



3D Laser Snapshot Sensor
NEW **LJ-S8000 Series**

3D Height-Based Visual Inspection



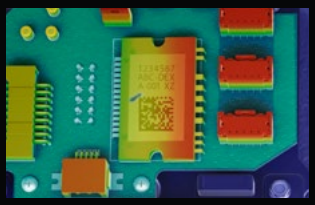
With three-dimensional XYZ inspections

Width, height, area, and volume measurements are possible

Detection of protrusions and indentations as well as numerical measurements of depth, volume, and other characteristics enable stable detection of even minute differences.

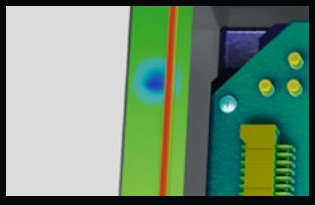
Results are not affected by focus or background patterns

Using height to generate a 3D image means results are not affected by focus or patterns, allowing for clear determination of height differences and accurate detection of tilted targets and defects.



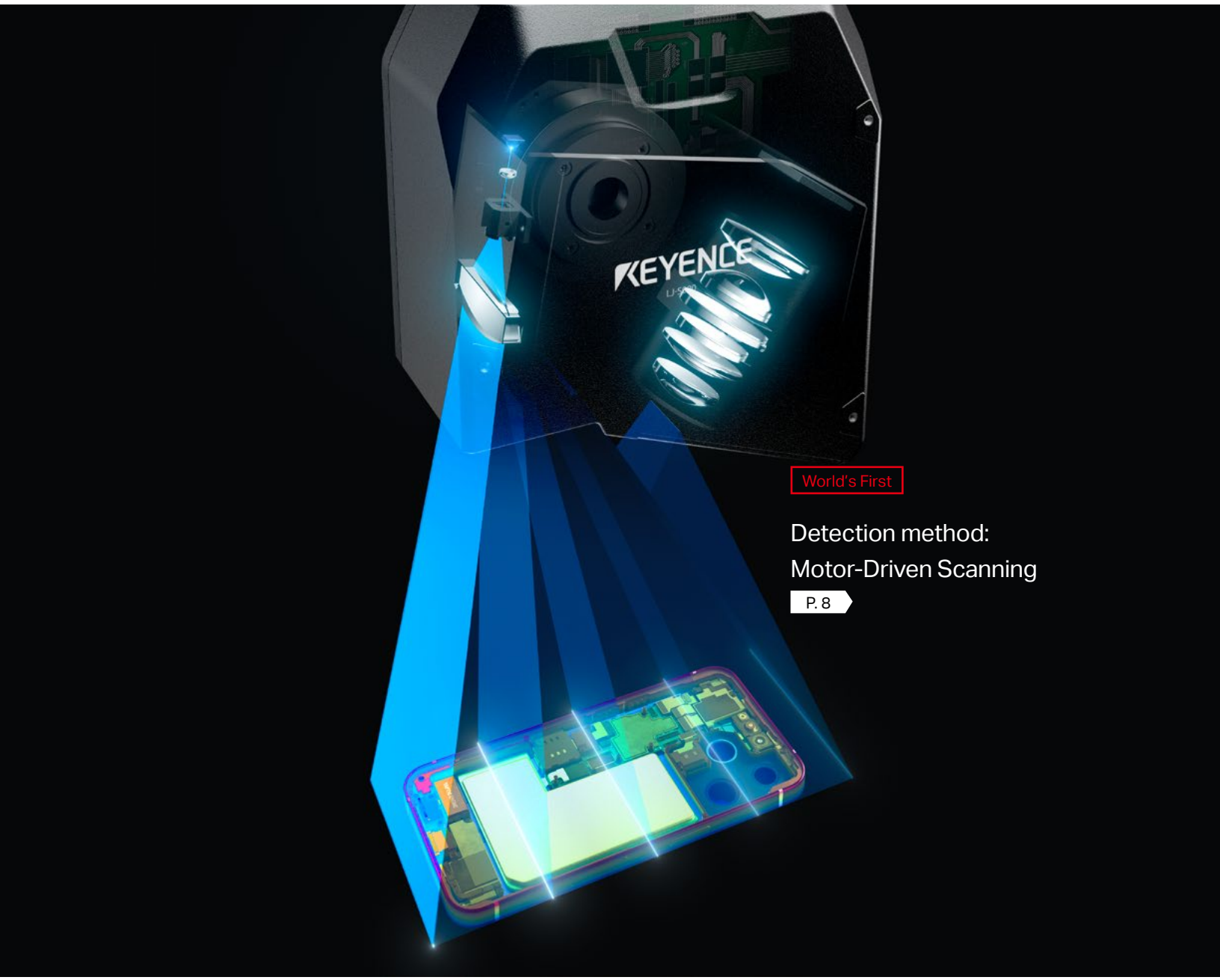
Stable inspection of similarly colored uneven surfaces

Stable detection is possible even for slight irregularities/defects that are not clearly seen with contrast-based detection by utilizing height information.



3D Inspection with Hassle-Free Integration

World's First Profiler with Built-In Scanning Mechanism!



World's First

Detection method:
Motor-Driven Scanning

P. 8

Painless installation and setup

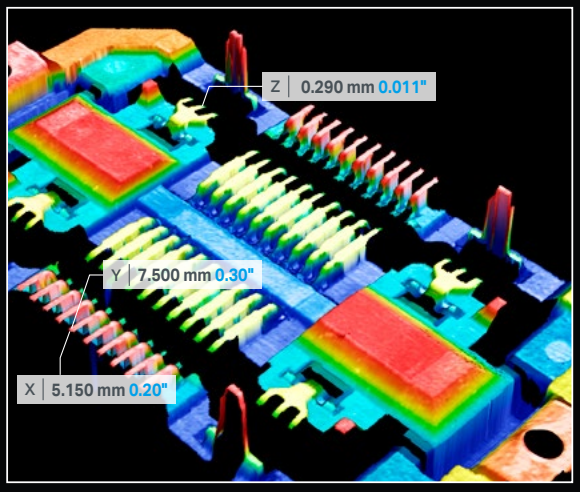
Immediate inspecting is possible without the need for any additional equipment such as lights, lens focus mechanisms, electronic stages, or encoders.

Highly accurate and stable

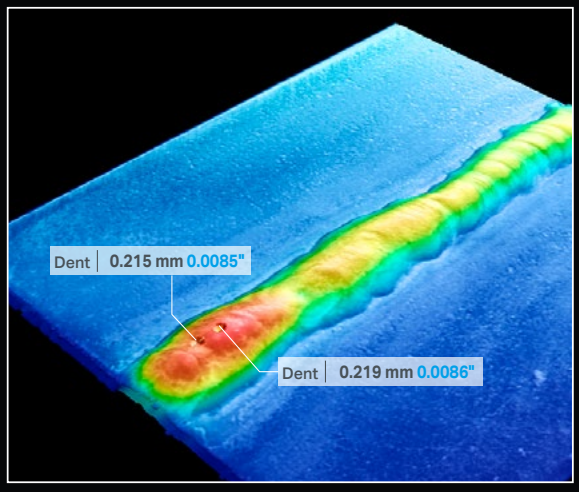
High-accuracy detection of targets featuring multiple materials and shapes is possible, with no focus blurring or errors from equipment operation.

All-In-One Measurement and Inspection, Beneficial for Countless Applications

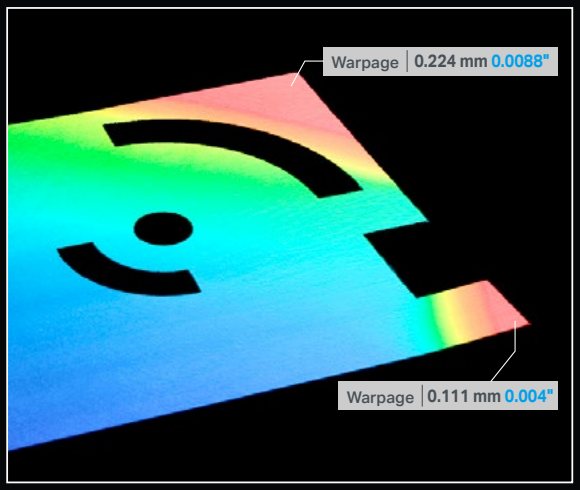
Connector Terminal Coplanarity Confirmation



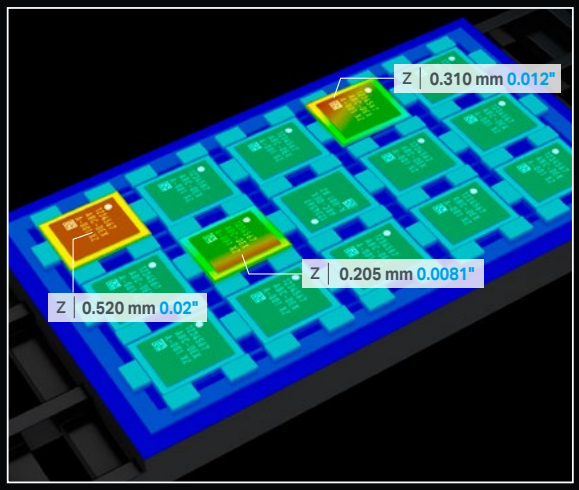
Weld Bead Shape Inspection



Pressed Part Flatness Inspection



IC Chip Seating and Orientation Checks



Dimension measurement

XYZ measurements such as width, position, height, area, volume, and angle can all be determined with a single device.

Appearance inspection

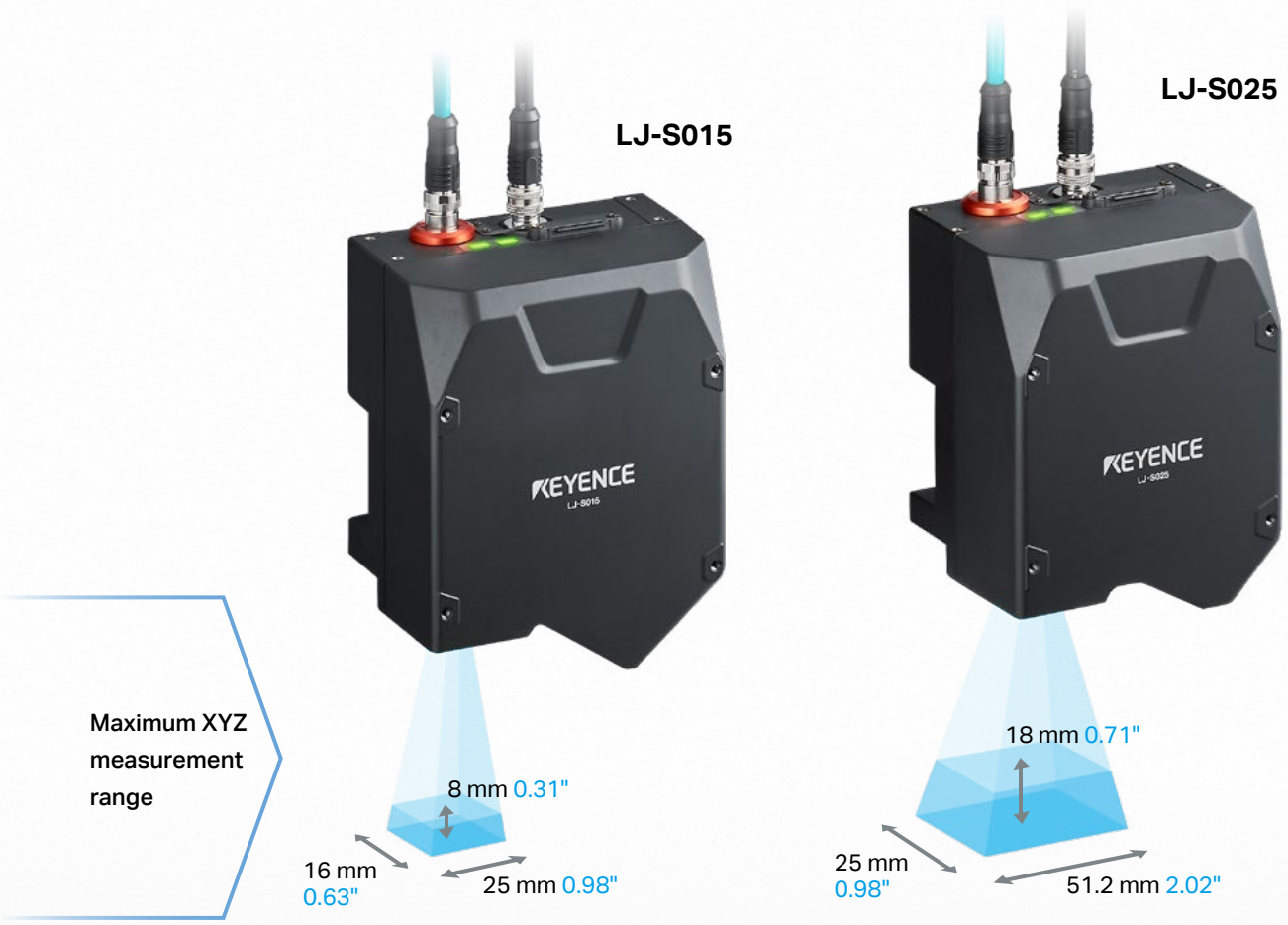
3D imaging ensures stable detection of even slight irregularities in targets without being affected by background or color differences.

Identification/ differentiation

Simultaneous capturing of 3D measurement and luminance data ensures stable detection of incorrect seating, assembly defects, OCR inspection, and more.

Select from a lineup designed to meet all application requirements

Maximum capturing speed: 0.2 seconds



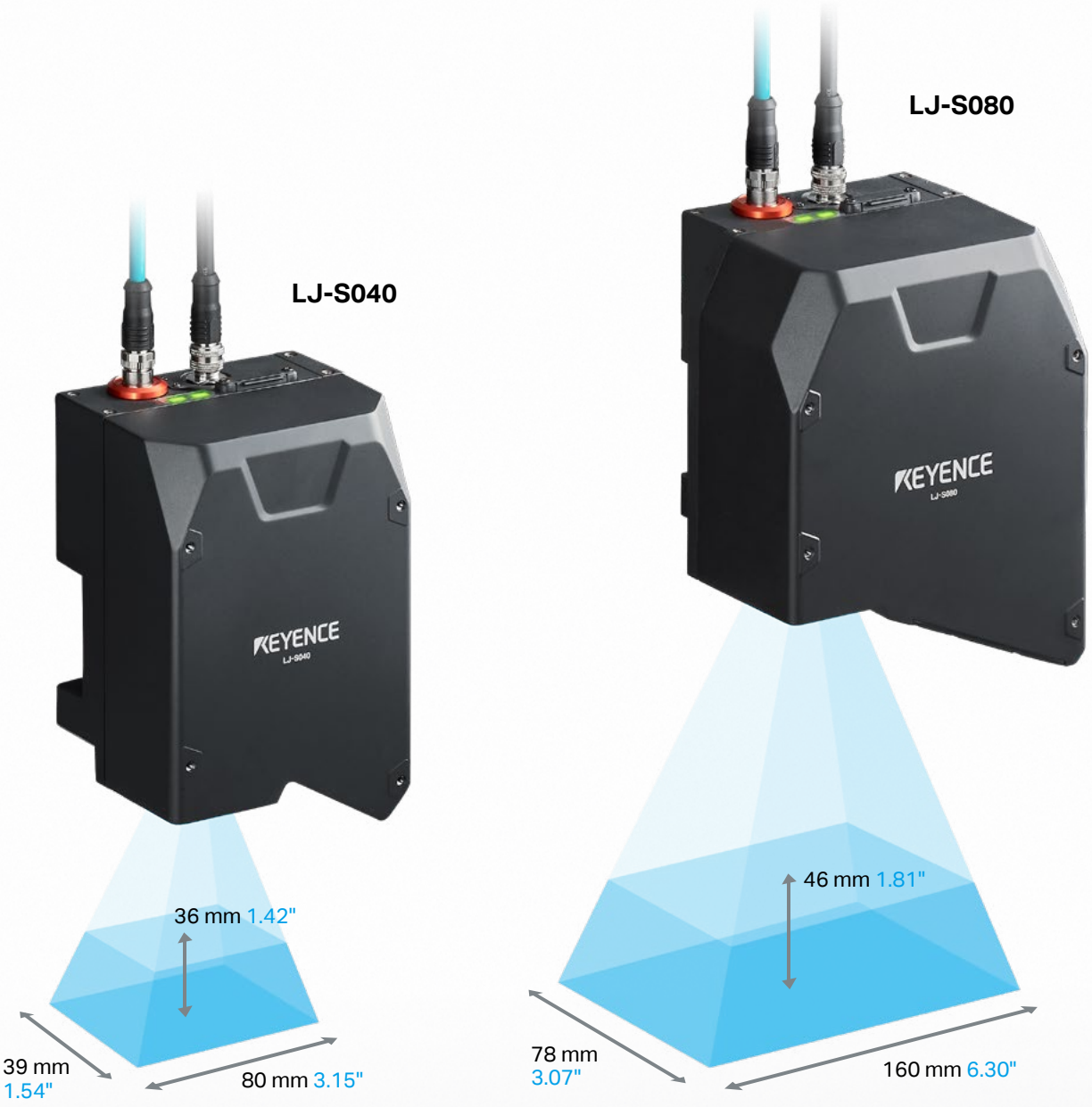
Two system configurations to choose from

Dedicated controller: **LJ-S8002**

The intuitive user interface makes configuring 3D image inspection settings simple. Configuration for inline inspection can be completed in just three easy steps.

Direct PC connection

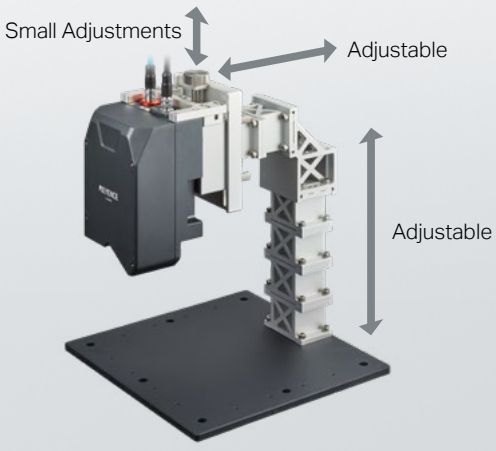
Create fully customized solutions with advanced programming capabilities. Ideal for integration with external softwares or programs.



Custom mounting made easy

Dedicated blocks to create custom stands

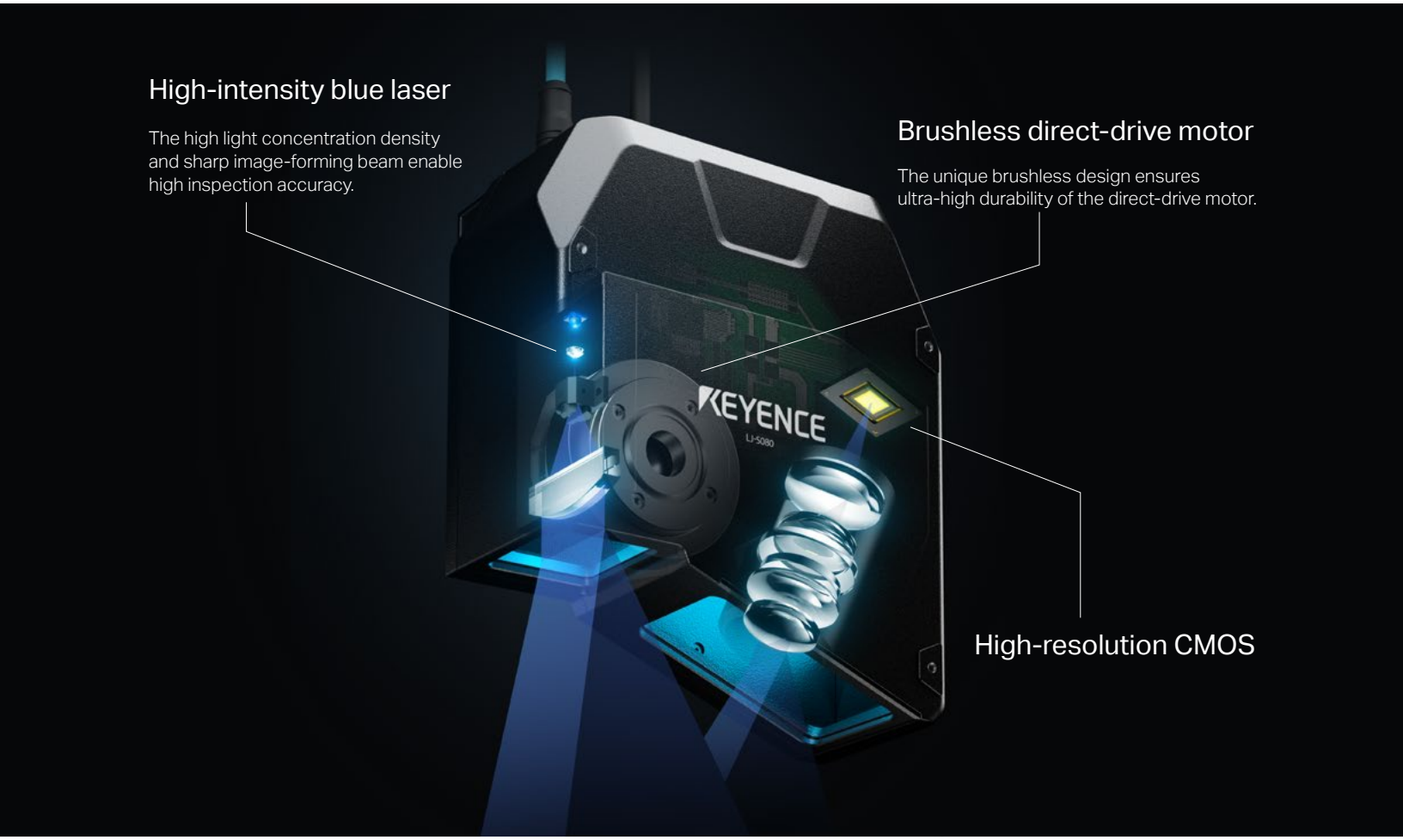
The installation height and position can be adjusted easily according to the target location. These highly rigid mounting blocks ensure safe mounting and adjustment for any applications. Custom mounting fabrications are no longer necessary and inspection can occur almost immediately after installation.



