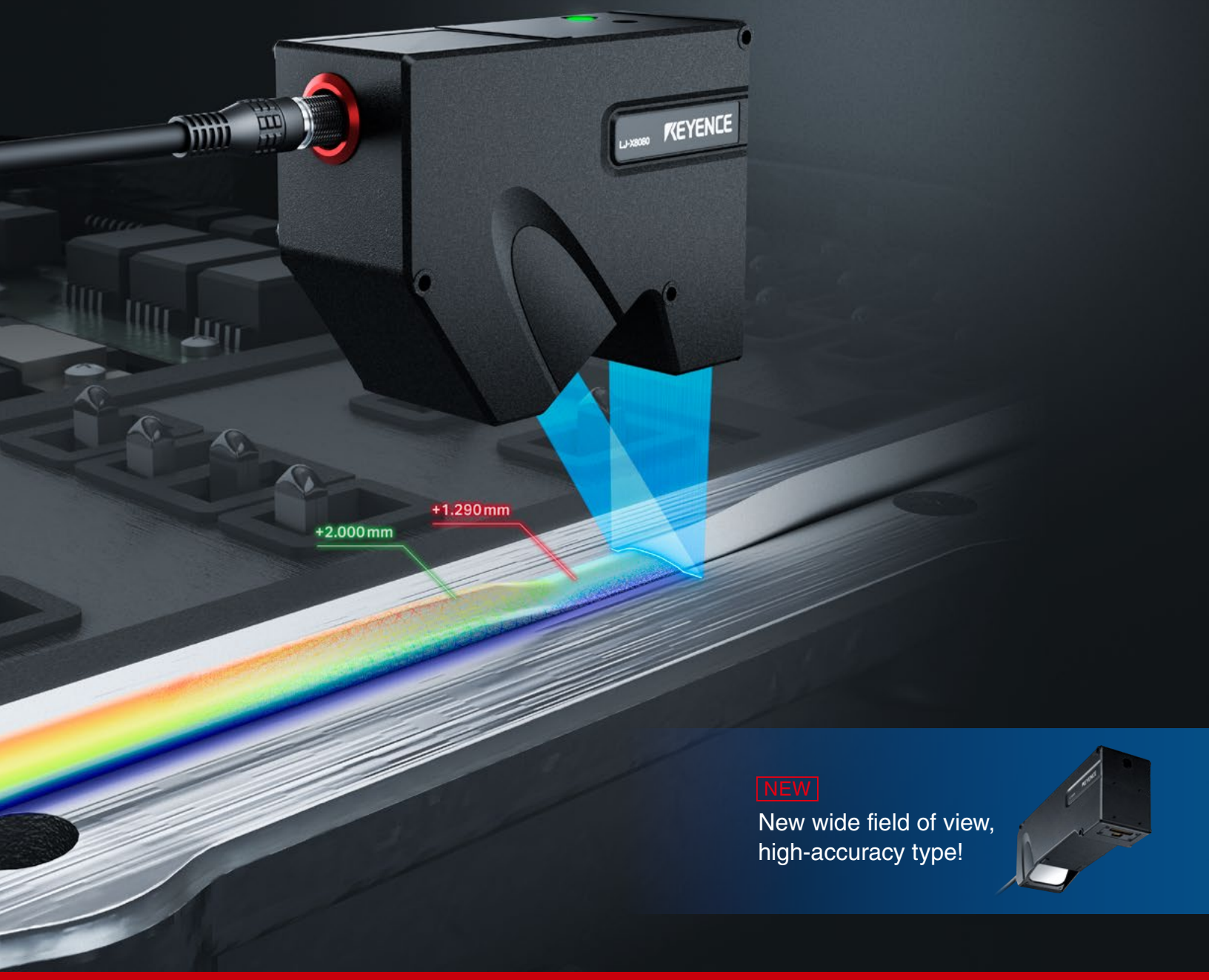
KEYENCE

2D/3D Laser Profiler

NEW LJ-X8000 Series

Height-Based Inline 3D inspection
Fast, Stable, and Easy



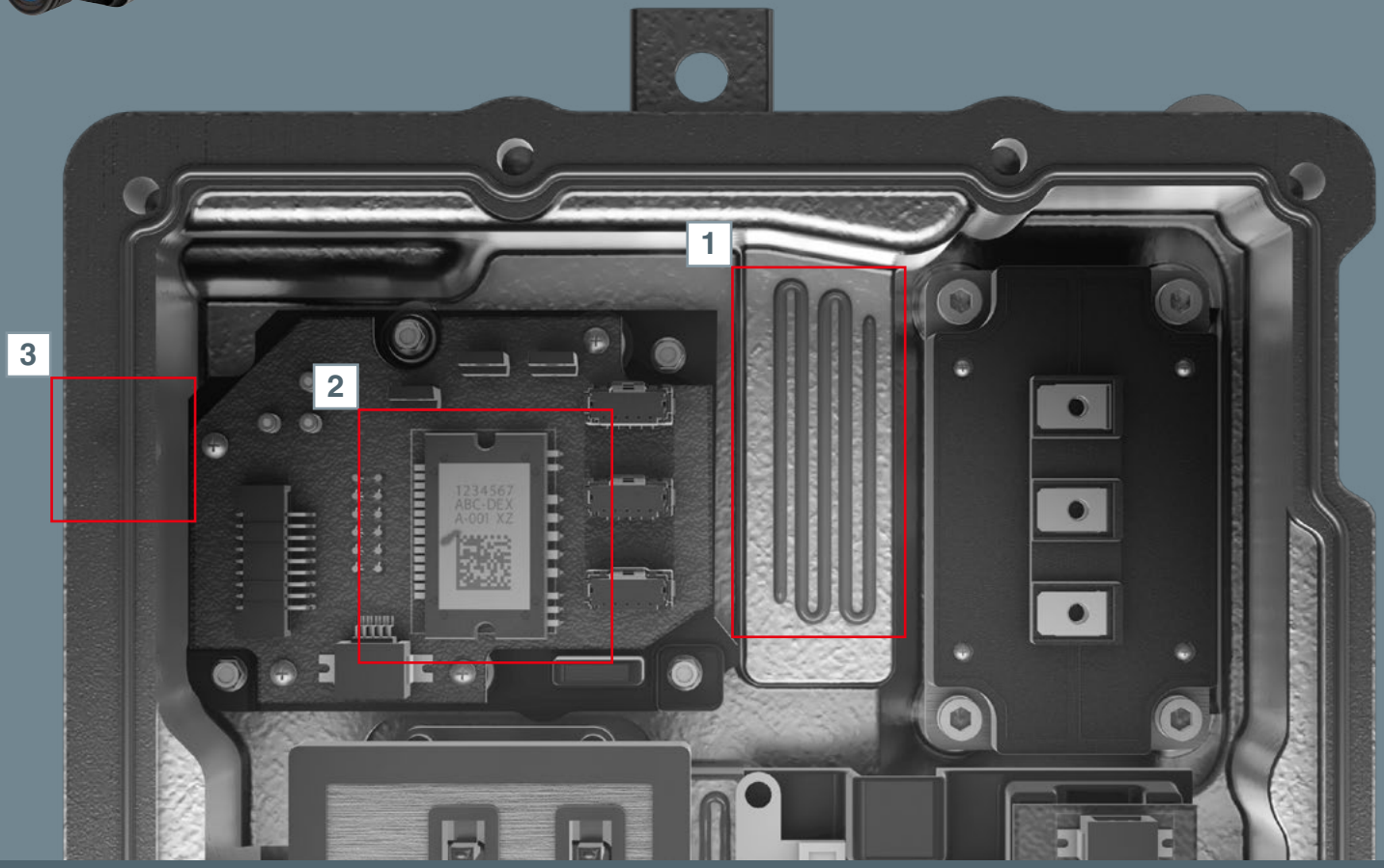
NEW

New wide field of view,
high-accuracy type!

LJ-X8000 Series

Taking Inline Visual Inspection into the Next Dimension

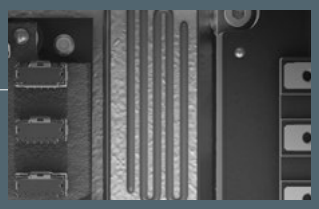
Flat Contrast-Based Visual Inspection



With two-dimensional XY inspections

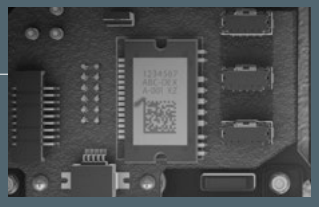
1 No height or depth measurement

When inspecting for incomplete or misshapen sealant, accurate detection is difficult because height cannot be measured from 2D information, making width and area measurement impossible.



2 Results are affected by color and pattern

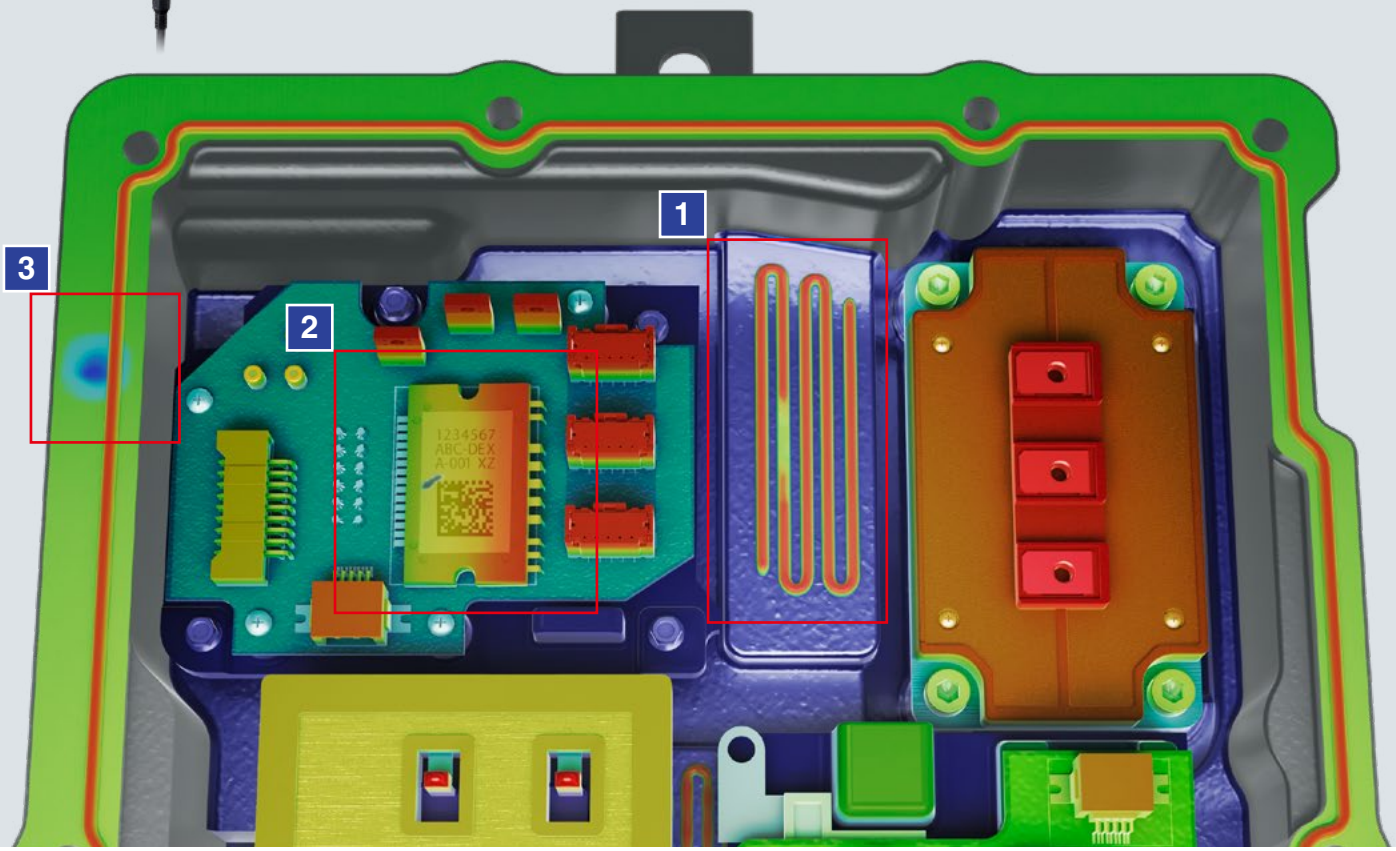
Distinguishing between uneven surfaces and target color or pattern differences is difficult, including if the target has markings on the surface, resulting in false detection.



3 Unstable inspection with subtle variations in shading

Subtle irregularities/defects with no clear difference in brightness do not result in sufficient differences in shading to make stable detection possible.

3D Height-Based Visual Inspection



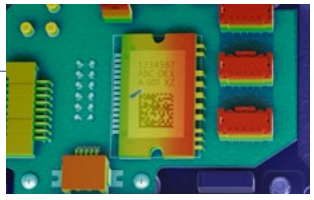
With three-dimensional XYZ inspections

1 Width, height, area, and volume measurement

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

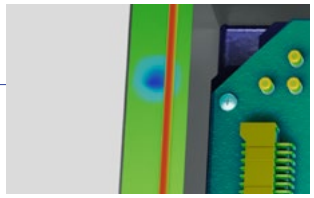
2 Results not affected by color and pattern

Using height to generate the 3D image means results are not affected by colors or patterns allowing for clear determination of height differences and accurate detection of tilted targets and indentations.

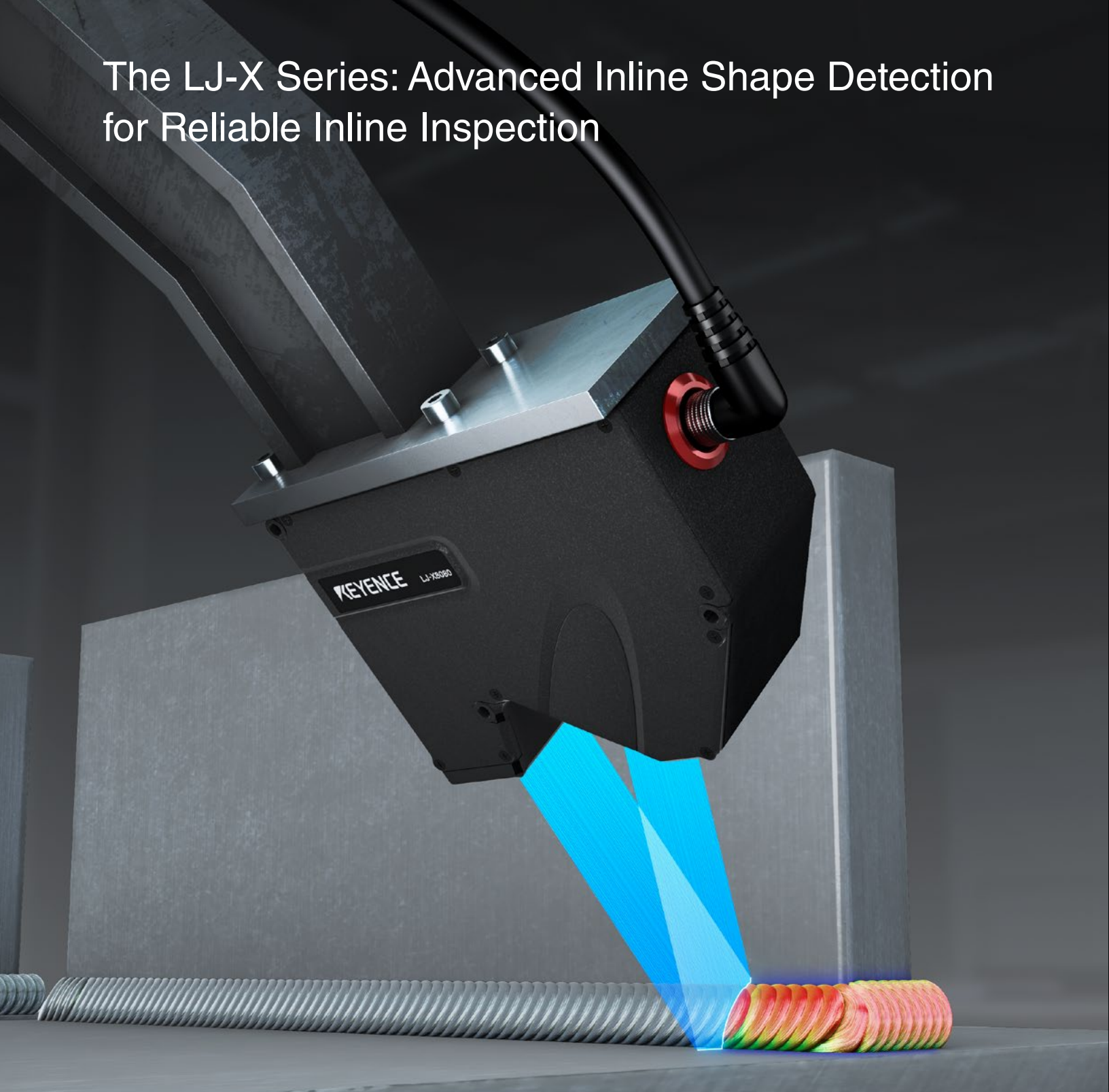


3 Stable inspection of similarly colored uneven surfaces

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



The LJ-X Series: Advanced Inline Shape Detection for Reliable Inline Inspection



Advantages of 3D inspection

Dimension inspection

- Height
- Depth
- Height difference
- Width
- Thickness
- Flatness
- Angle

Appearance inspection

- Volume
- Burrs
- Dents
- Foreign particles
- Cracks
- Chips
- Deformation
- Uneven surfaces

Shape Inspection

- Presence detection
- Orientation detection
- Incorrect seating
- Warpage
- Gaps
- Count
- OCR

Everything You Need for Reliable 3D Inspection

High precision measurements performed inline

Capture the shape of targets in exceptional detail with the new standard in high-resolution measurement, 3200 points/profile.

Compatible with all materials

Capture stable profiles of any target, regardless of color, material, or shape.

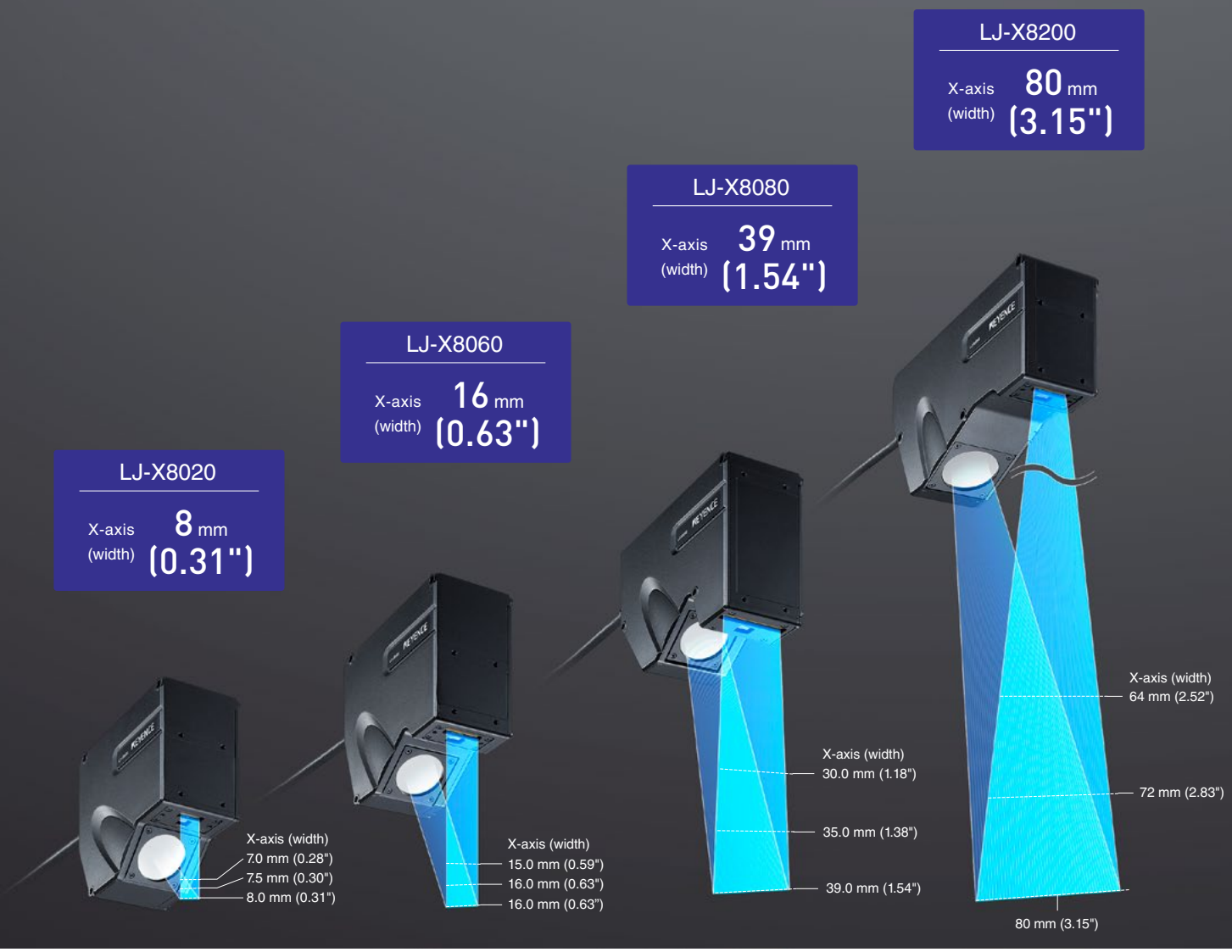
Set up in 3 easy steps

Measurement and inspection settings can be configured in three easy steps that any user can complete.

