4×

the measurement volume

INSTANT MEASUREMENT
Instant Measurement means that anyone can easily take measurements in seconds.

The basic concept of speed, accuracy, and simplicity remains unchanged.

- **NEW**
  - 4× the measurement volume
    - Supports large and tall objects.
  - Measure previously obscured areas
    - Newly-developed "light probe"

See p. 16 and p. 20 for more details.
Common Problems with Dimensional Measurements

**SLOW**

Measurements take a long time
- Adjusting complex fixtures for part placement and datum setup is time consuming
- Parts requiring custom fixtures introduce additional time and component costs
- An increase in measurements and parts can mean an exponential increase in required time
- Data management and creating inspection reports can be tedious processes

**INCONSISTENT**

Varying measurement results depending on the operator
- Changes in focus due to setup by different operators results in inconsistent measurements
- Variation in lighting setup between stations affect the measurement
- Measurements rely heavily on operator judgment and experience

**COMPLICATED**

A limited number of people can operate the device
- Learning how to operate the measuring instrument takes time
- Operator error easily occurs in the measurements of items such as rounded parts and curved surfaces
- Features requiring virtual lines or points add a layer of complexity
IM-7000 Series
Image Dimension Measurement System

FAST

Drastically reduced measurement and recording times
- Automatic recognition of position and orientation
- Measure up to 99 dimensions on up to 100 parts with a single button press
- Automatically saves measurement results
- Create inspection reports with a single click

CONSISTENT

Eliminating operator error
- Automated focus adjustment
- Automated lighting settings
- Automatic edge detection

EASY

Intuitive interface that anyone can use
- Easily set up measurements with just a few clicks
- Radius and curved surface measurements are also easy
- Set up complicated virtual line settings by simply clicking

Configuring settings with the click of a mouse
Drastically Reduced Measurement and Recording Times

**Automatic recognition of position and orientation**

The location and orientation of the target placed on the measurement stage are automatically detected. By finding the part and comparing against the recorded shape, it is possible to perform accurate measurements without the need for precise positioning of the part.

Targets can be measured no matter where they are placed within the field of view.

**Measurement of up to 99 points with a single button press**

Identifies and measures up to a maximum of 99 points with a single button press. Even if the number of measurement points is increased, the measurement time remains the same.

Multiple measurement points specified with a diagram

Measures up to 99 points with a single button press

**Easily perform over 100 measurements simultaneously**

The dimensions of all targets on the stage are measured simultaneously. There is no need to measure each target individually.

Judgments can be made at a glance thanks to the OK/NG display

Measurement results can also be viewed just by clicking with a mouse
**STEP 2**

Press

---

**Measurement results are automatically recorded**

All measurement results and critical identifiers are automatically recorded to simplify data management. The IM-7000 Series then automatically calculates and displays critical statistical values such as average, $\sigma$, $3\sigma$, $6\sigma$, and Cpk.

**Complete inspection reports in seconds**

Complete inspection and analysis reports can be generated at the click of a button. Print reports directly from the IM-7000 Series or easily export data in a convenient CSV format for additional processing. Easy inspection recording and report preparation in one simple package.
Eliminating Operator Error

Automated focus adjustment
The IM-7000 Series is equipped with a specifically designed optical lens with a large depth of field. It is also equipped with an auto-focus function that automatically brings measurement points into focus. This is useful for targets with uneven surfaces for which all the measurement points cannot be brought into focus at the same time.

Automated lighting settings
The IM-7000 Series automatically optimizes and saves the lighting conditions so anyone can easily take accurate, consistent measurements.
Automatic edge detection

Unparalleled image processing technology

Sub-pixel processing
By splitting each pixel into 100 or more sub-pixels, the IM-7000 Series is able to provide a wide field-of-view while maintaining its high-precision measurement capability.

Shape processing
Lines and circles are detected using a least squares fitting of 100 or more* detection points. *There may be less than 100 points depending on the shape.

Automatic identification of burrs and chips
Burrs and chips found in the detection area are automatically recognized and excluded from the fitting processing as abnormal locations. It is also possible to set the system to interrupt measurement when burrs or chips are found that are larger than the threshold.
Easily set up measurements with just a few clicks

Just select the desired tool from the menu and use the mouse to define a general setting region. Settings are easy to make with intuitive mouse operations while verifying the image of the entire target.

Intuitive Interface That Anyone Can Use

A wide range of auxiliary functions make it easy for anyone to operate

Easy-to-use measurement menu

Frequently used line, point, circle, and arc measurements are brought together in a single tab that also includes angles and other measurement items. Video explanations are available for each measurement item, making it easy for even first-time users to operate right away.

