KEYENCE

NEW **Image Dimension Measurement System**
IM-7000 Series

The Next Generation Optical Comparator

INSTANT MEASUREMENT

IM series

NEW

Now It Is Possible To Take Faster, Easier, and More Consistent Measurements

Width, Radius, and Height Measurements.
All With One Device.

NEW
Contact height measurement unit
NEW
Newly-developed "light probe"
NEW
Up to 300 × 200 mm
11.81" × 7.87" stage

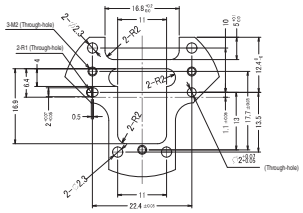
INSTANT MEASUREMENT

Increasing productivity by innovating inspection

Instant Measurement System Advantages
IM-7000 Series

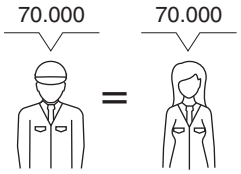
Measurements Performed in Seconds

Drastically reduce the amount of time and effort required for inspection. With conventional methods, measurement time increases in relation to the amount of dimensions taken. With the IM Series, up to 99 dimensions can be measured in seconds.



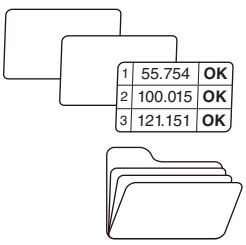
Intuitive Interface That Anyone Can Use

The easy-to-use interface allows anyone to operate the system at the push of a button, allowing for accurate and repeatable measurement results.



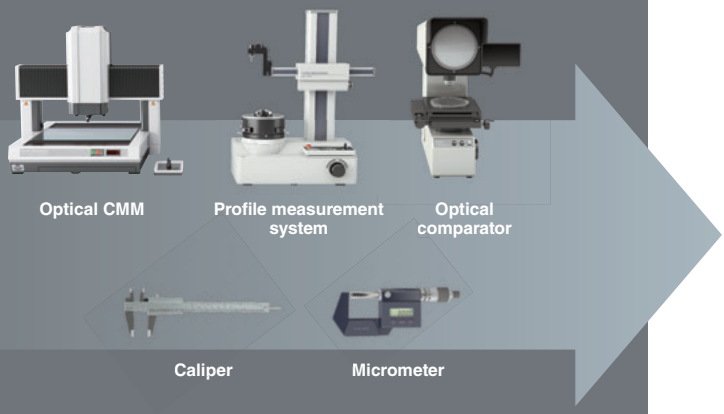
Measurement Results Are Automatically Recorded

Measurement data is automatically saved and managed as soon as a part is measured. Inspection reports can also be created with the push of a button to increase post-measurement work efficiency.



Common Problems with Dimensional Measurements

Conventional Measurement Tools



SLOW

- Adjusting complex fixtures for part placement and datum setup is time consuming
- An increase in the number of targets or measurement points can mean an exponential increase in required time
- Data management and creating inspection reports can be tedious

INCONSISTENT

- Differences in the way the tool is used can result in inconsistent measurements
- Changes in focus due to setup by different operators result in inconsistent values
- Measurements rely heavily on operator judgment and experience

COMPLICATED

- Learning how to operate the measuring instrument takes time
- Operator error easily occurs during measurement, especially radius inspection
- Dimensions requiring virtual lines or points add a layer of complexity

The IM-7000 Series Solves These Problems by Consolidating Conventional Tools into a Single System.

FAST

- No time consuming positioning work or datum setup required
- Measure up to 99 dimensions on up to 100 parts with the push of a button
- Automatically saves measurement data and creates inspection reports

CONSISTENT

- Automatically identifies measurement points, ensuring that the same measurement results are obtained each time
- Automatic focal adjustment prevents inconsistent values
- The simple place-and-press operation means consistent measurement results regardless of the operator

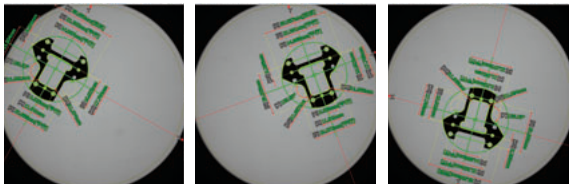
EASY

- Easily set up measurements with just a few clicks
- Setting up virtual lines and points is just as simple
- No measurement expertise is required to measure parts

Measurements Performed in Seconds

Automatic Recognition of Position and Orientation

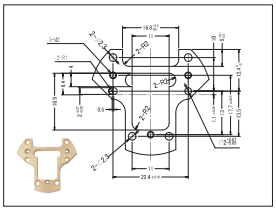
The location and orientation of the part placed on the measurement stage are automatically detected. No need for precise positioning of the part.



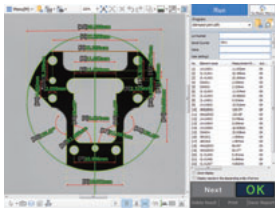
Parts can be measured no matter where they are placed within the field of view

Up to 99 Dimensions Measured at the Push of a Button

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



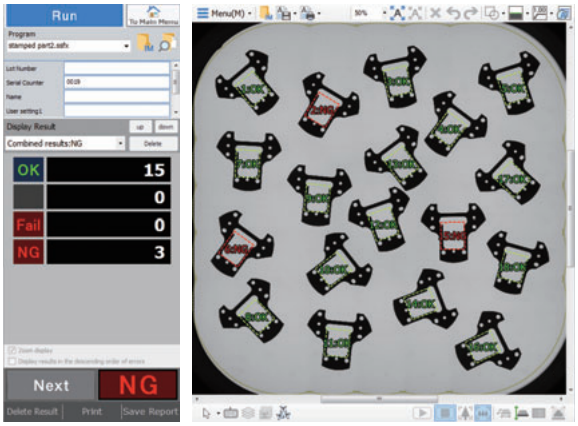
Drawing



Measurement result

Inspect up to 99 Parts Simultaneously

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

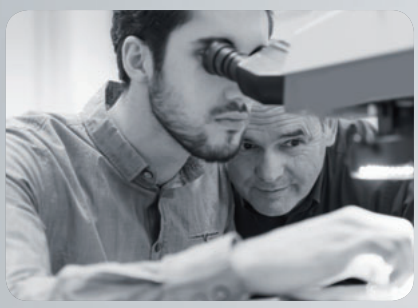


Eliminate Operator Error

Problems with Conventional Methods

Positioning errors

Focus errors



Skill level errors

Resolved with the IM-7000 Series

No positioning required

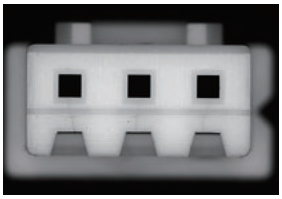
Automated focus adjustment

Consistent results regardless of operator

Automated Focus Adjustments

The IM-7000 Series is equipped with a specifically designed optical lens with a large depth of field. It also automatically brings measurement points into focus. This is useful for parts with uneven surfaces, where all of the measurement areas cannot be brought into focus at the same time.