World's First Profiler with Built-In Scanning Mechanism!

Highly accurate, stable inspection with no need for troublesome adjustments

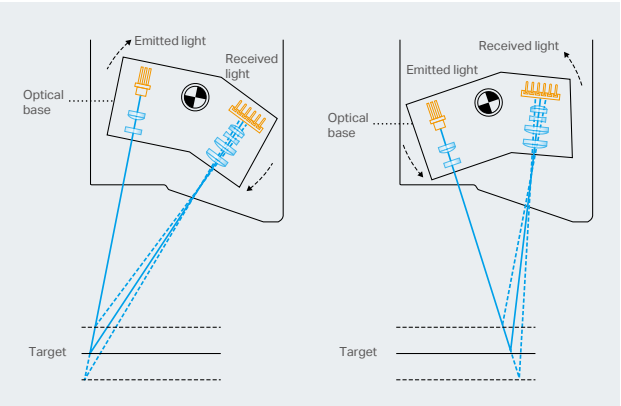
The sensor head is equipped with a built-in scanning mechanism for easier-than-ever highly accurate and stable 3D inspection.



World's First

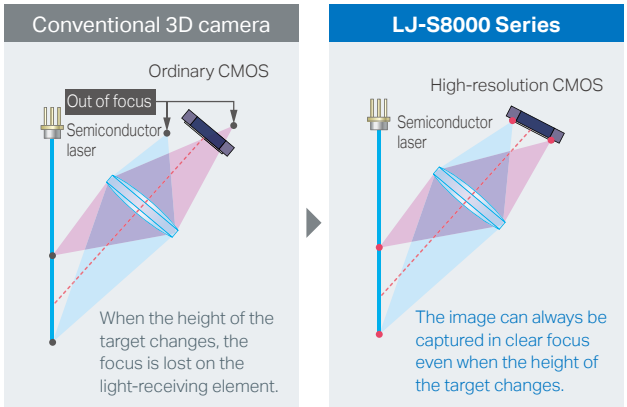
Motor-Driven Scanning Detection Method

The LJ-S Series utilizes a one-of-a-kind design that allows for scanning of parts by moving the components internally and eliminating the need to move the part of sensor head. This not only makes installation a breeze, but also creates a large depth of field.



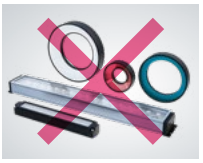
Large Depth of Field with Zero Focus Adjustment Needed

The advanced optical system ensures clear focus throughout the measurement range. This means that regardless of target height, the measurements and image stay in focus.

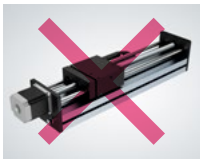


No Lighting, Motion, of Encoders Needed

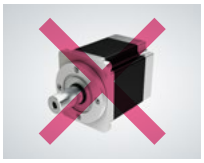
The built-in laser light source and scanning mechanism eliminate the need for lighting, stages, encoders, or other auxiliary parts. This dramatically reduces installation costs and time associated with setting up these devices. Inspections can be performed simply by mounting the device and setting up the program in 3 easy steps.



No lighting required



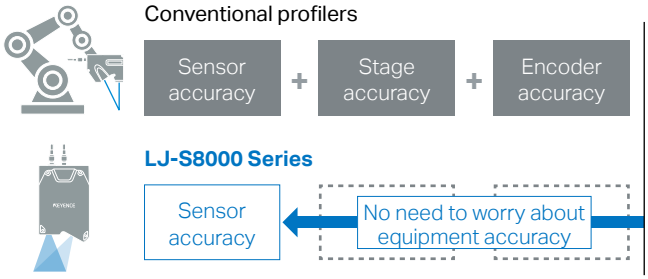
No stage required



No encoder required

Simplified Setup Helps Maintain Accuracy

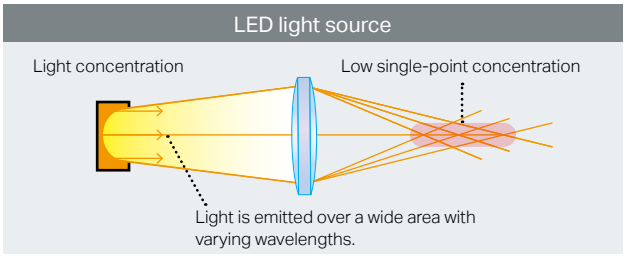
With conventional systems, selecting an inspection machine meant thinking about not only the accuracy of the sensor but also any potential problems with the encoder, electronic stage, or robot needed to move the sensor. The LJ-S8000 Series' built-in scanner ensures high-accuracy inspection without having to worry about auxiliary equipment accuracy, as that additional equipment has been eliminated.



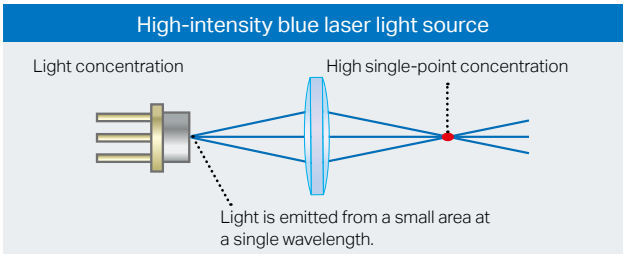
Stable Inline Inspection Regardless of Color or Surface Finish

High intensity blue laser

Conventional vision systems generally use LED light sources for illumination. The high light concentration and sharp image-forming beam of the high-intensity blue laser used in the LJ-S8000 Series allow for an increased amount of received light, improving detection performance and measurement accuracy, while also ensuring greater ambient light resistance.



The wide emission area and multiple wavelengths of the LED light source results in increased lens aberration, preventing the light from being focused on a single point and lowering the density of light at the focal point.



The small emission area and single wavelength of the blue laser light source allows light to be focused on a single point, increasing the light concentration at the focal point.

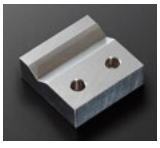
Single-shot HDR

The profiler is equipped with an ultra-high-sensitivity CMOS receiving element featuring KEYENCE's single-shot HDR function. This provides the sensor with a dynamic range wide enough to reliably measure targets with multiple surface types (or areas of low reflectance and high reflectance) in a single shot.

The Single-Shot HDR function enables highly accurate measurement even of targets that are difficult to measure with conventional models.

Milky white resin

Metal mirror-finished surface



Multiple reflective surfaces

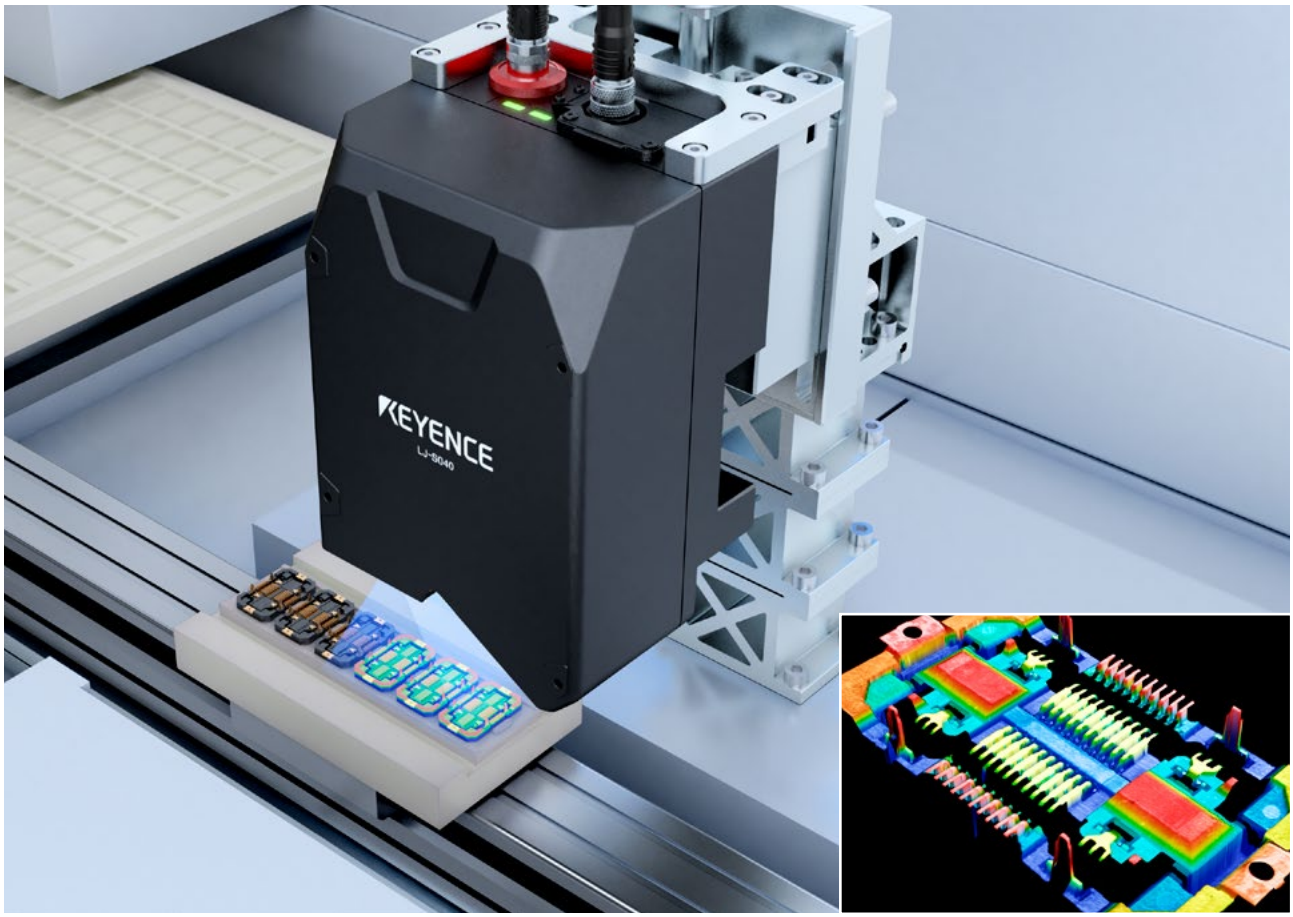
Black rubber

Versatile Applications

3D Dimensional Measurement

A wide variety of measurement tools are available in addition to height and flatness, including position, width, area, volume, angle, and GD&T tools.

Connector terminal coplanarity measurement

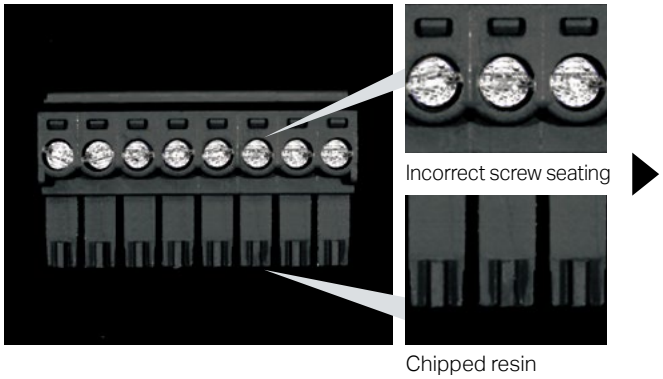


X, Y, and Z information with a single device

Inspections are performed not only with the contrast information but with the height information as well, enabling stable measurements and detection.

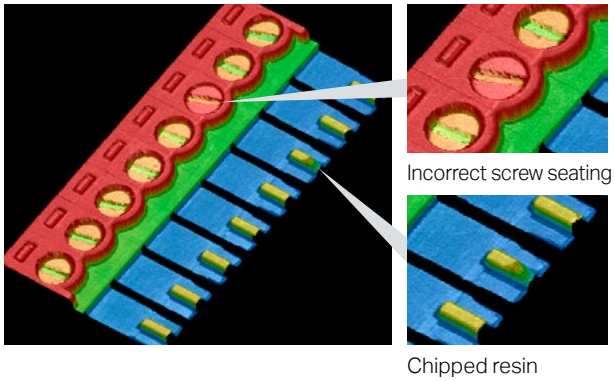
Conventional method: Vision camera

Determining defects and height is difficult using only a camera aimed from above the target.

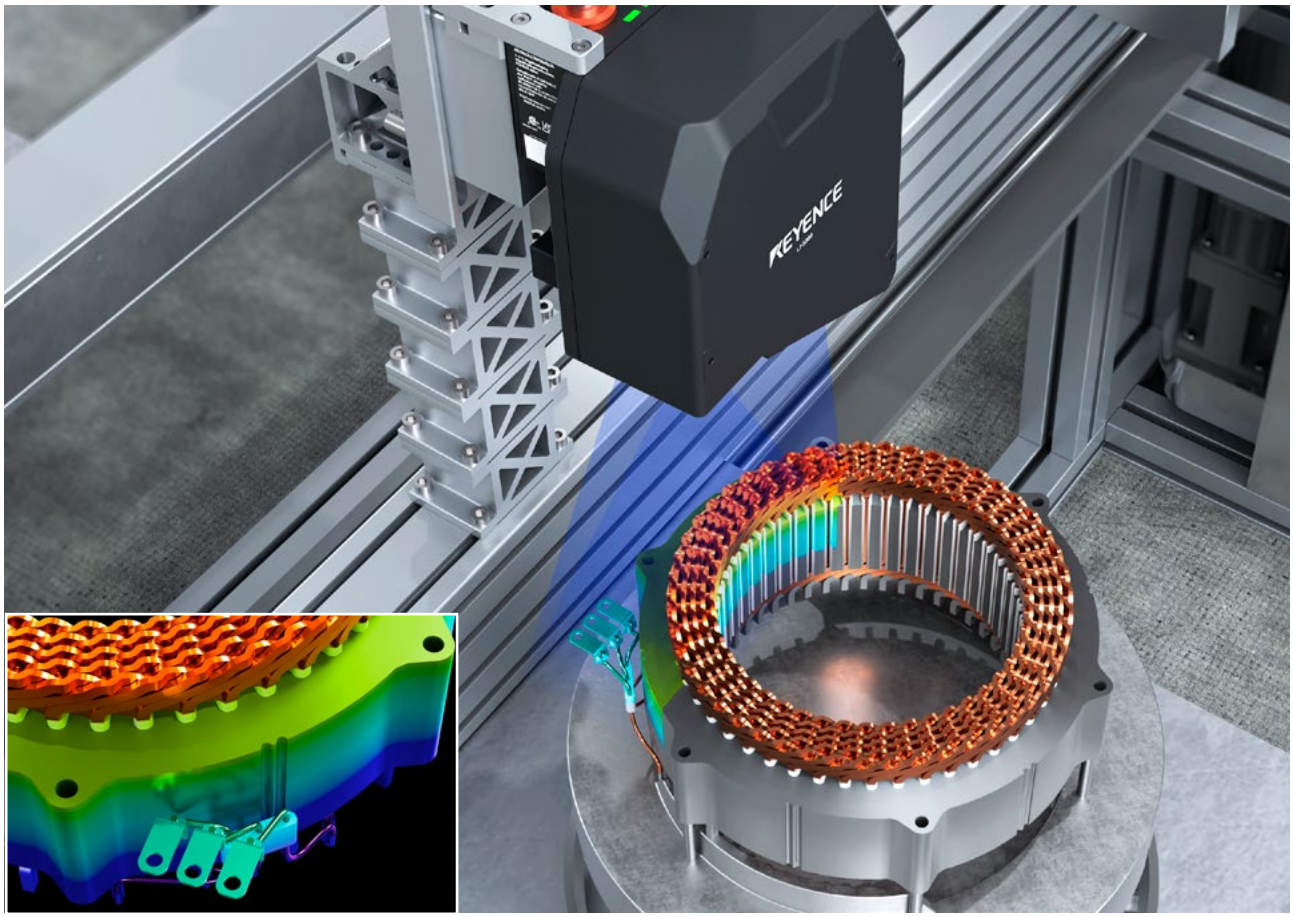


3D inspection

The addition of Z-direction data enables recognition of 3D shapes for easy judgment based on height.

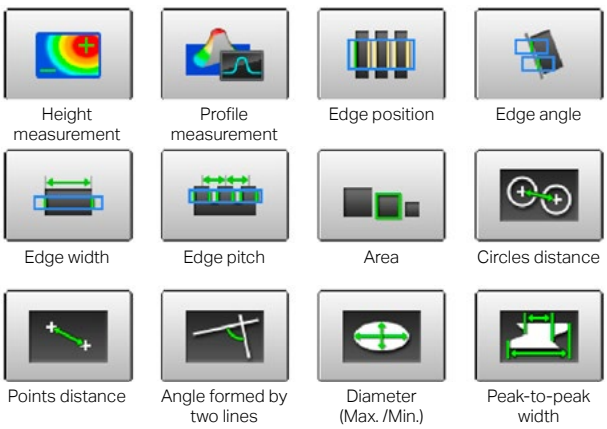


3-phase stator terminal height and position measurement



Intuitive inspection tools

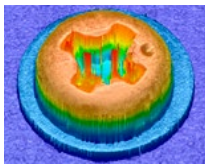
Adding inspection tools is simple and easy with a wide variety of tool options and visual icons for simple selection.



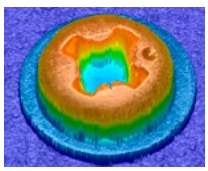
NEW FUNCTION

Stray Light Control function

With conventional systems, inspection of uneven shapes with glossy metal surfaces is often affected by stray light from the multiple reflective surfaces and scattered light. The new Stray Light Control function minimizes the effects of stray light so accurate shape images can be captured.



