NEW High-speed 2D/3D Laser Scanner
LJ-V7000 Series

THE WORLD’S FASTEST AT 64000 PROFILES/SEC.
SPEED THAT MAKES IN PROCESS 3D MEASUREMENT A REALITY!

LJ-V7000 Series
2D/3D LASER SCANNER EVOLVED TO ACHIEVE THE FASTEST SPEED IN THE WORLD

Improving quality, catching defects, and increasing yield. Every day our customers face the increasingly difficult push to raise quality control standards and boost yield despite the growing complexity of parts and manufacturing processes.

KEYENCE is proud to present our highest level of quality management designed to perform detailed measurement of any product and any profile in one simple package.

The High-speed 2D/3D Laser Scanner LJ-V7000 Series makes these measurements a reality.

High-speed 2D/3D Laser Scanner
LJ-V7000 Series
According to KEYENCE’s investigation (as of June 2013)

The LJ-V Series has realised the fastest sampling speed in the world for 2D laser measuring instruments.* This makes it possible to measure, in high definition, the profiles of products, without missing a single one, that are fed past the measuring instrument at extremely high speeds. For example, the LJ-V Series can measure targets moving at 6.4 m/s with a 0.1 mm pitch. The LJ-V Series doesn’t overlook even a single abnormal or defective part.

* According to KEYENCE’s investigation (as of June 2013)

Normally, detection stability is inversely proportional to speed. However, our newly developed HSE3-CMOS wide dynamic range has provided the LJ-V Series with improvements in both speed and detection stability. Profiles are accurately measured even in cases where black surfaces, inclines with low reflectivity and metallic surfaces with high reflectivity are mixed together under the same optical axis.

From small electronic components such as IC pins to automotive components such as bearings and engine blocks to building materials such as lumber and plaster, the LJ-V Series can perform a wide variety of measurements for any product in any industry. What’s more, connecting the LJ-V Series to an image processing system makes it possible to process 3D measured data.
Terminal height measurement
By measuring the height of the terminals used during insert moulding, it is possible to detect terminal floating and position offsets. The ultra-high-accuracy type sensor head achieves extremely accurate measurement with repeatability of 0.2 μm.

Building material board positioning
The slope and position of building material is measured when the building material is transported during the cutting process, and the measured results are fed back to the cutting machine. This makes high-speed and accurate control possible when performing work with equipment and robots.

Glass sealant inspection
The amount of sealant applied on glass is measured. A sensor head optimised for transparent objects allows inspection even on a glass substrate. It is also possible to measure the volume.
**WARPAGE AND FLATNESS**

**Cleaning blade warpage**
The profiles of the blades are continuously measured during blade transport, and any blade warpage is detected. Because it is possible to measure at speeds of up to 64 kHz, you can perform high-precision measurement at high speed.

**PROFILE MEASUREMENT**

**Welding defects like blow holes**
By measuring the profile of the welding mark left during welding processes, the LJ-V Series detects profile defects such as blow holes. Because the light source has been changed from a red to a blue laser, detections can even be performed on discoloured metal immediately after welding.

**SCRATCHES AND DENTS**

**Flaw detection on extrusion moulded products**
The LJ-V Series performs pass/fail measurements of the profiles of moulded products that are extruded at high speeds. A wide variety of targets are supported such as rubber, metal, ceramics, concrete, composites, and foodstuffs.
The LJ-V7000 Series is equipped with the newly developed HSE 3-CMOS. In addition to improved speed, the dynamic range has been further improved over the established and conventional E 3-CMOS. Even with the extremely short exposure time of 64 kHz (15.6 μs) it has achieved sensitivity that allows it to reliably measure a range of surfaces from black (small amount of reflection) surfaces to those with lustre (large amount of reflection) as well a wide dynamic range.

**HSE 3-CMOS**
- **HS** = High Speed, **E 3** = Enhanced Eye Emulation

**MEASUREMENT PRINCIPLE**
The laser light is projected in a horizontal line by the cylindrical lens and diffusely reflects on the target object. This reflected light is formed on the HSE 3-CMOS and by detecting changes in position and shape, displacement and shapes are measured.