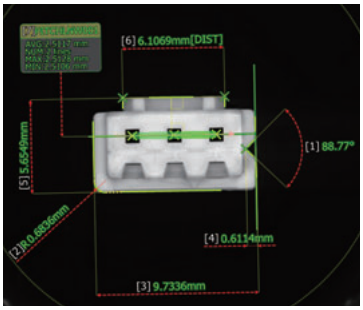
Parts with large height differences



Only the upper image is in focus.

Only the lower image is in focus.

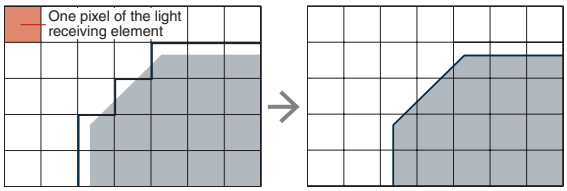
The focus is automatically adjusted for measurement



Automatic Edge Detection

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.



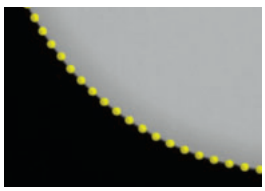
Without sub-pixel processing

With sub-pixel processing

Shape processing

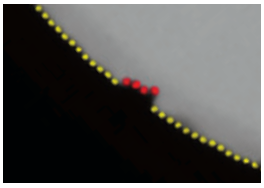
Lines and circles are detected using a least square fitting of 100 or more* detection points.

*There may be less than 100 points depending on the shape.



Automatic identification of burrs and chips

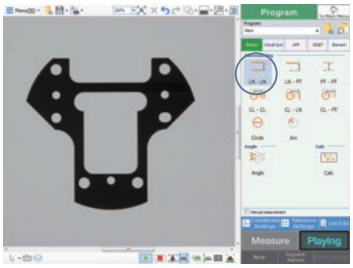
Burrs and chips found in the detection area are automatically recognized and excluded from the fitting process as abnormal locations. It is also possible to set the system to interrupt measurement when burrs or chips are found that are larger than the threshold.

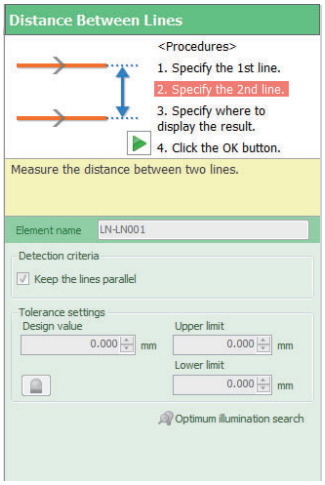


Easily Set up Measurements with Just a Few Clicks

Easily Program Parts

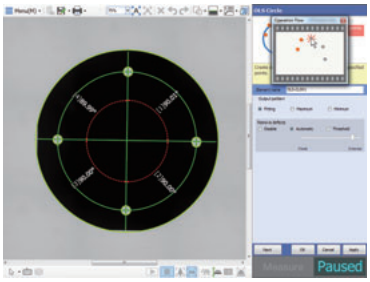
Just select the desired tool from the menu and use the mouse to define the tool on the part. Settings are easy to make with intuitive mouse operations while verifying the image of the entire part.





A Wide Range of Auxiliary Measurement Tools

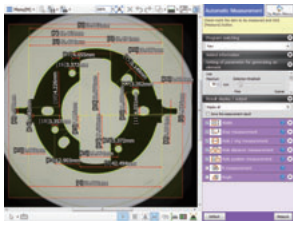
Even complicated measurements using center lines and other virtual lines that are difficult to handle with conventional measurement systems can be set with intuitive clicks while viewing the screen.



The Automatic Measurement Function Makes Setup Even Easier

This new function truly achieves "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, just as they would use a caliper or micrometer.

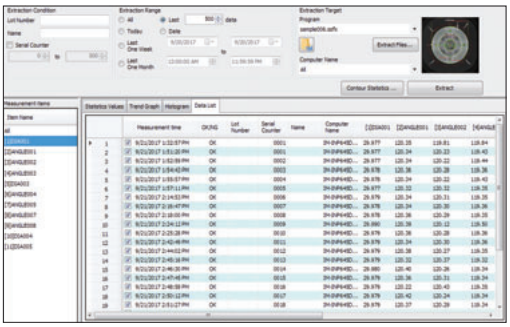
Simply select the measurement condition check boxes



Automatic Inspection Reports

Automatically Calculate Cp and Cpk

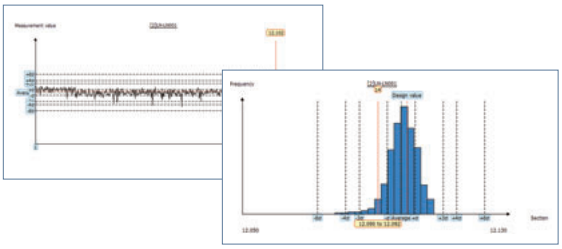
The system automatically calculates and displays key statistical values for each measurement item including OKs, NGs, maximum point, minimum point, average, (sigma, 3sigma, 6sigma) Cp, Cpk, and others. Processing capability management by lot is also possible.



Immediate Feedback on Trends and Variations

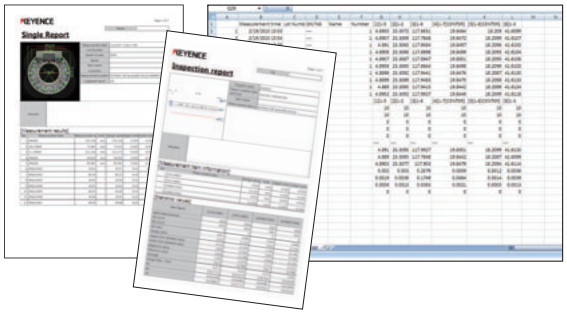
Built-in trend graph and histogram functions allow for verification of trends and variations such as those detailed below in each measured item using graphs.

- Measured values are gradually decreasing
- Variation has increased
- Measured values are fluctuating in a cyclical manner



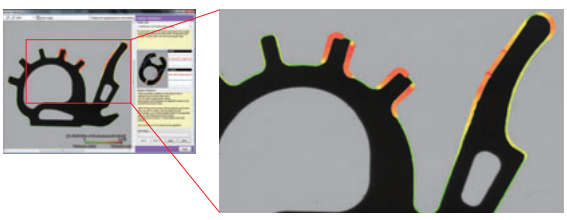
Complete Inspection Reports in Seconds

IM Series measurement results can be automatically transfered to specific spreadsheet software on a PC.