2D/3D Laser Profiler
NEW LJ-X8000 Series

Select from a lineup designed to meet any application requirements

The LJ-X Series offers a wide range of sensors to support quality control and process improvement in any industry.



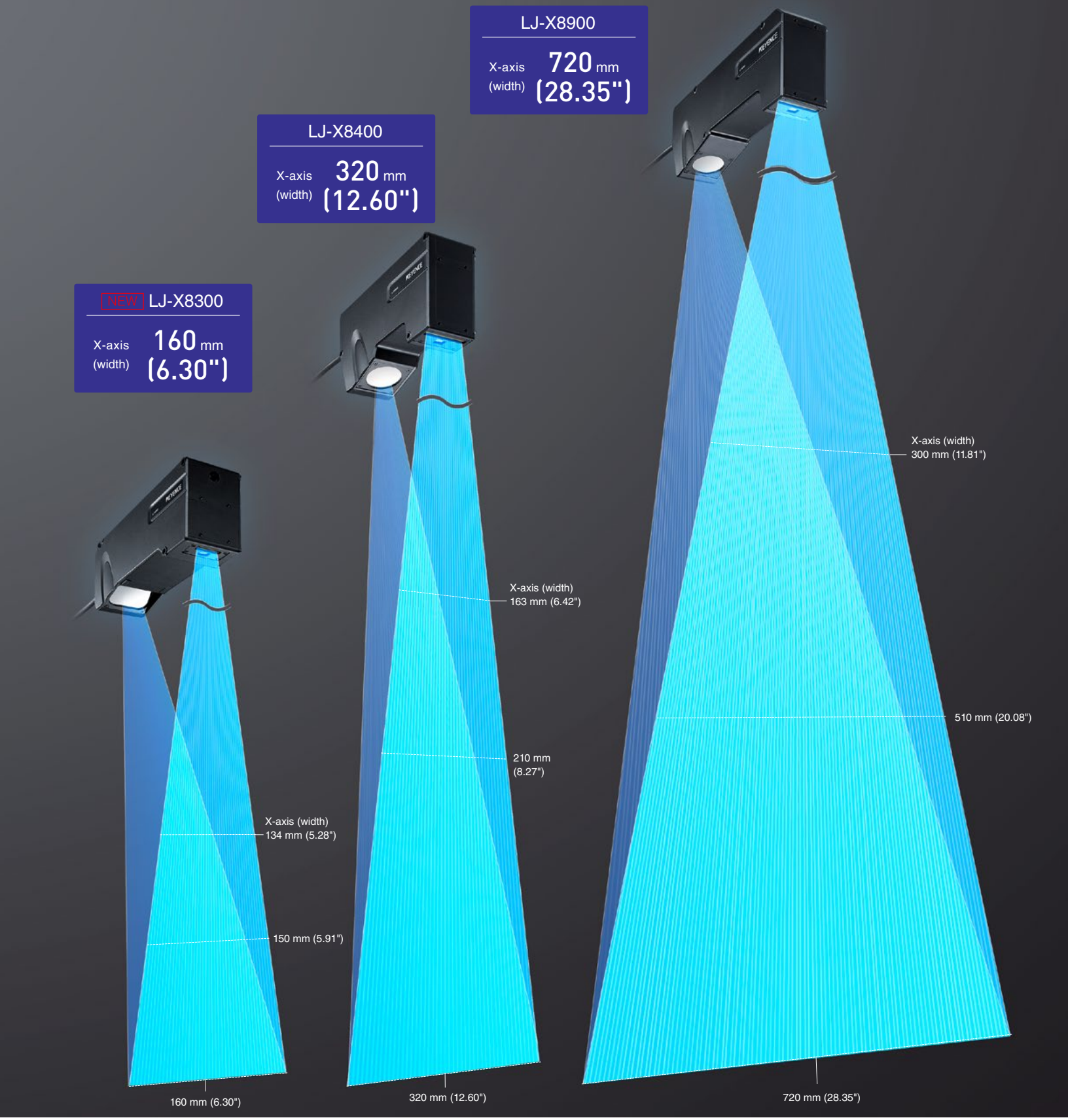
Choose a controller that fits your needs

Standard models

Intuitive user interface designed to make programming simple. Set up for inline inspection in 3 easy steps.

2D/3D Controller
LJ-X8002

2D Controller
LJ-X8000E



Advanced models

Create fully customized solutions with advanced programming capabilities. Adept for handling difficult 3D inspections or integration with external software.

XG-X Series
Dedicated LJ-X/
LJ-V Connection
Controller
XG-X2902LJ

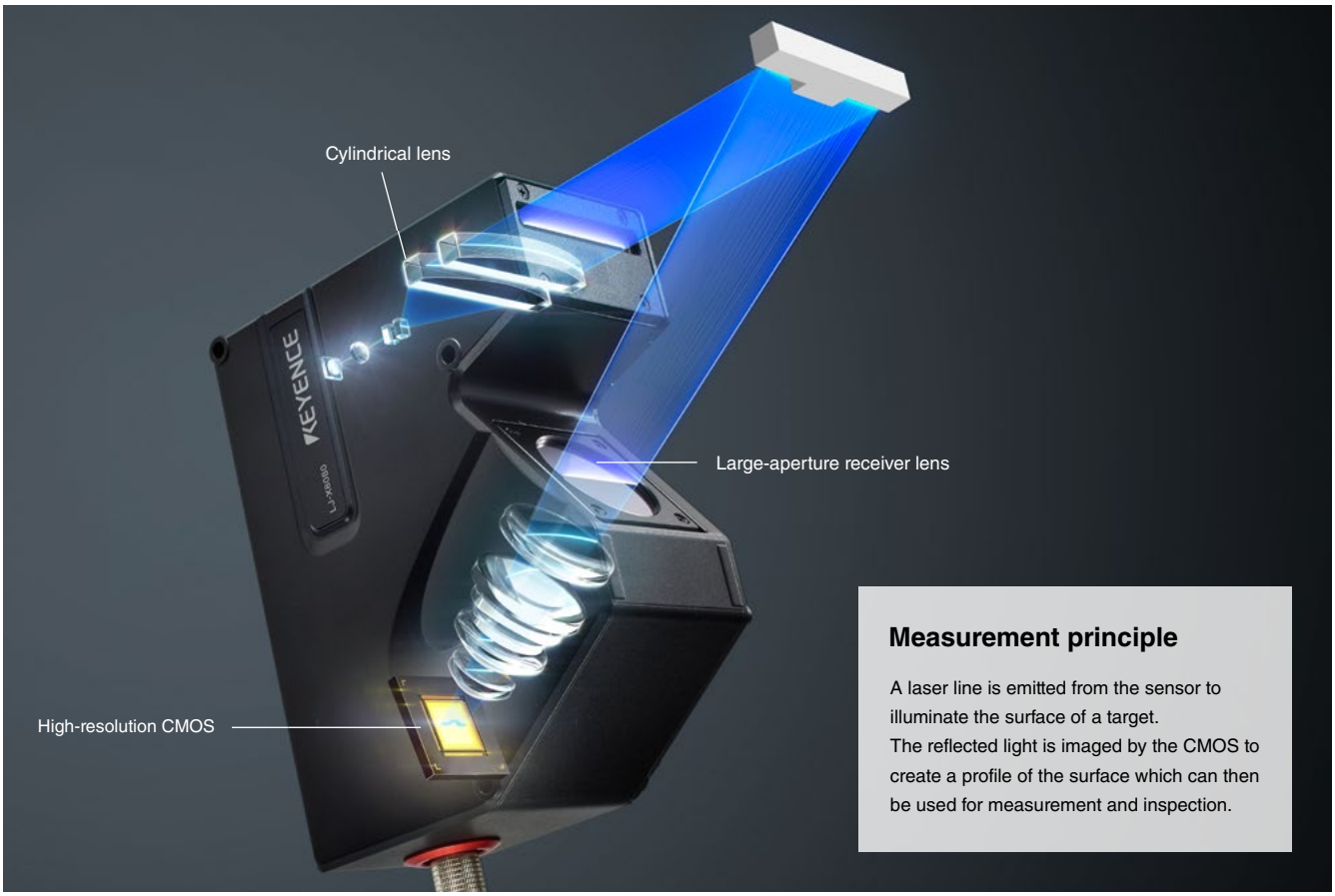
Raw Data Output
Controller
LJ-X8000A

Ultra-high precision

3200 points/profile

Maximizing resolution and target detection

To improve the resolution of the sensor, the number of pixels on the CMOS needs to be increased. This can be accomplished by making each pixel smaller; however, smaller pixels can result in insufficient light to create an accurate profile of some targets.
For the LJ-X Series, we've implemented new technology to create a laser profiler capable of high-resolution measurement on any target.



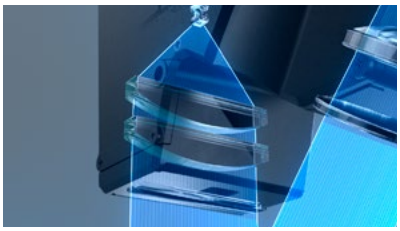
Measurement principle

A laser line is emitted from the sensor to illuminate the surface of a target.
The reflected light is imaged by the CMOS to create a profile of the surface which can then be used for measurement and inspection.

High-quality components create high-resolution images

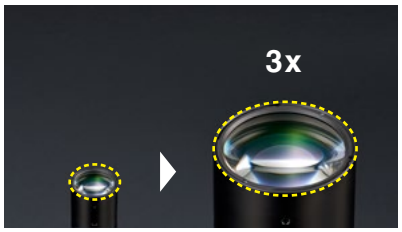
Cylindrical lens

Parallel light is emitted using a cylindrical lens designed to prevent the reflected light from scattering across the surface of the target. This ensures reliable reflections from any shape or surface.



Large-aperture receiver lens

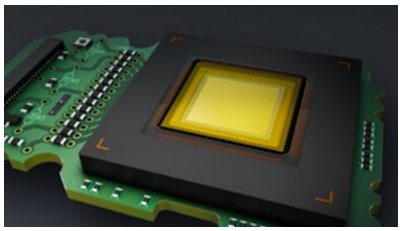
The sensor is equipped with a receiver lens that has 3x more area than conventional models, increasing the received light intensity. This allows the sensor to produce stable profiles in any environment.



Conventional unit LJ-X Series

High-resolution CMOS

This newly developed CMOS enables high-resolution measurement using 3200 points/profile, while delivering improved imaging capability on targets with varying reflectivity.



2D measurement

Car door flush and gap

Control flush and gap at the micron level. By mounting the sensor on a multi-axial robot, inspections can be performed inline.

3D measurement

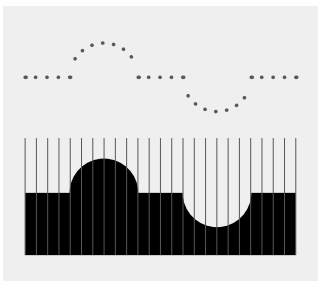
Brake rotor porosity

Using 3D images, it's possible to detect porosity in rough surfaces. High-resolution profiles enable stable detection of even the smallest defects.

Accurately capture target shape

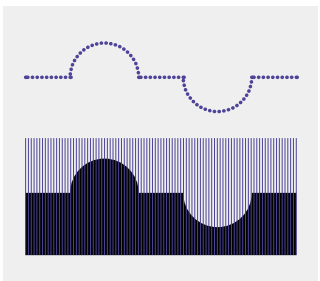
By creating each profile from 3200 data points, inspection can be performed using a profile that captures the shape of a target in more detail, improving measurement precision and defect detection.

Conventional System



Conventional systems have limited profile points which makes the shape rougher. Detecting small dents or protrusions was impossible.

LJ-X Series



With the LJ-X Series, the shape of the target is accurately rendered using 3200 points/profile. Abnormalities, such as small dents or protrusions, can be easily detected.

Ultra-high precision

Improved precision in both the X-axis and Z-axis

Implantable device assembly check

Confirm components are properly seated and soldered connections are intact with high precision.

Ensure long-term reliability by checking 100% of implantable devices in process.

Comparison with conventional product

X-axis (width)

Improved X resolution produces high precision width measurements.

	Conventional KEYENCE product	LJ-X8020
Measurement range	7 mm 0.28" (reference distance)	7.5 mm 0.30" (reference distance)
Profile data count	800	3200
Profile data interval	10 µm 0.0004"	2.5 µm 0.000098"

Measurement precision (X-axis)

4x more resolution

Z-axis (height)

Improved Z-axis precision provides high-accuracy height measurements.

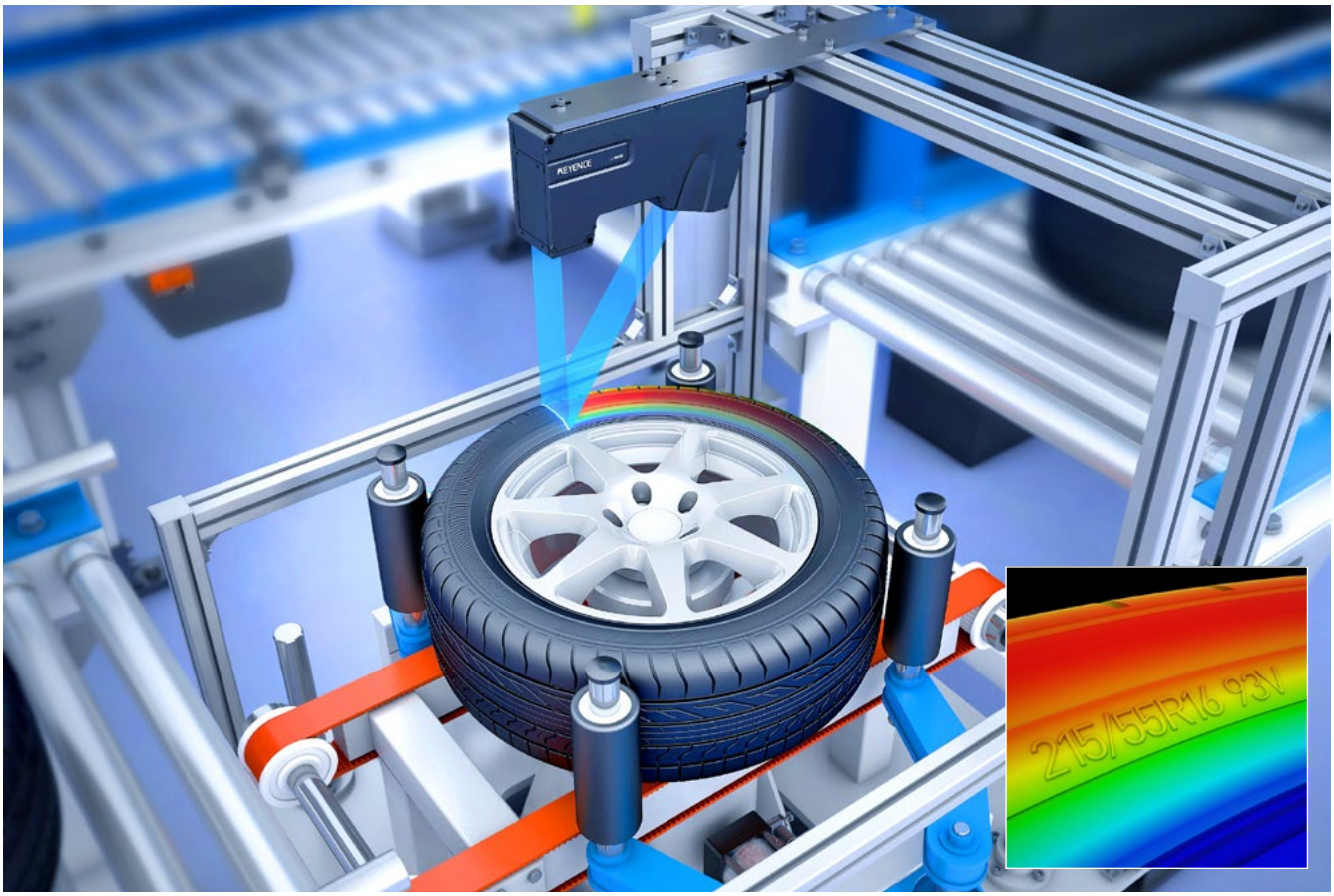
	Conventional KEYENCE product	LJ-X8080
Measurement range	±23 mm ±0.91"	±20.5 mm ±0.81"
Linearity	±0.1% of F.S.	±0.03% of F.S.

Measurement precision (Z-axis)

3x more accurate

Tire shape / DOT code inspection

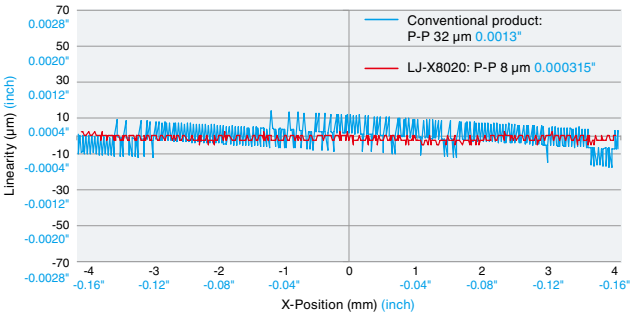
With improved X-axis and Z-axis precision, it's possible to hold tighter tolerances over a wider inspection area. This significantly expands the types of applications that can use 3D measurement.



Linearity comparison

X-axis direction

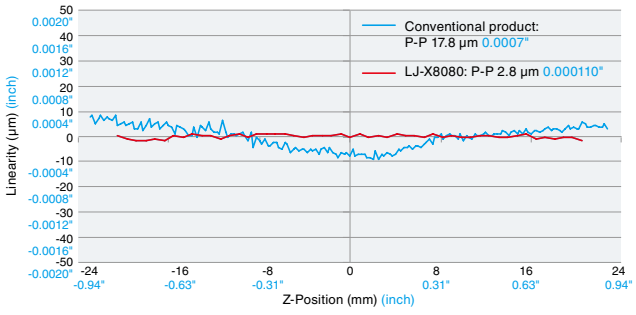
With 3200 points/profile, X-axis linearity has been significantly improved. Edge position can be tracked more reliably.



LJ-X8020 (typical example)

Z-axis direction

Z-axis linearity improvements make measurements of height difference and position more accurate.



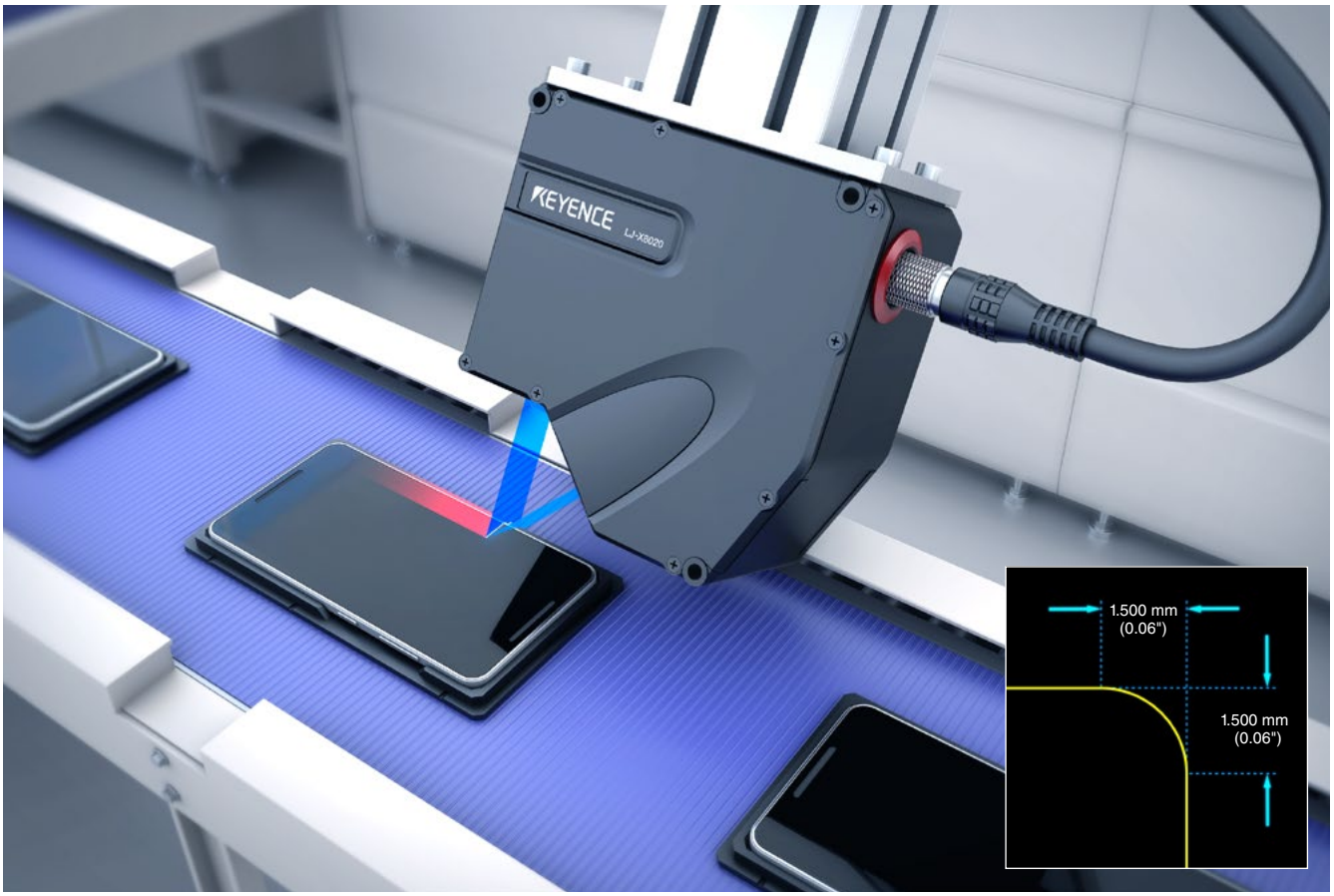
LJ-X8080 (typical example)

Compatible with all targets

Stable measurement on any material or surface

Smartphone assembly

Targets with multiple materials can be captured in a single profile, allowing measurements to be made between glass and metal surfaces. The LJ-X Series is equipped to handle reflectances ten times higher than conventional products.

