KEYENCE

Handheld Probe Coordinate Measuring Machine

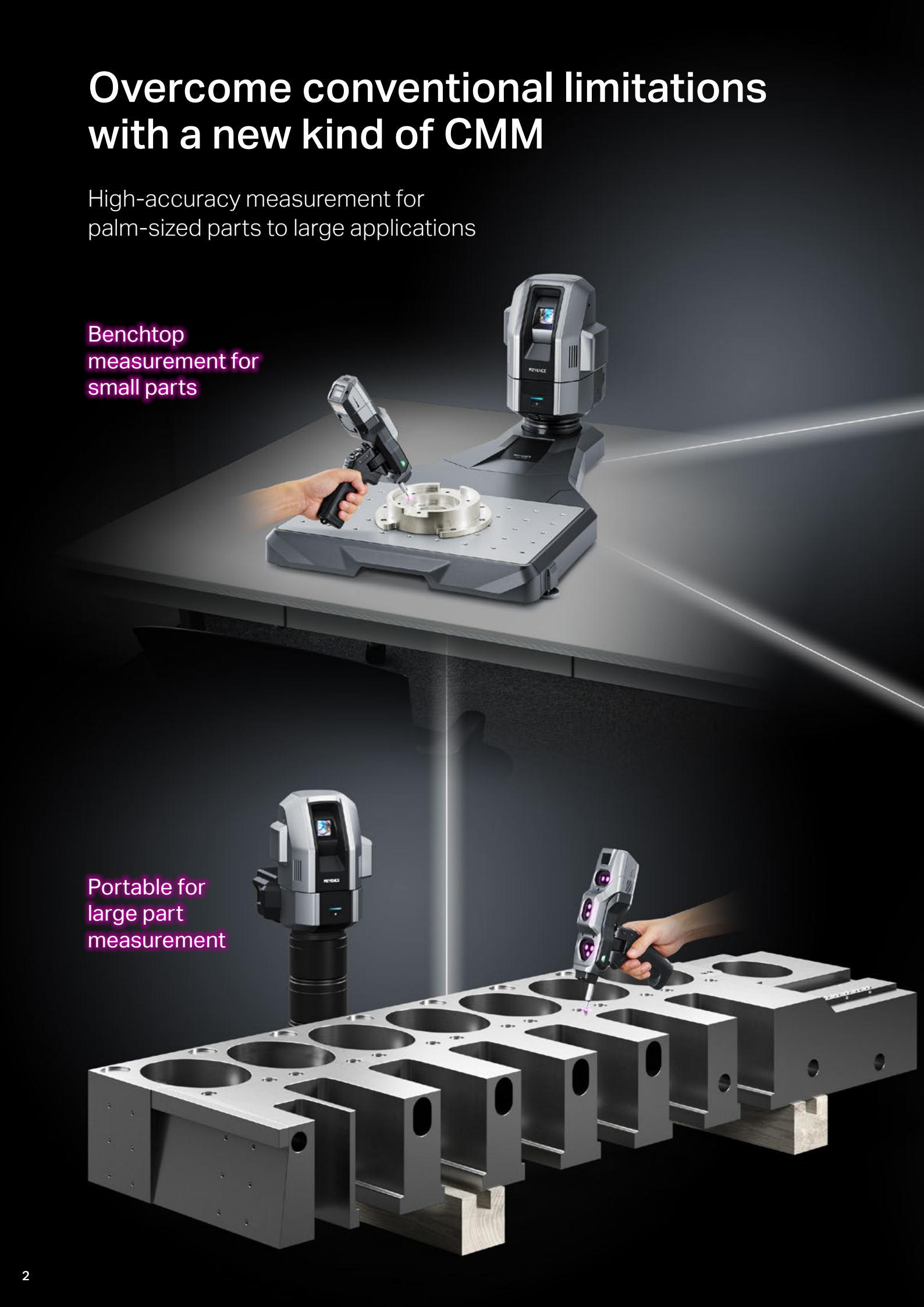
XM-5000

Portable, Benchtop CMM

High-accuracy measurement over a large area; on or off the system

Overcome conventional limitations with a new kind of CMM

High-accuracy measurement for
palm-sized parts to large applications




Adaptable to your workbench
In-machine measurement

Your Personal Coordinate Measuring Machine

Handheld Probe Coordinate Measuring Machine
XM-5000

Anyone

Built-in touch sensor for even greater ease-of-use

Easy-to-use free-angle probe

On-screen measurement guidance

Visual measurement overlay

Minimal training time

Simple interface

Anywhere

Measurement capability for any situation

Adaptable camera system

High-accuracy measurement in any environment

Ultra-robust camera and temperature compensation function

Hand tools

Advantages

- Easy to use by anyone
- Can be used anywhere

Disadvantages

- Unable to measure complex shapes
- Unable to measure GD&T
- Measurement results vary between operators