Profiles Are Also Automatically Aggregated

Records not only the measurement results, but also the profiles of measured parts. This allows for changes in appearance to be visualized in a way that cannot be achieved using measurement results alone.



KEYENCE
Run
29.965mm
120.46°
119.62°
119.92°
59.596mm
90.00°
90.00°
Next
OK
KEYENCE
IM series
MEASURE

Advanced Technologies for Achieving Place-and-Press Measurement

Large Diameter Telecentric Lenses

No extreme focus adjustment or positioning required

Programmable Ring-Illumination Unit

Accurately extracts edges with optimal lighting conditions

Light Probe Unit

New technology allows measurements of features at specific heights

Large High Speed/High Precision Stage

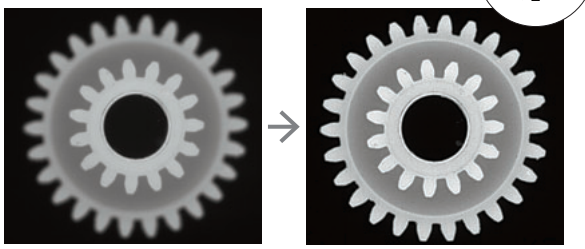
6x the measurement volume

Large Diameter Telecentric Lenses

No Extreme Focus Adjustment or Positioning Required

Clear Focus Regardless of Height Differences

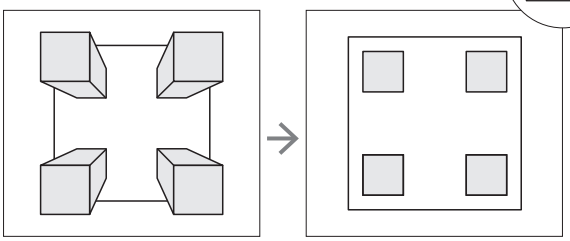
The IM-7000 Series is equipped with a specially designed lens with a large depth of field. This ensures accurate measurements despite height differences on the part.



Zoom lens | IM-7000 Series

Apparent Feature Size Not Affected by Height Differences

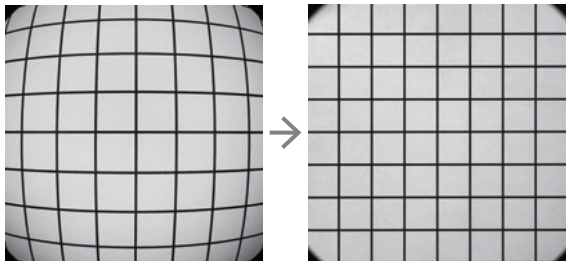
The IM-7000 Series is equipped with telecentric lenses, which means that the image is not affected by the height differences of the part. This enables accurate measurements of parts with uneven surfaces.



Zoom lens | IM-7000 Series

Reduced 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 centre, but also at the outer reaches of the field of view. This allows parts to be measured accurately despite its location on the stage.



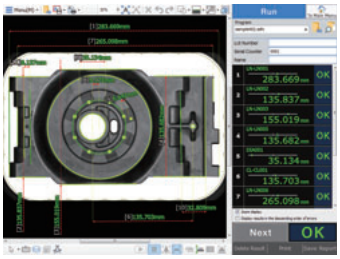
Zoom lens | IM-7000 Series

Large High Speed/High Precision Stage

6x the Measurement Volume

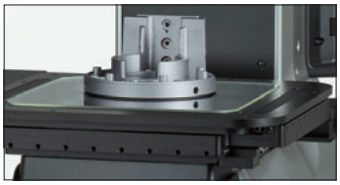
300 x 200 mm 11.81" × 7.87" Field of View, 3x Faster Stage Movement

The newly developed high-speed and high-precision stage offers a measurement field of view that is 300 x 200 mm 11.81" × 7.87" in size. Also, thanks to the high speed of the stage, the field of view can be measured at three times the speed of conventional systems.



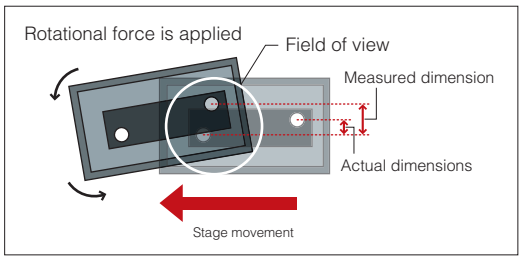
Measure Taller Parts

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

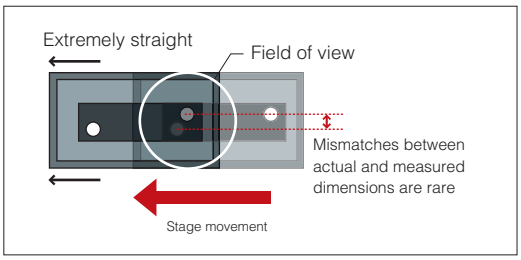


High-Precision Stage with High Linearity

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.



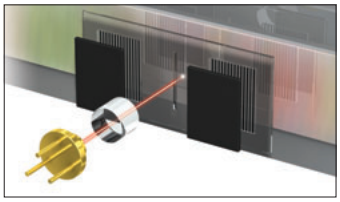
Without adjustment



IM-7000 Series

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.



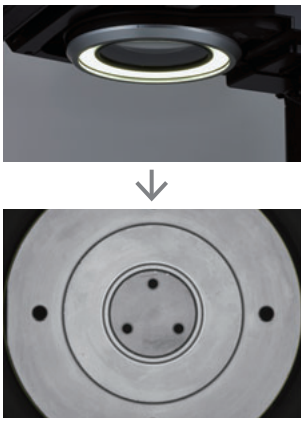
Programmable Ring-Illumination Unit

Accurately Extract Edges with Optimal Lighting Conditions

Multiple Illumination Units All in One

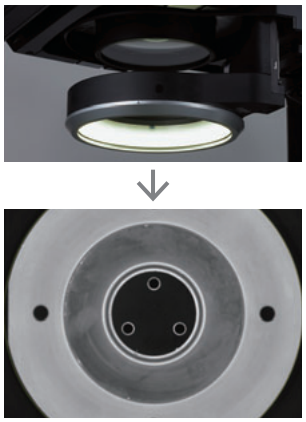
The programmable ring-illumination unit integrates multiple ring illumination functions into a single unit. This allows a wide variety of features to be inspected without the need for lighting changeover to maximize efficiency.

Multi-Angle Illumination, High



Light strikes all areas of the part in a uniform manner

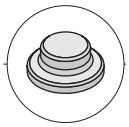
Multi-Angle Illumination, Low



Contrasts form between the different height elevations of the part

Slit Ring Illumination

A contrast forms between the part and the edge of its outer circumference

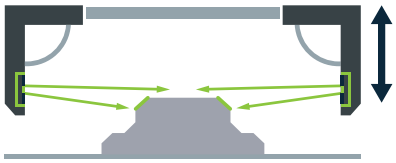


Programmable Ring-Illumination Unit Mechanism

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.