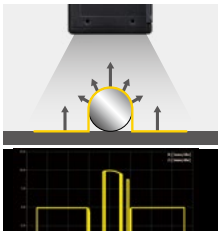


Single-shot HDR

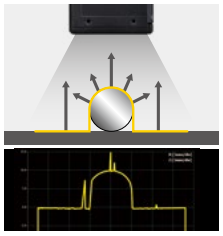
The profiler is equipped with an ultra-high-sensitivity CMOS featuring KEYENCE's single-shot HDR function.
This provides the sensor with a dynamic range wide enough to reliably measure targets with multiple surface types (or areas of low reflectance and high reflectance) in a single shot.

Without single-shot HDR function

Low reflectance — High reflectance

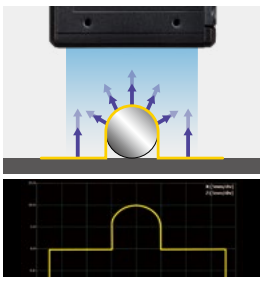


When optimized for a flat area, the received light intensity of slopes or dark areas is insufficient



When optimized for sloped areas, the received light intensity of flat areas is excessive

LJ-X Series



The shape of the target can be correctly rendered due to the high sensitivity and wide dynamic range

2D measurement

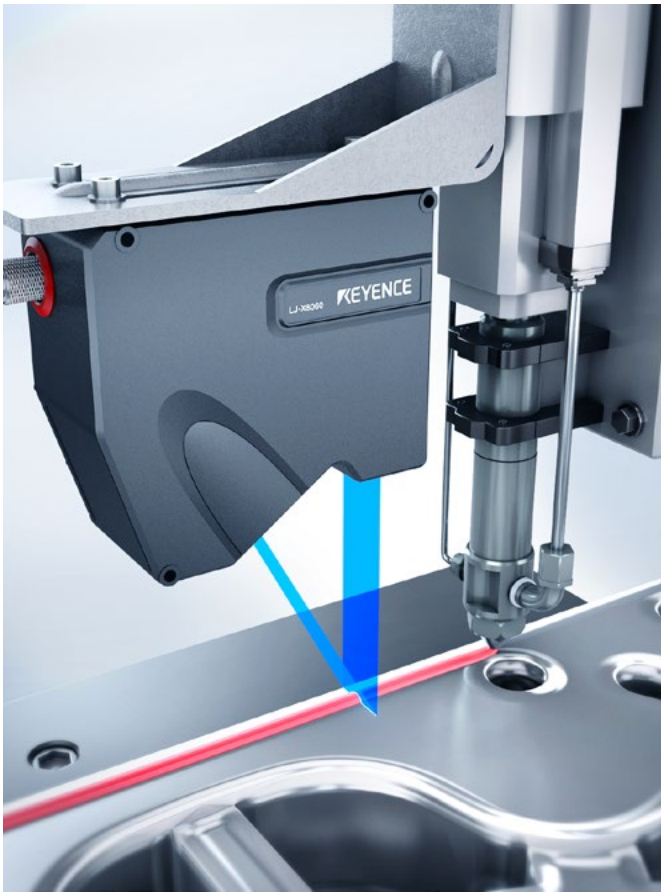
Simultaneous measurement of height and width

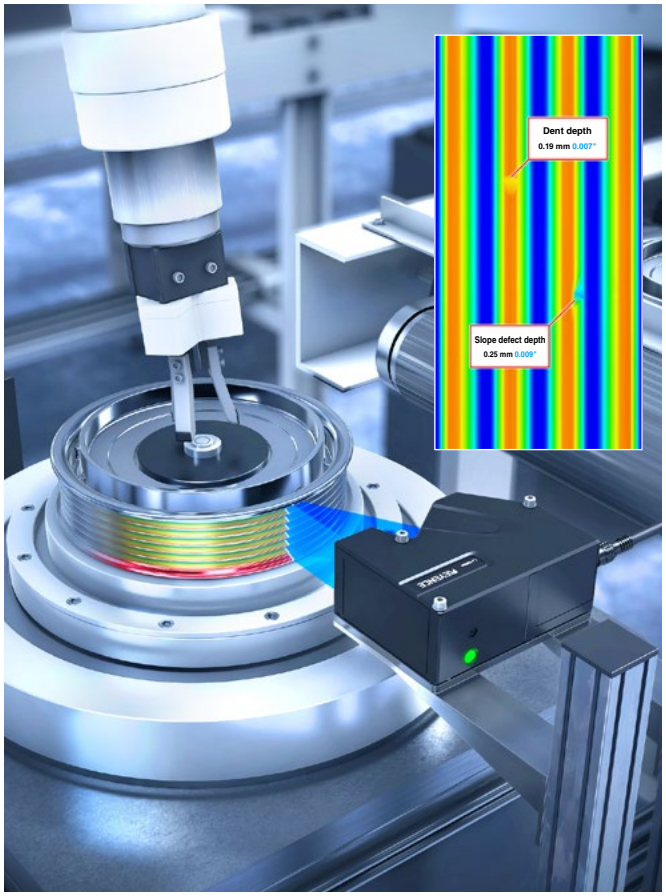
A dedicated detection algorithm for translucent objects means that accurate measurements can be taken for items such as translucent stickers.

3D measurement

Pulley shape measurement

By scanning the pulley as it spins, the sensor can detect chips and dents anywhere in the surface.

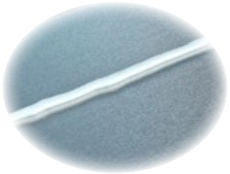


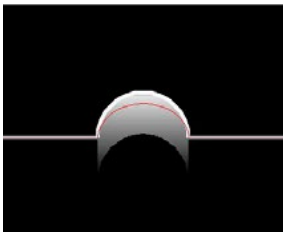


Newly developed

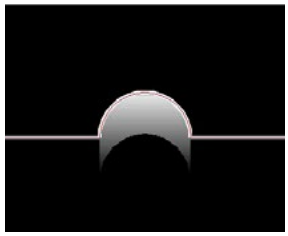
Translucent Object Detection function

A dedicated algorithm for tough to image translucent materials, such as adhesive beads or gels, allows for easy setup and accurate inspections of the profile.





Translucent Object Detection function **OFF**

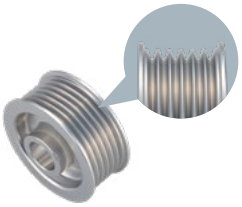


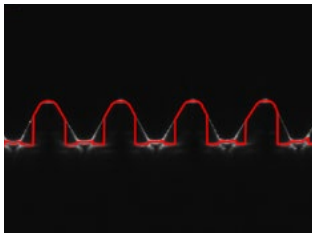
Translucent Object Detection function **ON**

Newly developed

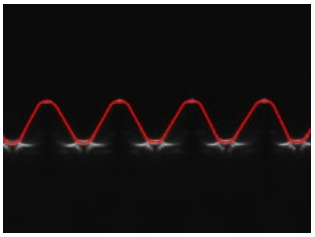
Irregular Reflection Removal function

Light scatters when projected into a channels, grooves, or scores.
The LJ-X8000 Irregular Reflection Removal eliminates errors in the profile caused by this stray light.





Stray light control **OFF**



Stray light control **ON**

Intuitive user interface reduces setup time

3-step configuration

Conventional unit setup

Exposure time	Detection sensitivity	Light intensity	Position detection Creation & verification	Tilt detection Creation & verification	Position correction Creation & verification

LJ-X Series setup

Capture settings	Position correction	Apply Inspection Tools

Configuration complete

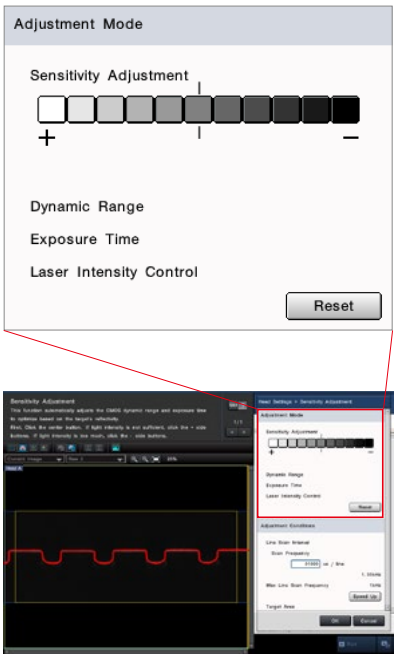
Easy 3-step configuration

STEP1

STEP2

Capture settings

Automatically tune the sensor by selecting the desired sensitivity.

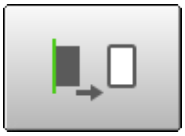


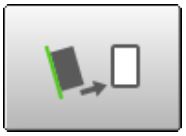
Position correction

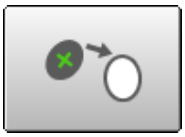
Apply position correction to have inspection regions track with a feature's location.


Pattern Match (Shading) Position


Pattern Match (Profile) Position


Edge Position


Line Position and Angle


Gravity Center of Cluster


Center of Circle

Flatness inspection tools Creation & verification	Clearance inspection tools Creation & verification	Appearance inspection tools Creation & verification

Configuration complete

Considerable time savings

STEP3

Configuration complete

Inspection tool setup

Add inspections by selecting from a list of available tools using visual icons.

2D profile measurement

3D profile measurement

3D appearance inspection

Start inspection

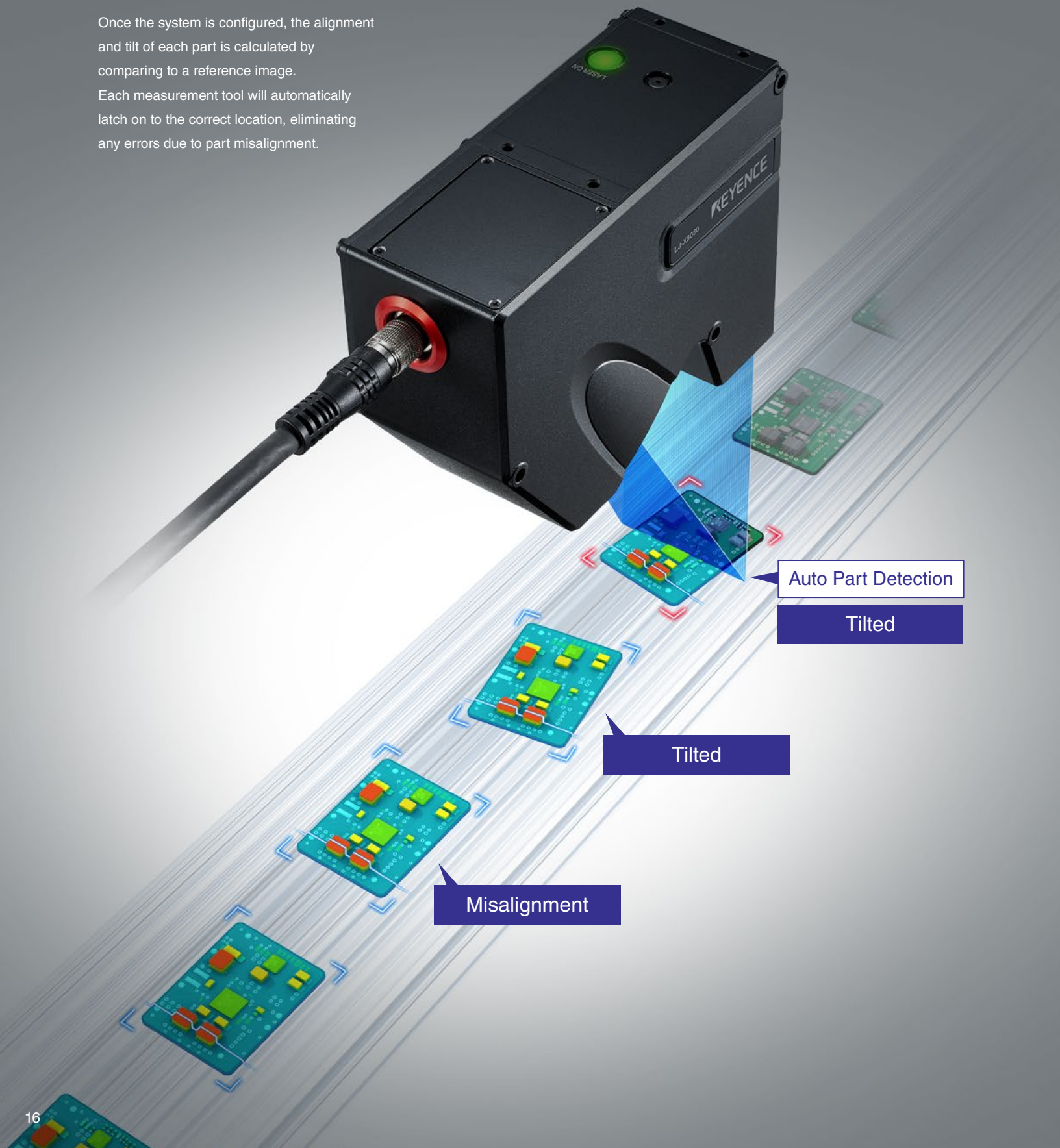
No external software required.

100% inspection made simple

Get accurate results with 3D position tracking

3D position correction

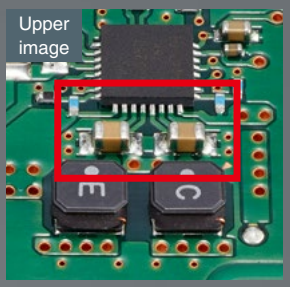
Once the system is configured, the alignment and tilt of each part is calculated by comparing to a reference image.
Each measurement tool will automatically latch on to the correct location, eliminating any errors due to part misalignment.



3D position correction

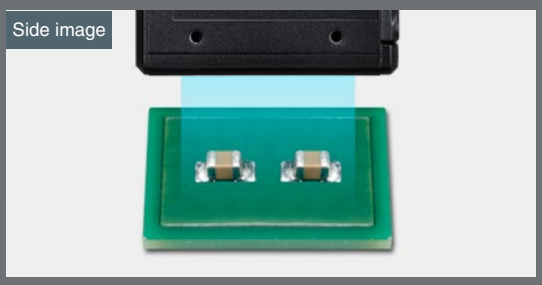
Height inspection of PCB-mounted parts

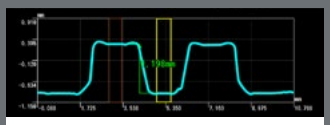
Any variation in part presentation, such as angle or tilt, is automatically corrected to produce stable profile measurements.



Height inspection of PCB-mounted parts

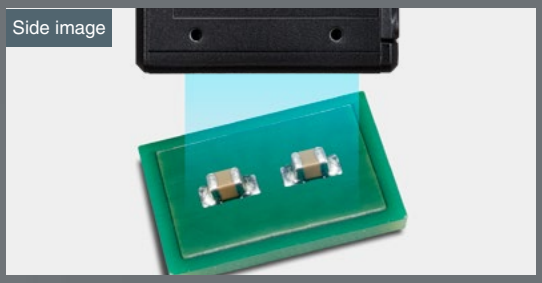
Properly aligned target



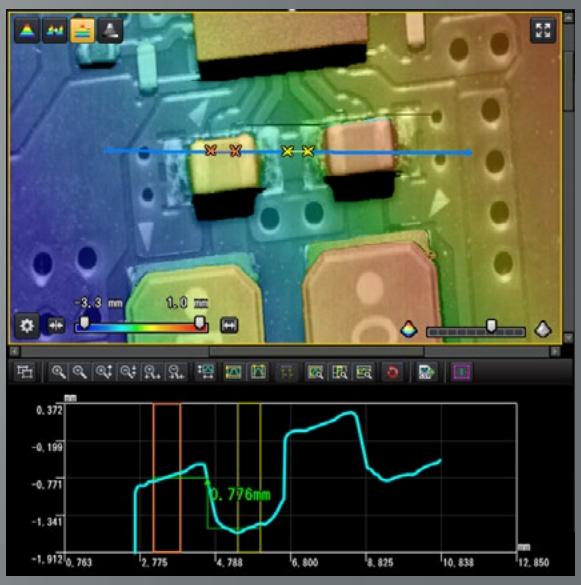


The profile can be accurately extracted.

Target that shifted during transport

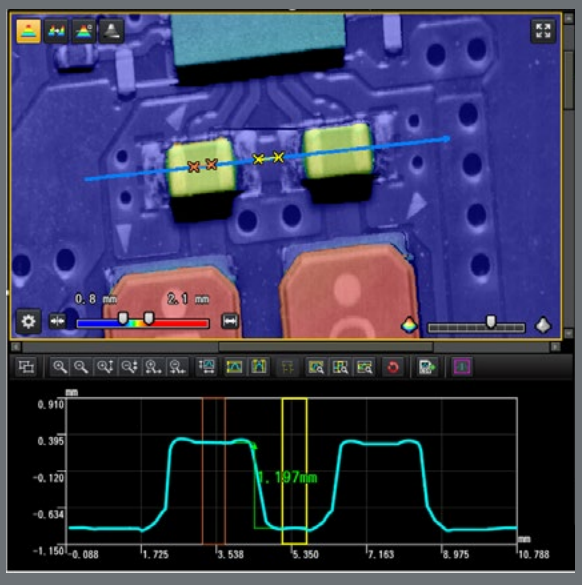


Conventional mode



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

3D position correction with LJ-X8002



3D position correction detects target position and tilt, then automatically performs correction, enabling stable inspection.

Auto Part Detection

The sensor detects when targets enter the measurement range and automatically starts measurement using the Automatic Target Detection function. This eliminates the need for external trigger signals to perform measurement.

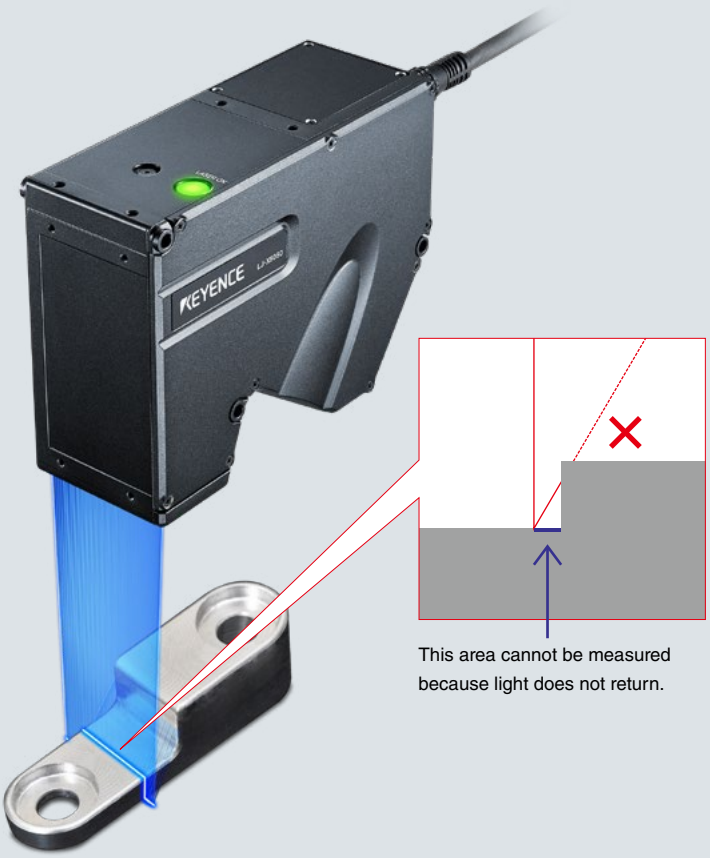
Functions for improved 3D inspection

1 Dead Zone Noise Removal

What causes noise around dead zones?

Laser profilers operate using laser triangulation to determine part position. If the shape of the part obstructs the return light during a portion of the scan, the resulting 3D image will contain a blind spot. This area is called a dead zone.

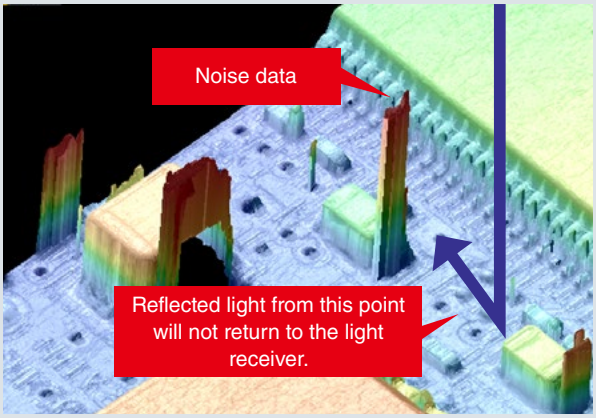
During a typical scan, the light reflected from the target is much stronger than any stray light present. This prevents stray light from impacting the 3D image. However, when scanning over a dead zone, the reflected light is blocked, leaving only stray light to be detected. This can cause noise in the 3D image, preventing stable measurement.