Bridge CMM

Advantages

- Measure complex shapes
- GD&T measurement
- High-accuracy

Disadvantages

- Difficult to operate
- Usable only in a specialised measuring room
- Ongoing costs

The XM-5000

Designed with advantages in mind

- As easy-to-use as calipers
- Can be used anywhere
- Can perform complex measurements anywhere
- High-accuracy measurement by anyone

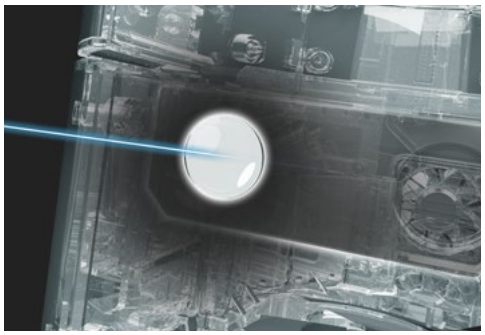
Dual-camera probe marker tracking

The XM-5000 adopts a new concept with a tracking camera that captures near-infrared light emitted by seven markers.
The probe search camera also enables measurement over a wide-area.

Probe position detection

Wide-area probe search camera

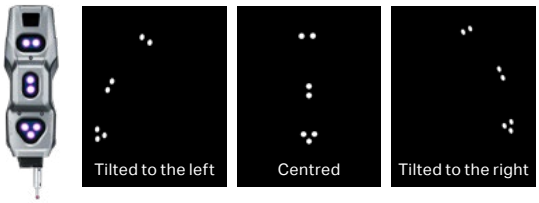
The probe search camera constantly tracks the light emitted by the probe to instantly detect the probe position anywhere within the wide measurement area.

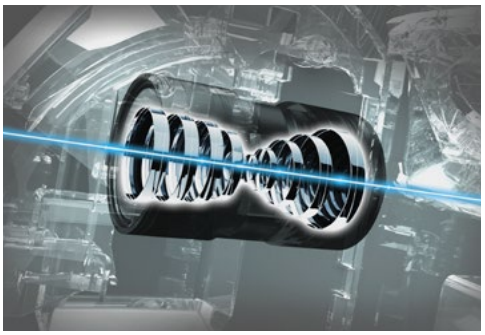


Probe position measurement

High-accuracy tracking camera

The tracking camera tracks the probe to identify its position and orientation with high accuracy.





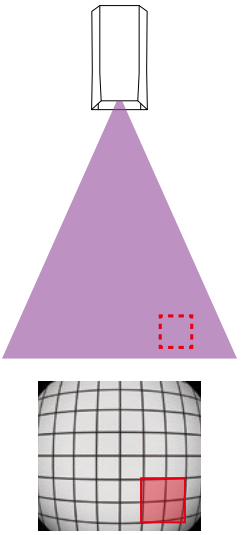
New measurement principle for high-accuracy over a wide-range

High-accuracy **Repeatability: ±3 µm**

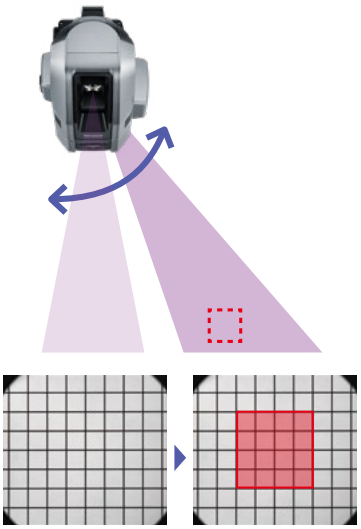
Capturing from the lens centre for the highest accuracy

The camera unit moves to ensure the marker is always captured from the centre of the lens for measurement with the highest possible accuracy.