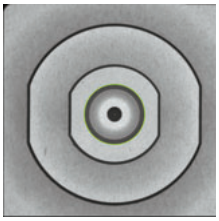
Cross section image with slit ring illumination turned on



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.

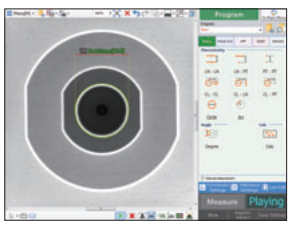
Automatically Finds the Optimal Lighting Settings

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. This means that even first time users can feel confident in their ability to use the instrument.



Select the feature to optimize

Select the settings from the automatically captured results



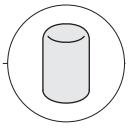
Measurements can be performed easily with the optimum settings

Light Probe Unit

New Technology Allows Measurement of Features at Specified Heights

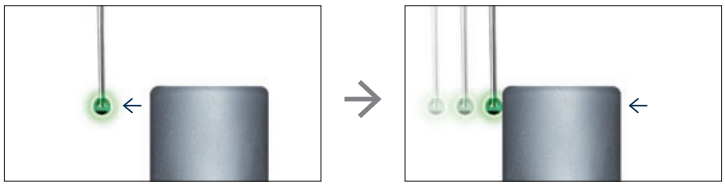
Accurately Measure Dimensions Previously Impossible with Vision Systems

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



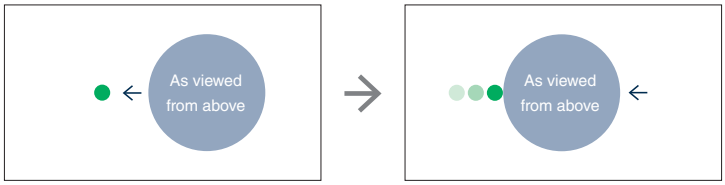
New Technology Accurately Measures Sides not Visible to the Camera

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



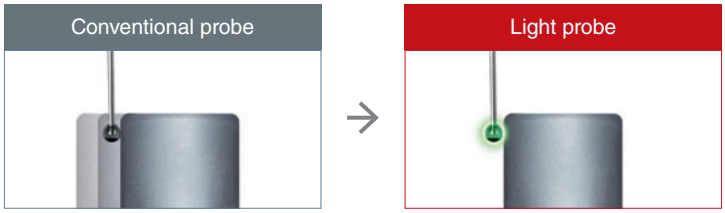
The part is moved to the desired point.

The camera detects the contact of the light part



The Extremely Low Force Measurement of Light and Small Parts

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 parts. This also eliminates the concern of deformation when soft parts are measured.



Pressure moves the part

Since measuring pressure is extremely low, detection is possible without affecting the part

Shop Floor Ready Performance and Reliability

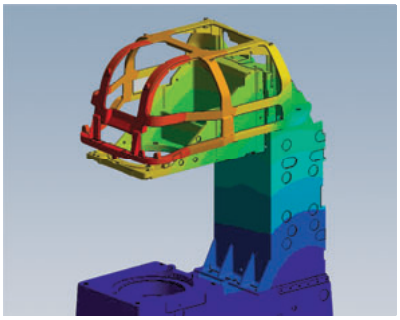
Traceability System Diagram

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.

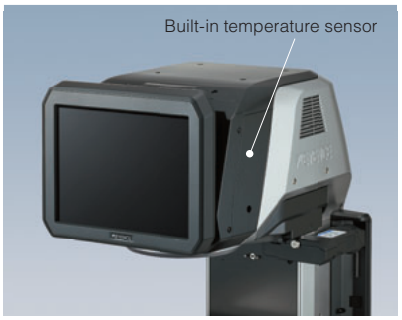
International standard	National Metrology Institute of Japan (NMIJ) of National Institute of Advanced Industrial Science and Technology
JCSS accredited calibration laboratory	Reference scale
Secondary standard	Precision coordinate measuring instrument
Common standard	Reference scale
Measuring instrument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

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 analysis in order to develop the housing stiffness necessary for the required accuracy. Temperature compensation ensures accurate measurement in the field.



Frame strength analysis diagram



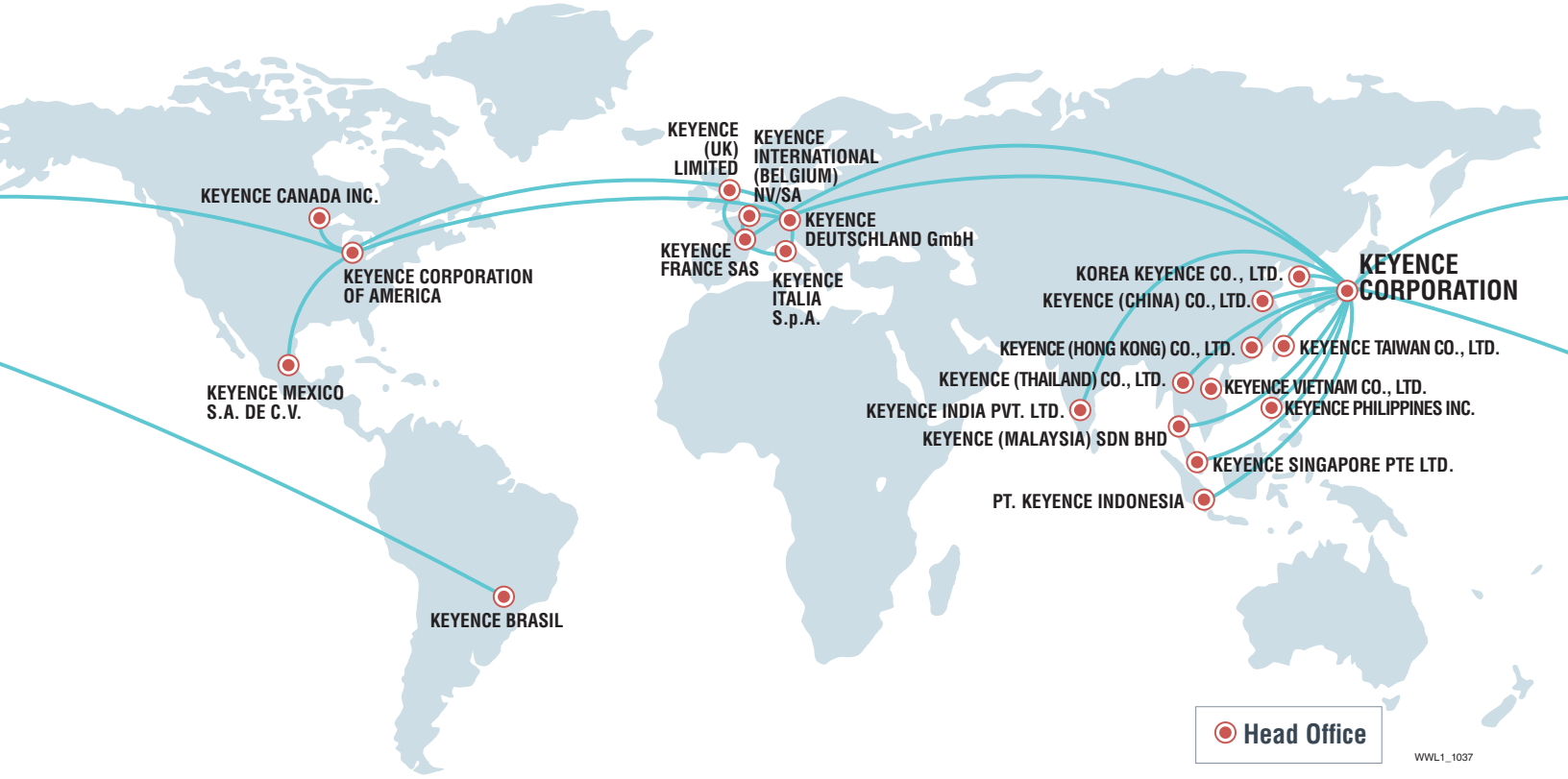
Temperature sensor ensures more stable measurement