**NEWLY DEVELOPED/WORLD’S GREATEST**

**MAKING POSSIBLE STABLE MEASUREMENTS OF ANY TARGET EVEN AT ULTRA HIGH SPEED**

The LJ-V7000 Series is equipped with the newly developed HSE 3-CMOS. In addition to improved speed, the dynamic range has been further improved over the established and conventional E 3-CMOS. Even with the extremely short exposure time of 64 kHz (15.6 μs) it has achieved sensitivity that allows it to reliably measure a range of surfaces from black (small amount of reflection) surfaces to those with lustre (large amount of reflection) as well a wide dynamic range.

**STOPPED TARGET**
- Measurement is impossible due to insufficient light intensity.
- All ranges could be measured.

**MOVING TARGET**
- Because there is even less light intensity, the measurement could not be performed at all.
- Even though the exposure time is short, all ranges could be measured without issue.
**NEWLY DEVELOPED**

## ACHIEVING ULTRA HIGH-SPEED MEASUREMENTS AT 64 KHZ

### GP64-Processor

With the conventional method, it takes time to perform the three processes of product positioning, stopping, and transportation and ejection in order to perform an accurate inspection.

### MERITS PROVIDED BY ULTRA HIGH-SPEED SAMPLING

#### REDUCED INSPECTION CYCLE TIME!

<table>
<thead>
<tr>
<th>Conventional model</th>
<th>LJ-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning time</td>
<td>NO POSITIONING TIME AND STOPPED TIME ARE NEEDED!</td>
</tr>
<tr>
<td>Stopped time</td>
<td>Measurements are performed during target transportation.</td>
</tr>
<tr>
<td>Transportation time</td>
<td></td>
</tr>
<tr>
<td>Measurement time:</td>
<td></td>
</tr>
<tr>
<td>500 ms</td>
<td></td>
</tr>
<tr>
<td>Transportation time</td>
<td></td>
</tr>
<tr>
<td>Measurement time:</td>
<td></td>
</tr>
<tr>
<td>2 ms</td>
<td></td>
</tr>
</tbody>
</table>

With the LJ-V Series, the measurement time is 240 times shorter than that of the conventional method, which makes it possible to finish inspections within the product transportation time, which leads to improved cycle time.

#### STABILISED MEASURED VALUES!

<table>
<thead>
<tr>
<th>Conventional model</th>
<th>LJ-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z axis</td>
<td>Measurement time</td>
</tr>
<tr>
<td>X axis</td>
<td>Measurement time</td>
</tr>
<tr>
<td>Measurement time</td>
<td>Measurement time</td>
</tr>
</tbody>
</table>

RESULT OF AVERAGING 3 PROFILES

With conventional models, measurement stability was limited due to insufficient sampling speeds necessary to hit the required cycle times.

RESULT OF AVERAGING 720 PROFILES

The LJ-V Series provides significantly higher profile stability by utilising ultra-high-sampling at as high as 240 times that of conventional models to allow for profile averaging as well as abnormal value elimination using median filters.

### DATA OUTPUT

| 64 kHz |

We have developed a new custom IC that can perform ultra-high-speed pipeline processing that in addition to reading CMOS image capture data and performing high-resolution subpixel processing, also performs high-precision linearisation and data output. This allows for the measurement of objects moving at high-speeds with room to spare.
OVERWHELMING CAPABILITIES
Blue laser optical system

The LJ-V7000 Series is the first 2D laser displacement sensor in the world to adopt a blue laser. A sharp line beam is formed on the light-receiving element by focusing a short wavelength 405 nm laser to its maximum limit with a 2D Ernostar lens. This generates a stabilised high-precision profile. Also, the received light density for the laser has been increased to successfully secure a greater level of received light intensity. This achieves ultra-stable and highly accurate measurement with all types of targets that are typically difficult to detect.

Double polarisation function

We have developed the world’s first double polarisation function, which distinguishes and cancels multiple reflection light that acts as an obstacle to measurement. Light is shined on the intersection between the X-polarisation and Y-polarisation to calculate differences in the amount of received light for each unit of image capture data. Multiple reflection light has the characteristic of generating differences in the amount of received light for X-polarisation and Y-polarisation, and this characteristic is used to cancel data for areas that have large differences. The power of this function is demonstrated in the measurement of metals with complex shapes and complicated areas.
74 types of measurement modes

With 16 types of measurement details and 11 types of measurement target specifications, this single device can handle a total of 74 types of measurements.