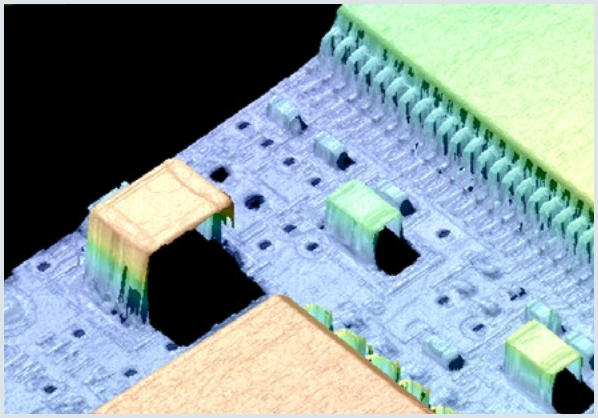
The Dead Zone Noise Removal function eliminates this issue

This filter stabilizes inspections by eliminating the false data created by stray light. It works by using context from other areas in the 3D image. For example, if the noise data below reflected the true target shape, the return light indicated by the blue arrow would have been blocked. However, data actually exists at this point. Therefore, this is identified as noise data, not the actual target. Data that is identified as noise is considered invalid data, and can be filtered out of the 3D image.

Blind area noise removal function OFF



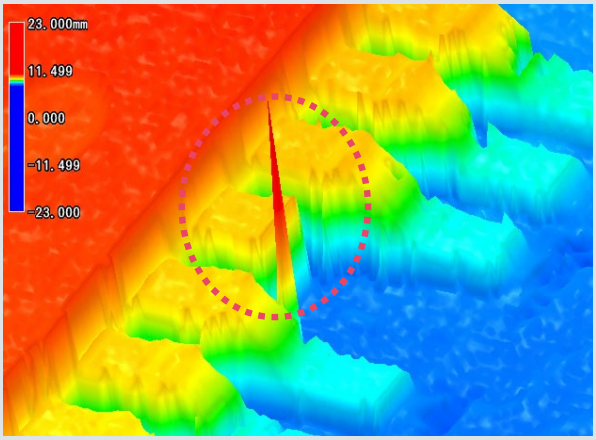
Blind area noise removal function ON



2 Spike Noise Cut

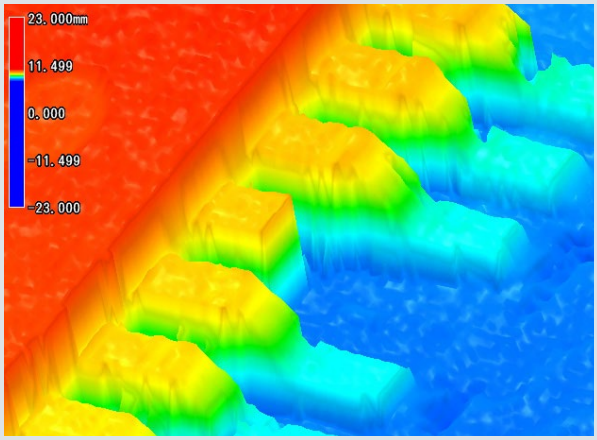
This function addresses spike-like noise (high/low data that is prominent in peripheral areas) generated on edges and highly reflective areas of the target.

Spike Noise Cut function OFF



Spike data is visible and can impact measurements.

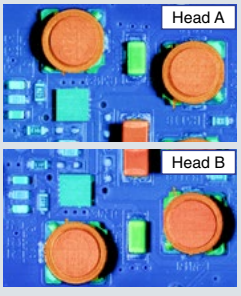
Spike Noise Cut function ON



Spike data has been removed.

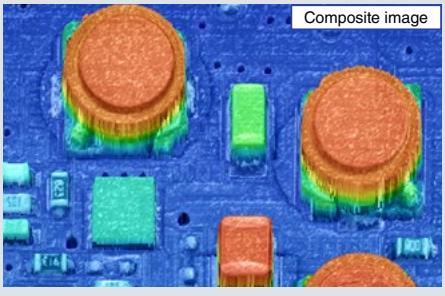
3 Dead Angle Cut

By merging profile data from two directions, unmeasurable blind areas can be filled in.



Both individual scans have dead zones where no data exists.

Composite

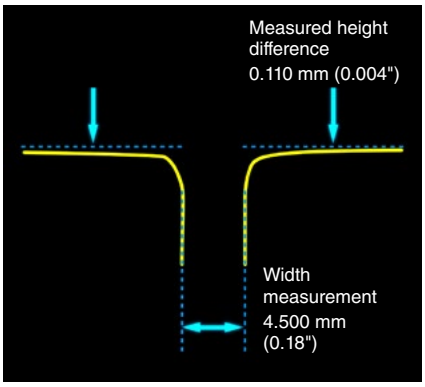


Filling in data with the Dead Angle Cut function creates a complete and accurate 3D image of the target.

2D profile measurement

Door panel flush and gap

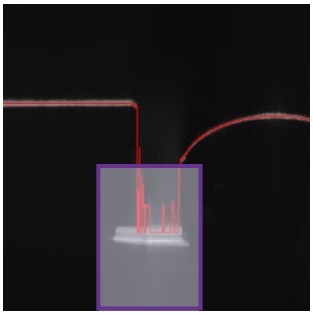
Measure door panel flush and gap without touching the car. The sensor settings don't need to be adjusted for variations in body color or size, making it easy to automate external appearance inspection.



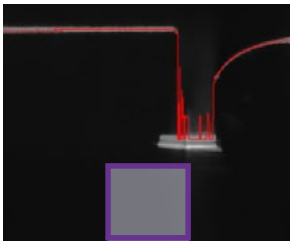
Mask tracking function

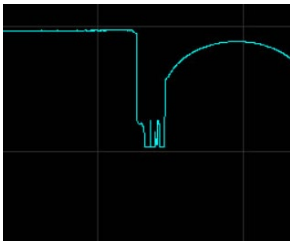
In cases where stray light due to scattered reflections cannot be eliminated with filters, a mask can be applied. Masks can dynamically track part location, so even if the height or position of the desired mask area changes, measurement results will not be impacted by stray light.

Apply a mask to stray light

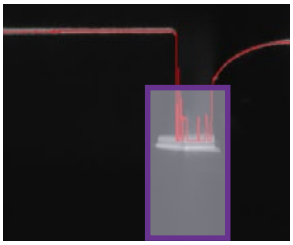


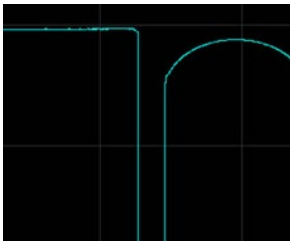
Mask tracking OFF





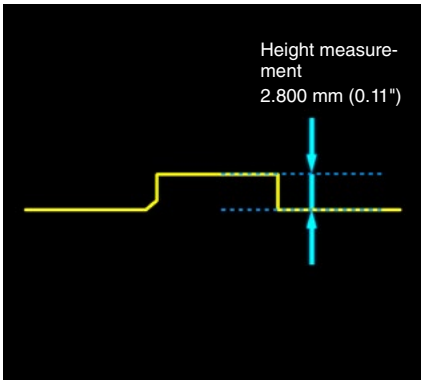
Mask tracking ON





PCB chip height

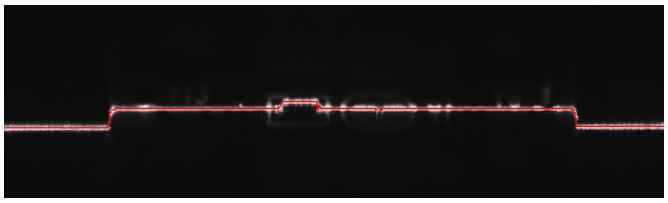
Inspect the height, position, and shape of a mounted part. By using parallel light, the sensor captures target shape accurately, right down to the fine details.



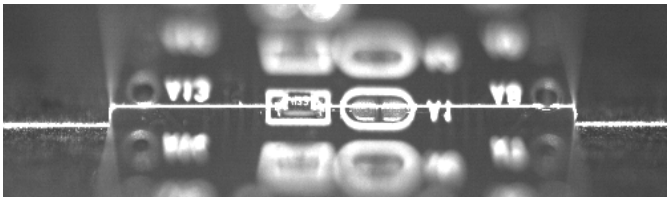
LED lighting function

The profiler is equipped with an LED right beside the laser transmitter.
This illuminates the area on the measurement target that is currently being captured by the laser, making it easy to understand where measurements are taking place.

Lighting setting OFF
Only the shape of the area being irradiated by the laser can be determined

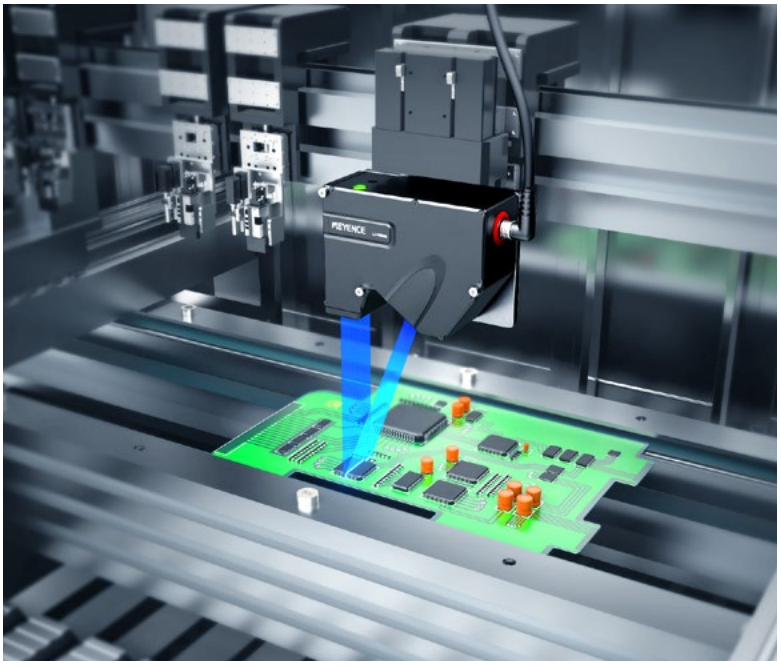


Lighting setting ON
It's possible to confirm where the laser line is located by viewing the target.

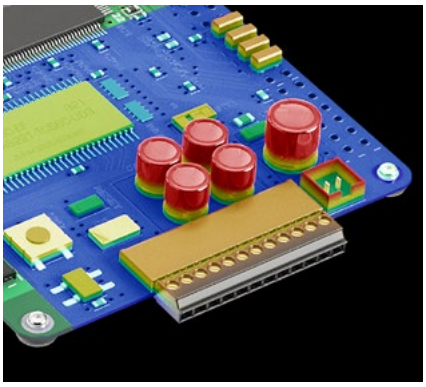


3D profile measurement

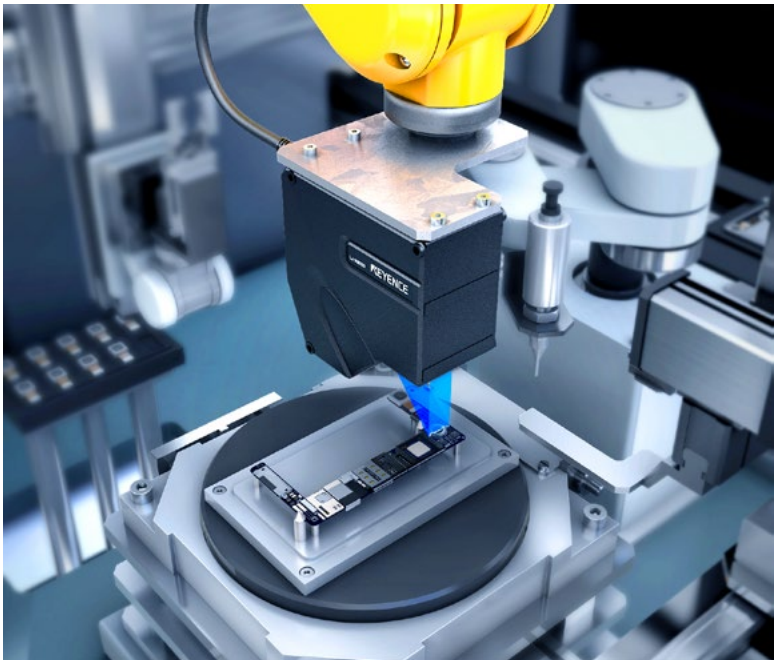
Inspection of mounted components



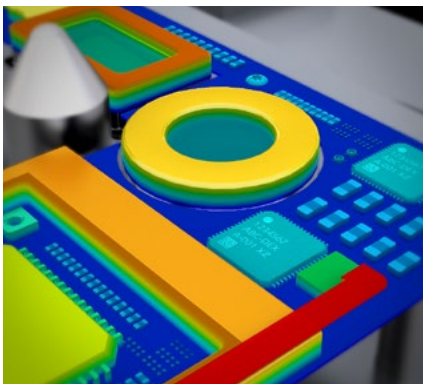
The height of mounted parts can be measured using the surface of the PCB as a reference. The adjustment function can handle misaligned and tilted targets, so accurate inspection is possible without stopping the target.



Camera module assembly check



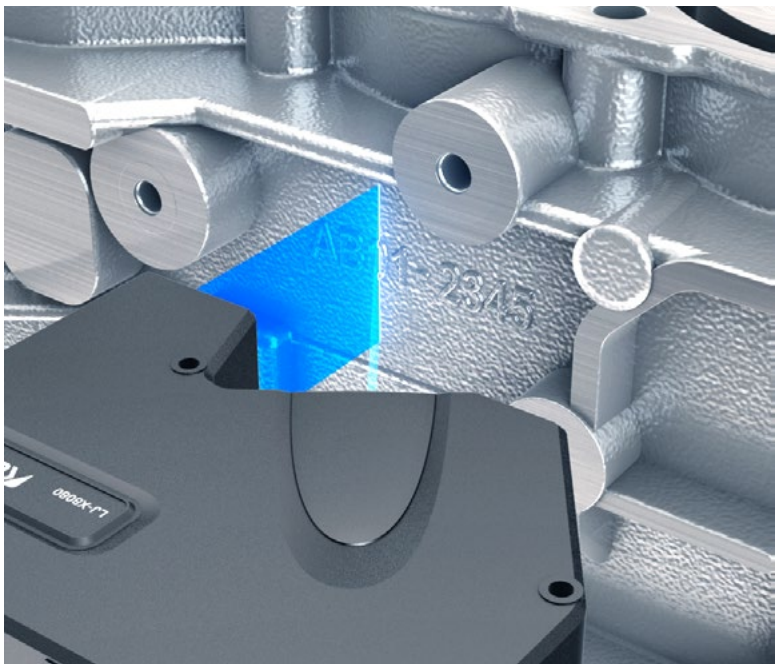
For camera modules with multiple functions, it's necessary to confirm the relative position of various elements. Performing high precision assembly inspection is possible with a single sensor using 3D data.



Terminal pitch and height

Measure height difference and pitch of positive and negative electrodes.
The LJX Series is equipped with a CMOS with a wide dynamic range, which allows it to stably perform measurements on a variety of target materials and colors.

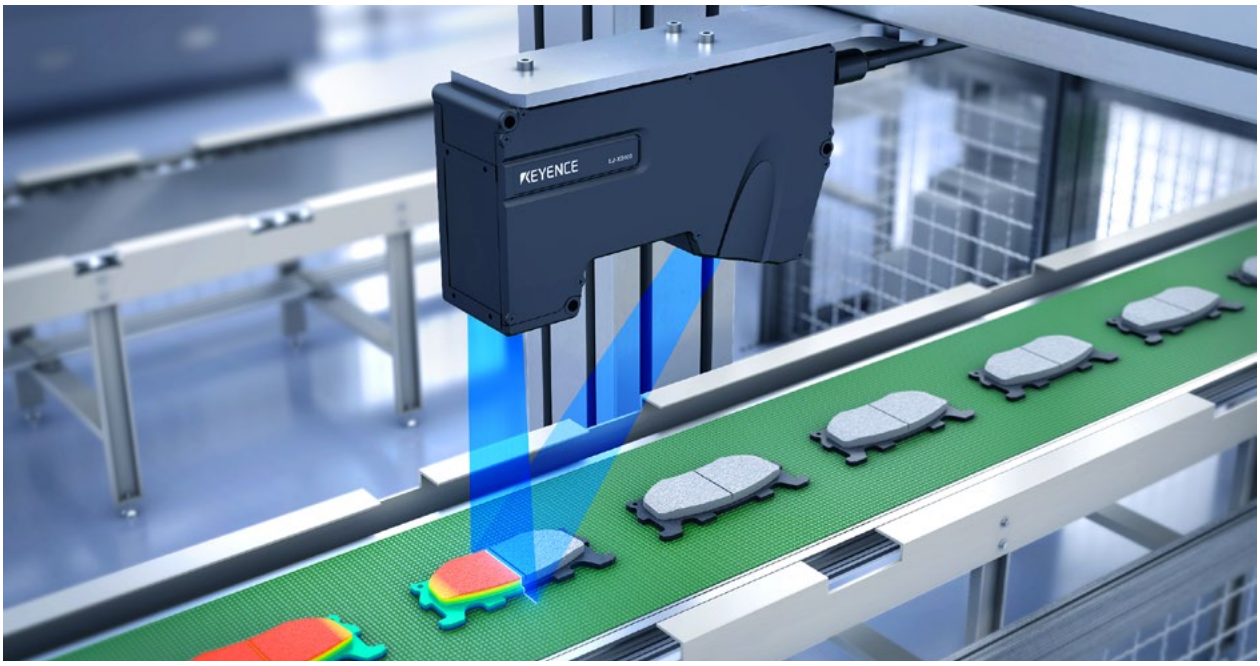
Character recognition (OCR) on cast surfaces



Characters machined on cast surfaces can be identified. Detection using height data allows for stable reading, even for characters on rough metal surfaces.

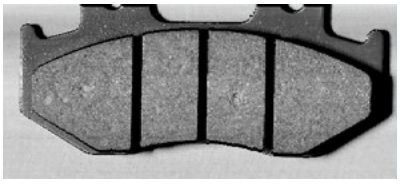
3D appearance inspection

Brake pad dent inspection

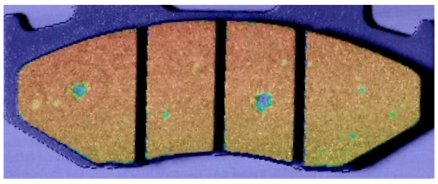


Height images provide reliable detection on patterned surfaces

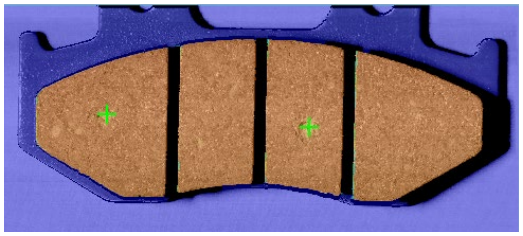
Height images are created by scanning a target and using color to represent height changes.
Patterns or markings on the surface do not impact the height image, making it easy to detect indentations or other defects.



Grayscale image



Height image



Indentation detection results

Weld shape inspection

Profile measurement tool

The profile measurement tool enables a variety of inspections based on the 2D cross-section (profile) of the target.
This toolset includes a number of tools dedicated to detecting issues with weld bead shapes.

Four dedicated tools essential for checking weld quality are available. Simply select the tool and specify the measurement range to set up the desired inspection.


Throat thickness


Leg length


Undercut


Overlap

Additional measurement tools for height, width, angles, arbitrary distances, and more can be used to perform a variety of measurements and inspections using profiles.