Space-Saving Design

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

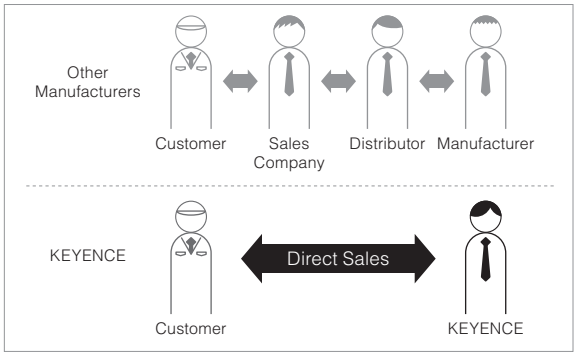
Optical comparator | IM-7000 Series | Measuring microscope

Comprehensive Coverage All Over the World & Global Support System



Quality Support Only Possible With a Direct Sales System

Our comprehensive after-sales support through technical sales technicians 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

English	German	French
Italian	Simplified Chinese	Traditional Chinese
Spanish	Thai	Korean

*To be released periodically

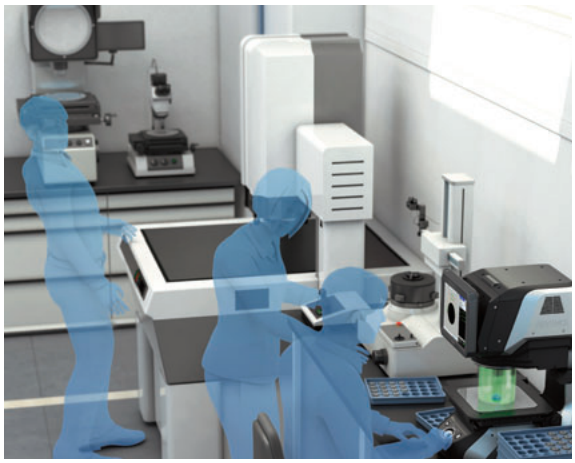
Instant Delivery System Also Available Internationally

KEYENCE's product inventory is 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 a Variety of Inspection Needs

Inspections of Prototypes and First Off-Tool Parts



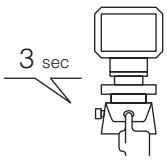
- Improvement of productivity through reductions in launch periods
- Measurement that does not depend on the inspector's experience level
- Measurement based on the traceability of international standards

In-Process Inspections of Samples and Parts

- 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

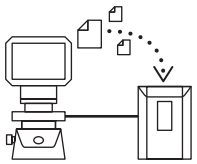
Reduction of Inspection Time

Reductions in inspection time can improve manufacturing efficiency and reduce cost.



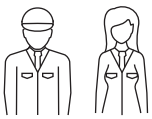
Reduction of Recording Time

Reductions in the work required to record inspection data can lead to reductions in data management cost.

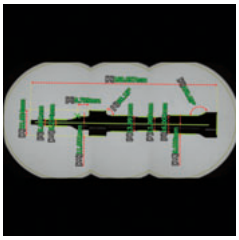


Operators Other than Inspectors Can Also Perform Inspections

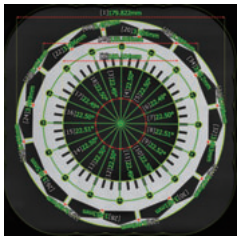
Reductions in the workload placed on the quality department can also lead to improvements in equipment availability.



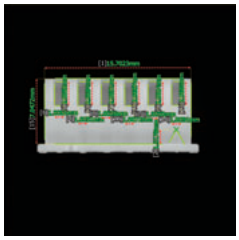
In a wide variety of applications...



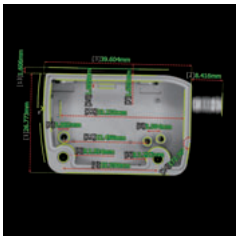
Lathe processing and cutting



Pressing



Plastic molding



Sintering

Pre-Shipping Inspections

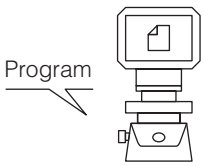
- Allows for shipping inspections with shortened delivery schedules
- Reduction of the work required to create inspection report tables
- Reduction of training time and labor costs associated with inspectors

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

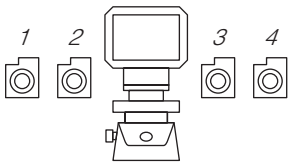
Constant Inspection Standards

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



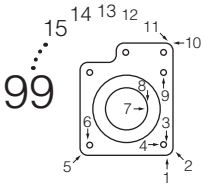
Increased Quantity of Inspections

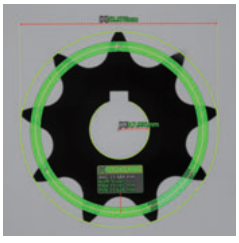
Since it is easy to increase the quantity of inspections, the risk of defects is decreased.



Increased Number of Dimensions

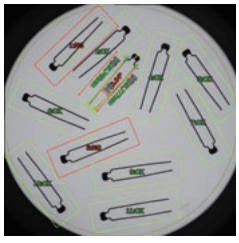
Since it is possible to measure uninspected dimensions without an increased workload, this leads to improvements in quality.