REPRESENTATIVE MEASUREMENT DETAILS

**HEIGHT**
- Peak
- Average
- Bottom

Measures the height within the specified range.

**WIDTH AND POSITION**
- Knee
- Width

Measures the width and positions under the specified conditions.

**HEIGHT DIFFERENCE**
- Measurement point
- Reference point

Measures the height difference from a reference point to a measurement point.

**CROSS SECTIONAL AREA**
- Cross sectional area

Measures the cross sectional area from a reference surface.

**ANGLE AND INTERSECTION**
- Angle
- Intersection position (X and Z coordinates)

Measures the angle between and the intersection point of a pair of detected straight lines.

**MASTER PROFILE COMPARISON**
- Master shape
- Measurement value

Makes a comparison with the registered master shape and then measures the area with the largest difference in height.

**DISTANCE (POINT - POINT)**
- Distance (X and Y)
- Peak
- Knee

Measures the distance between two points.

**RADIUS AND MIDPOINT**
- Measurement value

Measures the radius of a curved profile and the coordinates of the centre position of a specified point.
AN EMPHASIS ON
INLINE MEASUREMENT

IN-LINE POSITION ADJUSTMENT FUNCTION (X, Y, AND Z)

Corrects positional misalignment of the target, which is directly connected to errors in the measurement results. Even in cases where the target is moving at random or when it is difficult to perform positioning, it is possible to perform measurement without error.

θ → X adjustment (angle then x position)

If the position of the workpiece becomes misaligned...

Conventional model

LJ-V

The measurement area tracks the position and rotation misalignment of the target.

DOUBLE XZθ ADJUSTMENT FUNCTION

The LJ-V7000 Series is equipped with a new function that makes it possible to individually set various adjustments in 2 areas. This is effective when measuring gaps, angles, or height differences of two targets that move independently.

Conventional model

LJ-V

Because original adjustment is applied individually to measurement areas (1) and (2), measurement can be properly performed.

DUAL-HEAD ADJUSTMENT FUNCTION

By understanding the positional relationship of both heads, it is possible to match the θ adjustment centre of rotation for both heads. Even when measuring targets with variation or incline changes, it is possible to measure the correct points.

Ex. Minimum thickness measurement

Conventional model

LJ-V

The correct thickness can be measured.

The θ adjustment centre of rotation for both heads match, so the measurement area is not misaligned.
A NEW DIMENSION FOR PROFILE MEASUREMENT AND DETECTION

2D MEASURING INSTRUMENT

Highly functional profile measurement mode

The LJ-V Series provides accurate, stable profiles as high speeds by utilising the new blue laser optical system and HSE3-CMOS for enhanced dynamic range.

3D MAKES NEW INSPECTIONS POSSIBLE

3D MEASURING INSTRUMENT AND IMAGE PROCESSING

High-speed profile output mode

The LJ-V Series can output up to 64000 profiles/second, which makes it possible to perform 3D measurements with stunning accuracy.

2D MEASURING INSTRUMENT

Profile data

Ethernet

Maximum speed of 64000 profiles/second

Dedicated software

3D MEASURING INSTRUMENT AND IMAGE PROCESSING

Profile data

Ethernet

Maximum speed of 64000 profiles/second

Dedicated software
Combining the advanced profiling capabilities of the LJ-V Series with the CV-X Series Image Processing System, imaging processing can be performed on 3D measurement data to open new doors in the realm of quality inspection.

**MEASURED VALUE ACQUISITION**

The continuous profile data measured with the LJ-V Series is loaded into the CV-X Series.

**IMAGE PROCESSING**

Within the CV-X Series, the height data is converted to a grey-scale image with 256 gradations. The CV-X Series utilises 21 built-in pre-processing filters, such as real-time grey-scale adjustment and a blob filter to obtain the optimum image for the inspection.

**INSPECTION AND MEASUREMENT**

Performing image processing on height data makes a wide range of inspections possible. Not only can you perform accurate measurements utilising surface planes such as measuring relative heights and volumes, but also detect defects such as scratches and chips on any surface.

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AS FAST AS 2 MS PER INSPECTION!
DENTS AND SCRATCHES

CONVENTIONAL METHOD: CAMERA

A large amount of work is required to make adjustments related to the type of lighting and the camera position. This method is also easily affected by minor changes in the surface of the target object, so the conditions under which images are taken have to meet very strict guidelines.