Stray light control OFF



Stray light control ON

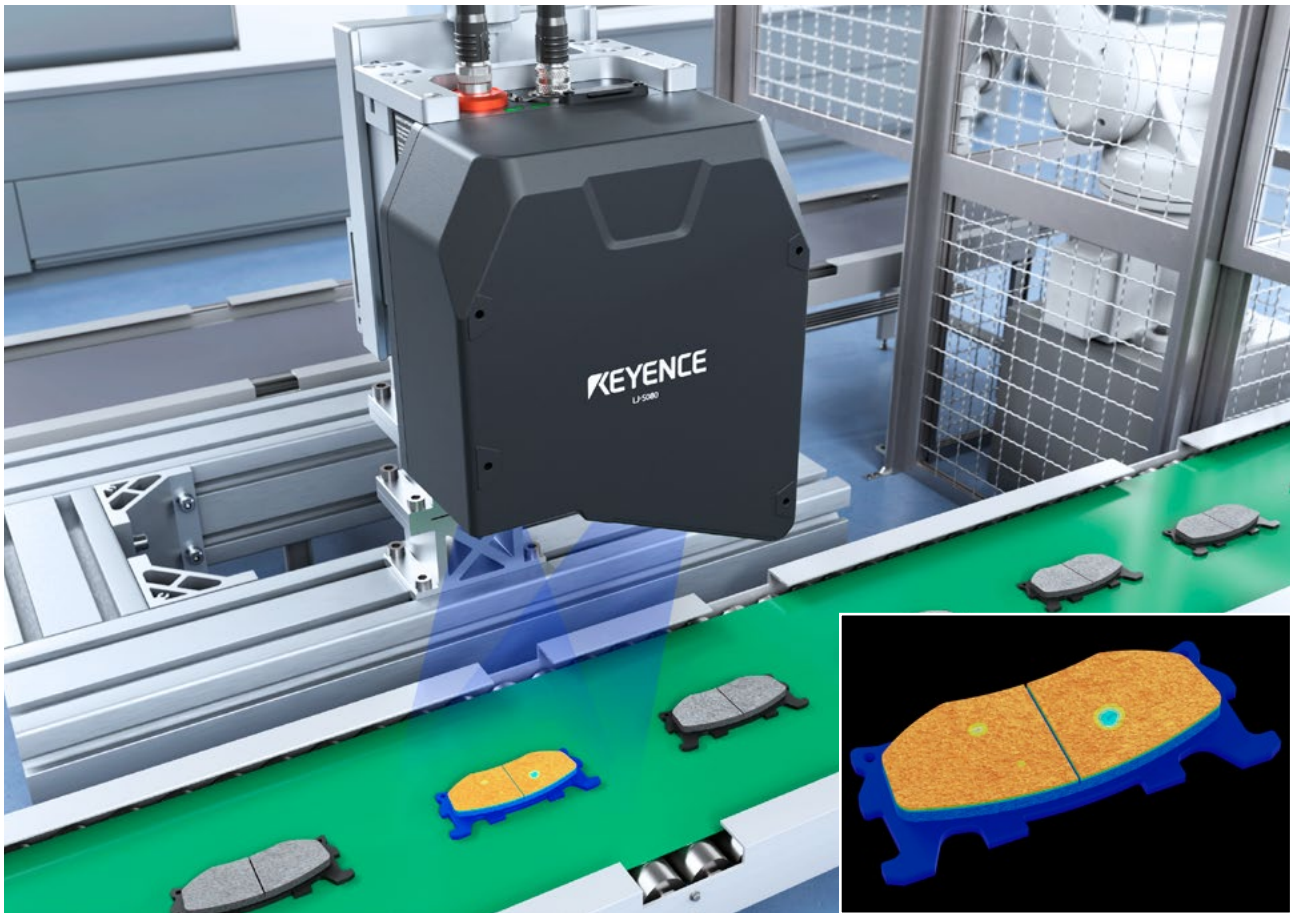
ECU PCB screw tightening height inspection

Versatile Applications

3D Appearance Inspection

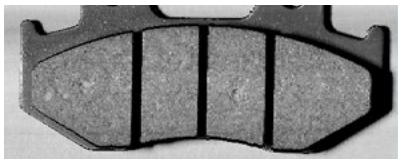
Various tools for inspecting welding defects, incorrect sealant application, dents, and other defects are available.

Brake pad dent inspection

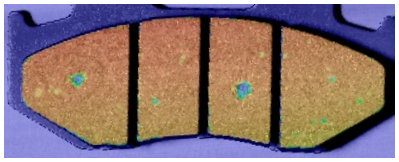


Reliable detection on patterned surfaces

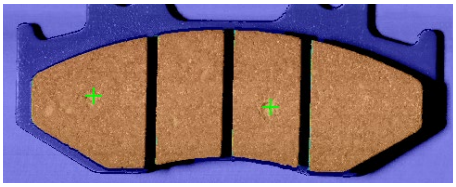
Height-based images are created by scanning the target and using color to represent height changes.
Patterns or markings on the surface do not impact the height-based image, making it easy to detect indentations or other defects that would typically be impossible to identify.



Grayscale image

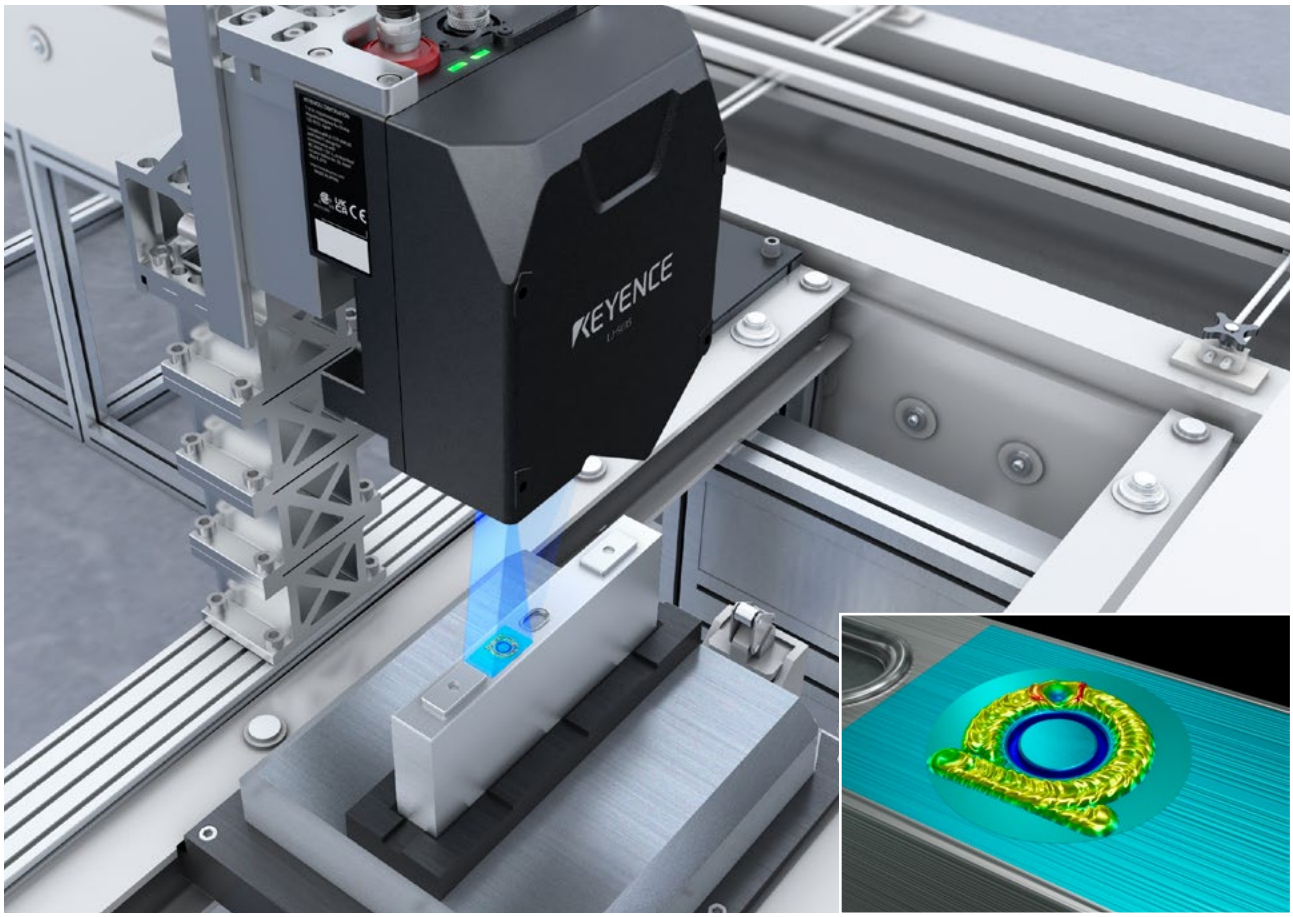


Height-based image



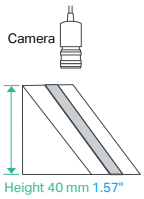
Defect/indent detection results

Inlet weld appearance inspection



Stable detection of targets with height differences

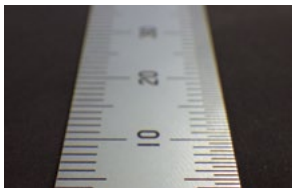
Clear images can be captured even when looking at targets with height variations or where the distance relative to the sensor could change. Stable detection over a large Z-range is possible, resulting in a more flexible and responsive inspection solution than a standard 2D camera.



When capturing inclined targets with a height difference of 40 mm 1.57"

Image with tilting

Ordinary 2D camera



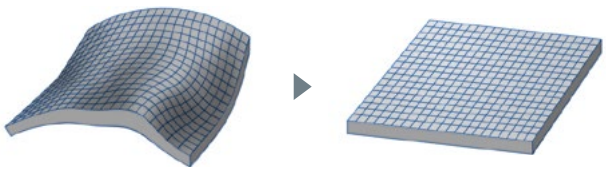
Out of focus

LJ-S8000 Series

Image captured clearly

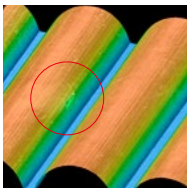
Identify defects on uneven surfaces using free-form planes

Free-form planes allow the system to pick up on deviations from the typical contour of a surface. This makes stable defect detection possible, even for targets with complex shapes.

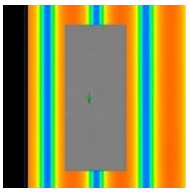


Defect inspection on a rubber curved surface

Picture of target



Height image



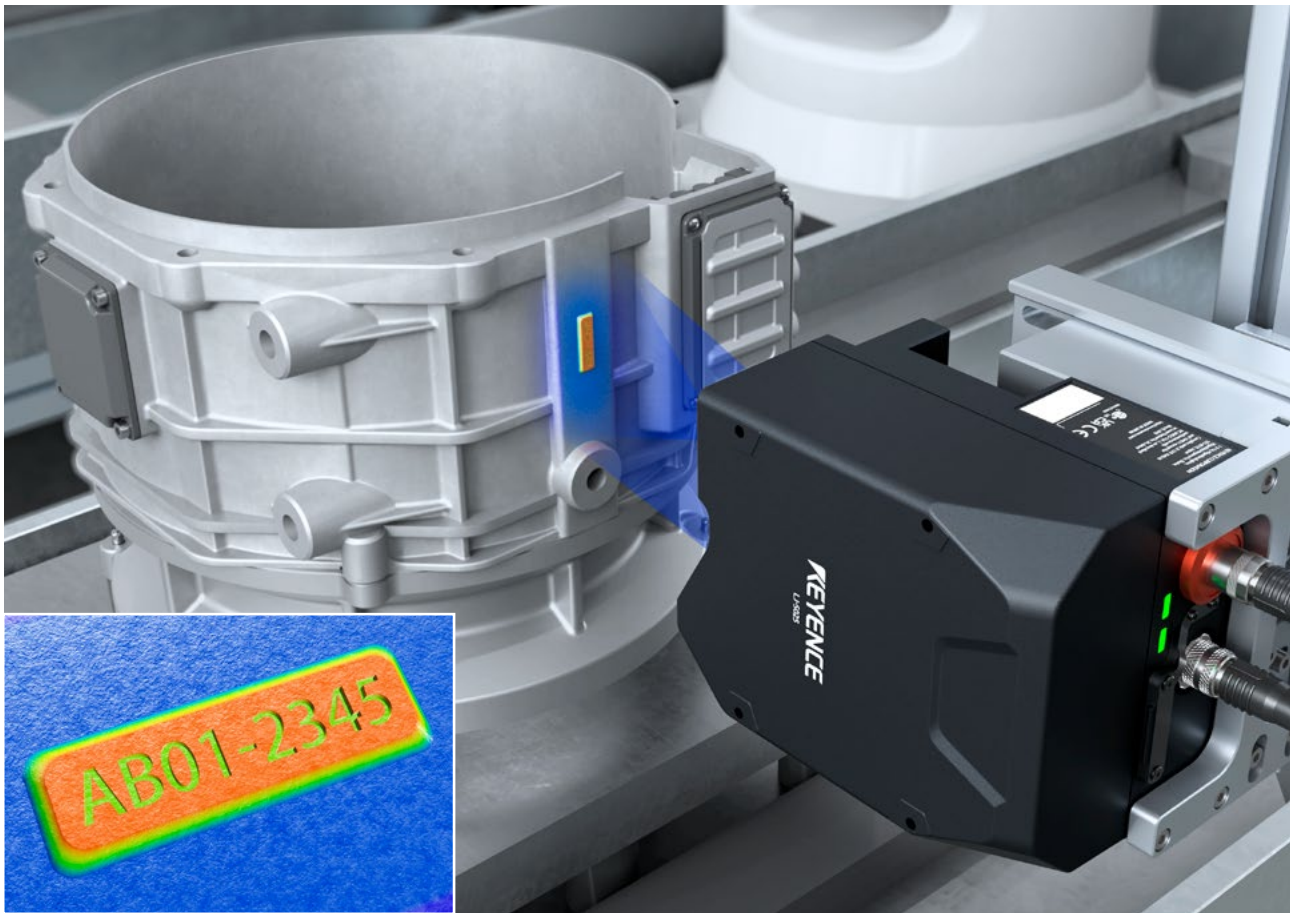
Flattened image to detect defect

Versatile Applications

3D Identification & Differentiation

The LJ-S8000 Series can be used for presence detection, counting, OCR, 2D code reading, and various other applications.

OCR and character depth inspection on motor cases



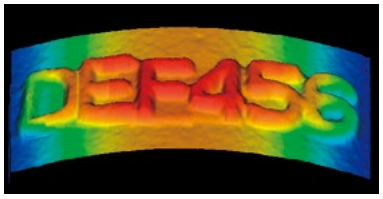
Stable OCR even on curved or uneven surfaces

Height extraction

Grayscale images that highlight the necessary height information can be automatically generated using the 3D data, allowing for trouble-free use of conventional character recognition tools. Using this function together with flat surface or free-form surface extraction ensures stable inspection, even for targets that are difficult to accommodate with conventional vision systems.

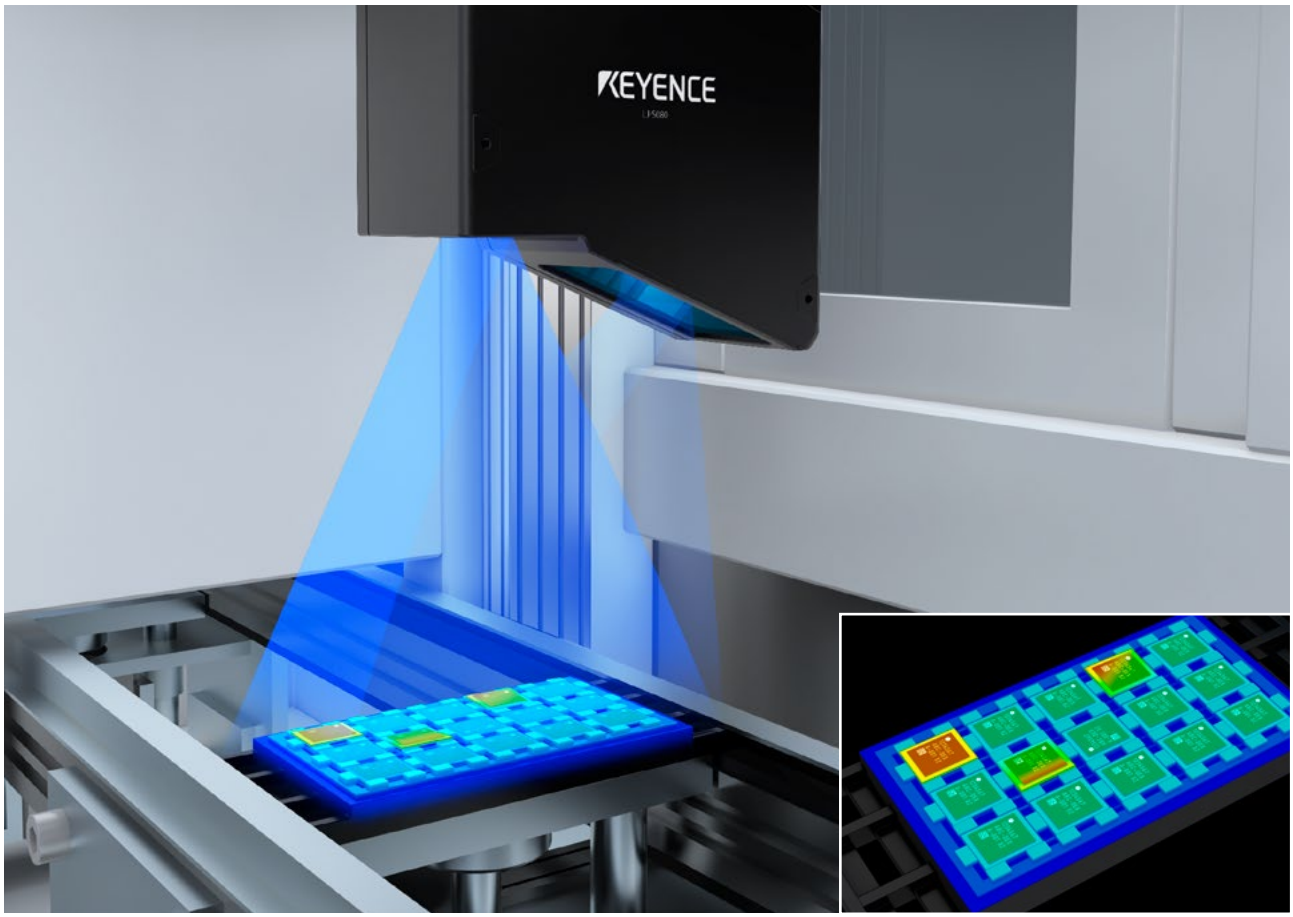
Picture of target

Height data



Detection image

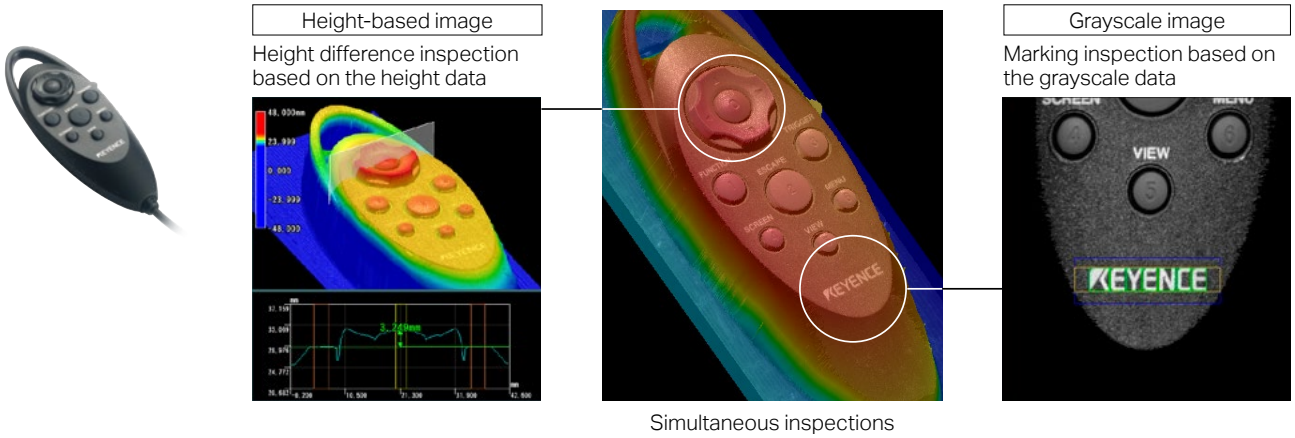
IC chip seating, orientation, and OCR inspection



Shading inspection and 3D inspection in a single device

Simultaneous acquisition of grayscale images and height-based images

Both height and grayscale images can be captured at the same time. Height inspection can be performed simultaneously without having to change conventional grayscale inspection settings. This helps improve stability and enables support for a wider range of applications.