Forged parts

Molded object
(profile tolerance)



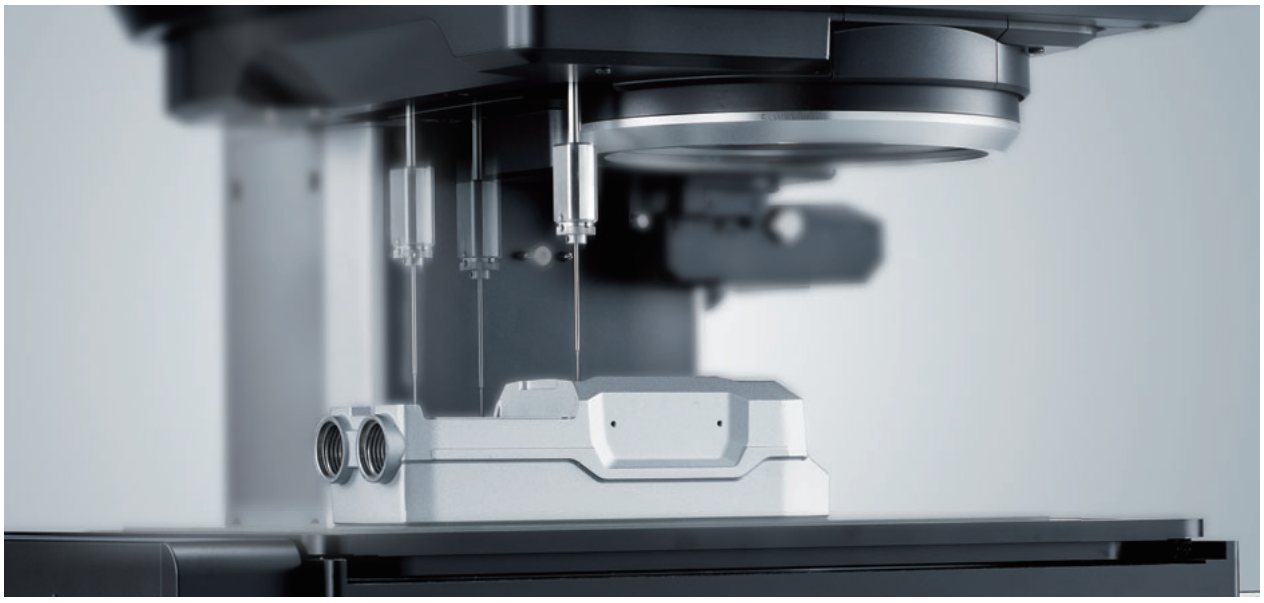
Electronic parts

Printing

NEW

Contact Height Measurement Unit

IM-7030T Option

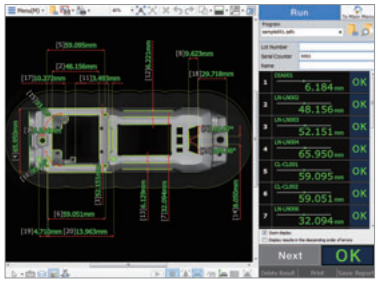


Instant Measurement Including Height

A dedicated contact height probe for the Instant Measurement system that helps reduce the amount of time required for using other measurement tools for different dimensions and the amount of work required for taking measurement results. The pattern search function enables the system to automatically detect and measure any pre-specified height/depth dimensions. It can help drastically reduce the amount of time required for measurement related tasks such as creating work procedure documentation or for training workers. Furthermore, centralized management of the measurement results enables an overall improvement in working efficiency of measurement tasks.

Simply place the target on the stage and press

The probe automatically performs the measurements



Display the height measurement results

		Height Measurement Unit
Measurement range		0 to 75 mm 0" to 2.95"
Measuring force		0.3 N
Measurement accuracy (XY)		±0.2 mm*1 ±0.0079"
Minimum display unit		1 µm
Measurable area (XY)	**Wide-field measurement mode**	145 × 95 mm 5.71" × 3.74"
	High-precision measurement mode	107.5 × 95 mm 4.23" × 3.74"
Repeatability		±2 µm*2
Measurement accuracy		±7.5 µm*3

*1 Operating ambient temperature: 23°C ±1°C 73.4°F ± 1.8°F.
*2 With a maximum measurement height of 30 mm 1.18" or less. ±3 µm when maximum measurement height is between 30 mm 1.18" and 75 mm 2.95".
*3 With a maximum measurement height of 30 mm 1.18" or less. ±9.5 µm when maximum measurement height is between 30 mm 1.18" and 75 mm 2.95".

Network Functions and Software

Measurement setup editor

Offline Programming

Optional: IM-H2EA

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

Optional: IM-H2C

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-H2EA) is also required.

PC software operating environment

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.

Data transfer software

Creating Inspection Reports

Optional: IM-H1T

IM Series measurement results can be automatically transfered to specific cells in spreadsheet software on a specified PC.

Data transfer over a LAN connection

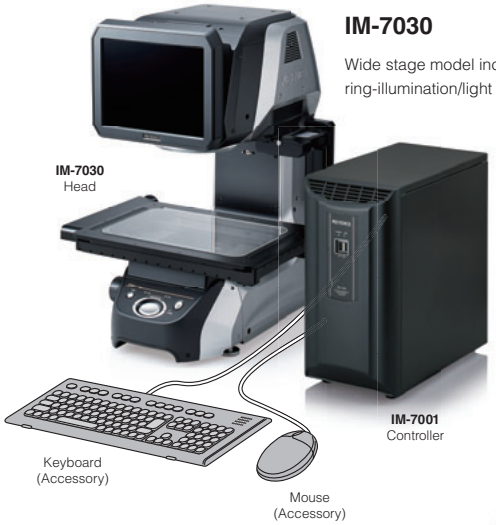
Communicating with PCs

It is easy to transfer a setting file created on an IM Series system or a PC to another IM Series system in another location.