LJ-V Series

The light source and receiver are contained in a single body, which makes on-site adjustments unnecessary. Also, the LJ-V Series is a measuring instrument, so traceability is built in.

Set thresholds using real-world values!

It is possible to perform inspections by assigning tolerances to measured values such as scratch depth, width, and volume. The LJ-V Series is not a camera but a measuring instrument with guaranteed precision, so it can perform reliable and trustworthy measurements and inspections.
It is difficult to determine conditions for curved surfaces and angled surfaces, so it is difficult to isolate characters.

The character heights are measured to create the image, which makes it possible to accurately isolate characters even on curved or angled surfaces.

Characters can be extracted from any kind of curved surface!

It is important for an OCR function to be able to correctly isolate characters. Using the height data from the LJ-V Series to adjust for surface curvature makes it possible to extract the characters.
FLATNESS AND WARPAGE

CONVENTIONAL METHOD: LASER DISPLACEMENT SENSOR OR CONTACT-TYPE SENSOR

These are profile measurements using points and lines. For contact-type sensors, in addition to selecting appropriate targets, it is necessary to select a number of heads that matches the number of measurement locations. For laser displacement sensors, scan time for the X and Y axes is required.

The LJ-V Series 3D profiler allows quick and easy flatness and warpage checks. Surfaces can be scanned with a single pass upon which internal profile measurements and surface adjustments can be made.

Surface slant adjustment

It is difficult to generate accurate reference surface planes using only limited 1D or even 2D data. With the LJ-V Series, 3D data is gathered to allow an accurate reference surface to be generated taking into account part features and irregularities.
VOLUME AND POSITION

CONVENTIONAL METHOD: LASER DISPLACEMENT SENSOR AND CAMERA

A laser displacement sensor is used to inspect the height and a camera is used to inspect the width and position. The two systems cannot be synchronised so installation can be difficult and must be adjusted if the part geometry changes. This setup also makes it difficult to determine the volume and the cross-sectional area.

LJ-V Series

Measurements such as height, width, position, cross-section area, and volume can be easily measured since 3D data is acquired over the entire area of interest. Target misalignments are also adjusted in real time.

Position adjustment

The LJ-V Series + CV-X Series combination comes equipped with a great number of algorithms to simplify setup. Target misalignment can easily be corrected using a pattern search which searches for a profile pattern or trend edge position can be used to virtual intersection points.

POSITION DETECTION ALGORITHMS

EDGE POSITION
EDGE ANGLE
BLOB
TREND EDGE POSITION
PATTERN SEARCH
and more
**SCRATCH DETECTION DURING ROTATION**

Using just a camera or laser displacement sensor, it has been difficult to detect scratches on the angled tooth surfaces of gears and on rounded surfaces due to the effect of diffuse reflections and varying geometry. By linking together the LJ-V Series, which operates at ultra high speeds and is highly resistant to the effect of diffuse reflections, and with the stain mode of the CV-X Series, these inspections are easily accomplished.

**VOLUME MEASUREMENT**

It's possible with 3D image processing

**PEAK HEIGHT MEASUREMENT**
OPTICAL FOCUS AND DEPTH OF FIELD
ADVANTAGES OF THE LJ-V SERIES

BETTER OPTICAL DESIGN
Cameras that are not equipped with auto focus or a similar technology have a set focus position which makes it impossible to obtain an accurate profile if the distance between the camera and target changes. The LJ-V Series uses a special optical system, which enables the LJ-V Series to always capture images that are in the measurement range.

BETTER DYNAMIC RANGE
For general 3D cameras, the light receiving element has a narrow dynamic range leading to measurement errors caused by the amount of light reflected from the target. The LJ-V Series can perform stable measurements without light saturation even if the amount of reflected light is large.

BETTER EASE OF USE
When using a 3D camera, the height and width data of individual pixels differs due to the positional relationship of the laser light source and the receiver, so a calibration must be performed for each pixel. With the LJ-V Series, there is no need for the user to perform additional calibration.

With the LJ-V Series, even if the target's position changes, the image will not go out of focus.
TWO TYPES OF SELECTABLE 3D MEASUREMENT SYSTEMS

1 LJ-V SERIES + CV-X SERIES

By loading LJ-V Series measured profiles into the CV-X controller, we have made possible image processing of 3D images.