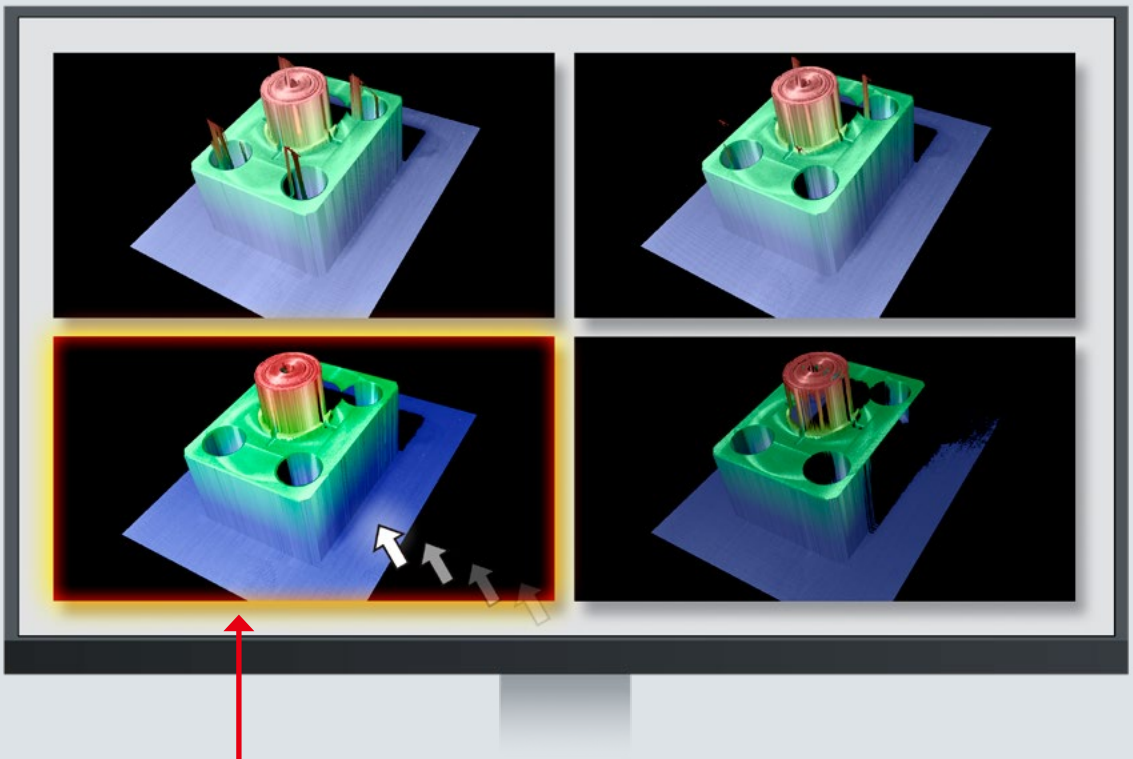
Simultaneous inspections

High Quality Images Have Never Been Easier to Obtain

Easy-to-use Imaging Navigation function—ideal settings achieved at the push of a button

With conventional systems, any time the conditions changed, targets had to be placed on the stage and the settings adjusted. With the LJ-S8000 Series, however, adjustment is as easy as selecting the image with the best image quality. This significantly reduces time spent on not only startup but also reconfiguring settings due to changes in the target.

Imaging Navigation function with automatic image display



Simply select the best image

Automatically see different setting results:
Simply choose the best 3D image three times to complete the settings.

Getting started with a conventional system

- Light intensity adjustment
- Target confirmation
- Re-adjust
- Target confirmation
- Noise reduction
- Target confirmation
- Reconfiguration of settings
- Target confirmation
- Filter settings
- Target confirmation
- Reconfiguration of settings
- Imaging settings complete

Settings configured with the LJ-S8000 Series Imaging Navigation function

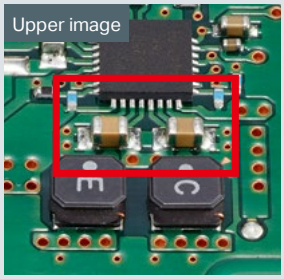
Significantly reduced setup time

- STEP 1 Image selection
- STEP 2 Image selection
- STEP 3 Image selection
- Imaging settings complete

Tilt Correction Ensures Stable Detection

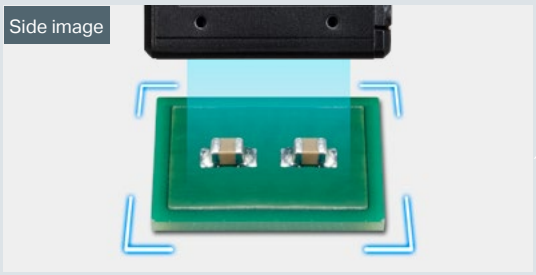
Height inspection of PCB-mounted parts

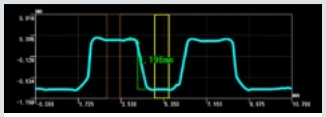
Any variation in part presentation, such as angle or tilt, is automatically corrected to produce stable profile measurements.



Height inspection of PCB-mounted parts

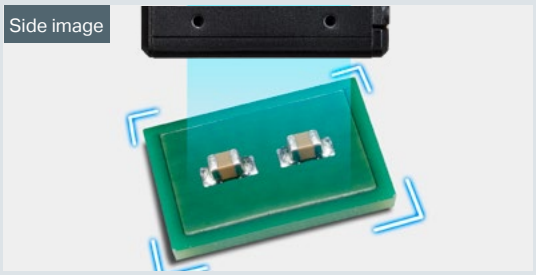
A target that did not become misaligned or tilted during transportation



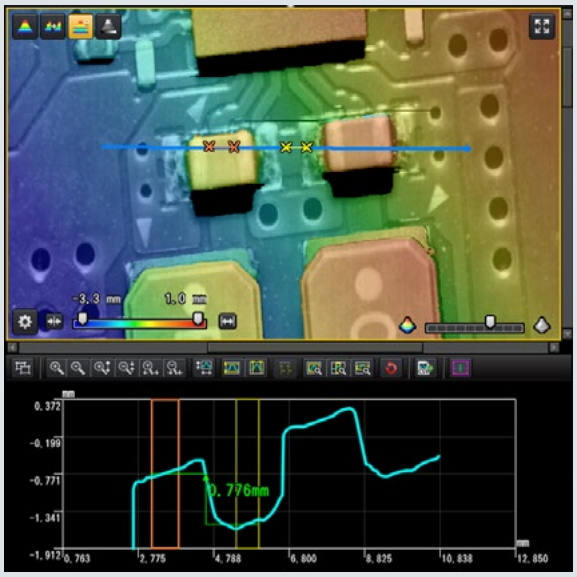


The profile can be accurately extracted.

A target that became misaligned and tilted during transportation

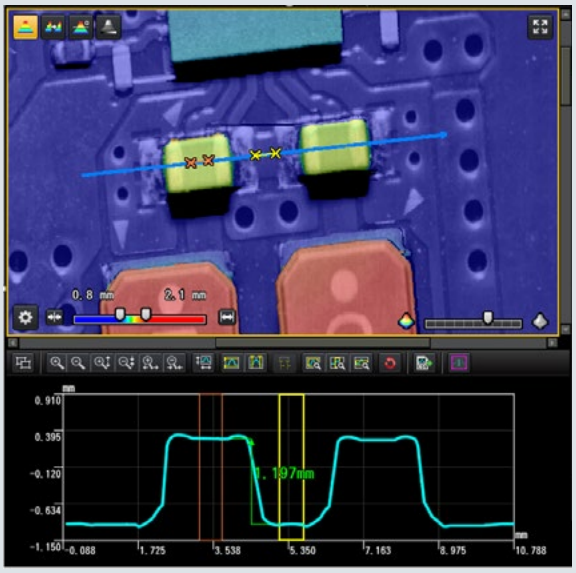


Conventional models



If a PCB is misaligned or tilted, measurements and inspection cannot be performed correctly.

3D position correction with LJ-S8002



The LJ-S8000 Series detects target position shifts and tilt, then automatically performs position corrections, ensuring stable inspection.

Easy-to-Use Software Options

The LJ-H1X simulator software for quick programming

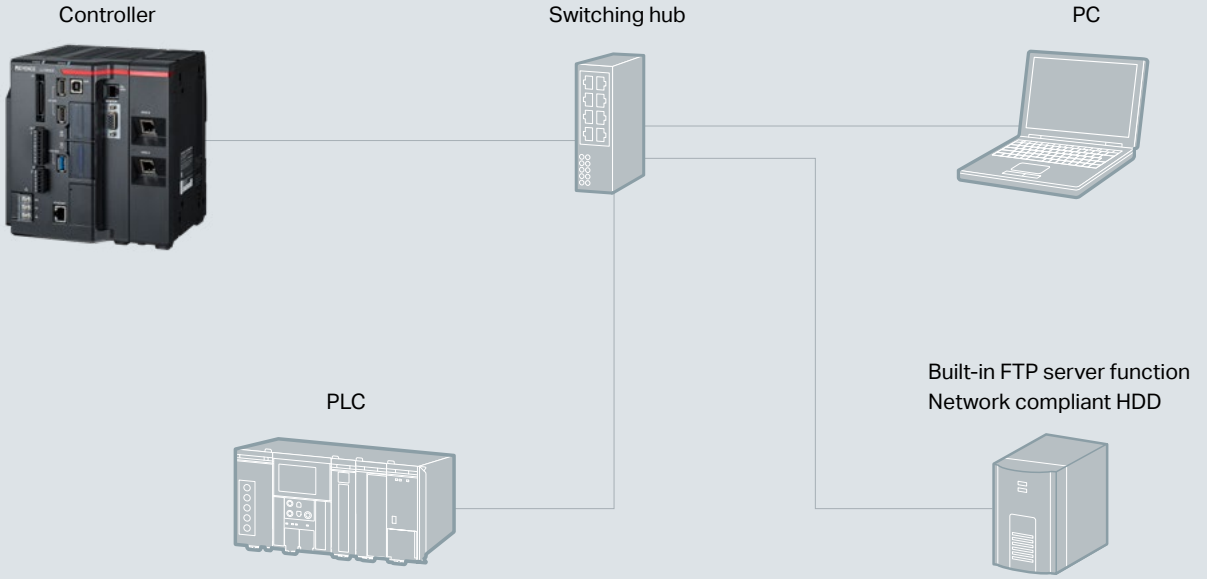
Dedicated software that can be installed and used on the user's own PC.
This software allows for configuration files to be uploaded, measurement values to be logged, and much more.

Simulation-Software

Image settings and inspection tools can be configured and verified offline.
Use stored OK/NG images to remotely simulate situations faced onsite.

Terminal-Software

Controller image data and measurement results can be obtained from remote locations using local PCs.
Additionally, by using the remote desktop function, it is possible to perform actions such as changing controller settings in other factories, enabling significant time savings.



PLC connection
Connect via RS-232C/Ethernet to PLCs made by various manufacturers.

PLC-compatible manufacturers
- KEYENCE Corporation: KV Series
- OMRON Corporation: SYSMAC Series
- Mitsubishi Electric Corporation: MELSEC Series
- Yaskawa Electric Corporation: MP Series

Output images and measurement values to FTP servers. Connecting a large-capacity HDD with an FTP server feature makes long-term image storage possible.

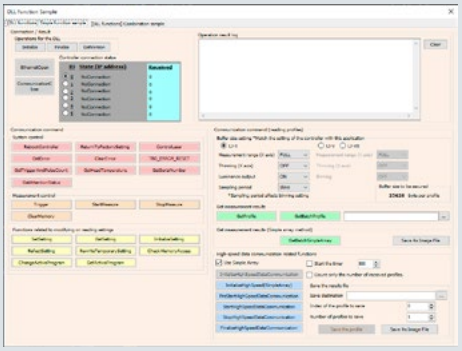
EtherNet/IP PROFINET EtherCAT® RS-232C/Ethernet PLC link

• EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Sensor heads can be connected directly to PCs for use with custom programs or external software

Compatible with various programming languages

Sample programs are available with a comprehensive list of commands for obtaining profile data, issuing triggers, changing various settings, and so on. Sample programs with a wide variety of commands—including 3D data acquisition, trigger generation, and setting changes—and programs for saving in CSV and TIFF formats are available.



• Windows

C# | C++ | VB.NET | Python

• Linux

C++ | Python

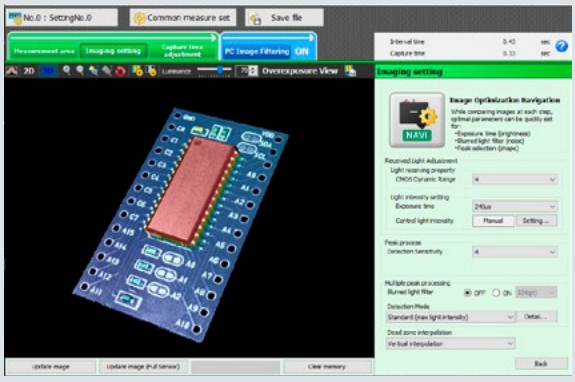
Extensive driver support

HALCON | VisionPro | Cognex Designer | Aurora Design Assistant*

* Conventional Matrox Design Assistant

Two types of dedicated software included

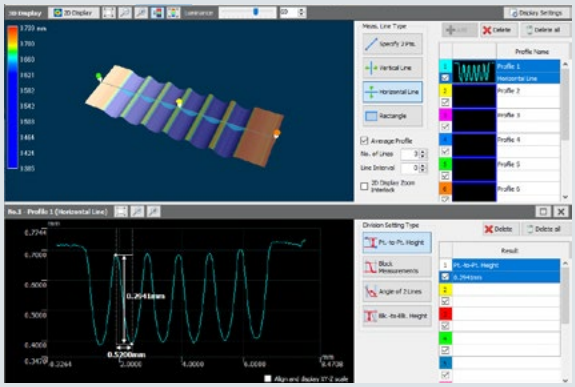
LJ-S Navigator



Optimize capture settings

Adjust capture settings, such as exposure time or sensitivity, while viewing the image to easily ensure performance.

LJ-S Observer



Easy analysis of measurement data

Measured data can be analyzed immediately. Measurement results can be verified before a custom program is created.

Applications

Inline 3D Inspection Examples: Installation examples with no additional equipment needed

Index table

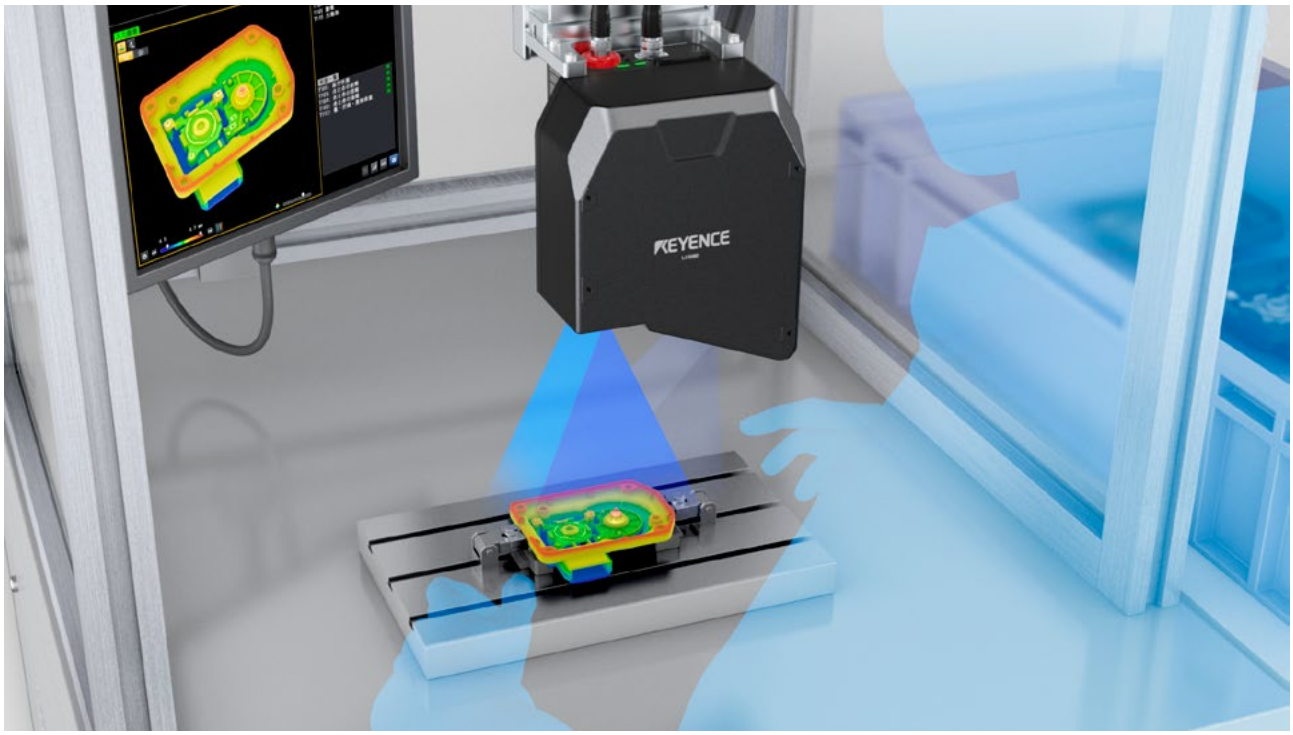
Inspections can be completed with only short, temporary target stoppage.
The LJ-S Series can be easily attached to existing equipment without any additional devices needed.

Robot mountable

Installing the LJ-S Series on a robot allows for inspection at any angle or location without having to worry about robot vibrations or linearity due to the high inspection stability.

Stand-alone inspection

Automatic target position and angle detection make inspection possible when simply placing the target down by hand.



Fixed-pitch transfer feeder

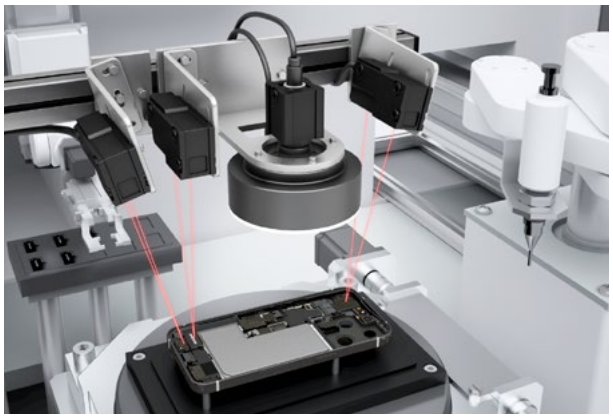
Inspections can be completed with only short, temporary target stoppage, enabling easy 3D inspections on existing equipment lines.

Advantages of 3D Inspection

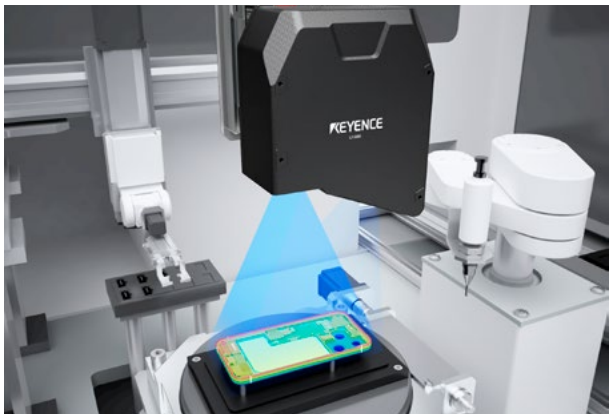
All-in-one solution for various inspection needs

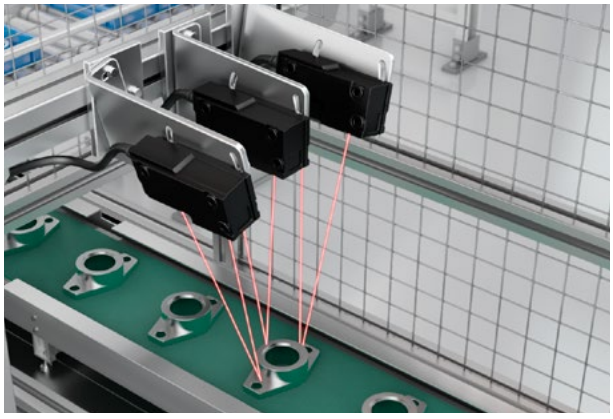
With the LJ-S Series, inspections requiring a combination of various displacement sensors, cameras, and other devices can be performed with a single system.
This helps reduce the space needed compared with conventional systems utilizing multiple inspection methods.

Conventional models



LJ-S8000 Series

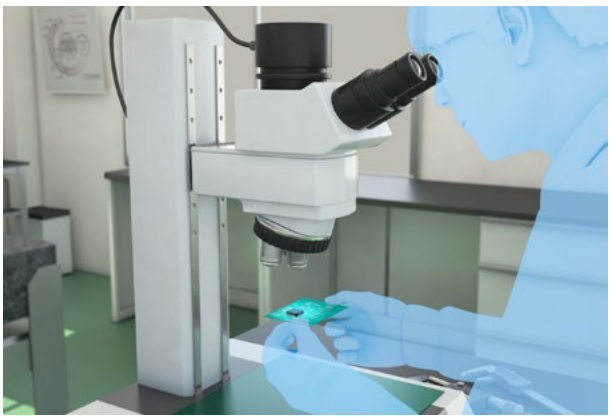




From offline inspection to 100% inline inspection

The LJ-S8000 Series enables 100% inline inspection even for items previously handled through visual inspections or sample inspections with calipers and micrometers.
Automated 3D inspection is also possible for all conventional inspection tasks.