System Configuration

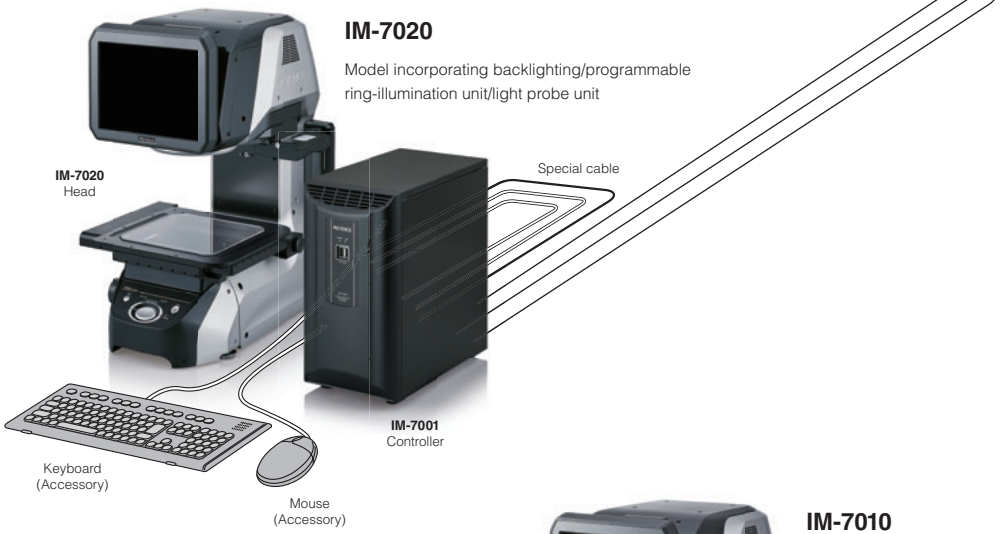
IM-7030

Wide stage model incorporating programmable ring-illumination/light probe unit



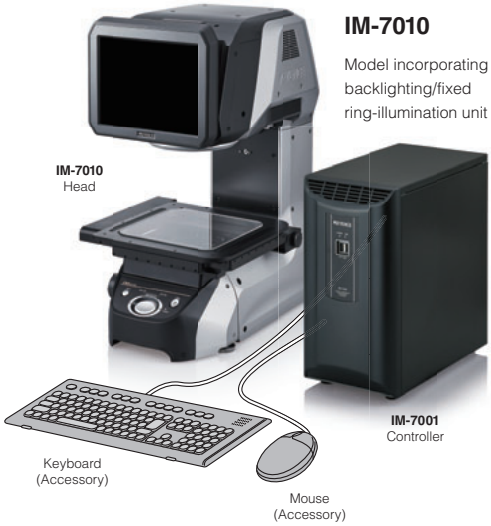
IM-7020

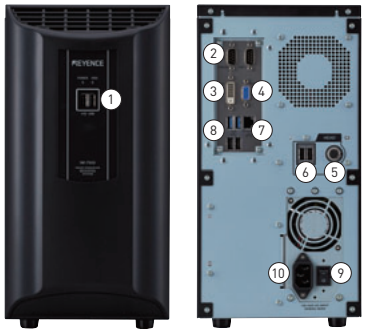
Model incorporating backlighting/programmable ring-illumination unit/light probe unit



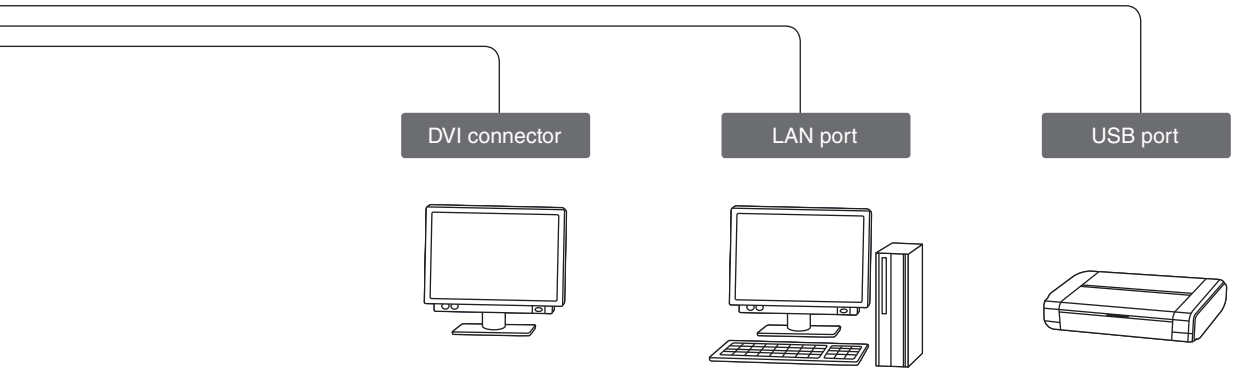
IM-7010

Model incorporating backlighting/fixed ring-illumination unit





(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

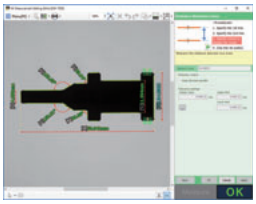


External monitor
(not included)

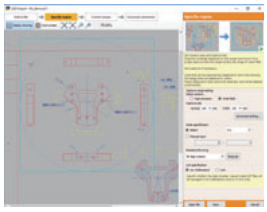
PC (not included)

Printer
(not included)

PC Software



IM-H2EA
IM measurement setup editor



IM-H2C
CAD import module

IM-H1T
IM data transfer software

Precision fixturing base

OP-87761
Precision fixturing base
(for long measurement targets)

OP-87501
Precision fixturing base

Optional Lighting

IM-DXW12N
Coaxial illumination

Stage glass

OP-88179[*1]
Stage glass

IM-SG2
Tempered stage glass

OP-88239[*2]
Stage glass for IM-7030

IM-SG3
Tempered stage glass for IM-7030

OP-88185
Fixture sheet

OP-88214[*3]
Stylus for IM-7030T

OP-88215
Flat stylus for IM-7030T

*1 One of these is included with the purchase of the IM-7020 or 7010.
*2 One of these is included with the purchase of the IM-7030.
*3 One of these is included with the purchase of the IM-7030T.

SPECIFICATIONS

Model		Controller		IM-7001		
		Head		IM-7010	IM-7020	IM-7030
Image sensor				1" 6.6 mega pixel monochrome CMOS		
Display				10. 4" LCD monitor (XGA: 1024 × 768)		
Receiver lens				Double telecentric lens		
Image measurement	Field of view	Wide-field measurement mode		200 mm × 200 mm 7.87" × 7.87" (4× R50)		300 mm × 200 mm 11.81" × 7.87" (4× R50)
		High-precision measurement mode		125 × 125 mm 4.92" × 4.92"		225 × 125 mm 8.86" × 4.92"
	Minimum display unit			0.1 µm		
	Repeatability	Wide-field measurement mode	W/o stage movement	±1 µm		
			With stage movement	±2 µm		
		High-precision measurement mode	W/o stage movement	±0.5 µm		
			With stage movement	±1.5 µm		
	Measurement accuracy (±2σ)	Wide-field measurement mode	W/o binding	±5 µm*1		
			With binding	±(7 + 0.02 L) µm*2		±(7 + 0.02 L) µm*3
		High-precision measurement mode	W/o binding	±2 µm*4		
			With binding	±(4 + 0.02 L) µm*5		± (4 + 0.02 L) µm*6
Light probe Measurement	Measurable area (XY)			-	90 × 90 mm 3.54" × 3.54"	190 × 90 mm 7.48" × 3.54"
	Maximum measurement depth			-	30 mm 1.18"	
	Light probe diameter			-	ø3 mm	
	Measuring force			-	0.015 N	
	Repeatability			-	±2 µm*7	
	Measurement accuracy			-	±(8 + 0.02 L) µm*8	±(8 + 0.02 L) µm*9
External remote input				Non-voltage input (with and without contact)		
External output		OK/NG/FAIL/MEAS.		PhotoMos output Rated load 24 VDC 0.5 A ON resistance 50 mΩ or lower		
Interface		LAN		RJ-45 (10BASE-T/100BASE-TX/1000BASE-T)		
		USB 2.0 series A		6 ports (front: 2, rear: 4)		
Record		Hard disk drive		500 GB		
Environmental resistance		Operating ambient temperature		+10°C to 35°C +50°F to 95°F		
		Operating ambient humidity		20% RH to 80% RH (no condensation)		
Illumination system		Transparent		Telecentric transparent illumination		
		Ring		Four division ring illumination	-	
		Ring		-	Four division, multi-angle illumination (electric)	
		Ring		-	Slit ring (directivity) illumination (electric)	
XY stage		Moving range		100 × 100 mm 3.94" × 3.94" (electric)		200 × 100 mm 7.87" × 3.94" (electric)
		Withstand load		5 kg		7.5 kg
Z stage		Moving range		75 mm 2.95" (electric)		
Power supply		Power voltage		100–240 VAC, 50/60 Hz		
		Power consumption		430 VA or lower		
Weight		Controller		Approx. 8 kg		
		Head		Approx. 30 kg	Approx. 31 kg	Approx. 33 kg