▮Conventional camera



▮XM-5000 camera



XM-5000 lens with distortion correction

Measurement only from the area with the highest accuracy

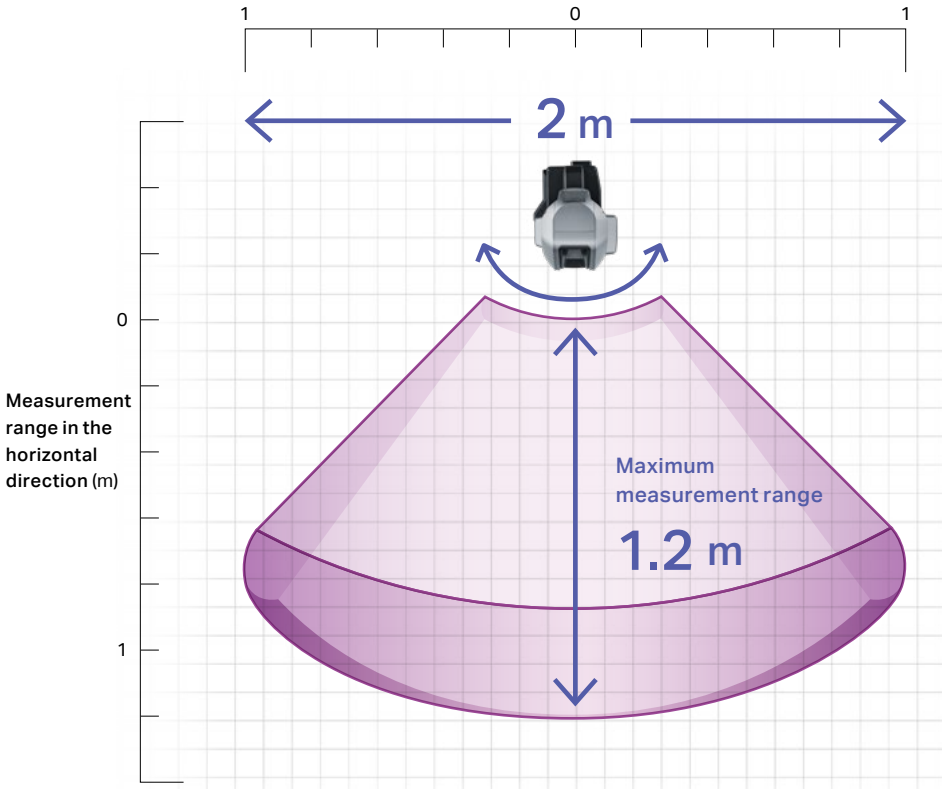
Reference camera for high-accuracy vertical and horizontal rotation measurement

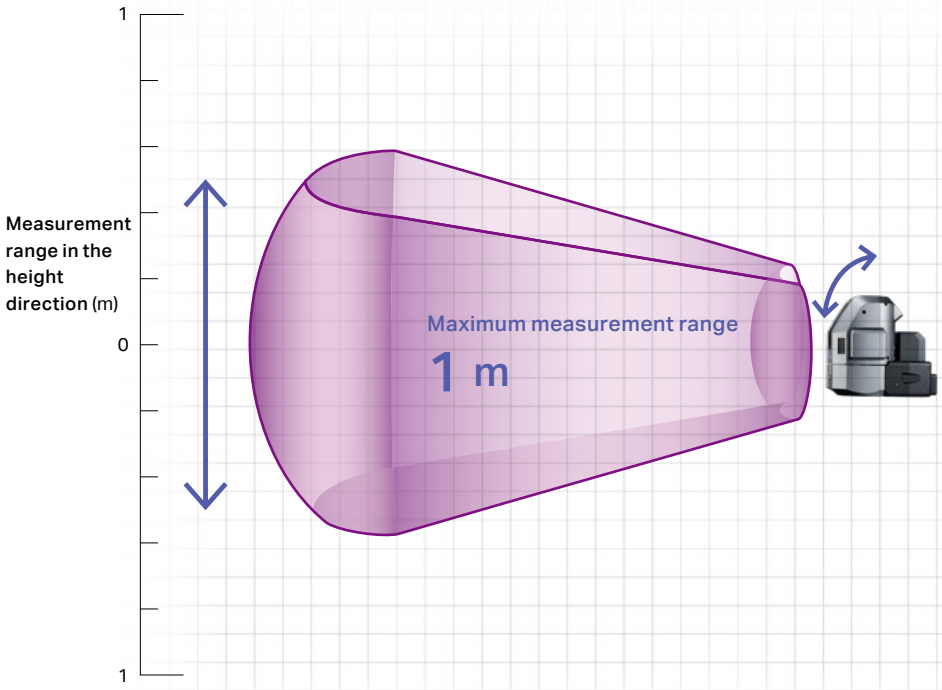
The internal chart and camera are used for detecting motion, allowing for high-accuracy measurement of the vertical and horizontal rotation of the tracking camera.