Height difference

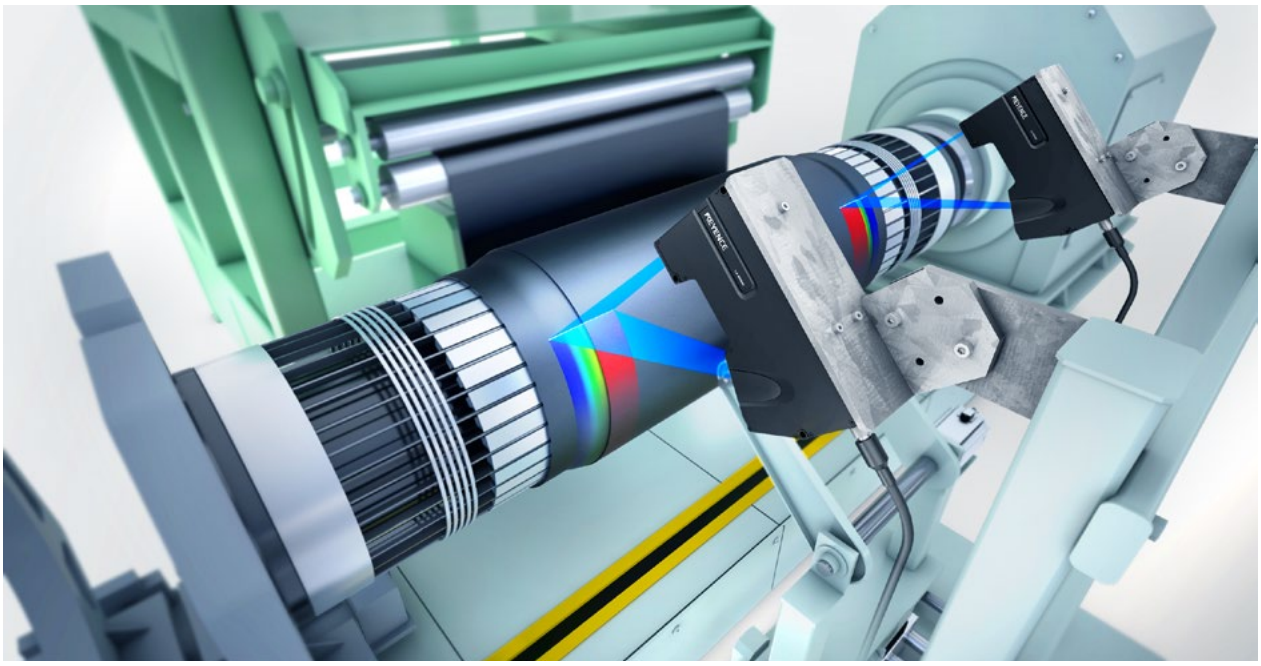

Width


Angle formed by two lines


Point/line distance

3D appearance inspection

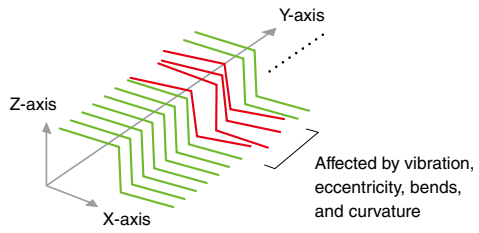
Rubber sheet defect inspection

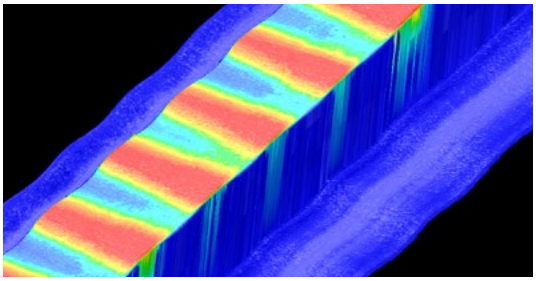


Profile alignment function

When creating a 3D image, the positions of the 2D profile are adjusted in the X, Z, and θ directions. This eliminates the effects from vibration and eccentricity as well as bends and curvature in the target, creating an image fit for inspections.

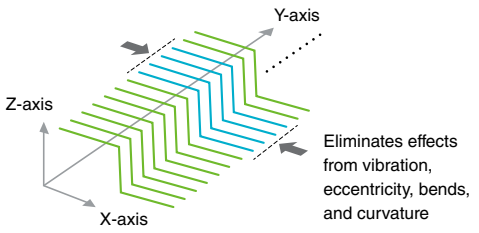
Without profile alignment

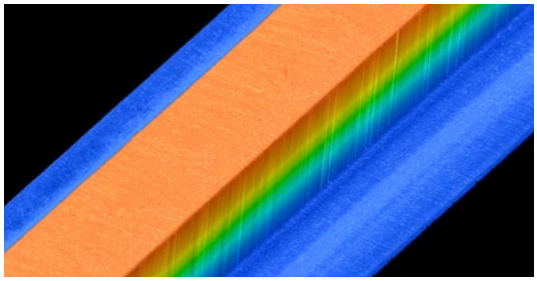




Without profile alignment, the target image is distorted by vibration, making it impossible to perform accurate inspection.

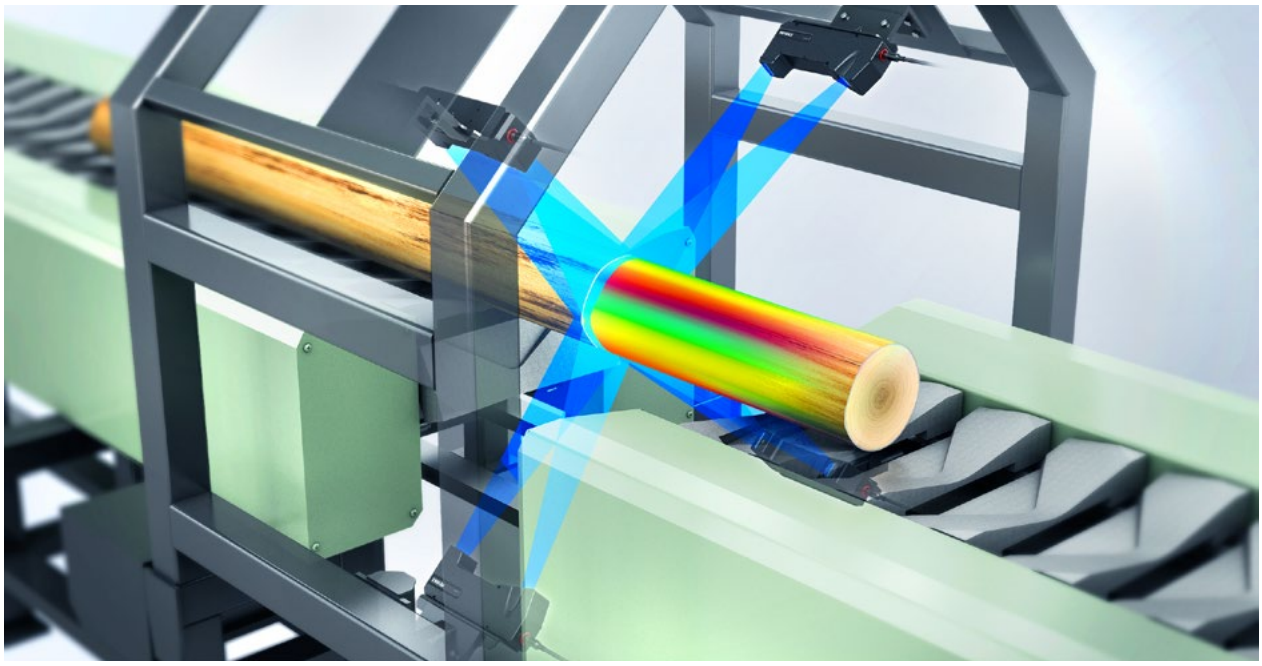
With profile alignment





Profile alignment allows for an optimal 3D image to be created. This achieves stable, inline inspections for dents, chips, and other defects.

Lumber grading

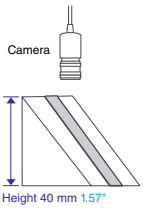


Stable detection for targets with height differences

Clear images can be captured even when measuring targets with height differences or where the distance relative to the sensor could vary. 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-X Series

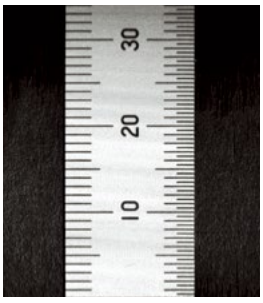
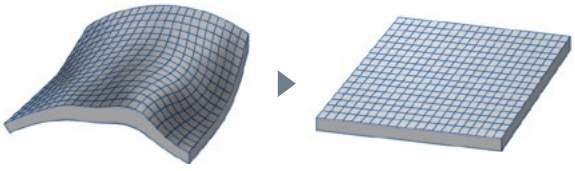


Image captured clearly

Extract defects from 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.



Dent inspection for rubber curved surface

Picture of target

Height image

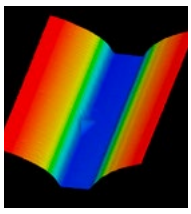
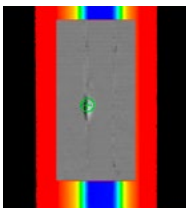


Image after extracting height + damage



Advanced controllers provide maximum inspection capability

“XG-X Series” offers enhanced image processing and functionality

XG-X2902LJ

The XG-X Series offers an advanced set of tools for programming 3D inspections. This platform enables users to complete fully customized measurements and inspections using the 3D image generated by the LJ-X sensor head.

LJ-X/V Series sensor head

Input unit **CA-E200LJ**

Controller **XG-X2902LJ**

PC configuration software “VisionEditor”

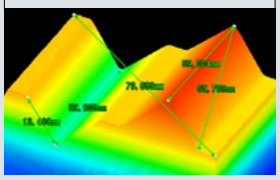
Create/edit programs with dedicated PC software

Simply select the desired target and location to perform complex measurements and inspections

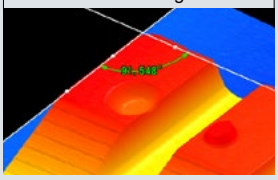
Conduct dimensional inspections that take all XYZ surfaces into account, including height, distance, tilt, and angle. The software provides visual feedback, enabling easy confirmation that the measurement tool functions as intended, even for complex shapes.

3D geometry

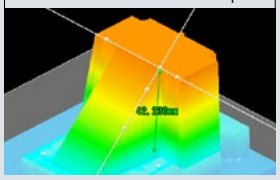
Distance



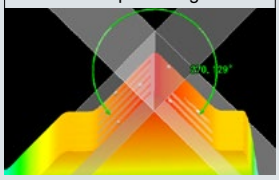
Line/line angle



Distance from line intersection to plane



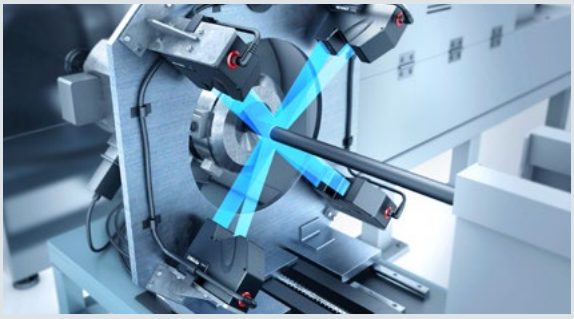
Plane/plane angle



Calculation target	Calculation method
Distance	• Points distance • Point/line distance • Point/plane distance • Lines distance
Angle	• Line/line angle • Line/plane angle • Plane/plane angle
Point	• Point • Two lines intersection • Line/plane intersection • Point between two points • Point between point/line • Point between point/plane • Intersection with dropped perpendicular line from point to line
Line	• Lines • Line linking two points • Point/line center line • Line projected on to a plane • Plane/plane intersection
Plane	• Planes • Central plane between points • Central plane between point/plane • Plane made by point and line • Plane made by two lines
Sphere	• Spheres

Connect up to four heads with a single controller

Inputs from up to four heads can be used simultaneously to take measurements and conduct inspections. The sensors can operate independently or in unison to perform multi-point inspections of large targets.



360° cable surface inspection

Dedicated profile output controller for use with custom programs or external software

LJ-X8000A

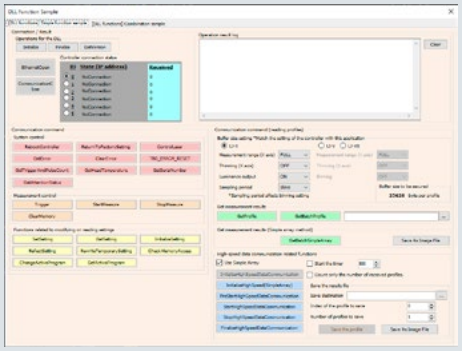
Complete output of all profile data

High-speed profile data output with a maximum speed to *64Khz
(*When LJ-V sensor head is connected)

Synchronized measurement with multiple units is possible

Compatible with various programming languages

A sample program is available with a comprehensive list of commands for obtaining profile data, issuing triggers, changing various settings, and so on. There is also a program for saving files in bitmap and TIFF format.



• Windows

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

• Linux

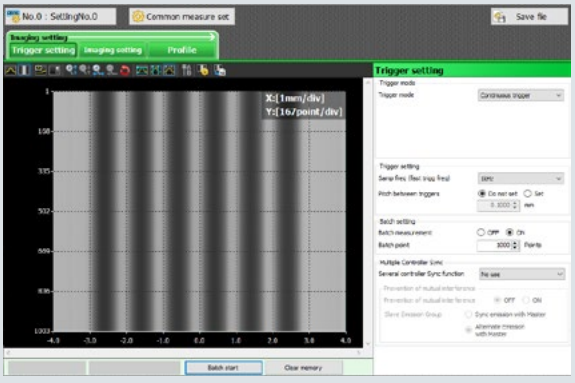
C++ | Python

Extensive driver support

HALCON | VisionPro | LabVIEW | Cognex Designer | Matrox Design Assistant

Two types of dedicated software included

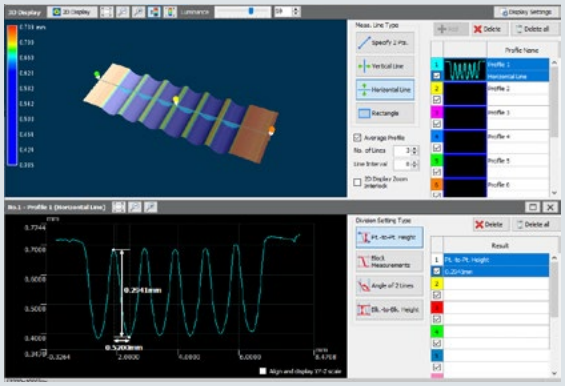
LJ-X Navigator



Optimize capture settings

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

LJ-X Observer



Easy analysis of measurement data

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

Integrating the LJ-X Series into your process

Dedicated encoder

Capture

KEYENCE's dedicated encoders can be set to any number of pulses, making it easy to install an encoder that matches with the capture conditions.

LJ-X sensor head

Measure

Perform high precision 2D and 3D measurements inline. Get the system up and running quickly with 3-step configuration.

Monitor

Control

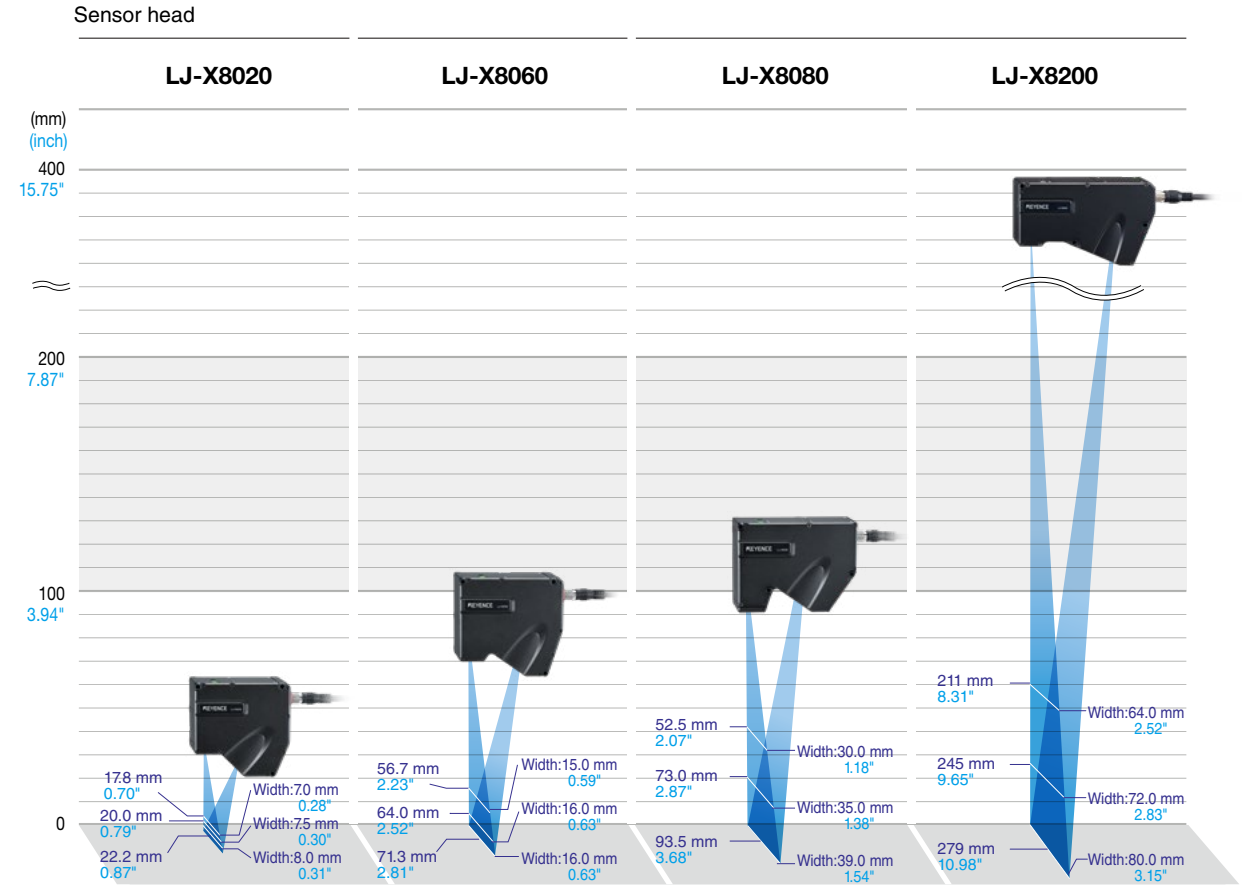
Based on measurement results, parts can be sorted in real-time. Data can be fed back to control upstream and downstream processes with a variety of communication methods.

LJ-X controller

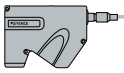
Record

Gain a better understanding of your process by storing image and measurement data locally or on your server.

Head lineup



	LJ-X8020	LJ-X8060	LJ-X8080	LJ-X8200
Measurement range	Z-axis (height) 20 ± 2.2 mm 0.79" ± 0.09"	Z-axis (height) 64 ± 7.3 mm 2.52" ± 0.29"	Z-axis (height) 73 ± 20.5 mm 2.87" ± 0.81"	Z-axis (height) 245 ± 34 mm 9.65" ± 1.34"
	X-axis (width) 7.5 mm 0.30"	X-axis (width) 16.0 mm 0.63"	X-axis (width) 35.0 mm 1.38"	X-axis (width) 72.0 mm 2.83"
Repeatability	Z-axis (height) 0.3 µm 0.000012"	Z-axis (height) 0.4 µm 0.000016"	Z-axis (height) 0.5 µm 0.000020"	Z-axis (height) 1.0 µm 0.000039"
	X-axis (width) 0.3 µm 0.000012"	X-axis (width) 0.5 µm 0.000020"	X-axis (width) 1.0 µm 0.000039"	X-axis (width) 3.0 µm 0.000118"



Required

Head-to-controller cable
CB-B3 (3 m 9.8')
CB-B10 (10 m 32.8')

Extension cable
CB-B5E (5 m 16.4')
CB-B10E (10 m 32.8')
CB-B20E (20 m 65.6')

Extension cables & L-shaped connectors
CB-B05LU (0.5 m 1.64')
CB-B05LL (0.5 m 1.64')
CB-B05LR (0.5 m 1.64')

*Total cable length is 30 m 98.4', and a maximum of two extension cables (three if an L-shaped connector is included) can be added. Users can make their selection according to their needs.

Required

2D/3D controller
LJ-X8002

2D controller
LJ-X8000E

XG-X Series Dedicated LJ-X/LJ-V Connection Controller
XG-X2902LJ

Profile Controller
LJ-X8000A

Dedicated XG-X2902LJ LJ-X/LJ-V Input Unit
CA-E200LJ

*The XG-X2902LJ must be used together with the CA-E200LJ.