Full array of measurement auxiliary tools

Even complicated measurements using center lines and other virtual lines that are difficult to handle with conventional measurement systems can be set with intuitive clicks while viewing the screen.
STEP 1
Select tools

STEP 2
Simply select around an area with the mouse

This function brings new meaning to Place and Press inspection.

Automatic measurement function makes settings unnecessary

This new function truly achieves "just place and press" operation. Simple dimensions can be measured without any prior setup by simply selecting the types of measurements expected. Anyone can use it right away as they would use a caliper or micrometer.

Wide range of application and GD&T tools

A large number of application-specific tools designed for measuring extremely small rounded corners and curved surfaces, pitch measurements, screw measurements, and others improve operation efficiency. In addition, GD&T tools are provided for concentricity, true position, and other functions.

Automatic element extraction function

The hassle of making settings is further reduced with the automatic extraction of elements. Simply specify targets by selecting around them to automatically extract lines, circles, and arcs.

Use GD&T measurement such as gear pitch measurement, circularity, concentricity, and others by simply clicking

Simply select around an area with the mouse to extract edges
Advanced Technologies for Achieving Place-and-Press Measurement

- Large diameter telecentric lenses
  - No extreme focus adjustment or positioning required

- Large 200×200 mm stage
  - 4× the measurement volume

- Programmable ring-illumination unit
  - Accurately extracts edges with optimal lighting conditions

- Light probe unit
  - New principle enables measurement in previously obscured areas
Large diameter telecentric lens

No Extreme Focus Adjustment or Positioning Required

Clear focus regardless of height differences
The IM-7000 Series is equipped with a specially designed lens with a large depth of field. This ensures accurate measurements despite height differences on the part.

Apparent feature size not affected by height differences
The IM-7000 Series is equipped with a telecentric lens, which means that the image size is not affected by the height differences between different parts of the target. This enables accurate measurements of targets with uneven surfaces.

Less distortion throughout the entire field of view
The IM-7000 Series is equipped with a low distortion lens designed to not only minimize distortion near the center, but also at the outer reaches of the field of view. This allows parts to be measured accurately despite its location on the stage.
Large 200 × 200 mm stage

4× the Measurement Volume

Measurement field of view is twice as large as for conventional systems, and speed is three times as fast during binding

The newly developed high-speed and high-precision stage offers a measurement field of view that is 200 × 200 mm in size. Also, thanks to the high speed of the stage, twice the field of view can be measured at three times the speed of a conventional system.

Tall targets are also supported

Innovations in the structures of the stage system and lens unit have dramatically improved support for the measurement of tall targets.

High-precision stage with high linearity

By utilizing precision cross-roller bearings, we are able to offer high accuracy while maintaining increased durability. This eliminates measurement errors due to stage movement.

Custom high-precision linear scale

A high-precision linear scale designed specifically for the IM-7000 Series allows the stage movement to be tracked in micron increments. This makes it possible to perform accurate measurements, even on large parts.
Programmable ring-illumination unit

Accurately Extracts Edges with Optimal Lighting Conditions

Multiple illumination units all in one
The programmable ring-illumination unit integrates multiple ring illumination functions into a single unit. This allows a wide variety of features to be inspected without the need for lighting changeover to maximize efficiency.

- **MULTI-ANGLE ILLUMINATION, HIGH**: Light strikes all parts of the target in a uniform manner.
- **MULTI-ANGLE ILLUMINATION, LOW**: Contrasts form between the different height elevations of the target.
- **SLIT RING ILLUMINATION**: A contrast forms between the target and the edge of its outer circumference.

Programmable ring-illumination unit mechanism

- **Cross section image with multi-angle lights turned on**: A wide area is illuminated. Placing at a high position causes the entire target to be illuminated evenly. The lower the position, the greater the contrast in lighting due to height differences.
- **Cross section image with slit ring illumination turned on**: Narrow bands of light are projected horizontally. Place the illumination unit at the height with edges to detect in order to create a clear contrast at the desired location.

[Optimum lighting search function] automatically finds the optimal lighting settings
It is often difficult to determine the correct lighting settings for a given feature. The optimal lighting search function simplifies this by showing you the actual images using different lighting techniques so you can simply select the one you want.

- **Select the feature to optimize**
- **Select the settings from the automatically captured results**
- **Measurements can be performed easily with the optimum settings**
Light probe unit

New Principle Enables Measurement in Previously Obscured Areas

Accurate detection is possible even in locations where conventional ring illumination has trouble detecting

The newly developed light probe unit has a deep-set shape and rounded corners that allow for easy and accurate measurement even of targets with shapes and processing states that made them difficult to measure for measurement systems using conventional images.