Wide-area **Maximum measurement range: 2 m**

Movable camera for stable measurement even for large targets

The camera can move up to 40 degrees to the left or right and up to 25 degrees up or down, enabling measurement over a wide area.





Easy-to-use free-angle probe designed for improved usability and accuracy

Probe marker position

Placing markers horizontally, vertically, in a triangle, and at different heights allows for stable measurement accuracy.

Front Side

Wide-variety of stylus options

* Compatible with commercially available products.

OLED display

Operation buttons

Probe detection status confirmation LED

Flexible-grip wireless probe with touch sensor for intuitive, accurate measurement

NEW Touch sensor

The built-in touch sensor is specially designed to activate when a certain amount of contact pressure is applied. This prevents variations due to contact pressure.

NEW Wireless

Wireless LAN connectivity makes it possible to use the probe in any setting without fussing with cables.

NEW Adjustable grip

The handheld grip can be rotated 90 degrees to either side, allowing for a more comfortable hold while the angle of the markers can be adjusted to face the camera.

Free-angle probe for intuitive handling

As long as the probe is within the camera's field of view, measurement locations can be approached from any angle. The probe can be used to measure the top surface of parts, horizontal or angled holes, and the rear with no part adjustment.

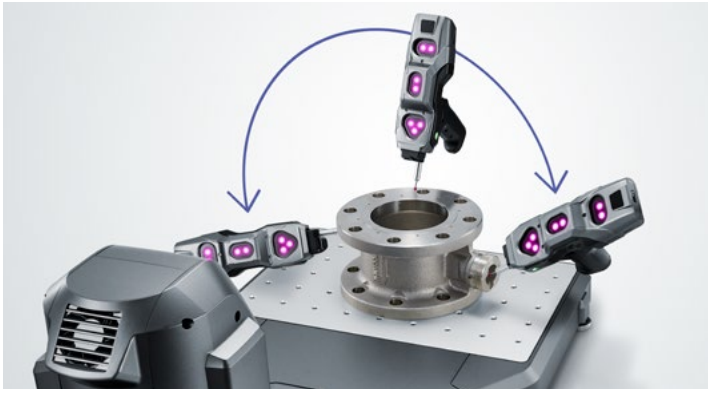


Image-based measurement results for easy visualisation

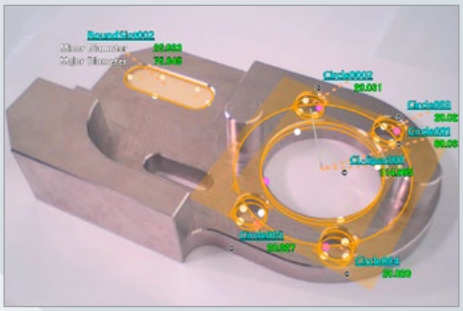
Small probe camera

The camera captures images of the target.

+

As measurement is performed...

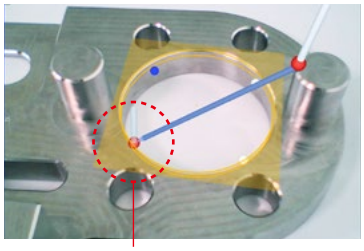
...the measurement results are displayed in real-time on the captured image.



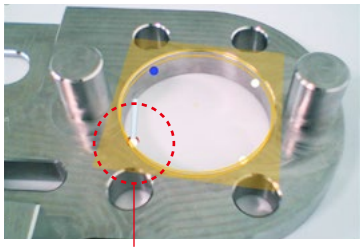
Easy-to-understand measurement results

On-screen visual guidance for repeated measurements

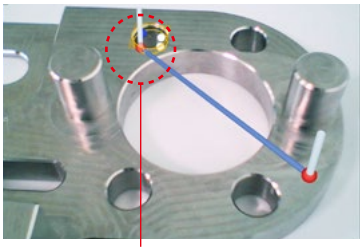
Anyone can measure a feature the same way it was originally measured simply by placing the probe against the location on the part displayed on the screen. The XM-5000 reduces subjectivity by automatically detecting if measurements were taken correctly.