2 LJ-V SERIES + PC

We have made it possible for users to load LJ-V Series profile output into a PC or similar device on which user-made proprietary programmes run.
**OUR AIM IS ON-SITE EASE OF USE**

**SELECTABLE 3-WAY OPERATION**

A touch panel has been prepared so that it is possible to perform on-site monitoring or setting operations during measurement. It is also possible to perform operation using a PC or a controller that is connected to a touch panel or LCD colour monitor.

**VARIOUS SPECIFICATIONS THAT INCLUDE ALL ON-SITE NEEDS**

**SUPPORTS ENCODER INPUT**

Can perform encoder synchronised measurement up to a top speed of 64 kHz. Can measure shapes in the direction of movement with high-speed and with an accurate pitch.

**HIGH-FLEX CABLE**

Has adopted a high flex cable as standard. Can be installed on robots and other movable parts without worry.

**IP67 RATED SENSOR HEAD AND CONNECTION CABLE**

In addition to the sensor head, the connection cable also supports an IP67 enclosure rating. There are no problems even in environments like processing plants where spray easily comes on to the product.

**PASSES IMPACT RESISTANCE TEST IEC 60068-2-27**

Equipped with high shock resistance that is necessary for industrial robots.
MULTI-SCREEN FUNCTION

It is possible to simultaneously check your favourite screens, including measurement values, measurement profiles, height image displays (grayscale displays), and measurement value trend graphs. It is possible to freely determine the screen size and placement to construct your own custom screen.

PROFILE STORAGE FUNCTION

It is possible to store approx. 160,000 profiles. You can also store measurement values for 16 outputs at the same time. The LJ-V7000 Series is equipped with various analysis functions, which is useful for the verification of defects and for research and development.

TERMINAL OPERATION MONITOR FUNCTION

Can check the ON/OFF status of controller I/O terminal in a list. It is possible to greatly reduce the time and effort needed for troubleshooting.

EASY SETTINGS

EASY NAVIGATION SETTINGS
Anyone can perform setting intuitively and by following the navigation in the order of image capture settings, measurement settings, and output settings.

HINT FUNCTIONS THAT DON’T REQUIRE THE MANUAL

“Hint” icons have been prepared for each screen.

SETTINGS APPLIED IN REAL-TIME
The measurement conditions are applied to the settings screen profile in real-time. There is no need to return to the measurement screen for confirmation, making it possible to greatly reduce the time and effort spent on setting up.
### Ultra high-accuracy specular reflection

<table>
<thead>
<tr>
<th>Sensor Head</th>
<th>Measurement Range</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LJ-V7020</td>
<td>20±2.6 mm</td>
<td>0.2 μm, X-axis 2.5 μm</td>
</tr>
<tr>
<td>LJ-V7020K</td>
<td>24.2±2.3 mm</td>
<td>0.2 μm, X-axis 2.5 μm</td>
</tr>
<tr>
<td>LJ-V7060</td>
<td>60±8 mm</td>
<td>0.4 μm, X-axis 5 μm</td>
</tr>
<tr>
<td>LJ-V7060K</td>
<td>54.6±7.6 mm</td>
<td>0.4 μm, X-axis 5 μm</td>
</tr>
</tbody>
</table>

### Controller

- **Controller**
  - LJ-V7001(P)
  - NPN output type: LJ-V7001
  - PNP output type: LJ-V7001P

- **Settings Monitor Software**
  - LJ-H2

- **USB Cable**
  - (LJ-H2 accessory) OP-66844

### Monitor

- **Touch Panel HMI**
  - CA-MP120T

- **LCD Colour HMI**
  - CA-MP120

- **Specialised Monitor Stand**
  - OP-87262

### Specifications

- Z-axis: 0.2 μm
- X-axis: 2.5 μm
- Width: 6.5 mm
- Width: 7 mm
- Width: 7.5 mm

- Z-axis: 0.2 μm
- X-axis: 2.5 μm
- Width: 6.5 mm
- Width: 7 mm
- Width: 7.5 mm

- Z-axis: 0.4 μm
- X-axis: 5 μm
- Width: 6.5 mm
- Width: 7 mm
- Width: 7.5 mm

- Z-axis: 0.4 μm
- X-axis: 5 μm
- Width: 6.5 mm
- Width: 7 mm
- Width: 7.5 mm
### Ultra high-accuracy Measurement range