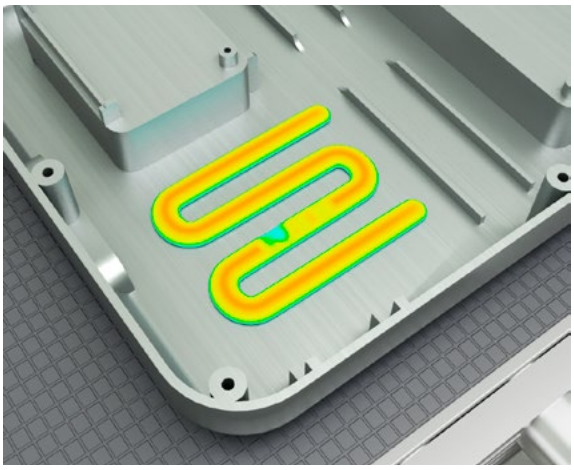
Conventional models



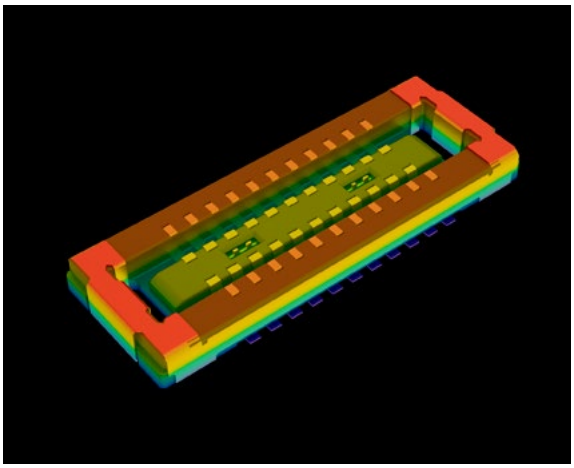
LJ-S8000 Series

Electrical/Electronic Devices

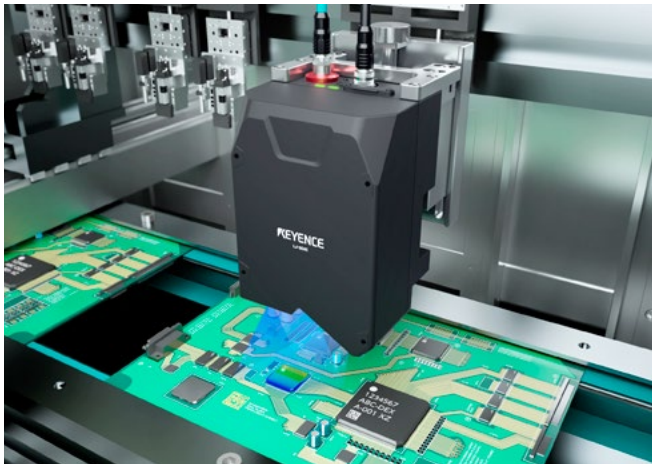
Heat-dissipation material width, height, and volume measurements

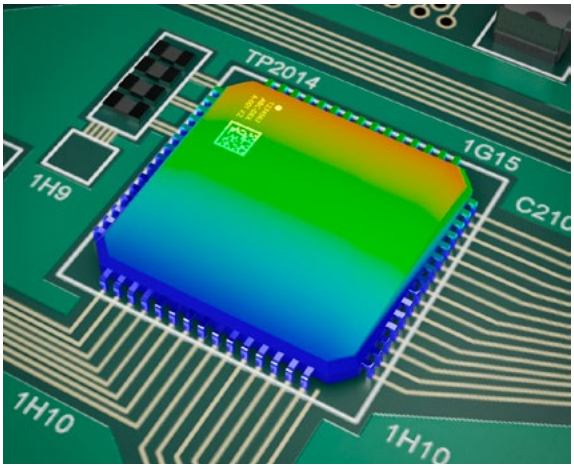


Connector coplanarity inspection



Packaged component height and seating inspection

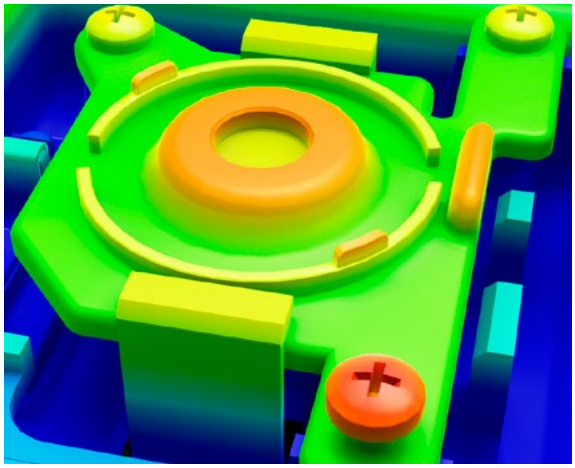




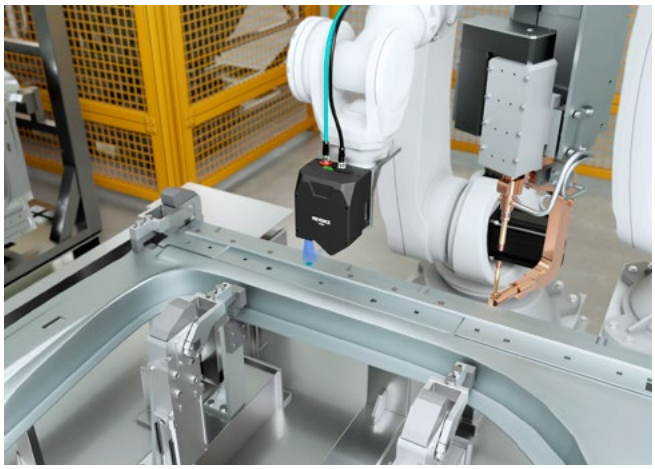
Advantages of 3D Inspection

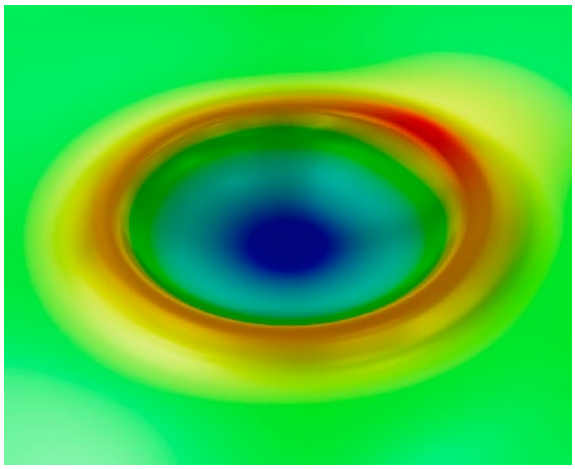
Automobiles/Metals

Screw seating inspection for plastic molded products



Spot welding depth

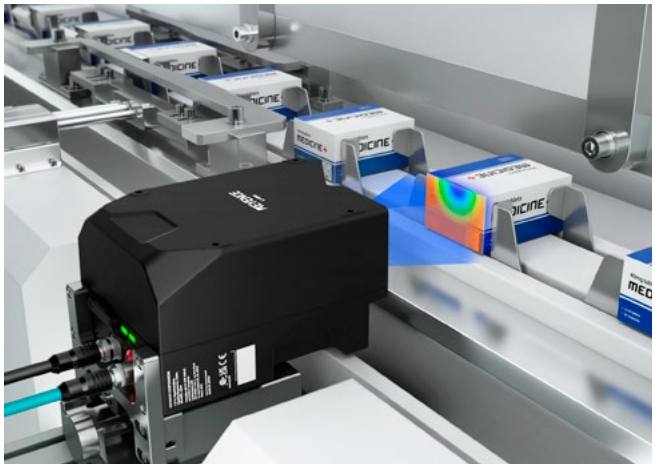


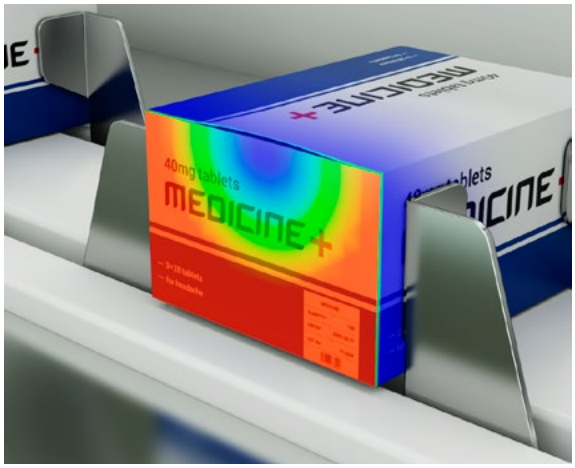


Character recognition (OCR) on die-cast parts

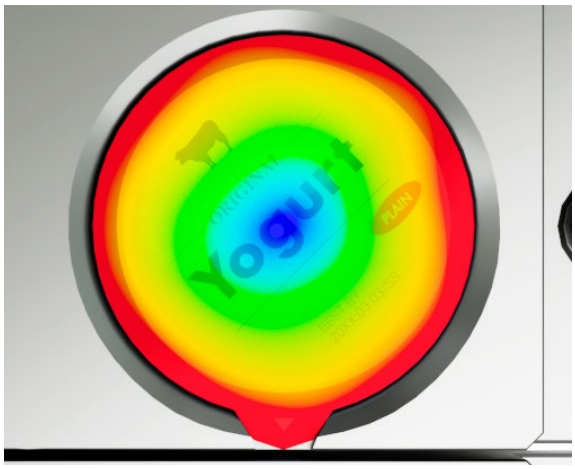
Food/Pharmaceutical/Cosmetics

Carton case deformation inspection

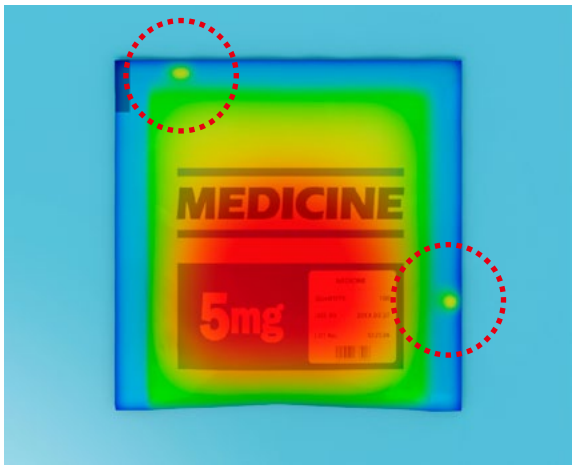




Lid heat seal inspection

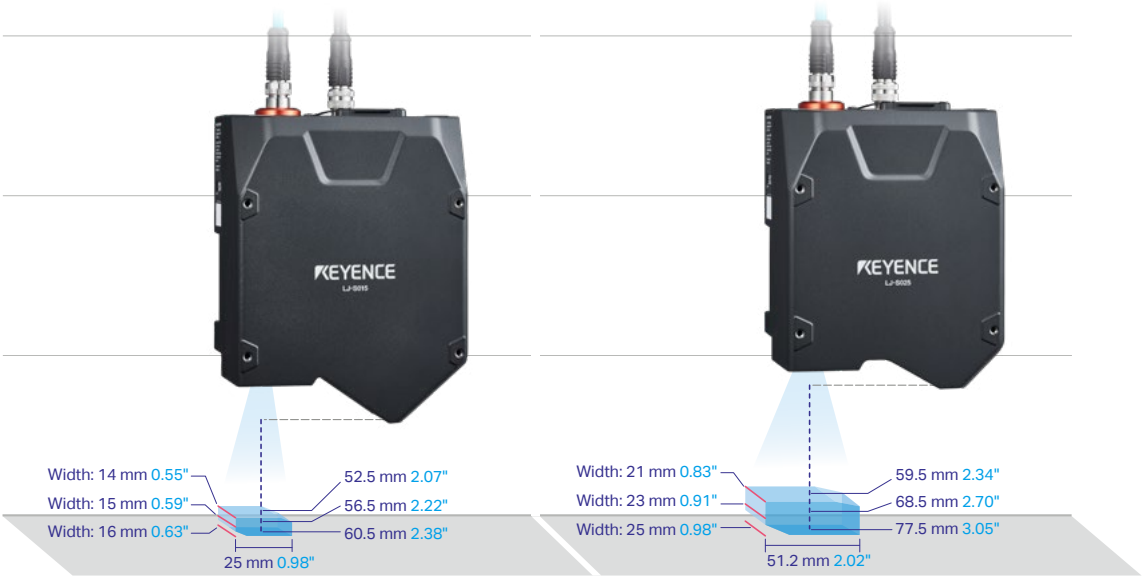


Heat seal engagement inspection



Sensor head lineup

Sensor heads

	LJ-S015	LJ-S025
		
Measurement range	Z-axis (height) 56.5 ±4 mm 2.22" ±0.16"	Z-axis (height) 68.5 ±9 mm 2.70" ±0.35"
	X-axis (width) 15 mm 0.59"	X-axis (width) 23 mm 0.91"
	Y-axis (length) 25 mm 0.98"	Y-axis (length) 51.2 mm 2.02"
Repeatability	Z-axis (height) 0.3 µm 0.000012"	Z-axis (height) 0.4 µm 0.000016"
	XY (distance) 0.5 µm 0.000020"	XY (distance) 0.7 µm 0.000028"

Required

Head Ethernet cables
OP-88835 (2 m 6.6')
OP-88836 (5 m 16.4')
OP-88837 (10 m 32.8')
OP-88825 (L-shaped/ 0.2 m 0.7')

Head power supply I/O cables
OP-88949 (2 m 6.6')
OP-88950 (5 m 16.4')
OP-88951 (10 m 32.8')
OP-88826 (L-shaped/ 0.2 m 0.7')

Required

Connecting to a controller

Controller
LJ-S8002

Connecting directly to PC

PC

Monitor

12" LCD color monitor
CA-MP120

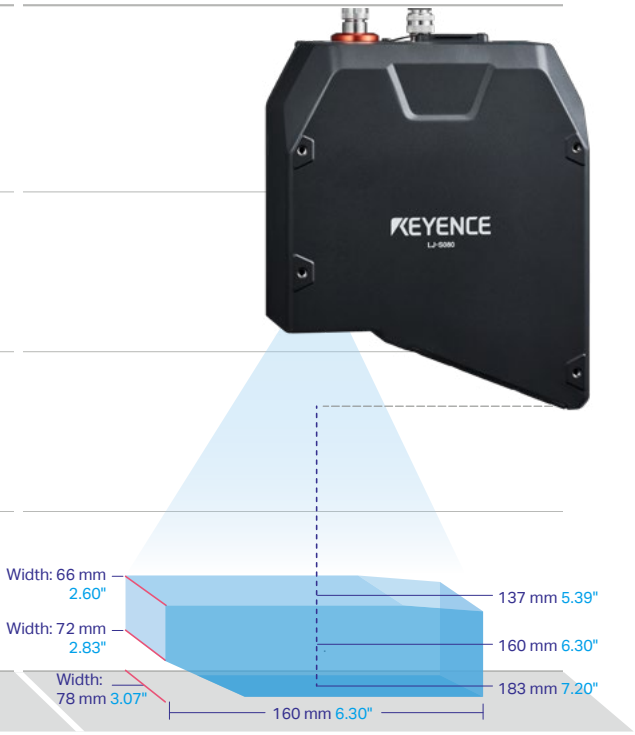
CA-MP120 monitor stand
OP-87262

CA-MP120 pole-mounting bracket
OP-42279

RGB monitor cable
OP-66842 (3 m 9.8')
OP-87055 (10 m 32.8')

LJ-S040

LJ-S080



		LJ-S040	LJ-S080
Measurement range	Z-axis (height)	70 ±18 mm 2.76" ±0.71"	160 ±23 mm 6.30" ±0.91"
	X-axis (width)	35 mm 1.38"	72 mm 2.83"
	Y-axis (length)	80 mm 3.15"	160 mm 6.30"
Repeatability	Z-axis (height)	0.5 µm 0.000020"	1 µm 0.000039"
	XY (distance)	1 µm 0.000039"	3 µm 0.000118"

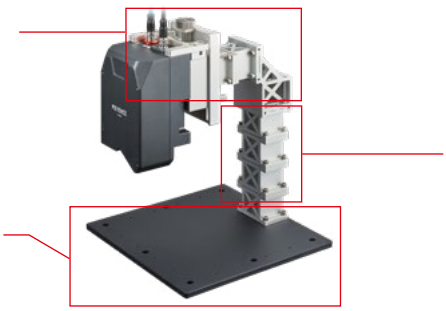
Dedicated stand

Mounting plate A
OP-88960

Mounting plate B
OP-88961

Adjuster
OP-88956

Base plate
OP-88957



Blocks: 1
OP-88958

Blocks: 3
OP-88959

*Height of 1 block = 50 mm 1.97"

Expansion units

EtherCAT® unit
CB-NEC20E

EtherNet/IP™ unit
CB-NEP20E

Communication cables

Extension I/O cable
OP-51657 (3 m 9.8')

Communication cable conversion connectors
OP-26486 for 9-pin
OP-84384 for 9-pin SYSMAC
OP-86930 for 9-pin MELSEC
* Use the OP-26486 for 9-pin when connecting the MELSEC FX.

RS-232C communication cable
OP-26487 (2.5 m 8.2')

Ethernet cable
OP-66843 (3 m 9.8')

USB cable
OP-66844 (2 m 6.6')

Other

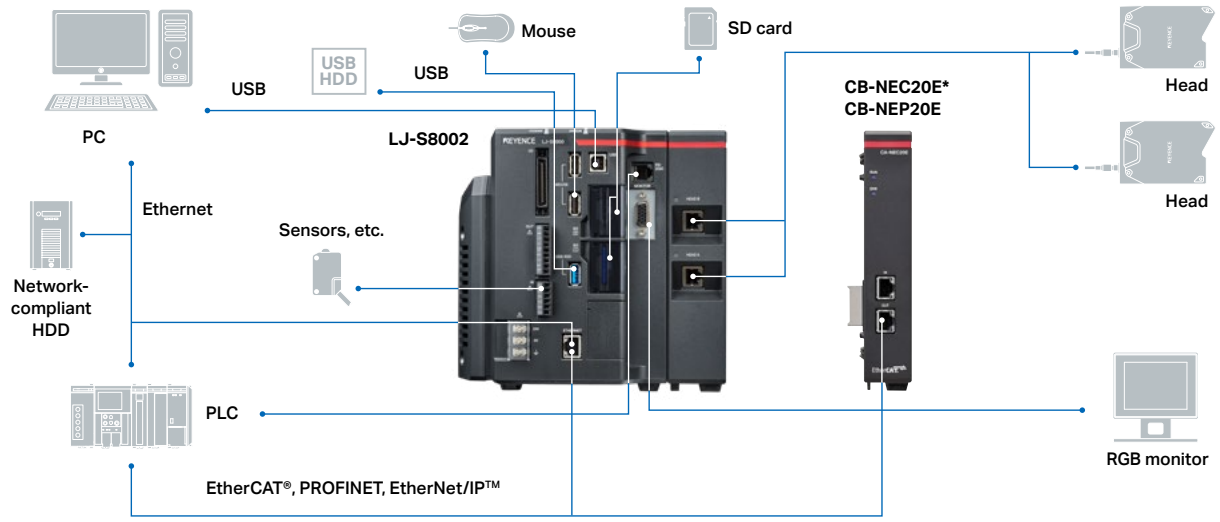
SD cards (industrial-grade)
16 GB **CA-SD16G**
4 GB **CA-SD4G**
1 GB **CA-SD1G**
512 MB **OP-87133**

Dedicated mouse
OP-87506
Mouse stand
OP-87601
* The mouse is included with the controller.

24 VDC power supplies
CA-U4
(Rated current: 6.5 A)

CA-U5
(Rated current: 12.5 A)

Dedicated controller system



EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

* Only one communication expansion unit (CB-NEC20E/NEP20E) can be connected.