Measurement point instructions are displayed.

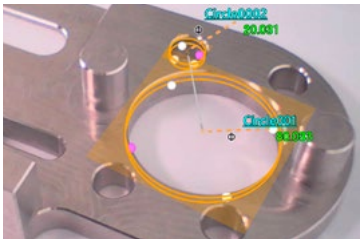


Follow the instructions to perform measurement.



Follow the next instruction to continue measurement.

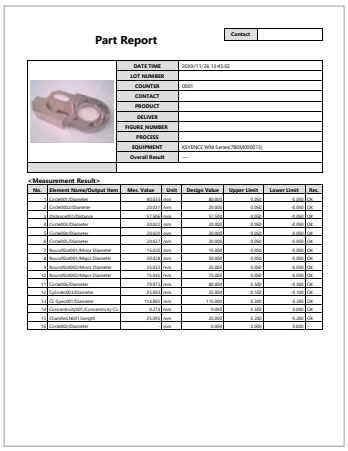
The measurement results will be displayed in a list alongside the judgement results.

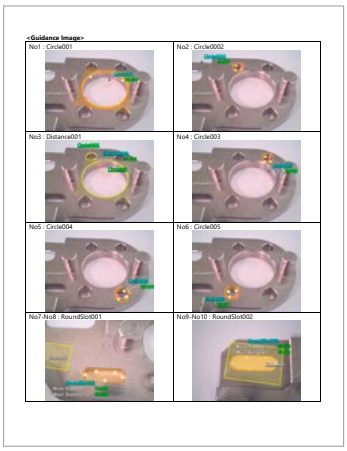


Continue to measure all parts without any expertise required.

Automatic creation of inspection reports with images for easy comprehension

The XM-5000 comes standard with a function for automatically creating inspection reports and work procedures that include camera images. Measurement points and items are laid out automatically, resulting in significant reductions in inspection report and operating instruction preparation time.





Easy-to-use and understand, even for first-time users

Coordinate measuring machine interfaces are often a mess of complex and unfamiliar commands. The XM-5000, however, uses images, icons, and other tools to ensure intuitive operation for any user.

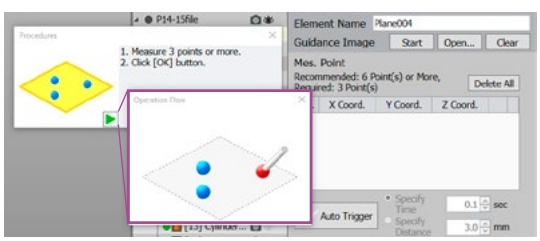
Measurement results display

Sortable elements tree

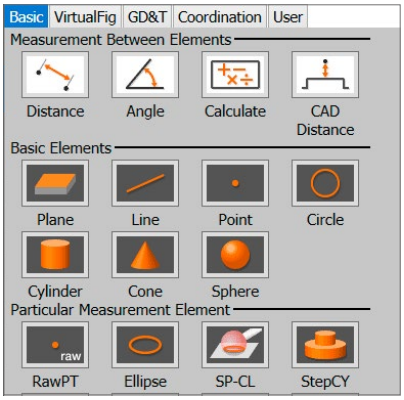
Drag measured elements up or down to change the order.

Easy-to-understand basic measurement menu

Frequently used basic measurement elements such as planes, lines, points, circles, cylinders, cones, and spheres are consolidated into a single tab. Each tool also comes with video instructions.



Clicking the ▸ button on the screen will bring up a window showing video instructions.

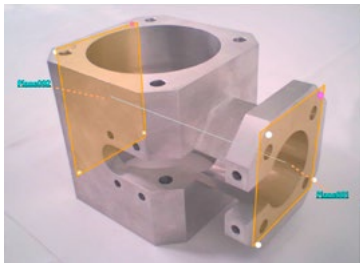


Simple interface for intuitive operation

Measurement can be performed without any complicated programming or selecting multiple commands with just three simple steps.
The intuitive operation makes it possible even for those unfamiliar with measurement to obtain measurement results easily.