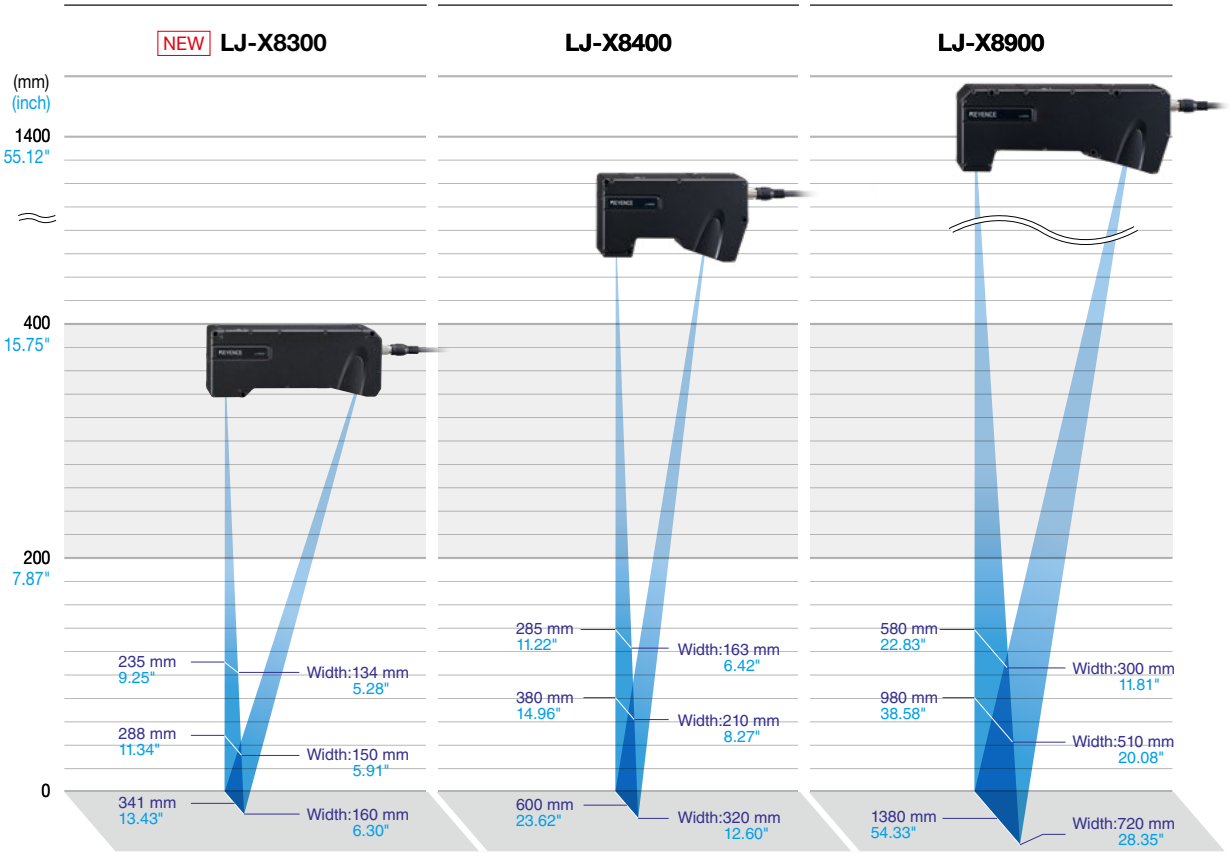
Monitor

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')



Z-axis (height) 288 ± 53 mm 11.34" ± 2.09"	Z-axis (height) 380+95/-220 mm 14.96"+3.74"/-8.66"	Z-axis (height) 980 ± 400 mm 38.58 ± 15.75"
X-axis (width) 150 mm 2.83"	X-axis (width) 210 mm 8.27"	X-axis (width) 510 mm 20.08"
Z-axis (height) 3 µm 0.000118"	Z-axis (height) 5 µm 0.000197"	Z-axis (height) 10 µm 0.0004"
X-axis (width) 5 µm 0.000197"	X-axis (width) 10 µm 0.0004"	X-axis (width) 25 µm 0.0010"

Programmable encoder

Dedicated encoder
CA-EN100H

Encoder relay unit
CA-EN100U

Accessories:
RS-422 cable (2.5 m 8.2')
RS-232C straight cable (2.5 m 8.2')

Encoder head cable
CA-EN5 (5 m 16.4')
CA-EN10 (10 m 32.8')

Expansion unit

EtherCAT® unit
CB-NEC20E
(for LJ-X8002/8000E)
CA-NEC20E
(for XG-X2902LJ)

PROFINET module
CB-NPN20E
(for LJ-X8002/8000E)
CA-NPN20E
(for XG-X2902LJ)

EtherNet/IP® module
CB-NEP20E
(for LJ-X8002/8000E)
CA-NEP20E
(for XG-X2902LJ)

Communication cable

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

Communication cable conversion connector
OP-26486 for 9-pin
OP-84384 for 9-pin SYSMAC
OP-86930 for 9-pin MELSEC

* Use OP-26486 for 9-pin when connecting MELSEC FX

RS-232 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 card (industrial grade)
16 GB **CA-SD16G** 4 GB **CA-SD4G**
1 GB **CA-SD1G** 512 MB **OP-87133**

24 V DC power supply
CA-U4

ND filter (for 20 mm 0.79" and 60 mm 2.36" heads)
LJ-XF1

Dedicated mouse
OP-87506

Mouse stand
OP-87601

*The mouse is included with the controller

Controller

Model		LJ-X8002/LJ-X8000E[*6]	
		2D mode	3D mode
Head input		Up to 2 head units Compatible with LJ-X8000 Series heads and LJ-V7000 Series heads *When using 2 units, heads A and B are the same model.	
Sampling cycle (trigger interval)		Maximum speed of 1 kHz (1 ms)[*1]	When connecting the LJ-X8000 Series: maximum speed of 16 kHz (63 µs)[*2] When connecting the LJ-V7000 Series: maximum speed of 64 kHz (16 µs)[*3] (Luminance output types for model designations ending with B have a maximum speed of 8 kHz (125 µs))[*4]
Number of registered inspection settings		Up to 1000 (depending on SD card capacity and setting contents) for each of SD cards 1 and 2. External switching is possible	
Master profile / number of reference images		Maximum 200 per setting per head (depends on SD card capacity)	Maximum 400 per setting (depends on SD card capacity)
Memory card		• SD card slot × 2 • Supports OP-87133 (512 MB), CA-SD1G (1 GB), CA-SD4G (4 GB), CA-SD16G (16 GB) *In the SD1 slot, CA-SD4G is equipped as standard for 8000, and CA-SD1G is equipped as standard for 8000E	
Number of tools		100/setting (of those, 20 are for misalignment correction)	Maximum of 100/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[*5]	
	RS-232C	• Value output and control I/O (exclusive use with PLC link using an RS-232C port) • Supports baud rates up to 230,400 bps	
	PLC link	• Value output using Ethernet port or RS-232C port, and control I/O (Exclusive use with EtherNet/IP® and PROFINET. When using an RS-232C port, exclusive use with RS-232C no-procedure communication)	
	Ethernet	• Value output and control I/O • In addition to the above functions, can upload/download inspection settings, perform various simulations, send/receive various data including profile and image data, and be used with remote connection programs via KEYENCE PC application software • Supports FTP client, FTP server, and SFTP client functions • Supports VNC server functions (for non-PC clients, only displaying the monitor screen is supported) • Supports BOOTP functions • 1000BASE-T/100BASE-TX/10BASE-T • Supports jumbo frames (when connected to any of CB-NEC20E/NEP20E/NPN20E)	
	USB	• Can output values (3D mode only), upload/download inspection settings, perform various simulations, send/receive various data including profile and image data, and be used with remote connection programs via KEYENCE PC application software • Dedicated USB 2.0	
	EtherNet/IP®	• Can input/output numerical values and perform control I/O using the Ethernet port or the optional EtherNet/IP® unit CB-NEP20E (Cannot be used with PLC Link, PROFINET, and 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.CT15 (Ethernet port)/CT17 (CB-NEP20E) conformance test	
	PROFINET	• Can input/output numerical values and perform control I/O using the Ethernet port or the optional PROFINET unit CB-NPN20E (Cannot be used with PLC Link, EtherNet/IP®, and EtherCAT®) • Supports cyclic communication (max. 1408 bytes) (Ethernet port) / 1252 bytes (CB-NPN20E) • Supports acyclic communication (recorded data) • Complies with Conformance Class A (Ethernet port) / C (CB-NPN20E)	
	EtherCAT®	• Can output numerical values and perform control I/O by connecting the optional EtherCAT® unit CB-NEC20E (Cannot be used with PLC link, EtherNet/IP®, and 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 V2.2.10 and V2.2.1.0 conformance test	
	Mouse	Various menus can be controlled via the dedicated mouse (included with the controller)	
	SNTP	Automatic correction of date and time for this unit is possible by connecting to an SNTP server	
	USB HDD	By connecting an HDD (max. 2 TB) to the dedicated USB port (supports USB 3.0, bus-powered, rated output: 900 mA), profile, image and other data can be output	
	Monitor output	Analog RGB output, XGA 1024 × 768 (24-bit color, 60 Hz)	
Encoder input		1 port: combination RS-422 line-driver output (with 5 V output: maximum 150 mA) open collector output (compatible with 5 V, 12 V, 24 V)	
Response frequency	RS-422	Single phase / Z phase: 1.6 MHz, 2 phase / 1×: 1.6 MHz, 2 phase / 2×: 3.2 MHz, 2 phase / 4×: 6.4 MHz	
	Open collector (OC)	Single phase / Z phase: 100 kHz, 2 phase / 1×: 100 kHz, 2 phase / 2×: 200 kHz, 2 phase / 4×: 400 kHz	
Laser ON input		Non-voltage input (Shorted with short pin when shipped from factory)	
Cooling fan		Provided	
Minimum display unit		0.1 µm 0.000004", 0.01°, 0.00001 mm² 0.00000002 in²	0.1 µm 0.000004", 0.001°, 0.0001 mm² 0.0000002 in², 0.00001 mm³ 0.000000001 in³
Language		Switchable between English, Japanese, Simplified Chinese, Traditional Chinese, Korean, German, French, Italian, Thai, Czech, Hungarian, and Polish	
Ratings	Power voltage	24 V DC ±10%	
	Maximum current consumption	3.3 A	
Environmental resistance	Operating ambient temperature	0 to +45°C 32 to +113°F (DIN rail mounting) / 0 to +40°C 32 to +104°F (base surface mounting)	
	Operating ambient humidity	85% RH or less (no condensation)	
Weight		Approx. 2500 g 5.51 lb	

*1 For LJ-X8080 and LJ-X8200 connection, when binning (Z) is ON, or when the measurement range (Z) is set to 1/2. LJ-X8900 when the measurement range (Z) is set to 1/2.
*2 When the measurement range is narrowed in accordance with the binning settings. *3 When the measurement range is set to minimum, binning is ON, and parallel imaging is ON. All other settings are default values.
*4 When binning and parallel imaging are both ON. All other settings are default values. *5 Positive common connection is supported for NPN input devices, and negative common connection for PNP input devices.
*6 3D mode cannot be used with the LJ-X8000E.

Model		LJ-X8000A
Head input		1 unit, compatible with LJ-X8000 Series heads and LJ-V7000 Series heads
Sampling cycle (trigger interval)		When connecting the LJ-X8000 Series: maximum speed of 16 kHz (63 µs)[*1] When connecting the LJ-V7000 Series: maximum speed of 64 kHz (16 µs)[*2] (Luminance output types for model designations ending with B have a maximum speed of 8 kHz (125 µs))[*3]
Interface	Control input	Compatible with batch measurement start (MEASURE_START) and batch measurement stop (MEASURE_STOP)
	Control output	Compatible with trigger ready (READY) and system error (ERROR), Photo MOSFET[*4]
	Synchronized I/O	For multiple controller trigger synchronization[*5]
	Ethernet[*6]	Profile output, settings, control, 1000BASE-T/100BASE-TX
Encoder input		1 port: combination RS-422 line-driver output (with 5 V output: maximum 150 mA) open collector output (compatible with 5 V, 24 V)
Response frequency	RS-422	Single phase / Z phase: 1.6 MHz, 2 phase / 1×: 1.6 MHz, 2 phase / 2×: 3.2 MHz, 2 phase / 4×: 6.4 MHz
	Open collector (OC)	Single phase / Z phase: 100 kHz, 2 phase / 1×: 100 kHz, 2 phase / 2×: 200 kHz, 2 phase / 4×: 400 kHz
Laser ON input		Non-voltage input (Shorted with short pin when shipped from factory)
Ratings	Power voltage	24 V DC ±10%
	Maximum current consumption	1.3 A
Environmental resistance	Operating ambient temperature	0 to 45°C 32 to 113°F (DIN rail mounting) / 0 to 40°C 32 to 104°F (Horizontal)
	Operating ambient humidity	85% RH or less (no condensation)
Weight		Approx. 700 g 24.71 oz

*1 When the measurement range is narrowed in accordance with the binning settings. *2 When the measurement range is set to minimum, binning is ON, and parallel imaging is ON. All other settings are default values.
*3 When binning and parallel imaging are both ON. All other settings are default values. *4 Positive common connection is supported for NPN input devices, and negative common connection for PNP input devices.
*5 Exclusively for synchronized I/O between controllers (LJ-X8000A).
*6 The PC application (LJ-H2X) includes communication libraries (DLL) and a sample program. Types of communication libraries (DLL): Profile output, changing various settings, laser ON/OFF control, trigger input, etc.

Controller

Model		XG-X2902LJ
Camera input[*1]		When connected to LJ-X/LJ-V input unit CA-E200LJ LJ-X/LJ-V Series head of the same model × 2 per CA-E200LJ, max. of 4 cameras can be connected across 2 units
	Trigger input	Simultaneous/individual capture[*2] with up to four heads can be selected (up to two heads for simultaneous capture when one CA-E200LJ Series unit is connected)
Supported cameras/ pixel count	LJ-V Series head[*3]	LJ-V7020/7020K/7060/7060K/7080/7200/7300 512 (H) × 16384 (L), Approx. 8.39 megapixels 1024 (H) × 8192 (L), Approx. 8.39 megapixels 2048 (H) × 4096 (L), Approx. 8.39 megapixels
	LJ-X Series head	LJ-X8020/8060/8080/8200/8400/8900 3200 (H) × 16000 (L), 51.20 megapixels 6400 (H) × 8000 (L), 51.20 megapixels
Main image processor		DSP (high-speed type)
No. of registration settings		Up to 1000 settings (depending on SD card capacity and setting contents) for SD card 1 and SD card 2 individually, external switching is possible
Screen capacity		Up to 1000 screens for each setting on each camera (depending on SD card capacity), Image compression functionality, supports image registration and partial image registration via a position-corrected image, externally switchable by referring to variables
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), CA-SD16G (16 GB)
Interface	Control input (assignable)	• 20 points (includes 4 high-speed input terminals which can be assigned to trigger input) • Rated input: 26.4 V max., 1.2 mA min. (High-speed input terminals: 2.2 mA min.)
	Control output (assignable)	• 28 points (includes 4 high-speed output terminals which can be assigned to FLASH output linked to external trigger) • Photo MOSFET[*4] 50 mA max. (30 V max.)
	Encoder input	• When connected to a CA-E200LJ, 1 system per unit, with up to 2 systems and 2 units • RS-422 line-driver output (with 5 V output: max 150 mA), also used for open collector output
	Monitor output	• Analog RGB output, XGA (1024 × 768, 24-bit color)
	Unit indicators	Power supply / ERROR LED display
	RS-232C	• Value output and control I/O can be switched to a CA Series touch panel interface (when this is in use, PLC Link using the RS-232C port cannot be used) • Supports baud rates up to 230400 bps
	PLC link	• Can output numerical values and perform control I/O using the Ethernet or RS-232C ports (CC-Link, EtherNet/IP®, and PROFINET cannot be used with PLC-Link) • The following PLCs are supported via link unit [*5] KEYENCE: KV-8000/7000/5000/3000/1000/700 Series, KV Nano Series Mitsubishi Electric: MELSEC iQ-R/L/Q Series, MELSEC A Series (RS-232C only), MELSEC iQ-F Series, MELSEC FX Series (RS-232C only) OMRON: SYSMAC CJ2/CJ1/CS1/CP1 Series, SYSMAC C Series (RS-232C Only) YASKAWA Electric Corporation: MP2000 Series, MP900 Series (RS-232C only)
	Ethernet	• Can output numerical values and perform control I/O • In addition to the above functions, can upload/download inspection settings, perform various simulations, send/receive various data including image data, and be used with remote connection programs via KEYENCE PC application software • Supports FTP client, FTP server, and SFTP client functions • Supports VNC server functions (for non-PC clients, only monitor screen display is supported) • Supports BOOTP functions • 1000BASE-T/100BASE-TX/10BASE-T • Supports jumbo frames (when connected to any of CA-NEC20E/NEP20E/NPN20E)
	USB	• Can output values, perform control I/O, upload/download inspection settings, perform various simulations, send/receive various data, including image data, and can be used with remote desktop connection programs via KEYENCE PC application software • Dedicated USB2.0
	CC-Link	• Connecting the optional CC-Link unit CA-NCL20E enables value output and control I/O (Cannot be used with PLC Link, EtherNet/IP®, PROFINET, or EtherCAT®) • Supports Ver. 1.10 and Ver. 2.00 remote device stations
	EtherNet/IP®	• Value output and control I/O using Ethernet port or the optional EtherNet/IP® unit CA-NEP20E (Cannot be used with PLC Link, CC-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 (CA-NEP20E) • Complies with Version.CT15 (Ethernet port)/CT16 (CA-NEP20E) conformance test
	PROFINET	• Can output numerical values and perform control I/O using the Ethernet port or the optional PROFINET unit CA-NPN20E (Cannot be used with PLC Link, CC-Link, EtherNet/IP®, and EtherCAT®) • Supports cyclic communication (max. 1408 bytes (Ethernet port) / 1248 bytes (CA-NPN20E)) • Supports acyclic communication (recorded data) • Complies with Conformance Class A (Ethernet port) / C (CA-NPN20E)
	EtherCAT®	• Can output numerical values and perform control I/O by connecting the optional EtherCAT® unit CA-NEC20E (cannot be used with PLC link, CC-Link, EtherNet/IP®, or PROFINET) • Supports cyclic communication (process data object communications) (input: Max. 536 bytes/Output: Max. 532 bytes) • Supports acyclic communication (mailbox communications) • Supports CoE • Explicit device identification • Complies with Version 2.1.0.2 conformance test
	SNTP	Automatic correction of device date and time possible through connection to an SNTP server
	USB handheld controller	• The optional USB handheld controller (OP-87983) allows control of various menus • Supports the assignment of controls to console buttons
	Mouse	Various menus can be controlled using the optional dedicated mouse (OP-87506)
	Touch panel	• Settings can be controlled from the CA Series touch panel using the RS-232C port (when this is in use, no-procedure RS-232C communication and PLC Link using RS-232C cannot be used) • Supports a dedicated touch menu and control buttons
	USB HDD	Images and other data can be output by connecting a HDD (max. 2 TB) to the dedicated USB port (USB 3.0-compliant, bus-powered, rated output: 900 mA)
	VisionDataStorage	Images and other data can be output by connecting the optional VisionDataStorage to the Ethernet port or to a USB HDD port via a dedicated USB cable (OP-88263: optional)
Language		Switch between English/Japanese/Chinese (Simp.)/Chinese (Trad.)/German (set the default language during initial start-up)
Cooling fan		Equipped as standard with the CA-F100 fan unit
Ratings	Power voltage	24 V DC ±10%
	Maximum current consumption	5.3 A
Environmental resistance	Operating ambient temperature	0 to +45°C 32 to +113°F (DIN rail mount) / 0 to +40°C 32 to 104°F (base surface mount)
	Operating ambient humidity	85% RH or less (no condensation)
Weight		Approx. 1750 g 3.86 lb

*1 A minimum of 1 camera input unit (optional) is required since the main controller does not support camera input. *2 LJ-X/LJ-V Series heads connected to the same CA-E200LJ Series unit are always set to simultaneous capture. Two CA-E200LJ Series units are required for individual capture. *3 LJ-V Series heads with a suffix of B are brightness output types. *4 The positive common connection compatible with NPN input devices and negative common connection compatible with PNP input devices can be used. *5 Models that are equipped with an Ethernet port on the CPU unit support direct connection with the Ethernet port.

Model		CA-E200LJ
Controller		XG-X2902LJ
Head input		2 points[*1]
Supported heads		LJ-X8020/LJ-X8060/LJ-X8080/LJ-X8200/LJ-X8400/LJ-X8900/LJ-V7020/LJ-V7020B/LJ-V7020K/LJ-V7020KB/LJ-V7060/LJ-V7060B/LJ-V7060K/LJ-V7060KB/ LJ-V7080/LJ-V7080B/LJ-V7200/LJ-V7200B/LJV7300/LJ-V7300B
Programmable encoder input		1 system: RS-422 line-driver output (with 5 V output: max 150 mA) also used for open collector output (compatible with 5 V/12 V/24 V)
Response frequency	RS-422	Single phase / Z phase: 1.6 MHz, 2 phase / 1×: 1.6 MHz, 2 phase / 2×: 3.2 MHz, 2 phase / 4×: 6.4 MHz
	Open collector (OC)	Single phase / Z phase: 100 kHz, 2 phase / 1×: 100 kHz, 2 phase / 2×: 200 kHz, 2 phase / 4×: 400 kHz
Laser remote interlock input		Non-voltage input (at factory settings. shorted with pin)
Power supply		Supplied from controller
Environmental resistance	Operating ambient temperature	0 to +45°C 32 to 113°F (DIN rail mount) / 0 to +40°C 32 to 104°F (base surface mount)
	Operating ambient humidity	85% RH or less (no condensation)
Weight		Approx. 830 g 29.30 oz

*1 Connecting 2 units is only supported if they are both the same model of head.