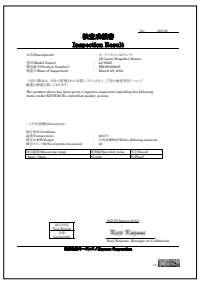
Direct sensor head communication for connection to a PC

3D data can be output directly from the sensor head without having to go through a controller, allowing users to construct their own image-processing programs. LJ-S Navigator, which includes the Imaging Navigation function, is also available to make configuring image creation settings easy. This allows users to concentrate on image processing development without having to worry about image capturing.

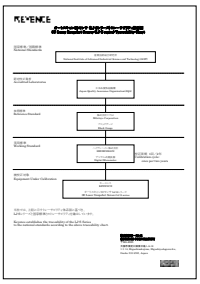
Calibration certificates available

A calibration certificate can be issued for guaranteed accuracy as an inspection device. All LJ-S8000 Series systems are calibrated before shipment, ensuring reliable usability upon delivery.

Calibration certificate



Inspection report



Full traceability system diagram

Specifications

Sensor head

Model		LJ-S015	LJ-S025	LJ-S040	LJ-S080
Reference distance*1		56.5 mm 2.22"	68.5 mm 2.70"	70 mm 2.76"	160 mm 6.30"
Measurement range Z		±4 mm ±0.16" (F.S.=8 mm 0.31")	±9 mm ±0.35" (F.S.=18 mm 0.71")	±18 mm ±0.71" (F.S.=36 mm 1.42")	±23 mm ±0.91" (F.S.=46 mm 1.81")
Measurement range XY	X: Near side	14 mm 0.55"	21 mm 0.83"	31 mm 1.22"	66 mm 2.60"
	X: Reference distance	15 mm 0.59"	23 mm 0.91"	35 mm 1.38"	72 mm 2.83"
	X: Far side	16 mm 0.63"	25 mm 0.98"	39 mm 1.54"	78 mm 3.07"
	Y: Reference distance	25 mm 0.98"	51.2 mm 2.02"	80 mm 3.15"	160 mm 6.30"
XY data interval		5 µm 0.000197"	8 µm 0.000315"	12.5 µm 0.0005"	25 µm 0.0010"
Number of XY data points		3200 × 5000	3200 × 6400	3200 × 6400	3200 × 6400
Repeatability	Z (height)*2	0.3 µm 0.000012"	0.4 µm 0.000016"	0.5 µm 0.000020"	1 µm 0.000039"
	XY (distance)*3	0.5 µm 0.000020"	0.7 µm 0.000028"	1 µm 0.000039"	3 µm 0.000118"
Linearity*4	Standard area	±0.035% of F.S.	±0.03% of F.S.	±0.02% of F.S.	±0.055% of F.S.
	High-accuracy area	—	—	—	±0.03% of F.S.
Imaging time*5		Min. 0.2 sec			
Light source	Laser light source	405 nm (visible light) wavelength blue semiconductor laser			
	Laser class	Class 2M laser product*6 (IEC 60825-1, FDA (CDRH) Part 1040.10*7)			
	Output	10 mW			
Ratings	Power voltage	24 V +25%, -20%			
	Current consumption*8 / Power	Max. 4.0 A (at 19.2 V), 3.2 A (at 24 V) / Typ. 17 W			
I/F	Ethernet	1000BASE-T, 100BASE-TX			
	Input*9	LASER_ON, TRG, MEM_CLEAR			
	Output*9	READY, EXPOSURE_BUSY, ERROR			
Environmental resistance	Enclosure rating*10	IP65 (IEC60529)			
	Ambient operating illuminance*11	Incandescent lamp: 10000 lux or less			
	Operating ambient temperature*12	0 to +45℃ 32.0°F to +113.0°F			
	Operating ambient humidity	85% RH or below (no condensation)			
	Vibration resistance	10 to 500 Hz; Power spectral density: 0.033 G2/Hz; X, Y, and Z directions (IEC 60068-2-64)			
	Impact resistance	15 G (IEC 60068-2-27)			
Material		Aluminum			
Weight		Approx. 2300 g 5.07 lb	Approx. 2100 g 4.63 lb	Approx. 2600 g 5.73 lb	Approx. 2600 g 5.73 lb

*1 The reference distance is the distance from the bottom edge of the head to the measurement center of the Z-axis (height). See the Dimensions section for the installation reference plane.
*2 The measured target is a KEYENCE standard target. Sigma value when the average height of 200 × 200 points in the center of the field of view is measured using the height tool with reciprocating imaging OFF.
*3 The measured target is a KEYENCE standard target. Sigma value when the distance between two circles of 500 points in diameter set 1000 points apart at the center of the field of view on a grayscale image is measured using the circle and circle distance tool with reciprocating imaging OFF.
*4 The measured target is a KEYENCE standard target. Value when the average height of 200 × 200 points is measured using the height tool with reciprocating imaging OFF. See the Dimensions section for the high-accuracy area reference plane.
*5 With YZ range minimum and Y thinning maximum.
*6 Do not view the beam directly using optical instruments (such as eye loupes, magnifiers, microscopes, telescopes, or binoculars). Observing the laser output using optical instruments is dangerous and may damage the eyes.
*7 Laser classification performed based on IEC60825-1 in accordance with FDA (CDRH) Laser Notice No. 56.
*8 The maximum value may be exceeded when extreme acceleration is applied.
*9 Laser ON input is enabled only when connected to a controller.
*10 With an OP cable connected.
*11 When measuring white paper, illuminance on the sensor head receiving surface when light is applied to white paper.
*12 The head needs to be mounted to a metal plate to be used.

LASER WARNING/EXPLANATORY LABEL

LJ-S015/LJ-S025/LJ-S040 /LJ-S080

LJ-S Navigator/Observer operating system environment

Item	Required Environment
Supported OS	Microsoft Windows® 11 Pro, Windows® 10 Home, Pro, Enterprise (supports 64-bit version only) • Cannot be used on an OS that is not listed.
Supported languages	English, Japanese, Chinese (Simplified)
CPU	Intel® Core™ i3 processor equivalent or greater
Memory	8 GB or more
Free space on hard disk	10 GB or more

• Windows is either a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.
• HALCON is a registered trademark or trademark of MVTec Software GmbH.
• VisionPro and Cognex Designer are registered trademarks or trademarks of Cognex Corporation.
• Aurora Design Assistant (formerly Matrox Design Assistant) is a registered trademark or trademark of Zebra Technologies.
• Company and product names mentioned in this catalog are trademarks or registered trademarks of their respective companies.

Specifications

Controller

Model		LJ-S8002
Head input		Up to two LJ-S8000 Series head units * When using two units, heads A and B must be the same model.
Number of inspection setting registrations		Up to 1000 settings (depending on SD card capacity and setting contents) for each of SD card 1 and SD card 2; External switching possible
Number of reference images		Up to 400 per setting (depending on SD card capacity)
Memory card		• SD card slot × 2 • Supports OP-87133 (512 MB), CA-SD1G (1 GB), CA-SD4G (4 GB; Equipped as standard for SD1 slot), and CA-SD16G (16 GB)
Number of tools		Up to 100 per setting
Interface	Control input	20 points (Input terminal block: 5 points, Parallel I/O: 15 points)
	Control output	• 28 points (Output terminal block: 6 points, Parallel I/O: 22 points) • Photo MOSFET*1
	RS-232C	• Numerical value output and control I/O (When in use, PLC Link using the RS-232C port cannot be used) • Supports baud rates of up to 230400 bps
	PLC link	• Numerical value output and control I/O using Ethernet or RS-232C ports (Cannot be used with EtherNet/IP™; When using an RS-232C port, cannot be used with RS-232C no-procedure communication)
	Ethernet	• Numerical value output and control I/O • In addition to the functions above, uploading/downloading inspection settings, performing various simulations, and sending/receiving images and other data, and using remote desktop connections are possible via KEYENCE PC application software. • Supports FTP client, FTP server, VNC server (for non-PC clients, only monitor screen display is supported), and BOOTP functions supported • 1000BASE-T/100BASE-TX/10BASE-T • Supports jumbo frames
	USB	• In addition to numerical value output, uploading/downloading inspection settings, performing various simulations, and sending/receiving images and other data, and using remote desktop connections are possible via KEYENCE PC application software. • USB 2.0 only
	EtherNet/IP™	• Numerical value I/O and control I/O using the Ethernet port or optional EtherNet/IP™ unit CB-NEP20E (Cannot be used with PLC Link, PROFINET, or EtherCAT®) • Supports cyclic communication (max. 1436 bytes) and message communication • Maximum number of connections: 32 (Ethernet port) / 1: Exclusive Owner, 4: Input Only (CB-NEP20E) • Complies with Version CT19.1 (Ethernet port) / CT19.1 (CB-NEP20E) conformance tests
	PROFINET	• Numerical value I/O and control I/O using Ethernet port (Cannot be used with PLC Link, EtherNet/IP™, or EtherCAT®) • Supports cyclic communication (max. 1408 bytes (Ethernet port)) • Supports acyclic communication (recorded data) • Complies with Conformance Class A (Ethernet port)
	EtherCAT®	• Numerical value output and control I/O using optional EtherCAT® unit CB-NEC20E (Cannot be used with PLC Link, EtherNet/IP™, or PROFINET) • Supports cyclic communication (process data object communication) (Input: Max. 536 bytes / Output: Max. 532 bytes) • Supports acyclic communication (mailbox communication) • Supports CoE • Explicit device identification • Complies with Version 2.5.0 conformance test
	Mouse	Various menus can be controlled using the dedicated mouse (included with the controller)
	SNTP	Automatic correction of controller date and time when connected to an SNTP server
	USB HDD	Images and other data can be output by connecting an HDD (2 TB max.) to the dedicated USB port (USB 3.0-compliant, bus-powered, rated output: 900 mA)
	Monitor output	Analog RGB output, XGA 1024 × 768 (24-bit color, 60 Hz)
Cooling fan		Available
Display language		Switchable between English, Japanese, and Chinese (Simplified)
Ratings	Power voltage	24 VDC ±10%
	Maximum current consumption	Max. 2.5 A (Typ. 28 W)
Environmental resistance	Operating ambient temperature	0 to 45°C 32.0°F to 113.0°F (DIN rail mounting) / 0 to 40°C 32.0°F to 104.0°F (Base surface mounting)
	Operating ambient humidity	85% RH or less (no condensation)
Weight		Approx. 2200 g 4.85 lb

*1 Positive common connection for NPN input devices and negative common connection for PNP input devices supported.

LJ-H1X (LJ Series Simulation-Software/Terminal-Software) operating system environment

LJ Series Simulation-Software

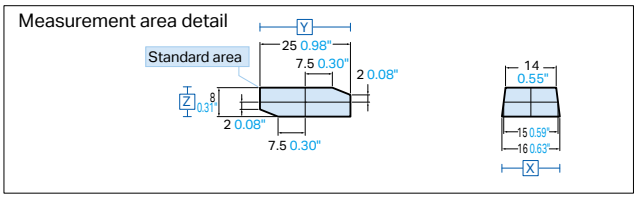
Item	Required Environment
Supported OS	Microsoft Windows® 11 Pro, Windows® 10 Home, Pro, Enterprise (supports 64-bit version only) • The OS supports the following languages: English, Japanese, and Chinese (simplified). • Cannot be used on an OS that is not listed.
CPU	Intel® Core™ i3 processor equivalent or greater
Memory	8 GB or more
Free space on hard disk	8 GB or more (Separate space is required for storing image)
Display resolution	Minimum: 1024 × 768 pixels, Recommended: 1280 × 1024 pixels or larger

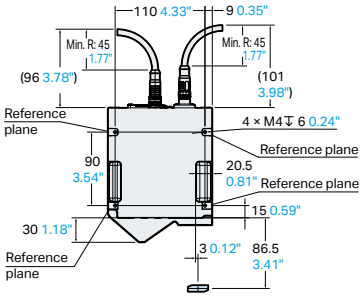
LJ Series Terminal-Software

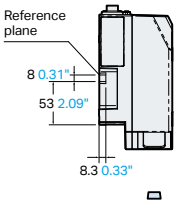
Item	Required Environment
Supported OS	Microsoft Windows® 11 Pro, Windows® 10 Home, Pro, Enterprise •The OS supports the following languages: English, Japanese, and Chinese (simplified). • Supports both 32-bit and 64-bit versions • Cannot be used on an OS that is not listed.
Running environment	• CPU: Intel® Core™ i3 processor equivalent or greater • Memory: 2 GB or more • HDD: 500 MB free space or more *Separate space is required for storing image • Display resolution: 1024 × 768 pixels or larger (Recommended: 1280 × 1024 pixels or larger)

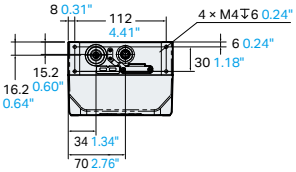
Sensor heads

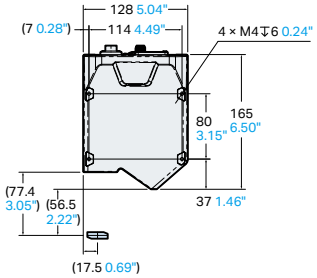
LJ-S015

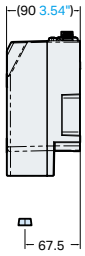


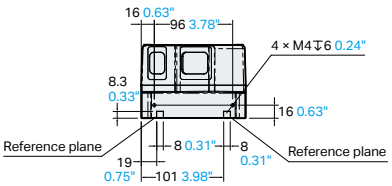




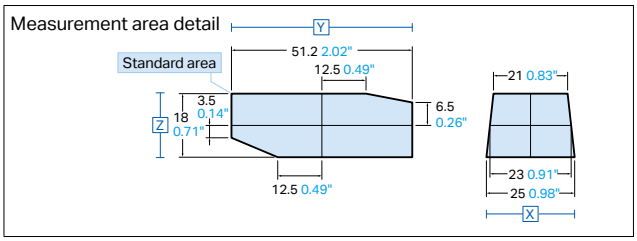


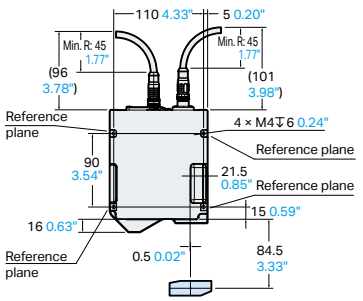


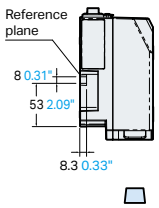


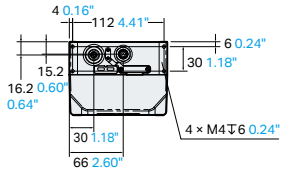


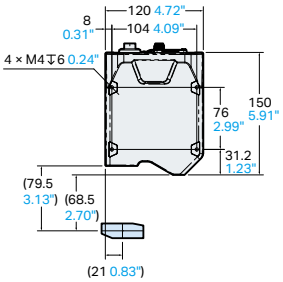
LJ-S025

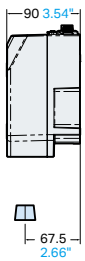


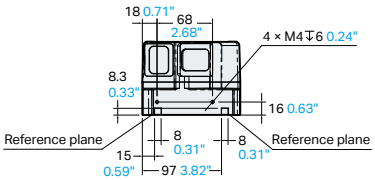






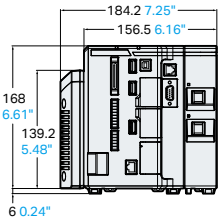


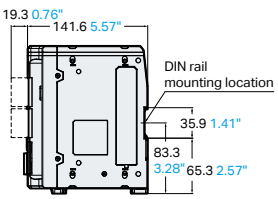


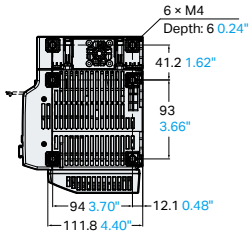


Controller

LJ-S8002

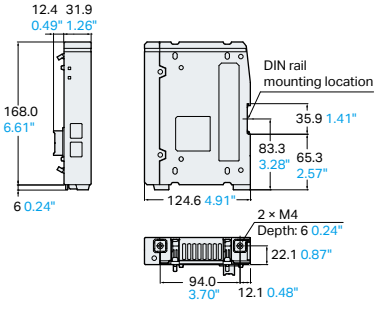






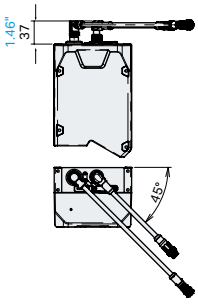
Expansion unit

CB-NEC20E / CB-NEP20E



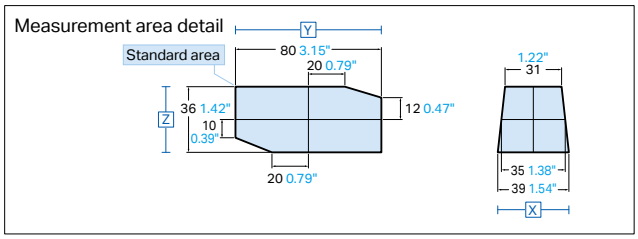
Head connection extension cable (L-shaped connector)