- **60±8 mm**
- **54.6±7.6 mm**
- **20±2.6 mm**
- **24.2±2.3 mm**

### Middle range

<table>
<thead>
<tr>
<th>LJ-V7080</th>
<th>LJ-V7200</th>
<th>LJ-V7300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measurement range</strong></td>
<td><strong>Measurement range</strong></td>
<td><strong>Measurement range</strong></td>
</tr>
<tr>
<td>Z-axis 80±23 mm</td>
<td>X-axis 32 mm</td>
<td>Z-axis 300±145 mm</td>
</tr>
<tr>
<td>Z-axis 0.5 μm</td>
<td>X-axis 10 μm</td>
<td>Z-axis 5 μm</td>
</tr>
<tr>
<td>Repeatability</td>
<td>Repeatability</td>
<td>Repeatability</td>
</tr>
<tr>
<td>L J-V connection</td>
<td>Ethernet cable</td>
<td>24 VDC constant-voltage power supply CA-U3</td>
</tr>
<tr>
<td>LJ-V connection extension cable CB-B5E (5 m) CB-B10E (10 m) CB-B20E (20 m)</td>
<td>Touch panel HMI extension cable OP-87258 (3 m) OP-87259 (10 m)</td>
<td>RS-232C cable OP-96368 (2.5 m) D-sub 9 pin connector OP-26401</td>
</tr>
<tr>
<td>Display monitor connection cable OP-66842 (3 m) OP-87055 (10 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head connection cable CB-B3 (3 m) CB-B10 (10 m)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CONTROLLER

<table>
<thead>
<tr>
<th>Model</th>
<th>No. of connectable sensors</th>
<th>Display</th>
<th>Input terminal block</th>
<th>Output terminal block</th>
<th>Ethernet interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>LJ-V7001</td>
<td>Max. 2 units</td>
<td>Minimum display unit</td>
<td>0.1 μm, 0.00001 mm², 0.01¹''</td>
<td>NPN/PNP open-collector output x 12 outputs</td>
<td>1000BASE-T/100BASE-TX</td>
</tr>
<tr>
<td>LJ-V7001P</td>
<td></td>
<td>Maximum display range</td>
<td>≤99999.9 mm, ≤99999 mm²</td>
<td>OUT comparator output NPN open-collector output x 12 outputs</td>
<td>USB 2.0 high speed compliant (USB 1.1 Full-Speed compatible)</td>
</tr>
</tbody>
</table>

- **Trigger inputs:**
  - Timing 1, 2 Input
  - Auto-zero 1, 2 Input
- **Start measurement/stop input:**
- **Start storage/stop input:**
- **Clear memory input:**
- **Laser OFF input:**
- **Programme switch input:**
  - Non-voltage input x 4 inputs
  - Voltage input x 4 inputs

#### Output terminal block

<table>
<thead>
<tr>
<th>Analogue voltage output</th>
<th>NPN open-collector output x 12 outputs (Can freely assign 16 OUTs x 3 stage judgement results)</th>
<th>PNP open-collector output x 12 outputs (Can freely assign 16 OUTs x 3 stage judgement results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT comparator output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disable trigger output</td>
<td>NPN open-collector output</td>
<td>PNP open-collector output</td>
</tr>
<tr>
<td>Memory FULL output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ready output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error output</td>
<td>NPN/open-collector output (N.C.)</td>
<td>PNP open-collector output (N.C.)</td>
</tr>
</tbody>
</table>

#### Rating

- **Voltage:**
  - 24 VDC, including ±10% ripple (P-P)
- **Maximum current consumption:**
  - 1.3 A or less when connected to 1 head/1.9 A or less when connected to 2 heads
- **Environmental resistance**
  - Operating ambient temperature: 0°C to +50°C
  - Operating ambient humidity: 20 to 85% RH (No condensation)