1 Select the elements to measure.

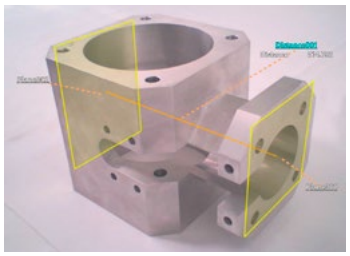
Click Plane from the Basic Elements in the measurement menu.



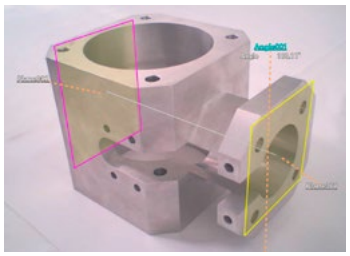
2 Touch the probe to the measurement location.

3 Simply the items to measure.

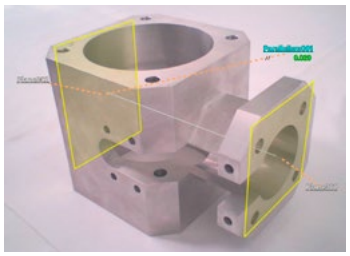
Distance measurement



Angle measurement

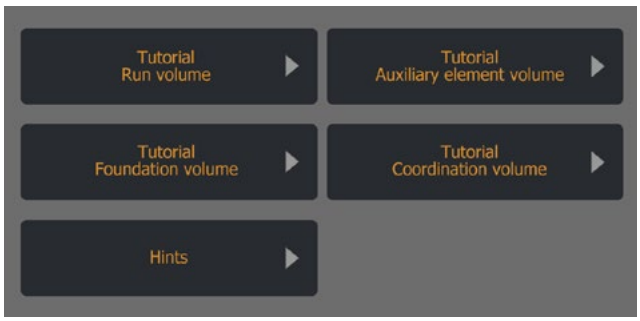


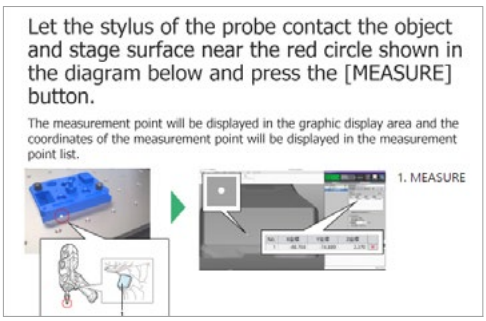
Parallelism measurement



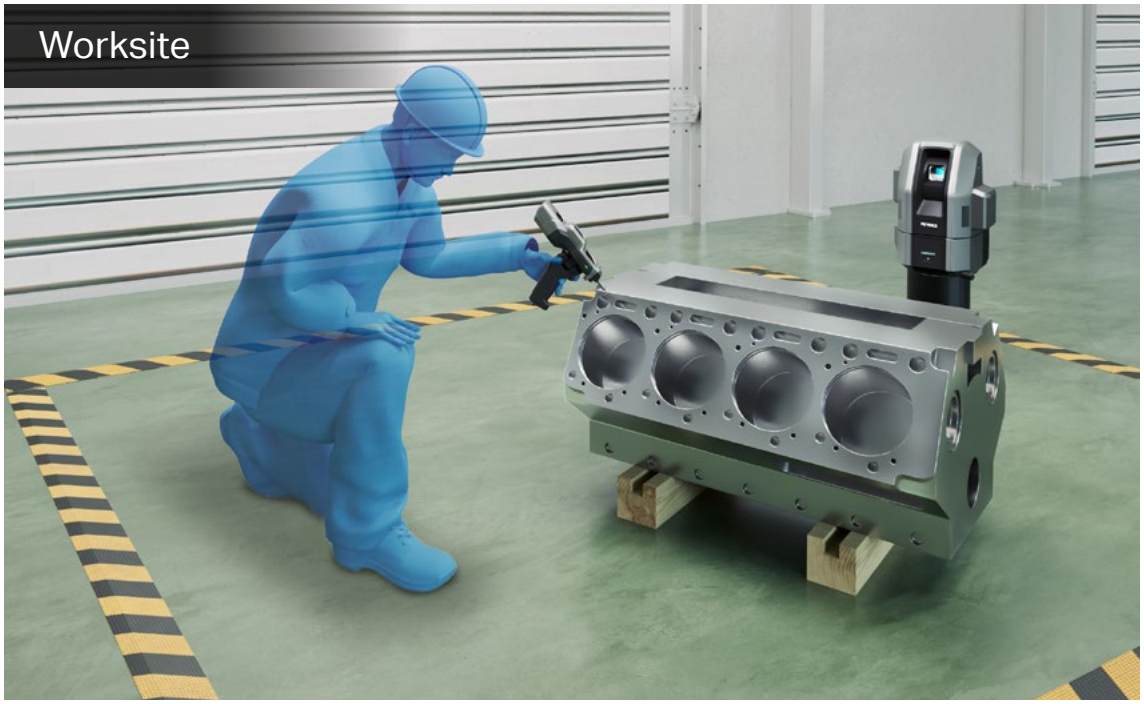
Tutorial function

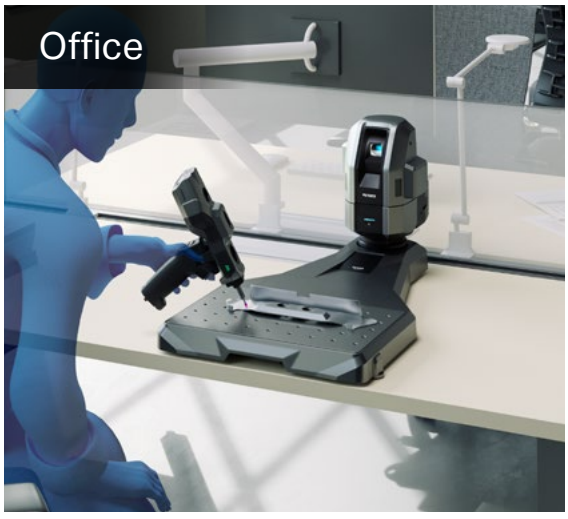
The tutorial function provides easy-to-understand measurement instructions with images.
This allows even first-time users to check measurement methods without having to look at the manual.