Structure of newly developed light probe unit

1. A glowing sphere is brought into contact with the desired point on the target
2. A camera is used to recognize the motion of the probe and measure distance

The target is moved to the desired point

The probe is brought into contact with the wall surface

The camera detects the contact

New technology accurately measures sides invisible to the camera

The ultra-low measurement force allows for accurate measurement of even light and small targets

Measurement with ultra-low force is made possible through the spherical bearing mechanism that slides with low friction. Conventional contact-type measurement systems use a strong measuring force that can cause misalignment due to the pressure applied to small and light targets. The light probe unit uses an extremely low measuring force of 0.015 N to accurately take measurements without the hassle or cost of fixturing targets. This also eliminates the concern of deformation when soft targets are measured.

*Spherical bearing mechanism: A joint mechanism that slides with equalized low pressure by coming in contact with the probe in all directions.

Conventional probe
Pressure from the probe moves the target

Light probe
Since measuring pressure is extremely low, detection is possible without affecting the target
Statistical Analysis

Statistical values such as $\sigma$ and Cpk are automatically aggregated

The system can automatically calculate and display key statistical values for each measurement item including OKs, NGs, maximum point, minimum point, average, $\sigma$, 3$\sigma$, 6$\sigma$, Cp, Cpk, and others. Processing capability management by lot is also easy.

Statistics/analysis viewer

The IM-7000 Series measurement results can be used to perform statistical analysis, create reports, and do other aggregation work on the PC.

Get immediate feedback on trends and variations

Built-in trend graph and histogram functions allow verification of trends and variations in each measured item using graphs. This makes it easy to visualize trends such as "measured values are gradually decreasing," "variation is growing larger," or "measured values are fluctuating in a cyclical manner."
Network Functions and Software

Measurement setup editor
Set on the PC
A PC can be used to add or change measurement locations in a setting file created by the IM-7000 Series system, or in data created with the CAD import module.

CAD import module
Import CAD data
The data required for measurements can be acquired from CAD drawing data in DXF format. Even when a target is not at hand, it is still possible to quickly create measurement setting files.

*Measurement setup editor (IM-H2EE) is also required.

Data transfer software
Creating inspection reports
IM Series measurement results can be automatically transferred to specific cells in spreadsheet software on a specified PC.

Optional: IM-H1T

Data transfer over a LAN connection
Communicating with PCs
It is easy to transfer a setting file created on a PC or an IM Series system to an IM Series system in another location.
Shop Floor Ready Performance and Reliability

Traceability system diagram

The reference scales used for manufacturing, inspection, and calibration conform to the reference scale of JCSS accredited calibration laboratories to establish traceability back to the national standard.

<table>
<thead>
<tr>
<th>International standard</th>
<th>National Metrology Institute of Japan (NMIJ) of National Institute of Advanced Industrial Science and Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCSS accredited calibration laboratory</td>
<td>Reference scale</td>
</tr>
<tr>
<td>Secondary standard</td>
<td>Precision coordinate measuring instrument</td>
</tr>
<tr>
<td>Common standard</td>
<td>Reference scale</td>
</tr>
<tr>
<td>Measuring instrument to be calibrated</td>
<td>IM-7000 Series image dimension measurement system</td>
</tr>
</tbody>
</table>

Includes a highly rigid body and temperature sensor

Highly rigid body and temperature sensor ensures practical installation anywhere. The design was optimized using topological and strength analyses in order to develop the housing stiffness necessary for the required accuracy. Temperature compensation ensures accurate measurement in the field.

Frame strength analysis diagram

Temperature sensor ensures more stable measurement

Space-saving design and a small footprint

In addition to the compact body, the built-in monitor saves significant space. This allows the IM-7000 Series to be installed anywhere.

Optical comparator

IM-7000 Series

Measuring microscope
Quality support only possible with a direct sales system

Our comprehensive after-sales support through technical sales representatives can only be achieved by our direct sales system. You can be confident that you will get the support you want immediately, without the hassle and delay of dealing with reps or distributors.

Support for multiple languages

In addition to the system’s control screen, manuals and other documentation are also provided in a wide range of languages. Local staff can easily use KEYENCE’s products after they are installed at international manufacturing bases.

Languages

<table>
<thead>
<tr>
<th>English</th>
<th>German</th>
<th>French</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian</td>
<td>Simplified Chinese</td>
<td>Traditional Chinese</td>
</tr>
<tr>
<td>Spanish</td>
<td>Thai</td>
<td>Korean</td>
</tr>
</tbody>
</table>

*To be released periodically

Instant delivery system also available internationally

KEYENCE’s product inventories are not limited to Japan. A wide variety of products are stocked at distribution sites in each country so that they can be delivered promptly on the day we receive your order. You do not need to worry about if it may take considerable effort and time to obtain a product from an overseas factory.
IM Series Application Examples
For every inspection need...