#### Environment

- **Weight:** Approx. 1500 g

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### DISPLAY OUTPUT UNIT

<table>
<thead>
<tr>
<th>Model</th>
<th>Monitor output</th>
<th>Voltage</th>
<th>Power consumption</th>
<th>Environmental resistance</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LJ-VM100</td>
<td>Analogue RGB XGA (1024 x 768) (Touch panel monitor) (CA-MP120T), specialised connector included</td>
<td>Supplied from the controller</td>
<td>2.5 W or less</td>
<td>Operating ambient temperature: 0°C to +50°C</td>
<td>Approx. 400 g</td>
</tr>
<tr>
<td>LJ-H2</td>
<td></td>
<td></td>
<td></td>
<td>Operating ambient humidity: 20 to 85% RH (No condensation)</td>
<td></td>
</tr>
</tbody>
</table>

#### LJ-H2 (LJ-NAVIGATOR 2) OPERATION SYSTEM ENVIRONMENT

<table>
<thead>
<tr>
<th>Item</th>
<th>Minimum system requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Interface</td>
<td></td>
</tr>
<tr>
<td>Ethernet</td>
<td>1000BASE-T/100BASE-TX</td>
</tr>
<tr>
<td>USB</td>
<td>USB 2.0 high speed compliant (USB 1.1 Full-Speed compatible)</td>
</tr>
</tbody>
</table>

#### Supported OS

- Windows® (Home Premium, Professional, Ultimate)
- Windows Vista (Home Basic, Home Premium, Business, Ultimate)
- Windows XP (SP2 or later) (Home Edition, Professional Edition)

#### Supported languages

- Japanese, English, German, French, Simplified Chinese, Traditional Chinese

#### CPU

- Core (i) 2.3 GHz or higher

#### Memory capacity

- 2GB or more

#### Free space on hard disk

- 2MB or more

#### Display resolution

- XGA (1024 x 768) or higher

#### Weight

- Approx. 400 g

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¹ Connections through a hub are not covered under warranty.
² Windows is a registered trademark of the Microsoft Corporation, U.S.A.
³ Core is a registered trademark of the Intel Corporation.
## SENSOR HEAD COMMUNICATION UNIT

### PROFINET UNIT

<table>
<thead>
<tr>
<th>Model</th>
<th>CB-PN100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatable network</td>
<td>PROFINET IO communication</td>
</tr>
<tr>
<td>Compatable standards</td>
<td>IEEE 802.3*1</td>
</tr>
<tr>
<td>Transmission speed</td>
<td>100 Mbps, full duplex (100BASE-TX)</td>
</tr>
<tr>
<td>Transmission media</td>
<td>STP or Category 5 or higher UTP</td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m</td>
</tr>
<tr>
<td>Supported functions</td>
<td>Data I/O communication, Record data communication</td>
</tr>
<tr>
<td>Number of connectable PROFINET IO controllers</td>
<td>1</td>
</tr>
<tr>
<td>Update time</td>
<td>2 ms to 2048 ms</td>
</tr>
<tr>
<td>Dimensions</td>
<td>224 mm (width), 20 mm (depth), 54.6 mm (height)</td>
</tr>
<tr>
<td>Reference distance</td>
<td>Specular reflection: 50 mm (F.S. = 4.6 mm), Diffuse reflection: 8 mm (F.S. = 4.6 mm), Specular reflection: 25 mm (F.S. = 15.2 mm), Diffuse reflection: 33 mm (F.S. = 15.2 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 470 g</td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.12 A max.</td>
</tr>
</tbody>
</table>

### ETHERNET/PROFINET UNIT

<table>
<thead>
<tr>
<th>Model</th>
<th>CB-EP100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatable network</td>
<td>EtherNet/IP and displacement sensor-specific protocols (socket communication)</td>
</tr>
<tr>
<td>Compatable standards</td>
<td>IEEE 802.3 (10BASE-T), IEEE 802.3u (100BASE-TX)</td>
</tr>
<tr>
<td>Transmission speed</td>
<td>100 Mbps (100BASE-TX)</td>
</tr>
<tr>
<td>Transmission media</td>
<td>STP or Category 5 or higher UTP (100BASE-TX)</td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>100 m (Distance between the unit and Ethernet switch)</td>
</tr>
<tr>
<td>Supported functions</td>
<td>Cyclic communication (explicit messaging), Message communication (Implicit messaging), Compatible with UCMM and Class 3</td>
</tr>
<tr>
<td>Number of connectable hubs</td>
<td>4 hubs (10BASE-T), 2 hubs (100BASE-TX)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>24 VDC (including ±10% ripple (P-P)) (supplied from the controller of the laser scanner)</td>
</tr>
</tbody>
</table>