*1. In the range of ø80 mm ø3.15", within the operating ambient temperature range of +23°C ±1°C +73.4°F ± 1.8°F at the focused focal point position

*2. In the range of 180 × 180 mm 7.09" × 7.09" (4× R40), within the operating ambient temperature range of +23°C ±1°C +73.4°F ± 1.8°F 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 280 × 180 mm 11.02" × 7.09" (4× R40), within the operating ambient temperature range of +23°C ±1°C +73.4°F ± 1.8°F at the focused focal point position, and with a load weighing 3 kg or less on the stage (L = amount of stage movement in mm units)

*4. In the range of ø20 mm ø0.79" within the operating ambient temperature range of +23°C ±1°C +73.4°F ± 1.8°F at the focused focal point position

*5. In the range of 120 × 120 mm 4.72" × 4.72", within the operating ambient temperature range of +23°C ±1°C +73.4°F ± 1.8°F 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)

*6. In the range of 220 × 120 mm 9.45" × 4.72", within the operating ambient temperature range of +23°C ±1°C +73.4°F ± 1.8°F at the focused focal point position, and with a load weighing 3 kg or less on the stage (L = amount of stage movement in mm units)

*7. When the detection system is standard. If the detection system is at a deep position, then ±3 µm

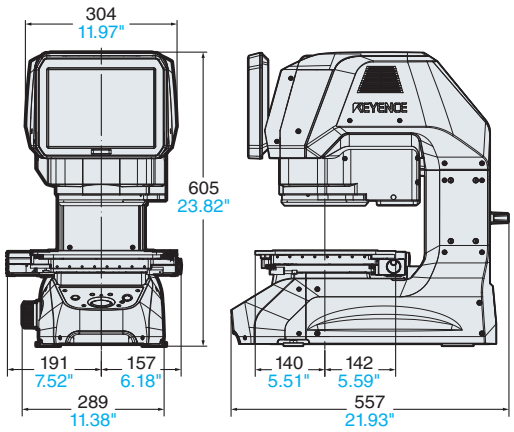
*8. When the detection system is standard, and the ambient temperature is +23°C ±1°C +73.4°F ± 1.8°F, with a stage load weighing 2 kg or less. If the detection system is at a deep position, then ±(10 + 0.02 L) µm with L as the measurement length in mm.

*9. When the detection system is standard, and the ambient temperature is +23°C ±1°C +73.4°F ± 1.8°F, with a stage load weighing 3 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.

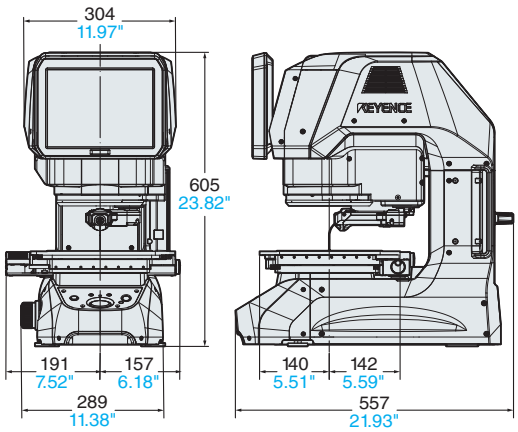
DIMENSIONS

Unit (mm inch)

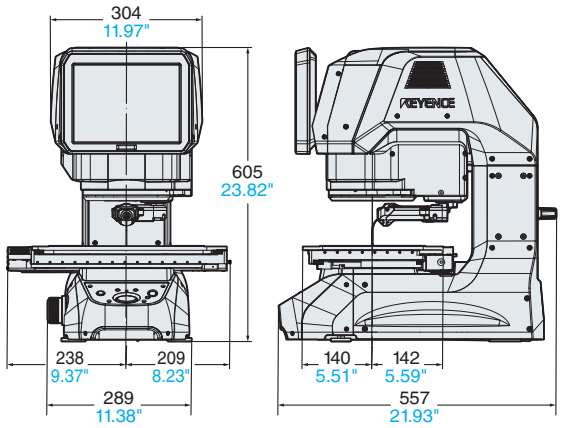
IM-7010 head



IM-7020 head



IM-7030 head



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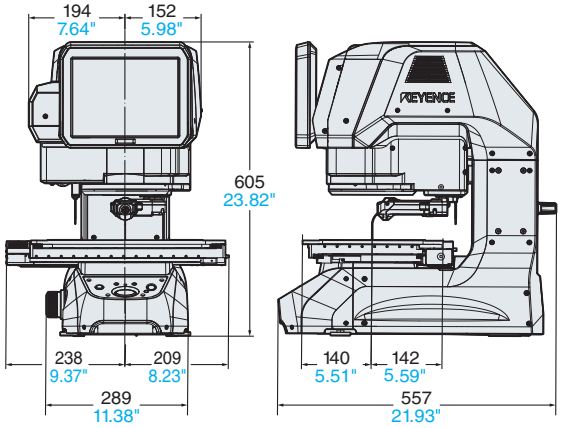

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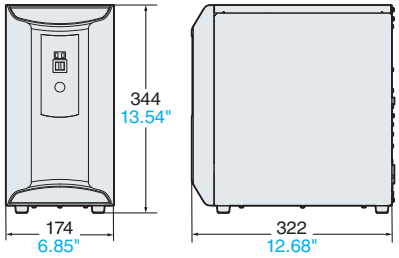

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