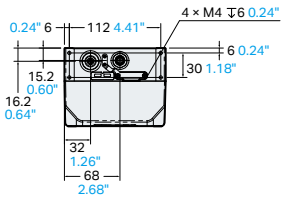
OP-88825 / OP-88826

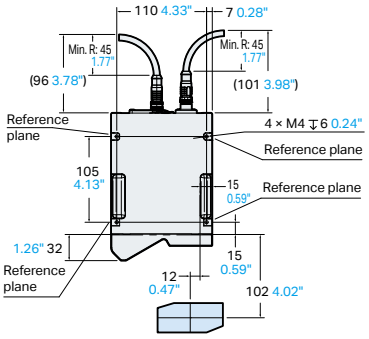


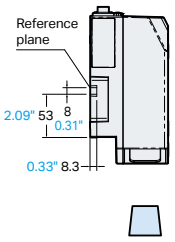
Sensor heads

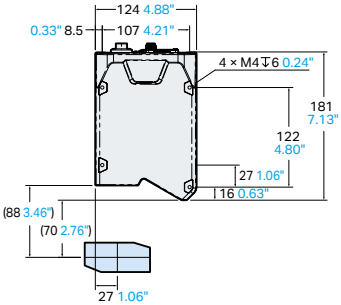
LJ-S040

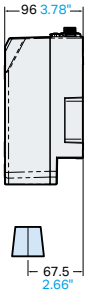


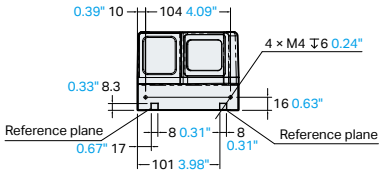




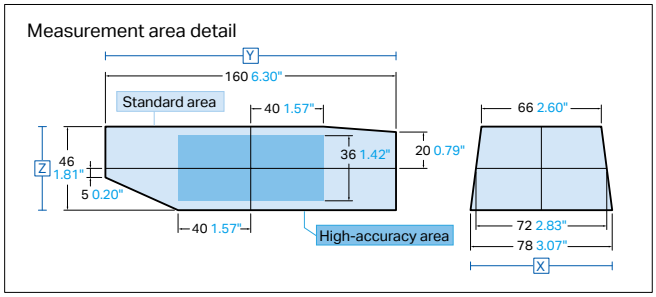


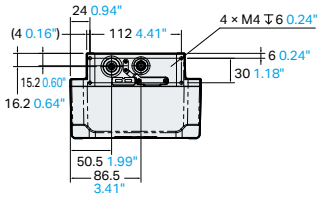


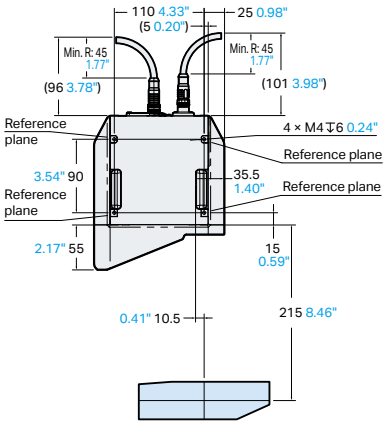


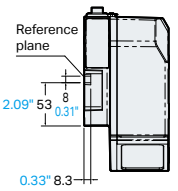


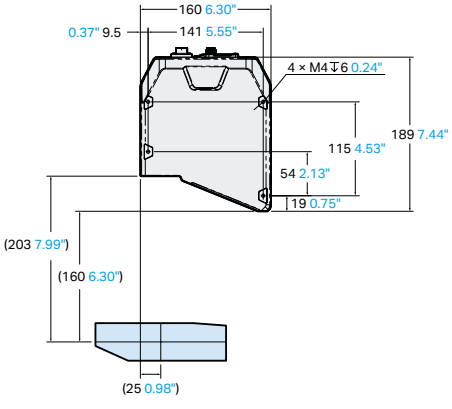
LJ-S080

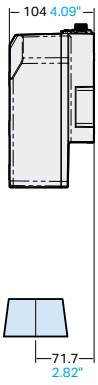


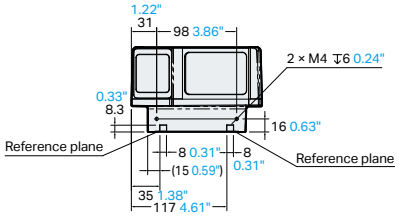






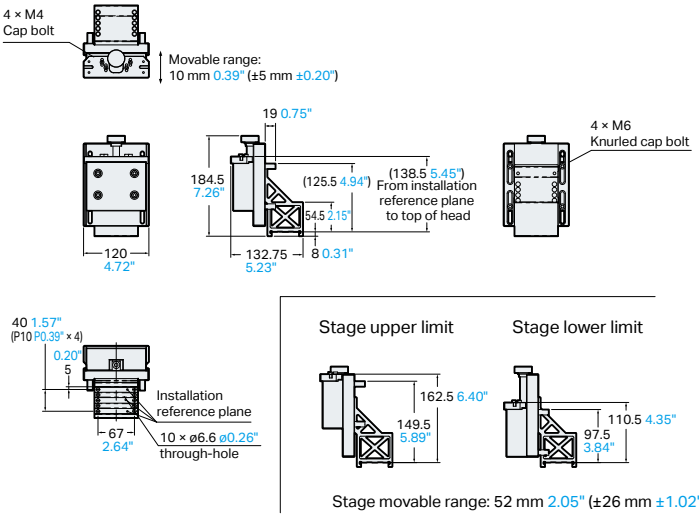




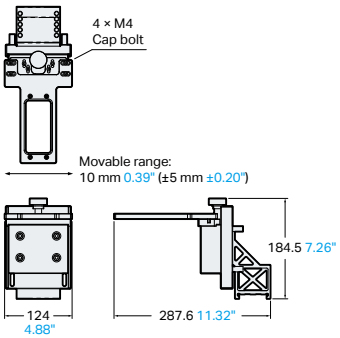


Dedicated stand

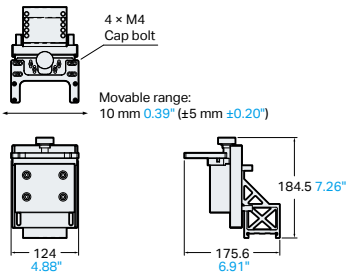
Adjuster OP-88956



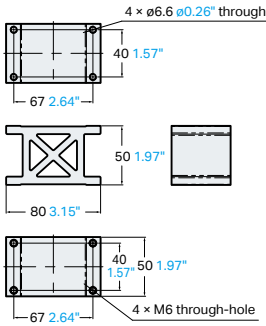
Vertical installation



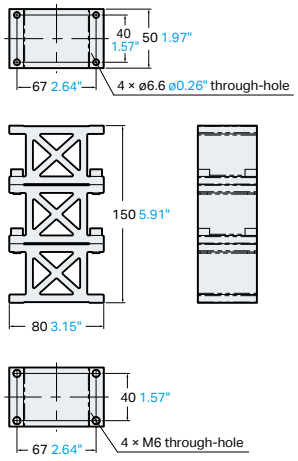
Horizontal installation



Blocks: 1 OP-88958



Blocks: 3 OP-88959

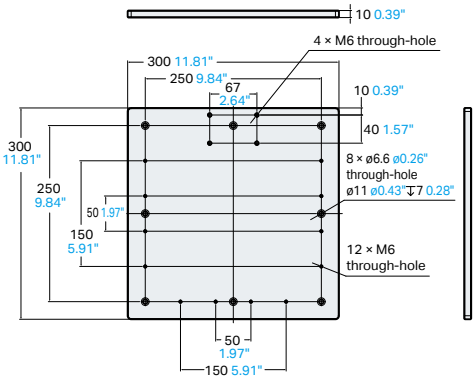


Suggested number of blocks required for each head model

When mounting the sensor head on the dedicated stand, the base plate height should be in the measurement field of view when the number of blocks shown in the table below are used.

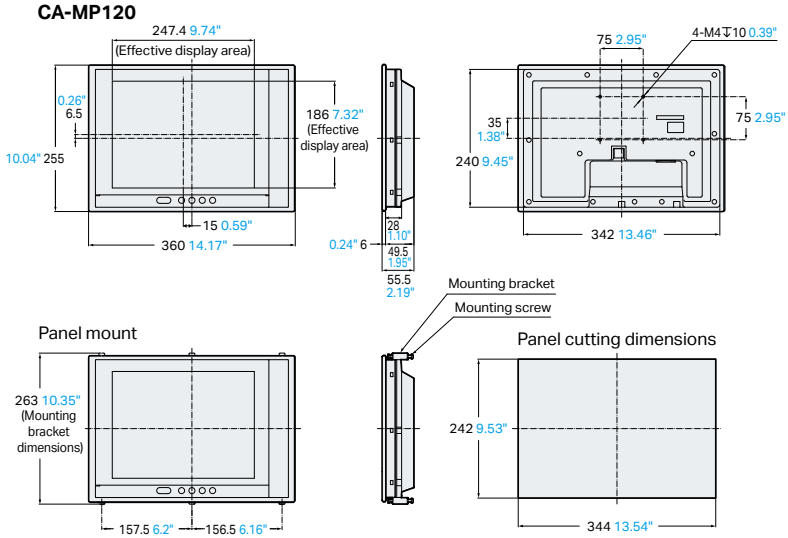
	LJ-S015	LJ-S025	LJ-S040	LJ-S080
Number of blocks	2	2	3	5

Base plate OP-88957



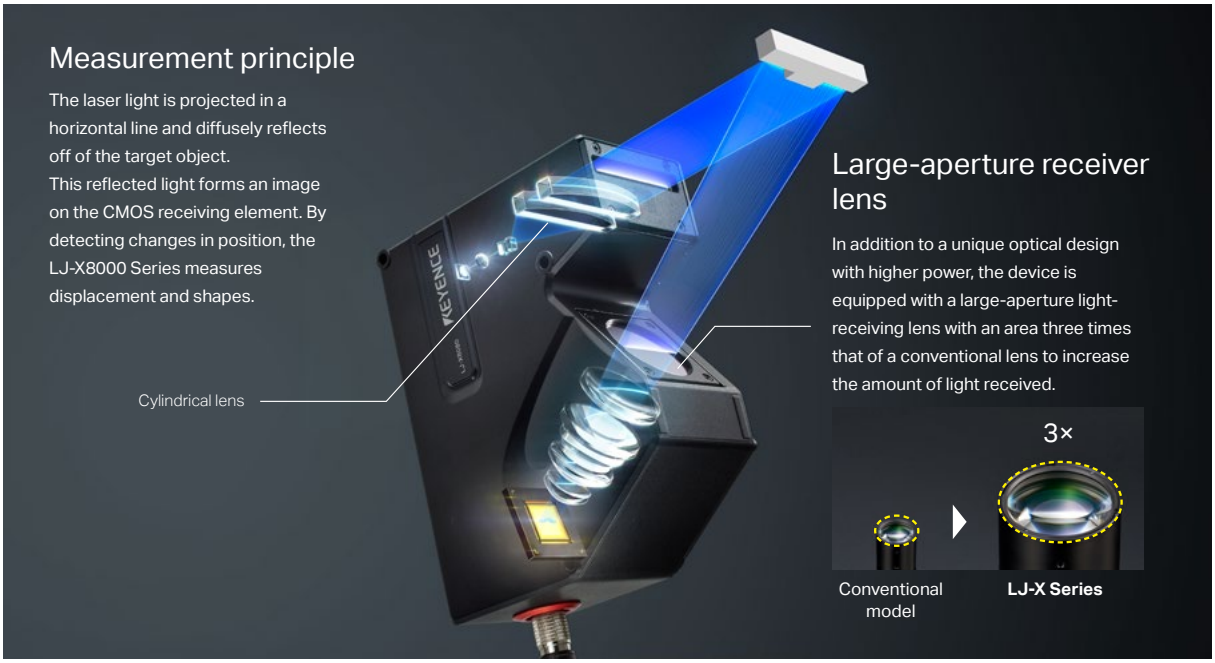
12" LCD color monitor

CA-MP120

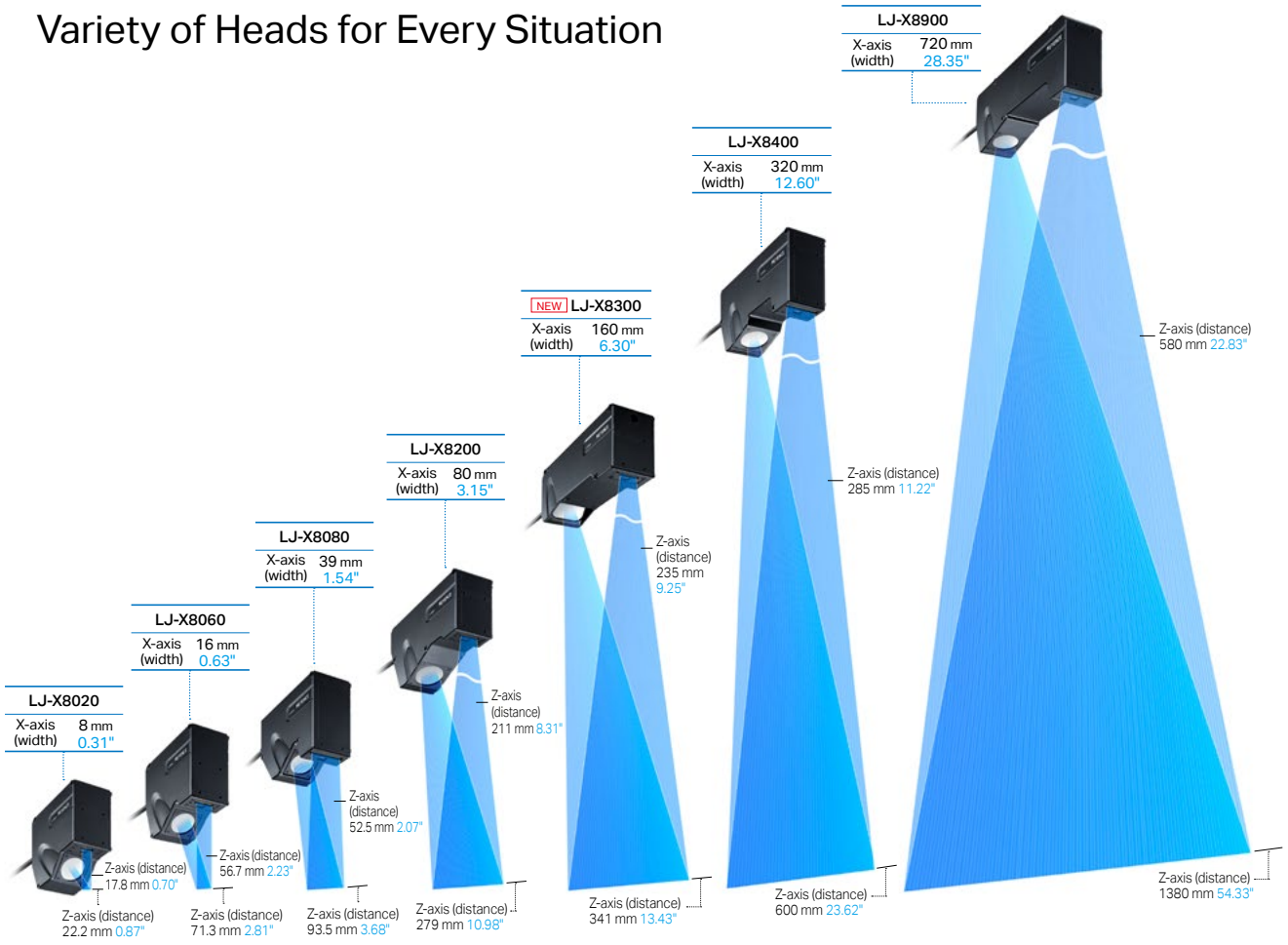


3D Profiler for Moving Targets

LJ-X8000 Series



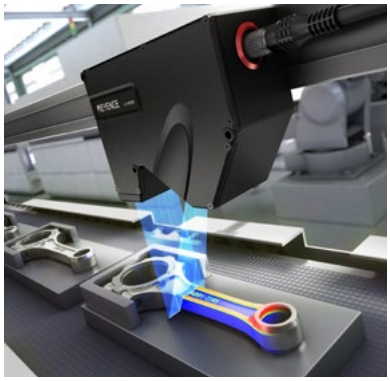
Variety of Heads for Every Situation



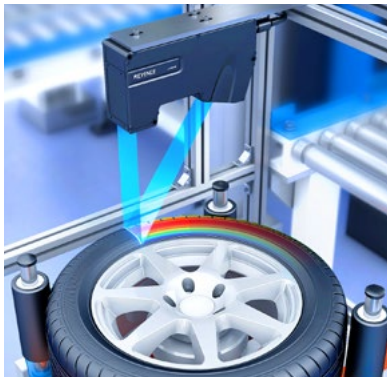
2D/3D Laser Profiler
LJ-X8000 Series

3D inspections without having to stop the target

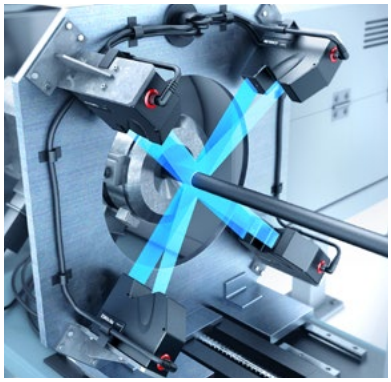
Inspection is possible for targets being transferred or rotated and for tubes or other long targets.
This allows for a wide variety of inline inspections, including dimensional inspection, appearance inspection, shape inspection, and differentiation.



Dimensional inspection of metal components



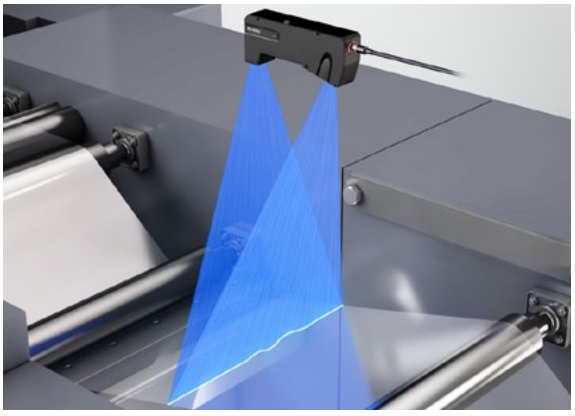
Shape inspection of tires

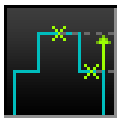


Surface inspection of cables

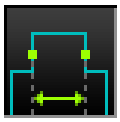
2D inspection tools

Profile measurement tools are available for inspecting the cross-sectional shape (profile) of the targets using lasers. These tools can be used in various applications, including tracking cross-sectional surface data changes over time.





Height difference



Width

Angle formed by two lines

Point/ line distance

Weld throat thickness

Weld leg length

Undercut

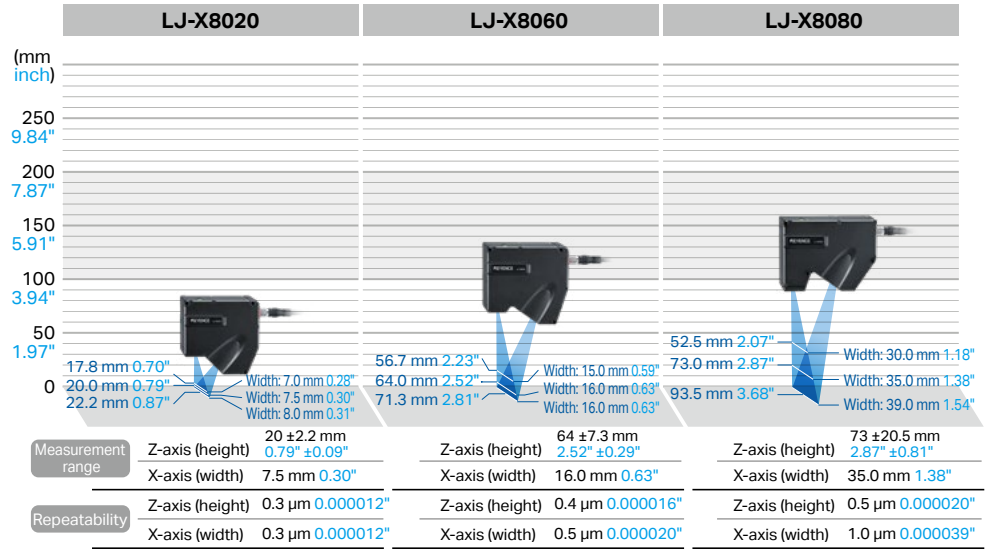
Overlap

High-Accuracy Models

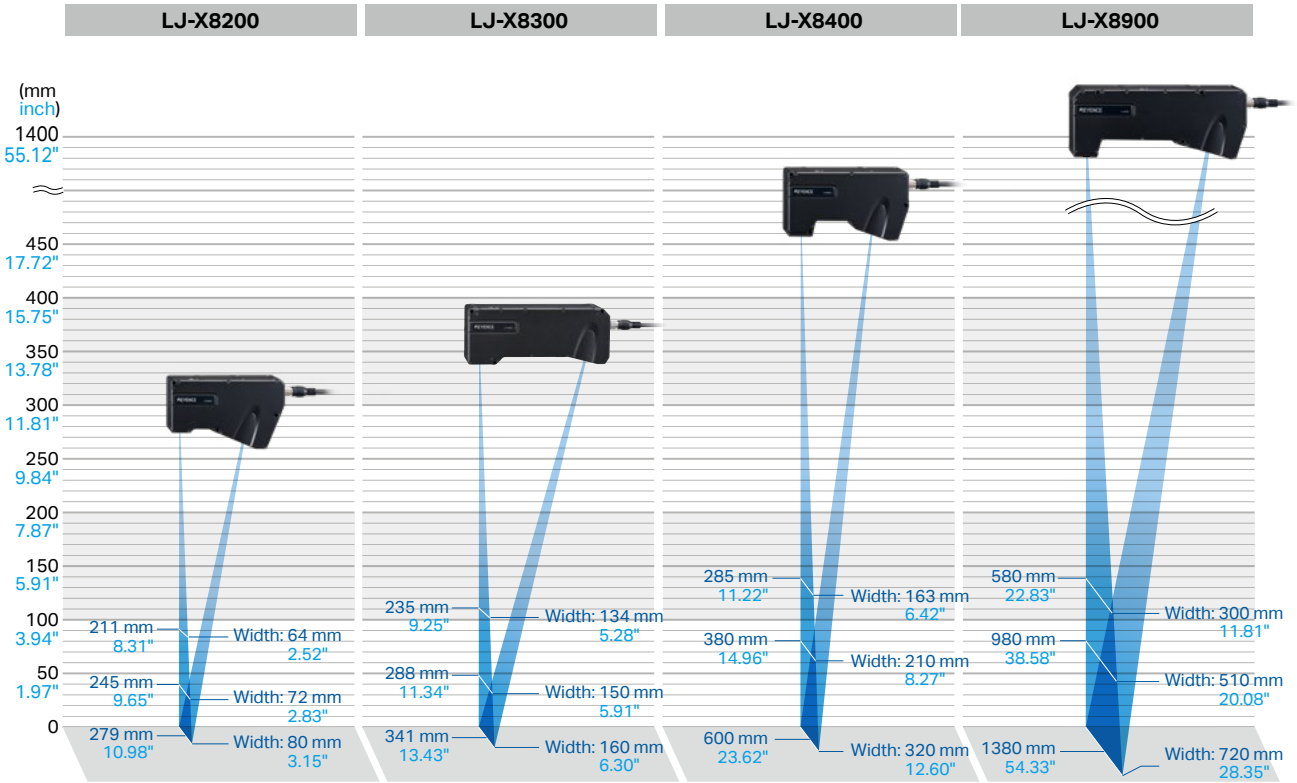
2D/3D Laser Profiler
3200 points/profile