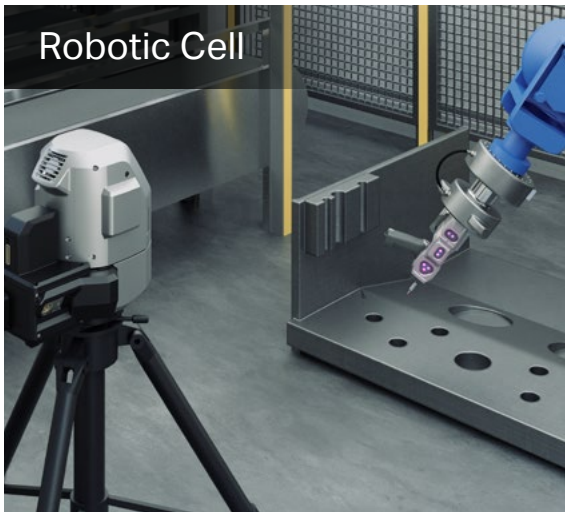




Measurement capability for any situation

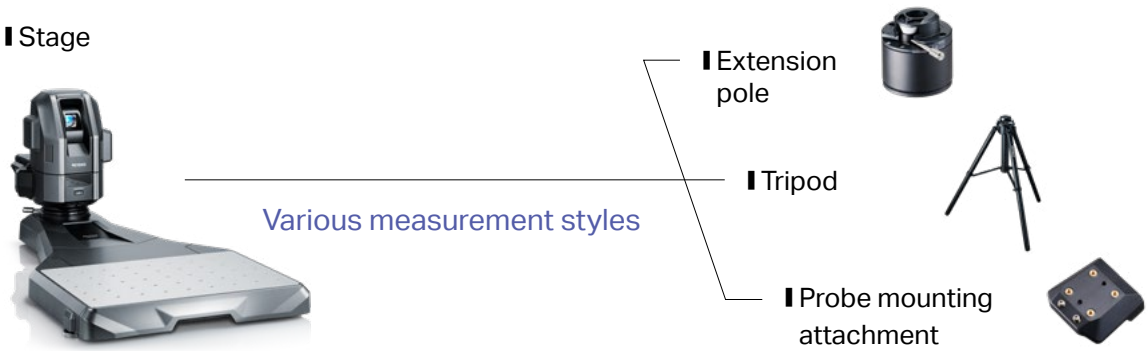




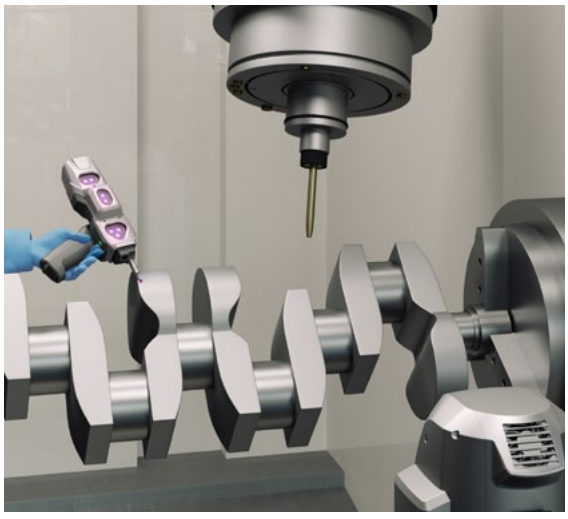


Flexible installation

A wide-variety of available attachments to suit the installation needs of the actual worksite.
Whether in an office or on shop floors, the XM-5000 enables measurement in any setting.



In-machine measurement



Advantages of in-machine measurement with the XM-5000

Hand tools

- Unable to measure complex shapes
- Unable to measure GD&T
- Measurement results vary between operators

On-device measurement touch probes

- Measurement limited to machining axis
- Difficult to configure measurement settings
- Measurement takes time, so processing takes longer

XM-5000

- **High-accuracy measurement by anyone**
- **Complex measurements and GD&T measurements**
- **Measurement with a calibrated measuring instrument**
- **Faster measurement of target locations with less processing stop loss**

Install wherever measurements are needed

On-site usability with no need for a quality lab