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

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" × 0.0042"	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 to +113°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

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

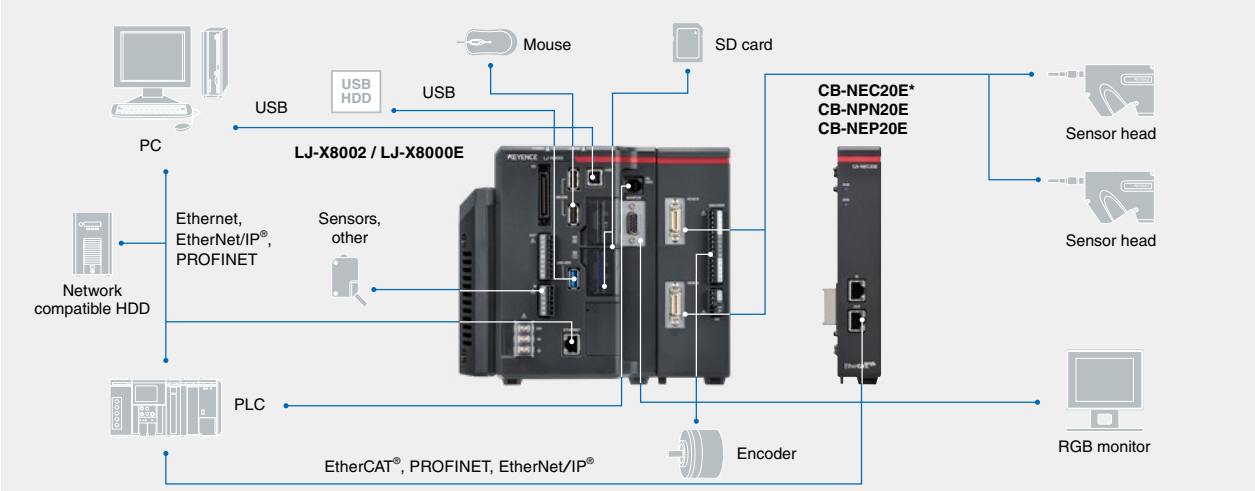
LJ-X Series Simulation-Software

Item	Required Environment
Supported OS	Microsoft Windows11® Pro, Windows® 10 Home, Pro, Enterprise (supports 64-bit version only) Microsoft Windows® 7 Home Premium, Professional, Ultimate, Enterprise (supports 64-bit version only) • The OS supports the following languages: English, Japanese, Chinese (Simplified/Traditional), Korean, German, French, Italian, Thai, Czech, Hungarian, and Polish. • 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 and profile data)
Display resolution	Minimum: 1024 × 768 pixels or larger, Recommended: 1280 × 1024 pixels or larger

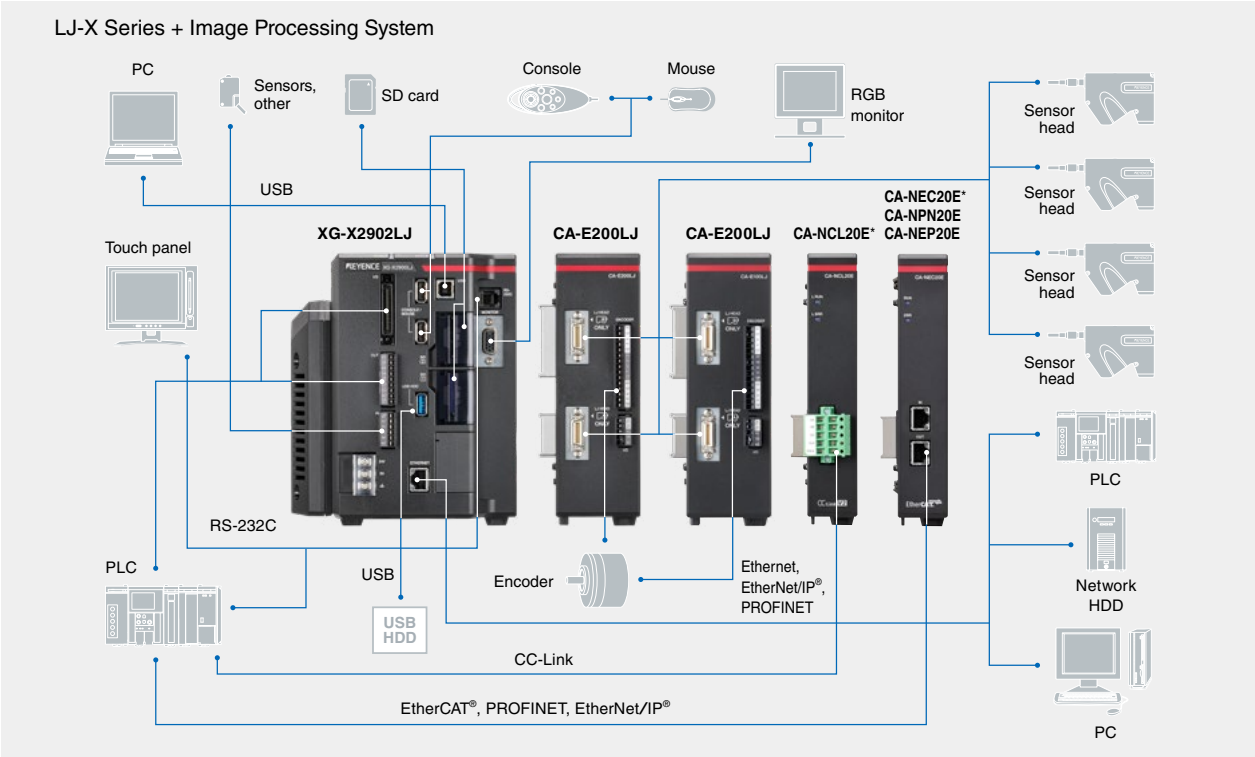
LJ-X Series Terminal-Software

Item	Required Environment
Supported OS	Microsoft Windows11® Pro, Windows® 10 Home, Pro, Enterprise Microsoft Windows® 7 Home Premium, Professional, Ultimate, Enterprise • The OS supports the following languages: English, Japanese, Chinese (Simplified/Traditional), Korean, German, French, Italian, Thai, Czech, Hungarian, and Polish. • 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 and profile data • Display resolution: 1024 × 768 pixels or larger (Recommended: 1280 × 1024 pixels or larger)

System configuration

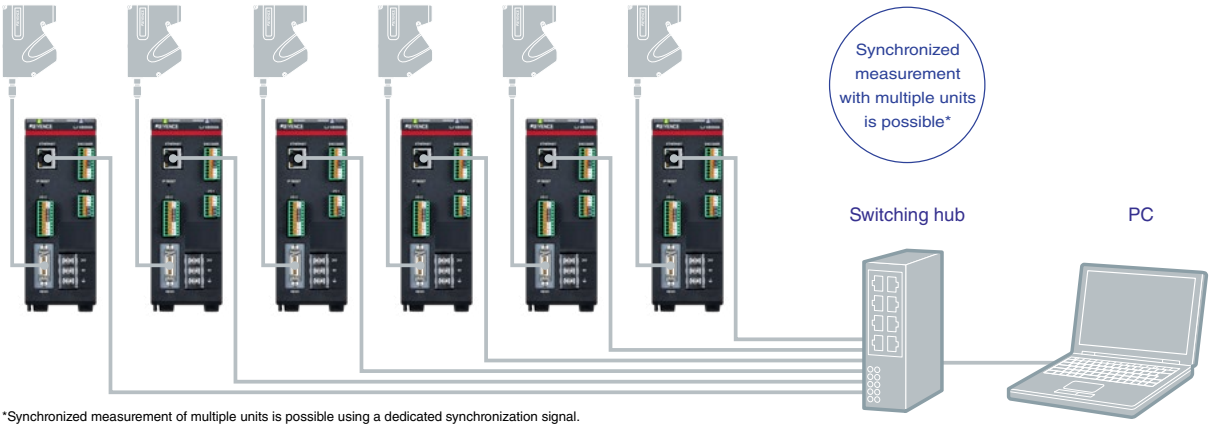


*Only one communication expansion unit (CB-NEC20E/NEP20E/NPN20E) can be connected.



*Only one communication expansion unit (CA-NCL20E/NEC20E/NEP20E/NPN20E) can be connected.

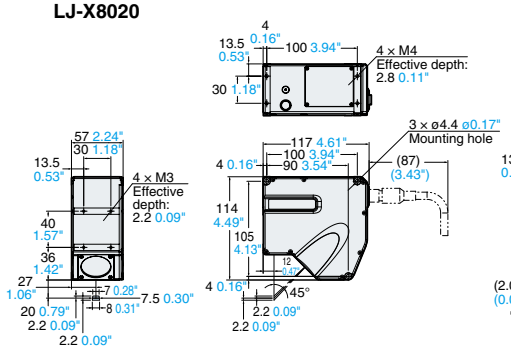
Synchronized measurement of multiple units (LJ-X8000A)



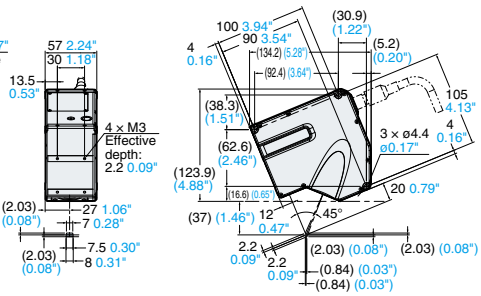
*Synchronized measurement of multiple units is possible using a dedicated synchronization signal.

Sensor head LJ-X Series

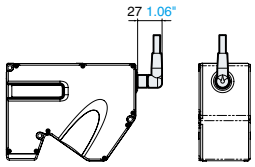
LJ-X8020



LJ-X8020 in specular reflection configuration

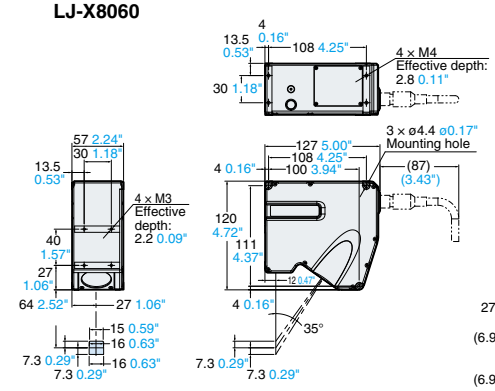


With CB-B05LU (L-shaped cable) connected

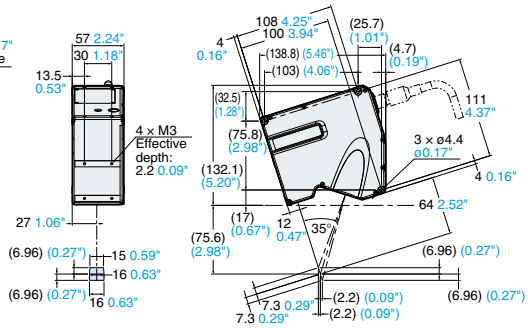


*The value inside parentheses is a reference value calculated by tilting the dimensions during installation by 22.5 degrees.

LJ-X8060

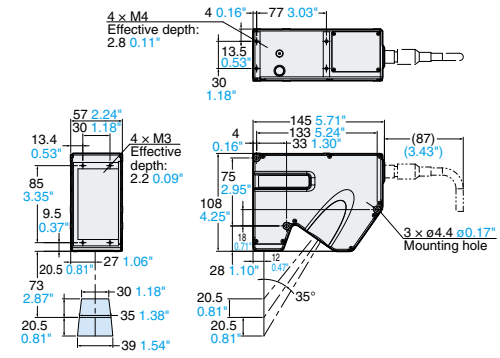


LJ-X8060 in specular reflection configuration

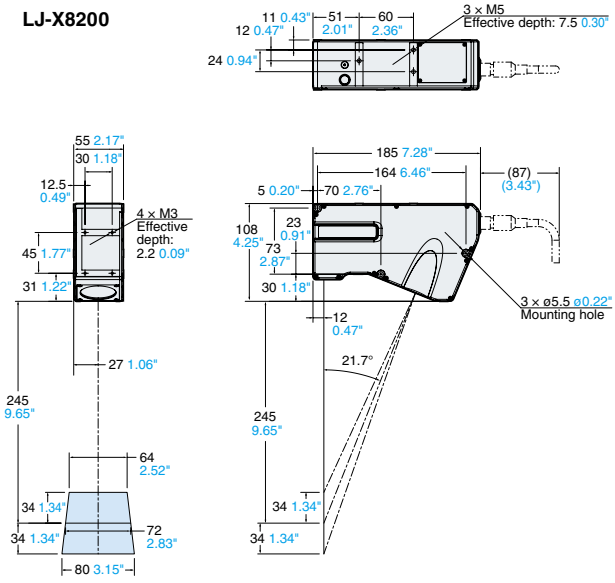


*The value inside parentheses is a reference value calculated by tilting the dimensions during installation by 17.5 degrees.

LJ-X8080



LJ-X8200



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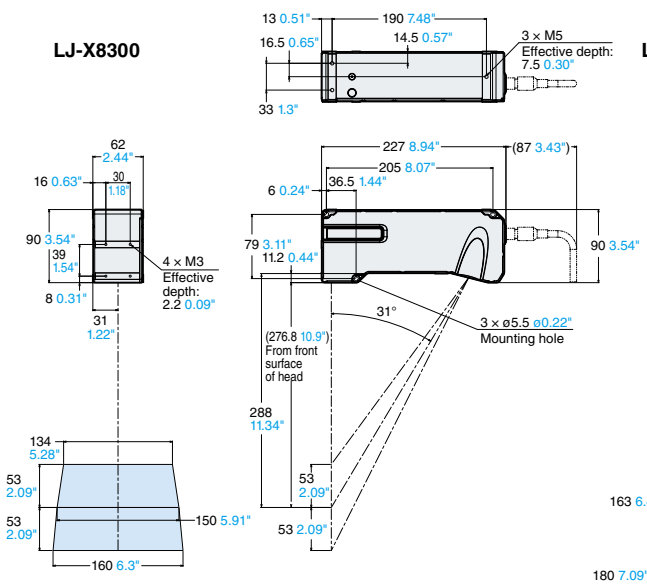
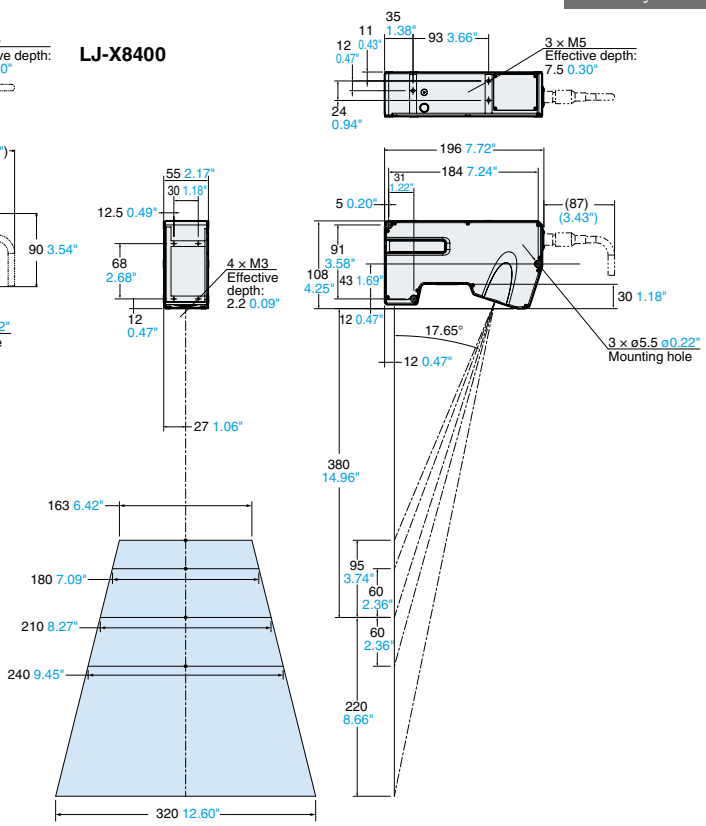
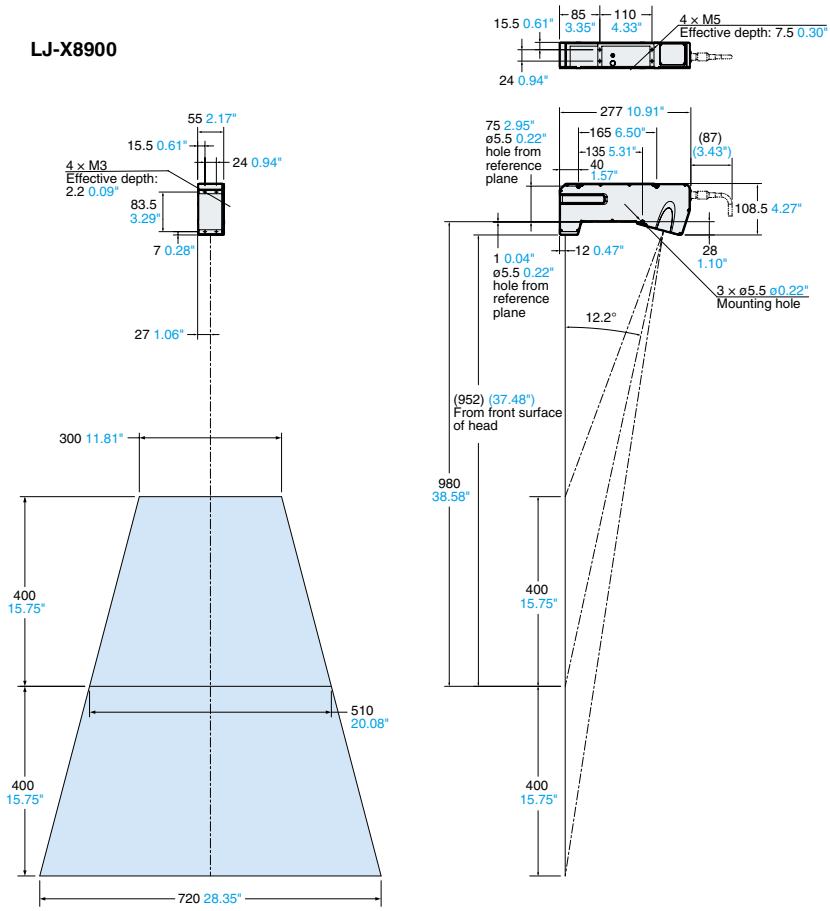
LJ-X8300



LJ-X8400

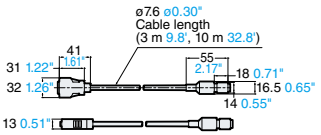


LJ-X8900



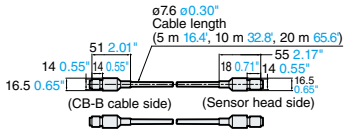
Head-to-controller cable

CB-B3/CB-B10



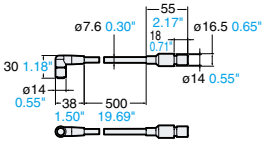
Head connection extension cable

CB-B5E/CB-B10E/CB-B20E



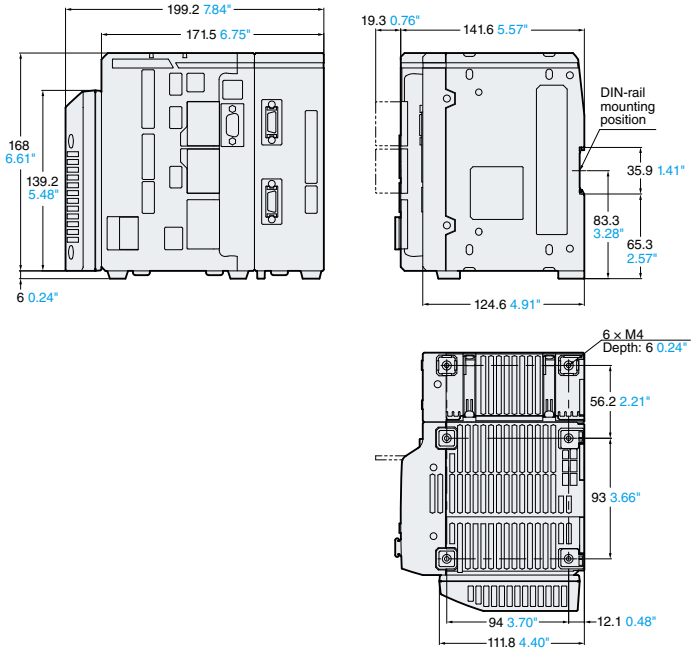
Head connection extension cable (L-shaped connector)