## SENSORS HEAD UNIT

### Mounting conditions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting condition</td>
<td>Specular reflection</td>
<td>Diffuse reflection</td>
<td>Specular reflection</td>
<td>Diffuse reflection</td>
<td>Specular reflection</td>
<td>Diffuse reflection</td>
<td>Specular reflection</td>
</tr>
<tr>
<td>Reference distance</td>
<td>24.2 mm</td>
<td>20 mm</td>
<td>54.6 mm</td>
<td>60 mm</td>
<td>80 mm</td>
<td>200 mm</td>
<td>300 mm</td>
</tr>
<tr>
<td>Z-axis (height)</td>
<td>2.3 mm</td>
<td>2.6 mm</td>
<td>5.6 mm</td>
<td>8 mm</td>
<td>±8 mm</td>
<td>±22 mm</td>
<td>±24 mm</td>
</tr>
<tr>
<td>X-axis (width)</td>
<td>6.5 mm</td>
<td>6.5 mm</td>
<td>8 mm</td>
<td>13.5 mm</td>
<td>25 mm</td>
<td>57 mm</td>
<td>110 mm</td>
</tr>
<tr>
<td>Tolerance distance</td>
<td>7 mm</td>
<td>14 mm</td>
<td>15 mm</td>
<td>32 mm</td>
<td>62 mm</td>
<td>180 mm</td>
<td></td>
</tr>
<tr>
<td>Far side</td>
<td>7.5 mm</td>
<td>7.5 mm</td>
<td>8 mm</td>
<td>15 mm</td>
<td>39 mm</td>
<td>73 mm</td>
<td>240 mm</td>
</tr>
<tr>
<td>Light source</td>
<td>Blue semiconductor laser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wavelength</td>
<td>405 nm (visible beam)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser class</td>
<td>Class 2 Laser Product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>10 mW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spot size (reference distance)</td>
<td>Approx. 14 mm x 35 μm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.2 μm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>±0.1% of F.S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profile data interval</td>
<td>Top speed: 16 μs (high-speed mode)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental resistance</td>
<td>0.01% of F.S. / °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Material

| Weight | Approx. 410 g |

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*1 The laser classification for FODA (DFR) is implemented based on IEC60825-1 in accordance with the requirements of Laser Notice No. 50.

*2 This value is from a case in which measurement has been performed with and without a reference distance of 4936 times of averaging.

*3 The measurement target is a pin gauge. The value is from a case in which the average height of the default setting area has been measured in height mode. All other settings are default.

*4 The measurement target is a pin gauge. This value is from a case in which the average height of the default setting area has been measured in high-speed mode, when the measurement area is at its minimum, binning is ON, image capture mode is set to standard, and parallel image capture is ON. All other settings are default.

*5 The measurement target is a pin gauge. This value is from a case in which the average height of the default setting area has been measured in advanced function mode. All other settings are default.

*6 The measurement target is a pin gauge. The value is from a case in which the average height of the default setting area has been measured in high-speed mode, when the measurement area is at its minimum, binning is ON, image capture mode is set to standard, and parallel image capture is ON. All other settings are default.

*7 The measurement target is a pin gauge. The value is from a case in which the average height of the default setting area has been measured in advanced function mode. All other settings are default.

*8 The measurement target is a pin gauge. This value is from a case in which the average height of the default setting area has been measured in height mode. All other settings are default.

*9 The measurement target is a pin gauge. This value is from a case in which the average height of the default setting area has been measured in advanced function mode. All other settings are default.

*10 The sensor head must be mounted on a metallic plate for use.

*11 The double polarization function cannot be used.

*120° DOF. View the laser output with an optical instrument may pose an eye hazard.
Middle-range model
LJ-V7080

Long-range model
LJ-V7200

Unit: mm
Multi-function controller
LJ-V7001(P)

Display output unit
LJ-VM100

Head connection cable
CB-B3/CB-B10

Head connection extension cable
CB-85E/CB-B10E/CB-B20E

Touch panel HMI
CA-MP120T

Specialised monitor stand
OP-87262

Panel mounting
Panel thickness (16/16/4.0)
Mounting brackets
Mounting screws
Panel cut dimensions
Visit our website for answers to all your measurement or gauging questions.

www.keyence.com/measure