LJ-X8000 Series

Sensor head selection guide



		LJ-X8020	LJ-X8060	LJ-X8080
Measurement range	Z-axis (height)	20 ±2.2 mm 0.79" ±0.09"	64 ±7.3 mm 2.52" ±0.29"	73 ±20.5 mm 2.87" ±0.81"
	X-axis (width)	7.5 mm 0.30"	16.0 mm 0.63"	35.0 mm 1.38"
Repeatability	Z-axis (height)	0.3 µm 0.000012"	0.4 µm 0.000016"	0.5 µm 0.000020"
	X-axis (width)	0.3 µm 0.000012"	0.5 µm 0.000020"	1.0 µm 0.000039"

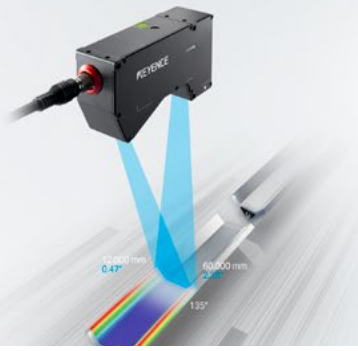


		LJ-X8200	LJ-X8300	LJ-X8400	LJ-X8900
Measurement range	Z-axis (height)	245 ±34 mm 9.65" ±1.34"	288 ±53 mm 11.34" ±2.09"	380+95/-220 mm 14.96"+3.74"/-8.66"	980 ±400 mm 38.58" ±15.75"
	X-axis (width)	72 mm 2.83"	150 mm 5.91"	210 mm 8.27"	510 mm 20.08"
Repeatability	Z-axis (height)	1 µm 0.000039"	3 µm 0.000118"	5 µm 0.000197"	10 µm 0.0004"
	X-axis (width)	3 µm 0.000118"	5 µm 0.000197"	10 µm 0.0004"	25 µm 0.0010"

High-Speed Models

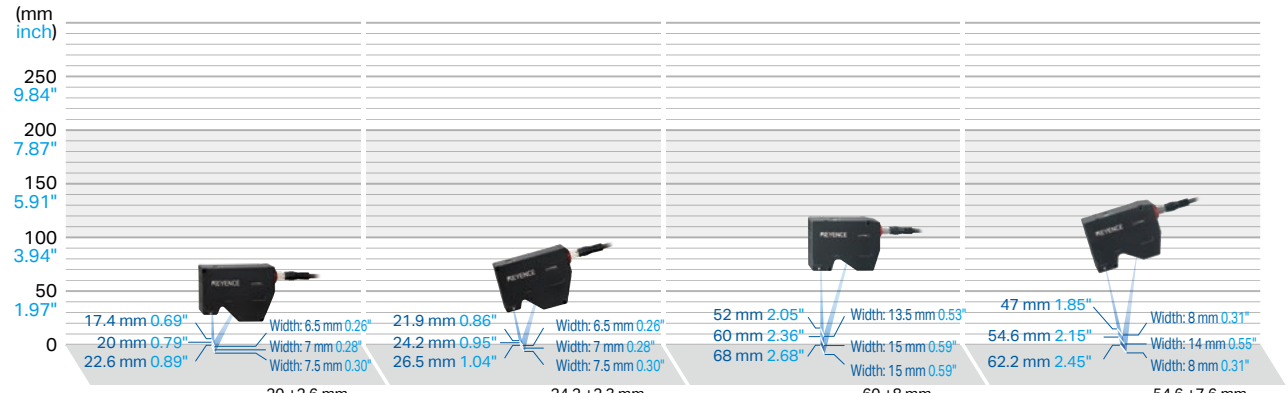
High-speed 2D Laser Profiler
64000 profiles/second

LJ-V7000 Series



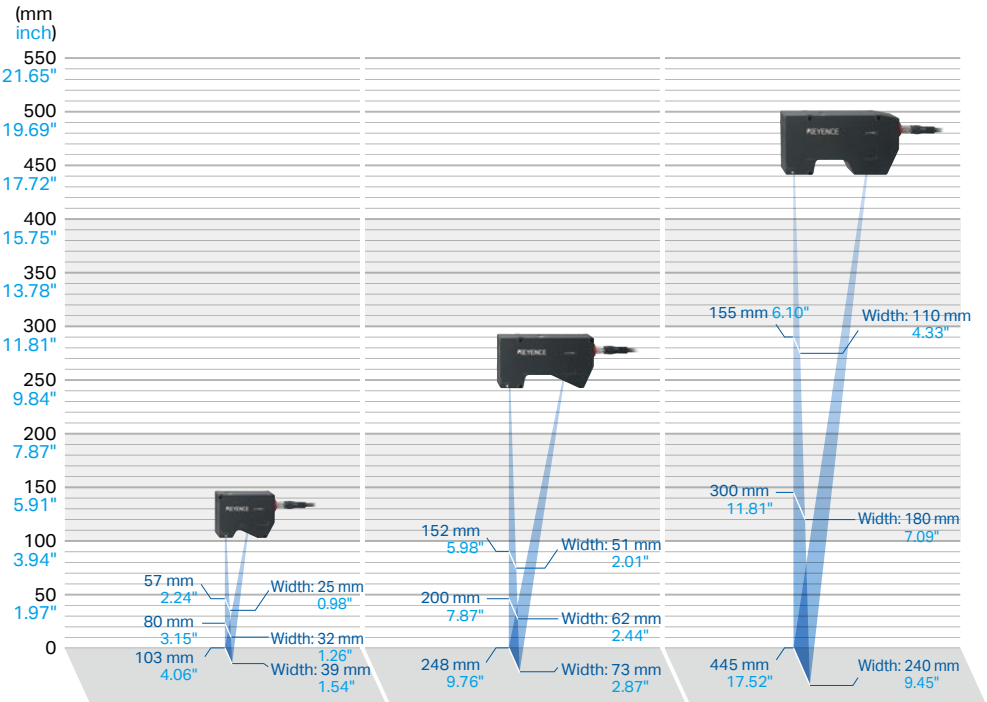
Sensor head selection guide

Ultra high-accuracy	Ultra high-accuracy specular reflection	High-accuracy	High-accuracy specular reflection
LJ-V7020/LJ-V7020B	**LJ-V7020K/LJ-V7020KB**	**LJ-V7060/LJ-V7060B**	**LJ-V7060K/LJ-V7060KB**



Measurement range	Z-axis (height)	20 ±2.6 mm 0.79" ±0.10"	Z-axis (height)	24.2 ±2.3 mm 0.95" ±0.09"	Z-axis (height)	60 ±8 mm 2.36" ±0.31"	Z-axis (height)	54.6 ±7.6 mm 2.15" ±0.30"
	X-axis (width)	7 mm 0.28"	X-axis (width)	7 mm 0.28"	X-axis (width)	15 mm 0.59"	X-axis (width)	14 mm 0.55"
Repeatability	Z-axis (height)	0.3 µm 0.000012"	Z-axis (height)	0.3 µm 0.000012"	Z-axis (height)	0.4 µm 0.000016"	Z-axis (height)	0.4 µm 0.000016"
	X-axis (width)	2.5 µm 0.000098"	X-axis (width)	2.5 µm 0.000098"	X-axis (width)	5 µm 0.000197"	X-axis (width)	5 µm 0.000197"

Mid range	Long range	Ultra-long range
LJ-V7080/LJ-V7080B	**LJ-V7200/LJ-V7200B**	**LJ-V7300/LJ-V7300B**



Measurement range	Z-axis (height)	80 ±23 mm 3.15" ±0.91"	Z-axis (height)	200 ±48 mm 7.87" ±1.89"	Z-axis (height)	300 ±145 mm 11.81" ±5.71"		
	X-axis (width)	32 mm 1.26"	X-axis (width)	62 mm 2.44"	X-axis (width)	180 mm 7.09"		
Repeatability	Z-axis (height)	0.5 µm 0.000020"	Z-axis (height)	1 µm 0.000039"	Z-axis (height)	5 µm 0.000197"		
	X-axis (width)	10 µm 0.0004"	X-axis (width)	20 µm 0.0008"	X-axis (width)	60 µm 0.0024"		

Sensor head LJ-X Series

Model			LJ-X8020	LJ-X8060	LJ-X8080	LJ-X8200	LJ-X8300	LJ-X8400	LJ-X8900
Reference distance			20 mm 0.79"	64 mm 2.52"	73 mm 2.87"	245 mm 9.65"	288 mm 11.34"	380 mm 14.96"	980 mm 38.58"
Measurement range	Z-axis (height)		±2.2 mm ±0.09" (F.S.=4.4 mm 0.17")	±7.3 mm ±0.29" (F.S.=14.6 mm 0.57")	±20.5 mm ±0.81" (F.S.=41 mm 1.61")	±34 mm ±1.34" (F.S.=68 mm 2.68")	±53 mm ±2.09" (F.S.=106 mm 4.17")	±60 mm ±2.36" (+95 to -220 mm +3.74" to -8.66"*11) (F.S.=315 mm 12.40")	±400 mm ±15.75" (F.S.=800 mm 31.50")
	X-axis (width)	NEAR side	7 mm 0.28"	15 mm 0.59"	30 mm 1.18"	64 mm 2.52"	134 mm 5.28"	180 mm 7.09" (163 mm 6.42"*11)	300 mm 11.81"
		Reference distance	7.5 mm 0.30"	16 mm 0.63"	35 mm 1.38"	72 mm 2.83"	150 mm 5.91"	210 mm 8.27"	510 mm 20.08"
		FAR side	8 mm 0.31"	16 mm 0.63"	39 mm 1.54"	80 mm 3.15"	160 mm 6.30"	240 mm 9.45" (320 mm 12.60"*11)	720 mm 28.35"
Light source			Blue semiconductor laser						
	Wavelength		405 nm (visible light)						
	Laser class (IEC60825-1, FDA (CDRH) Part 1040.10*1)		Class 2M laser product*9						
	Output		10 mW						
Spot size (reference distance)			Approx. 16 mm × 32 µm 0.63" × 0.0013"	Approx. 25 mm × 49 µm 0.98" × 0.0019"	Approx. 44 mm × 72 µm 1.73" × 0.0028"	Approx. 115 mm × 116 µm 4.53" × 0.0046"	Approx. 215 mm × 108 µm 8.46" × 0.0043"	Approx. 275 mm × 249 µm 10.83" × 0.0098"	Approx. 622 mm × 566 µm 24.49" × 0.0223"
Repeatability*2	Z-axis (height)*3		0.3 µm 0.000012"	0.4 µm 0.000016"	0.5 µm 0.000020"	1 µm 0.000039"	3 µm 0.000118"	5 µm 0.000197"	10 µm 0.0004"
	X-axis (width)*4		0.3 µm 0.000012"	0.5 µm 0.000020"	1.0 µm 0.000039"	3 µm 0.000118"	5 µm 0.000197"	10 µm 0.0004"	25 µm 0.0010"
Linearity	Z-axis (height)*5		±0.05% of F.S. (±0.012%)	±0.04% of F.S. (±0.008%)	±0.03% of F.S. (±0.004%)	±0.04% of F.S. (±0.006%)	±0.033% of F.S. (±0.005%)	Reference distance: ±60 mm ±2.36" ±0.025% of F.S. (±0.003%) Total range: ±0.035% of F.S. (±0.005%)	Near–reference: distance ±0.015% of F.S. (±0.004%) Total range: ±0.05% of F.S. (±0.006%)
Profile data interval*12	X-axis (width)		2.5 µm 0.000098" (2 µm~ 0.000079"~)	5 µm 0.000197" (4 µm~ 0.000157"~)	12.5 µm 0.0005" (10 µm~ 0.0004"~)	25 µm 0.0010" (20 µm~ 0.0008"~)	50 µm 0.0020" (40 µm~ 0.0016"~)	75 µm 0.0030" (50 µm~ 0.0020"~) 100 µm 0.0039" (50 µm~ 0.0020"~)*11	225 µm 0.0089" (100 µm~ 0.0039"~)
Profile data count			3200 points						
HDR (high dynamic range)			Single-shot HDR*10						
Laser irradiation position confirmation function	Light source		Blue LED (405 nm)						
Temperature characteristic			0.01% of F.S./°C						
Environmental resistance	Enclosure rating*6		IP67 (IEC60529)						
	Ambient operating illuminance*7		Incandescent lamp: 10,000 lux or less						
	Ambient temperature*8		0 to +45°C 32.0°F to +113.0°F						
	Operating ambient humidity		85% RH or less (no condensation)						
	Vibration resistance		10 to 57 Hz, double amplitude 1.5 mm 0.06"; 3 hours each for X, Y, and Z axes						
	Impact resistance		15 G / 6 msec						
Material			Aluminum						
Weight			Approx. 1000 g 2.20 lb	Approx. 1000 g 2.20 lb	Approx. 1100 g 2.43 lb	Approx. 1200 g 2.65 lb	Approx. 1400 g 3.09 lb	Approx. 1300 g 2.87 lb	Approx. 1600 g 3.53 lb

*1 Classification performed based on IEC60825-1 in accordance with FDA (CDRH) Laser Notice No. 56.
*2 Values measured by averaging 4096 times at the reference distance.
*3 The measured target is a KEYENCE standard target. Value when the average height of the default setting area is measured with height and position tools. All other settings are default values.
*4 The measured target is a pin gauge. Value when the point of intersection for the pin gauge rounded surface and edge level is measured using height and position tools. All other settings are default values.
*5 The measured target is a KEYENCE standard target. Profile data when measured by smoothing 64 times and averaging 8 times.
All other settings are default values. Values inside parentheses are representative examples of averages for all profile data.
6 The value when a head cable (CB-B) or extension cable (CB-B*E) is connected. Does not include CB-B**L connection.
*7 When measuring white paper, illuminance on the sensor head receiving surface when light is applied to white paper.
*8 The head needs to be mounted to a metal plate to be used.
*9 Do not view the beam directly using optical instruments (such as eye loupes, magnifiers, microscopes, telescopes, or binoculars).
Observing the laser output using optical instruments is dangerous and may damage the eyes.
*10 A characteristic that allows for stable, high-precision measurement with a single capture (exposure) at all levels of reflectance, from black (low) to glossy surfaces (high).
*11 When range is extended.
*12 The profile data interval can be changed. If changed, the measurement range in the X direction will also change.

LASER WARNING/EXPLANATORY LABEL

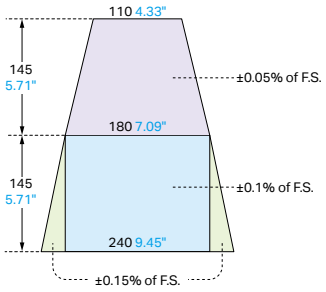
LJ-X8020/LJ-X8060/LJ-X8080/
LJ-X8200/LJ-X8300/LJ-X8400/LJ-X8900

Sensor head LJ-V Series

Model			LJ-V7020K*1/ LJ-V7020KB*1	LJ-V7020*1/ LJ-V7020B*1	LJ-V7060K/ LJ-V7060KB	LJ-V7060/ LJ-V7060B	LJ-V7080/ LJ-V7080B	LJ-V7200/ LJ-V7200B	LJ-V7300/ LJ-V7300B
Mounting conditions			Specular reflection	Diffuse reflection	Specular reflection	Diffuse reflection			
Reference distance			24.2 mm 0.95"	20 mm 0.79"	54.6 mm 2.15"	60 mm 2.36"	80 mm 3.15"	200 mm 7.87"	300 mm 11.81"
Measurement range	Z-axis (height)		±2.3 mm ±0.09" (F.S. = 4.6 mm 0.18")	±2.6 mm ±0.10" (F.S. = 5.2 mm 0.20")	±7.6 mm ±0.30" (F.S. = 15.2 mm 0.60")	±8 mm ±0.31" (F.S. = 16 mm 0.63")	±23 mm ±0.91" (F.S. = 46 mm 1.81")	±48 mm ±1.89" (F.S. = 96 mm 3.78")	±145 mm ±5.71" (F.S. = 290 mm 11.42")
	X-axis (width)	NEAR side	6.5 mm 0.26"	6.5 mm 0.26"	8 mm 0.31"	13.5 mm 0.53"	25 mm 0.98"	51 mm 2.01"	110 mm 4.33"
		Reference distance	7 mm 0.28"	7 mm 0.28"	14 mm 0.55"	15 mm 0.59"	32 mm 1.26"	62 mm 2.44"	180 mm 7.09"
		FAR side	7.5 mm 0.30"	7.5 mm 0.30"	8 mm 0.31"	15 mm 0.59"	39 mm 1.54"	73 mm 2.87"	240 mm 9.45"
Light source			Blue semiconductor laser						
	Wavelength		405 nm (visible light)						
	Laser class (IEC60825-1, FDA (CDRH) Part 1040.10*2)		Class 2M*3		Class 2	Class 2M*3	Class 2		
	Output		10 mW		4.8 mW	10 mW	4.8 mW		
Spot size (reference distance)			Approx. 14 mm × 35 µm 0.55" × 0.0014"		Approx. 21 mm × 45 µm 0.83" × 0.0018"		Approx. 48 mm × 48 µm 1.89" × 0.0019"	Approx. 90 mm × 85 µm 3.54" × 0.0033"	Approx. 240 mm × 610 µm 9.45" × 0.0240"
Repeatability*4	Z-axis (height)*5		0.3 µm 0.000012"		0.4 µm 0.000016"		0.5 µm 0.000020"	1 µm 0.000039"	5 µm 0.000197"
	X-axis (width)*6		2.5 µm 0.000098"		5 µm 0.000197"		10 µm 0.0004"	20 µm 0.0008"	60 µm 0.0024"
Linearity	Z-axis (height)*7		±0.1% of F.S.						From ±0.05% ±0.15% of F.S.*8
Profile data interval	X-axis (width)		10 µm 0.0004"		20 µm 0.0008"		50 µm 0.0020"	100 µm 0.0039"	300 µm 0.0118"
Profile data count			800 points						
HDR (high dynamic range)			Single-shot HDR*12						
Temperature characteristic			0.01% of F.S./°C						
Environmental resistance	Enclosure rating*9		IP67 (IEC60529)						
	Ambient operating illuminance*10		Incandescent lamp: 10,000 lux or less						
	Ambient temperature*11		0 to +45°C 32.0°F to +113.0°F						
	Operating ambient humidity		85% RH or less (no condensation)						
	Vibration resistance		10 to 57 Hz, double amplitude 1.5 mm 0.06"; 3 hours each for X, Y, and Z axes						
	Impact resistance		15 G / 6 msec						
Material			Aluminum						
Weight			Approx. 410 g 14.47 oz		Approx. 450 g 15.89 oz		Approx. 400 g 14.12 oz	Approx. 550 g 19.42 oz	Approx. 1000 g 2.20 lb

*1 Double polarization function cannot be used.
*2 Classification performed based on IEC60825-1 in accordance with FDA (CDRH) Laser Notice No. 50.
*3 Do not view the beam directly using optical instruments (such as eye loupes, magnifiers, microscopes, telescopes, or binoculars). Observing the laser output using optical instruments is dangerous and may damage the eyes.
*4 Values measured by averaging 4096 times at the reference distance.
*5 The measured target is a KEYENCE standard target. Value when the average height of the default setting area is measured with height and position tools. All other settings are default values.
*6 The measured target is a pin gauge. Value when the point of intersection for the pin gauge rounded surface and edge level is measured using height and position tools. All other settings are default values.
*7 The measured target is a KEYENCE standard target. Profile data when measured by smoothing 64 times and averaging 8 times. All other settings are default values.
*8 Linearity will vary depending on the measuring area (refer to the figure on the right)
9 The value when a head cable (CB-B) or extension cable (CB-B*E) is connected.
*10 When measuring white paper, illuminance on the sensor head receiving surface when light is applied to white paper.
*11 The head needs to be mounted to a metal plate to be used.
*12 A characteristic that allows for stable, high-precision measurement with a single capture (exposure) at all levels of reflectance, from black (low) to glossy surfaces (high).

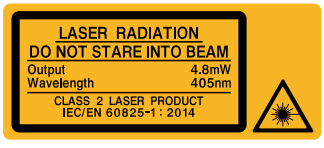
• Model designations ending with B are luminance output types. The multi emission (optimizing light) and multi emission (synthesis) imaging modes are not available.



LASER WARNING/EXPLANATORY LABEL

LJ-V7020/LJ-V7020B, LJ-V7020K/LJ-V7020KB, LJ-V7060/LJ-V7060B

LJ-V7060K/LJ-V7060KB, LJ-V7080/LJ-V7080B, LJ-V7200/LJ-V7200B, LJ-V7300/LJ-V7300B



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