CB-B05LU/CB-B05LL/CB-B05LR

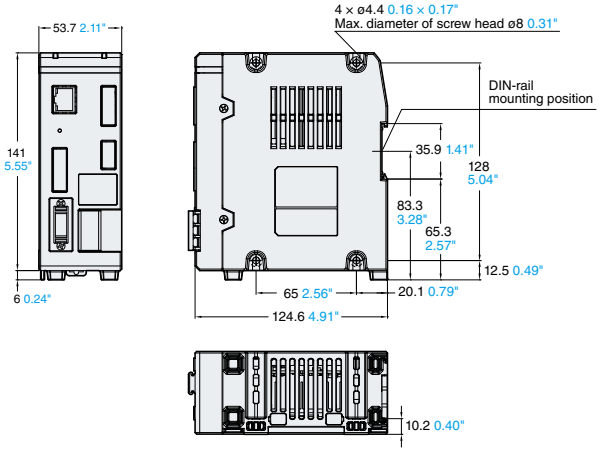


Controller

LJ-X8002/LJ-X8000E

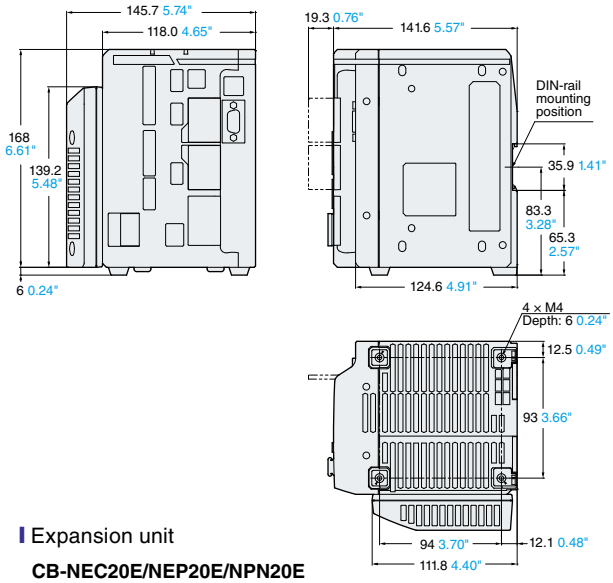


LJ-X8000A

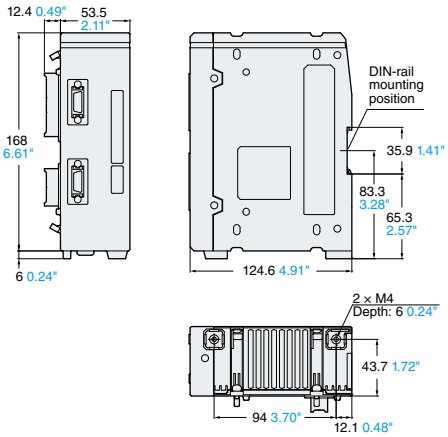


Input unit

XG-X2902LJ

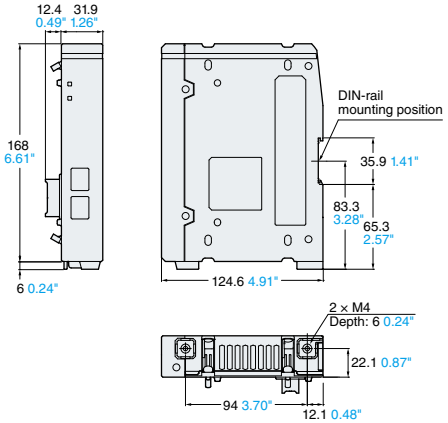


CA-E200LJ



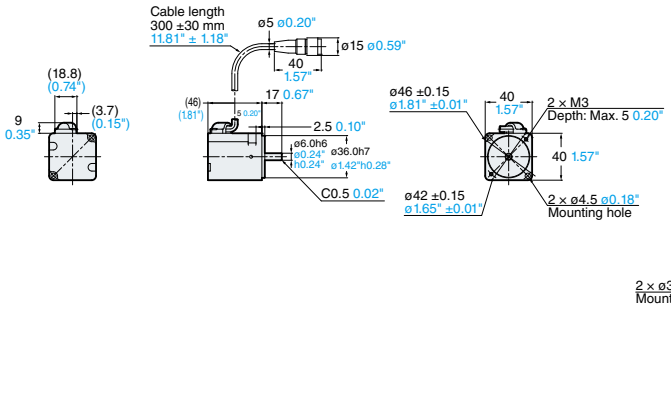
Expansion unit

CB-NEC20E/NEP20E/NPN20E
CA-NEC20E/NEP20E/NPN20E



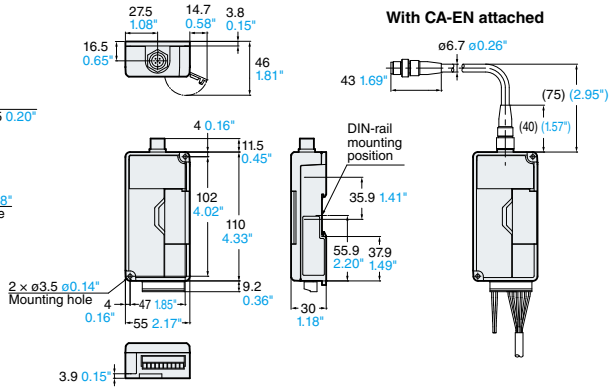
Dedicated encoder

CA-EN100H



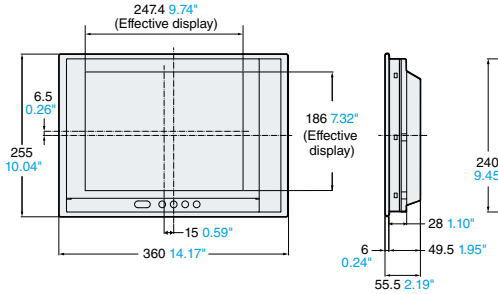
Encoder relay unit

CA-EN100U

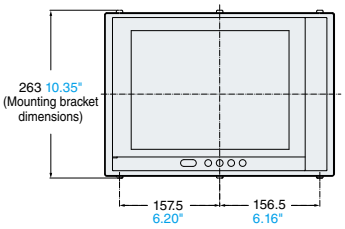


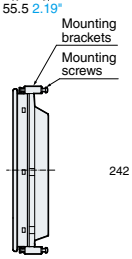
12" LCD color monitor

CA-MP120

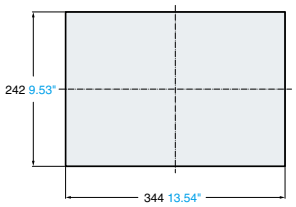


Panel mounting



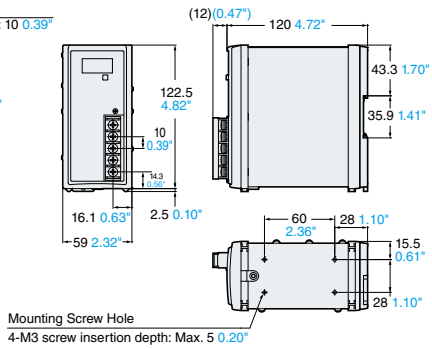


Panel cut dimensions



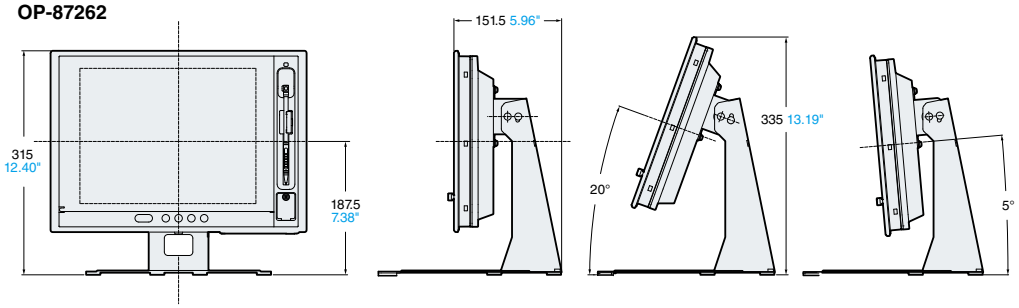
24 V DC power supply

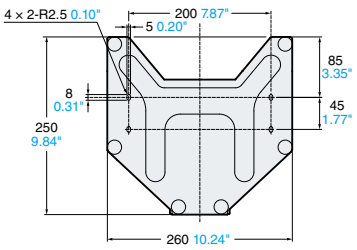
CA-U4

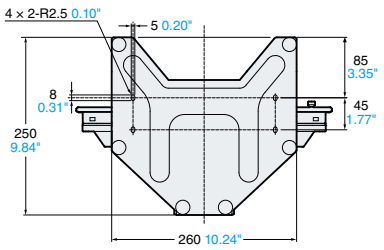


Dedicated monitor stand

OP-87262







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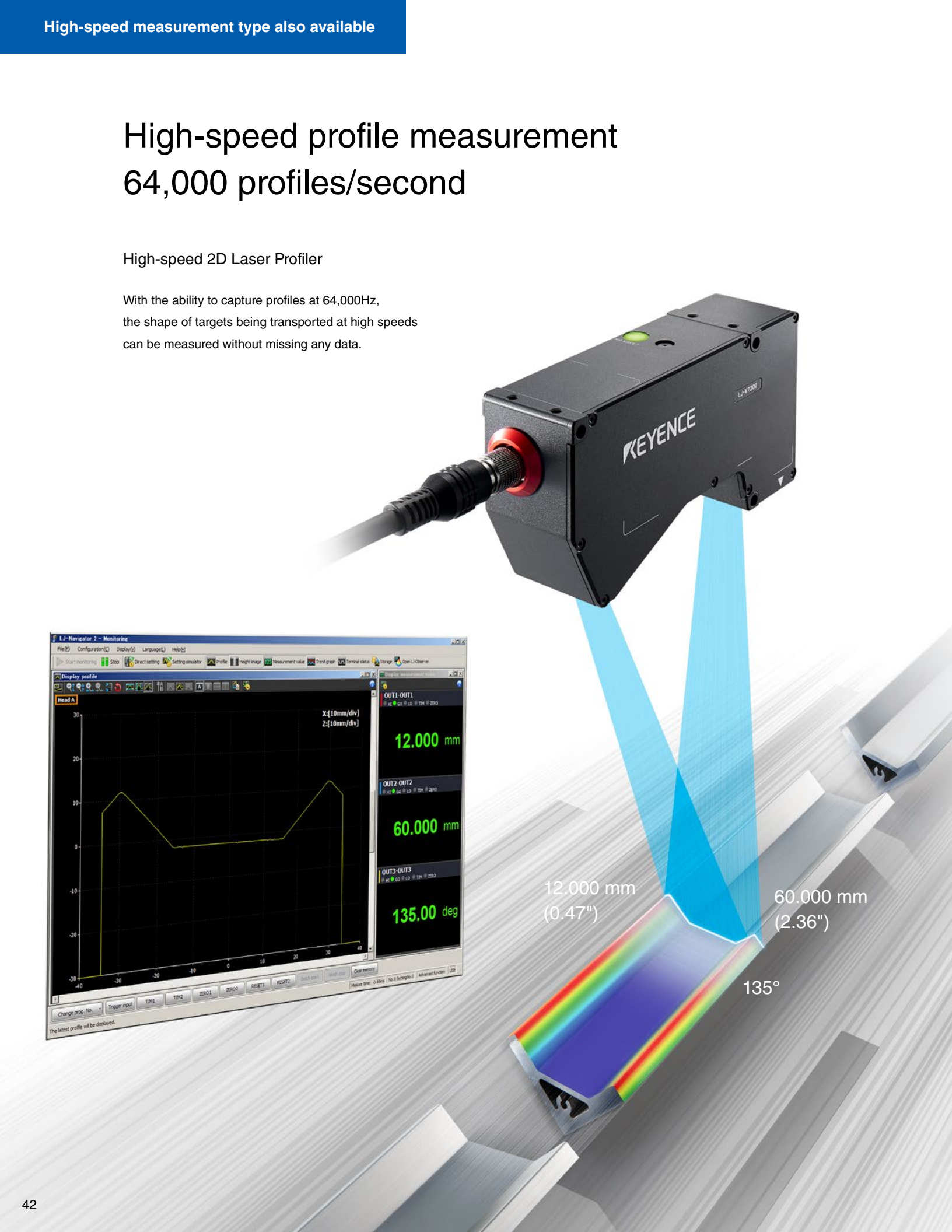
High-speed profile measurement 64,000 profiles/second

High-speed 2D Laser Profiler

With the ability to capture profiles at 64,000Hz,
the shape of targets being transported at high speeds
can be measured without missing any data.



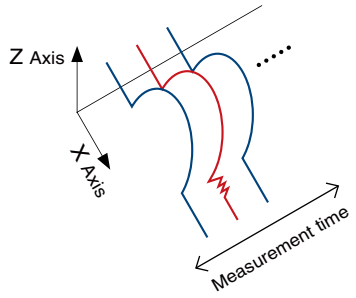
High-speed sampling allows detailed appearance data to be obtained

GP64-Processor

The sensor is equipped with a custom IC that enables a range of ultra-high-speed pipeline processing, from capture data reading to sub-pixel processing, linearization processing, and data output. Perform measurements of targets moving at high speed.

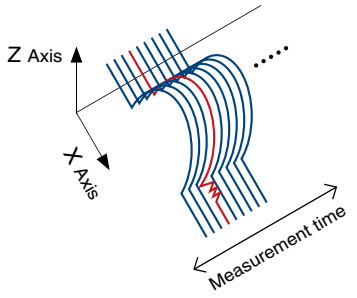
Previous models

If the sampling speed is insufficient, minute appearance changes will be missed.



LJ-V Series

Ultra-high-speed sampling ensures that even minute appearance changes are detected.



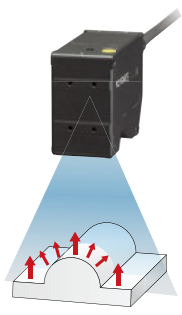
High-speed measurement supports shorter takt times

HSE^3-CMOS

The sensor is equipped with an HSE^3-CMOS, which has both high sensitivity and wide dynamic range. This enables stable measurements, even at high speeds.

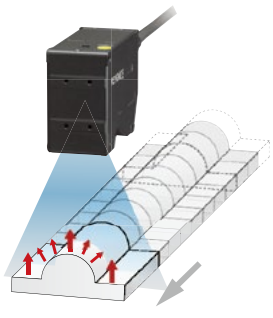
Previous models

There were limits to target transportation speed.



LJ-V Series

Takt time is shortened since targets can be transported at high speed.



Sensor head

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	20 ± 2.6 mm 0.79" ± 0.1"	Z-axis	24.2 ± 2.3 mm 0.95" ± 0.09"	Z-axis	60 ± 8 mm 2.36" ± 0.31"	Z-axis	54.6 ± 7.6 mm 2.15" ± 0.30"
	X-axis	7 mm 0.28"	X-axis	7 mm 0.28"	X-axis	15 mm 0.59"	X-axis	14 mm 0.55"
Repeatability	Z-axis	0.2 µm 0.000008"	Z-axis	0.2 µm 0.000008"	Z-axis	0.4 µm 0.000016"	Z-axis	0.4 µm 0.000016"
	X-axis	2.5 µm 0.000099"	X-axis	2.5 µm 0.000099"	X-axis	5 µm 0.000197"	X-axis	5 µm 0.000197"

• Models with a "B" suffix are brightness output types. These cannot be connected to the LJ-V7000 or LJ-V7000P. Additionally, the capture modes "Multi-light emitter (composition)" and "Multi-light emitter (light intensity optimized)" cannot be used.

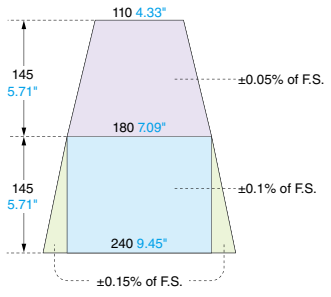
Middle range	Long range	Ultra-long range
LJ-V7080/LJ-V7080B	**LJ-V7200/LJ-V7200B**	**LJ-V7300/LJ-V7300B**

Z-axis	80 ± 23 mm 3.15" ± 0.91"	Z-axis	200 ± 48 mm 7.87" ± 1.89"	Z-axis	300 ± 145 mm 11.81" ± 5.71"
X-axis	32 mm 1.26"	X-axis	62 mm 2.44"	X-axis	180 mm 7.09"
Z-axis	0.5 µm 0.000020"	Z-axis	1 µm 0.000040"	Z-axis	5 µm 0.000197"
X-axis	10 µm 0.000394"	X-axis	20 µm 0.000788"	X-axis	60 µm 0.002363"

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 to +113°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

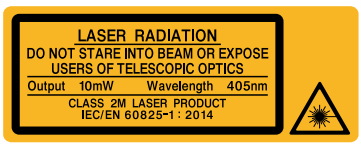
*1 Double polarization function cannot be used.
*2 Classification performed based on IEC60825-1 in accordance with FDA (CDRH) Laser Notice No. 50.
*3 Do not view the beam directly using optical instruments (such as eye loupes, magnifiers, microscopes, telescopes, or binoculars). Observing the laser output 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).



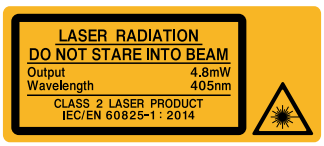
• Model designations ending with B are luminance output types. The multi emission (optimizing light) and multi emission (synthesis) imaging modes are not available.

LASER WARNING/EXPLANATORY LABEL

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



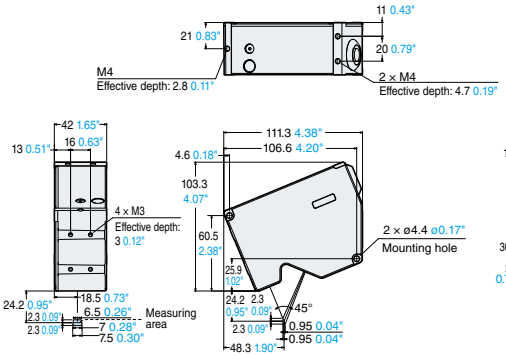
LJ-V7060K/LJ-V7060KB, LJ-V7080/LJ-V7080B, LJ-V7200/LJ-V7200B, LJ-V7300/LJ-V7300B



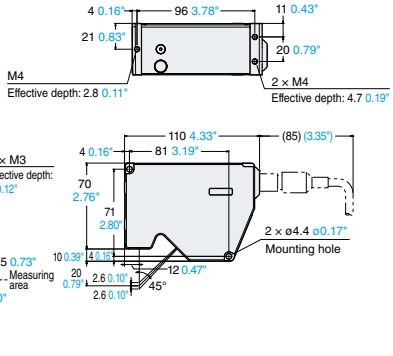
Sensor head LJ-V Series

CAD DATA DOWNLOAD
www.keyence.com/CADG

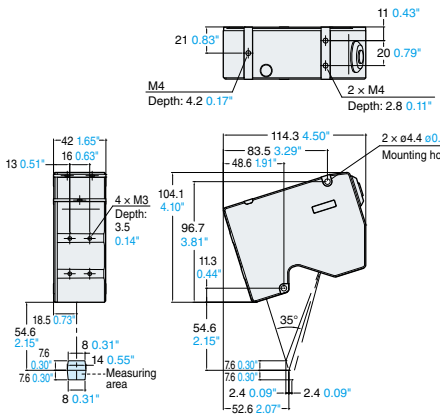
LJ-V7020K/LJ-V7020KB



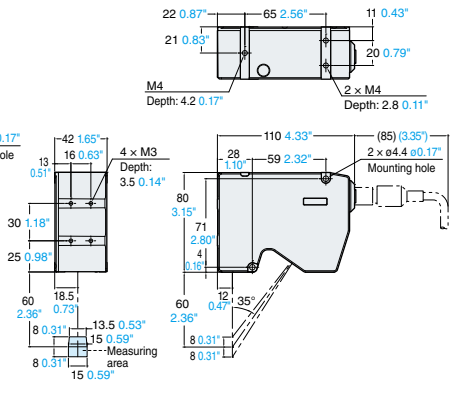
LJ-V7020/LJ-V7020B



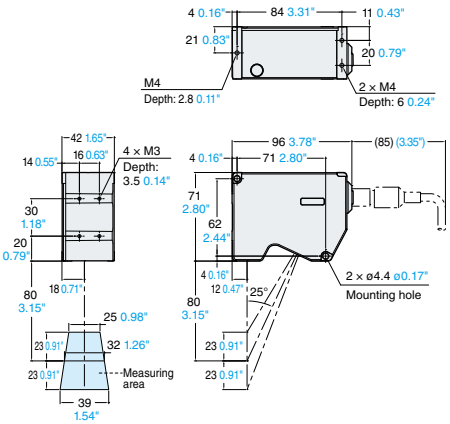
LJ-V7060K/LJ-V7060KB



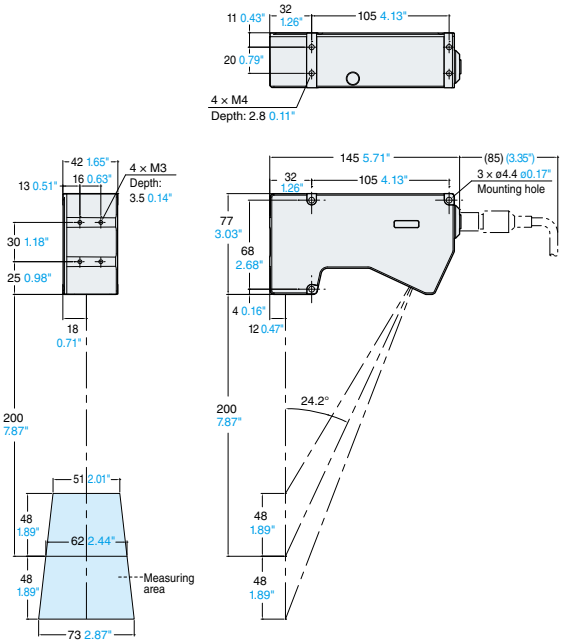
LJ-V7060/LJ-V7060B



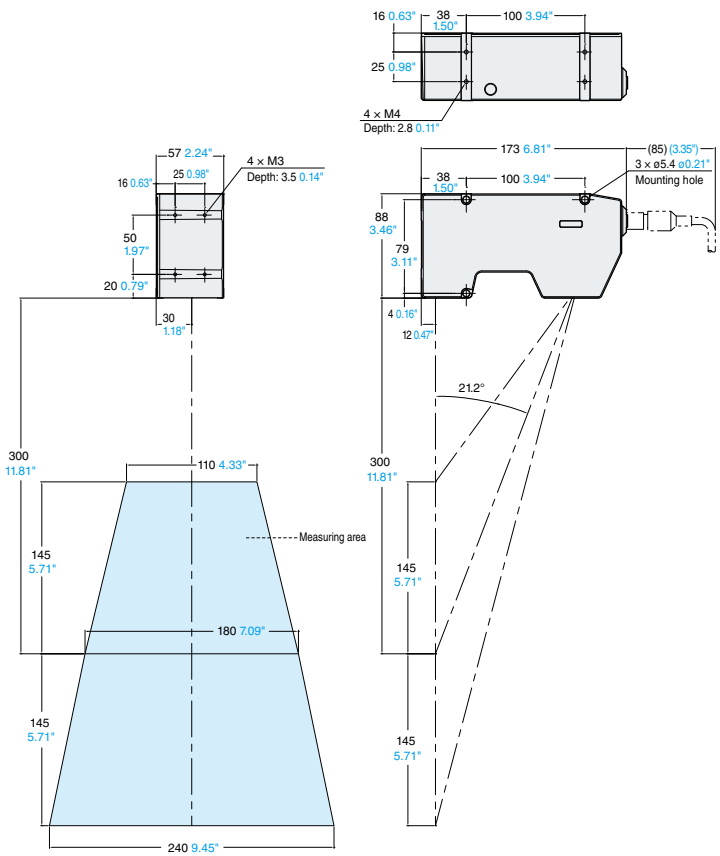
LJ-V7080/LJ-V7080B



LJ-V7200/LJ-V7200B



LJ-V7300/LJ-V7300B



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