Inspections of prototypes and first off-tool parts
- Improvement of productivity through reductions in launch periods
- Measurement that does not depend on the inspector’s experience level
- Measurement based on the traceability of international standards

Inspections of samples and parts during processes
- Improvement of equipment availability through reductions in setup time
- Improvement of yield rates through better accuracy in equipment adjustment
- Since inspection can be performed by other operators in addition to the original inspector, this reduces the workload of the quality department.
- Symptom management within processes

In a wide variety of applications...
- Reduction of inspection time
  - Reductions in inspection time can improve manufacturing efficiency and reduce cost.
- Reduction of recording time
  - Reductions in the work required to record inspection data can lead to reductions in data management cost.
- Operators other than inspectors can also perform inspections
  - Reductions in the workload placed on the quality department can also lead to improvements in equipment availability.

Lathe processing and cutting  Pressing  Plastic molding  Sintering
Pre-shipping inspections

- Allows for shipping inspections with shortened delivery schedules
- Reduction of the work required to create inspection report tables
- Reduction of training time and labor costs associated with inspectors

Incoming inspections

- Can manage acceptance inspections for multiple types with constant standards
- Reduction of the risk of defects even when the quantity of inspections is increased
- Improved quality through measurement of previously uninspected points

Constant inspection standards

The use of constant inspection standards enables manufacturing with more stable quality levels.

Increased quantity of inspections

Since it is easy to increase the quantity of inspections, the risk of defects is decreased.

Increased measurement points

Since it is possible to measure uninspected points without an increased workload, this leads to improvements in quality.
System Configuration

**IM-7020**
Model incorporating backlighting/programmable ring-illumination unit/light probe unit

**IM-7010**
Model incorporating backlighting/fixed ring-illumination unit

---

**Special cable**

---

1. USB ports (two in front)
2. Communication port
3. DVI connector
4. MONITOR connector
5. POWER connector
6. CAMERA CONTROL port (× 2)
7. LAN port
8. USB ports (four in back)
9. Main power switch
10. AC power input connector
Windows® is a trademark or registered trademark of Microsoft Corporation in the United States and other countries. The formal name of Windows is Microsoft Windows® operating system.

DVI connector
LAN port
USB port

External monitor (not included)
PC (not included)
Printer (not included)

Supported OS
Windows 7 Ultimate/Professional/Home Premium (64-bit version)
Windows 8.1/Windows 8.1 Pro (64-bit version)
Windows 10 Home/Pro/Enterprise (64-bit version)

Required free space on hard disk
5 GB or more

- Windows® is a trademark or registered trademark of Microsoft Corporation in the United States and other countries.
- The formal name of Windows is Microsoft Windows® operating system.

Optional Accessories

Additional illumination
IM-DXW12N
Coaxial Illumination (Option)

Stage glass
IM-SG2
Tempered stage glass

Precision fixturing base
OP-87761
Precision fixturing base (for long measurement targets) (Option)
OP-88185
Fixture sheet (10 pieces) *2

*1 One of these is included with the purchase of the IM-7020 or 7010.
*2 This Sheet is for fixing the object by sticking on the stage glass of the IM-7000 Series.
<table>
<thead>
<tr>
<th><strong>SPECIFICATIONS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td><strong>Head</strong></td>
</tr>
<tr>
<td><strong>Image sensor</strong></td>
</tr>
<tr>
<td><strong>Display</strong></td>
</tr>
<tr>
<td><strong>Receiver lens</strong></td>
</tr>
<tr>
<td><strong>Image measurement</strong></td>
</tr>
<tr>
<td><strong>Field of view</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Minimum display unit</strong></td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Measurement accuracy (±2σ)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Light probe Measurement</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>External remote input</strong></td>
</tr>
<tr>
<td><strong>External output</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Interface</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Record</strong></td>
</tr>
<tr>
<td><strong>Environmental resistance</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Illumination system</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>XY stage</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Z stage</strong></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*1. In the range of ø80 mm, within the operating ambient temperature range of +23°C ±1°C at the focused focal point position.
*2. In the range of ø80 to 180 mm (ø4 R40), within the operating ambient temperature range of +23°C ±1°C at the focused focal point position, and with a load weighing 2 kg or less on the stage (L = amount of stage movement in mm units).
*3. In the range of ø20 mm within the operating ambient temperature range of +23°C ±1°C at the focused focal point position.
*4. In the range of ø20 to 120 mm, within the operating ambient temperature range of +23°C ±1°C at the focused focal point position, and with a load weighing 2 kg or less on the stage (L = amount of stage movement in mm units).
*5. When the detection system is standard. If the detection system is at a deep position, then ±3 μm.
*6. When the detection system is standard, and the ambient temperature is 23°C ±1°C, with a stage load weighing 2 kg or less. If the detection system is at a deep position, then ±(10+0.02 L) μm with L as the measurement length in mm.