Paying close attention to the measurement unit materials and device design, KEYENCE wanted to make a CMM that can be used anywhere. With no need for an environmentally controlled measuring room, the XM-5000 can be installed wherever necessary.

Probe internals (quartz glass)

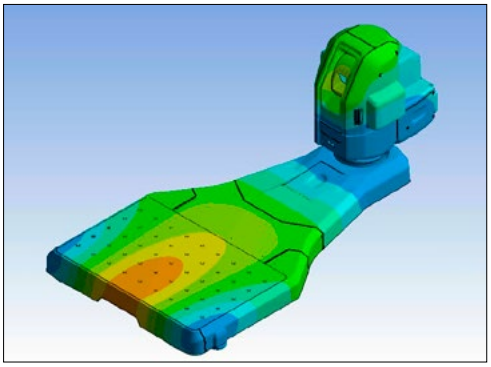
Specially designed ultra-robust camera

Robust design for use in adverse environments

The XM-5000 is designed to be durable and rigid for use even in harsh environments like manufacturing sites.

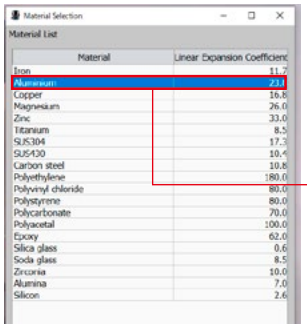
Built-in environment diagnosis function

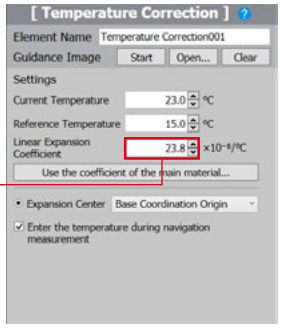
A high-accuracy sensor in the camera unit diagnoses whether ambient vibrations will adversely affect measurement.

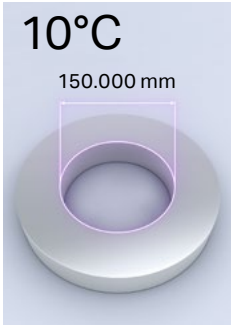


Accurate measurement even with temperature changes

The XM-5000 includes a temperature compensation function that ensures measurement targets are measured under the same conditions, just like a climate-controlled measuring room, even if the ambient temperature is not constant. Simply select the current temperature and the material, and the device will automatically compensate for the standard temperature dimensions.

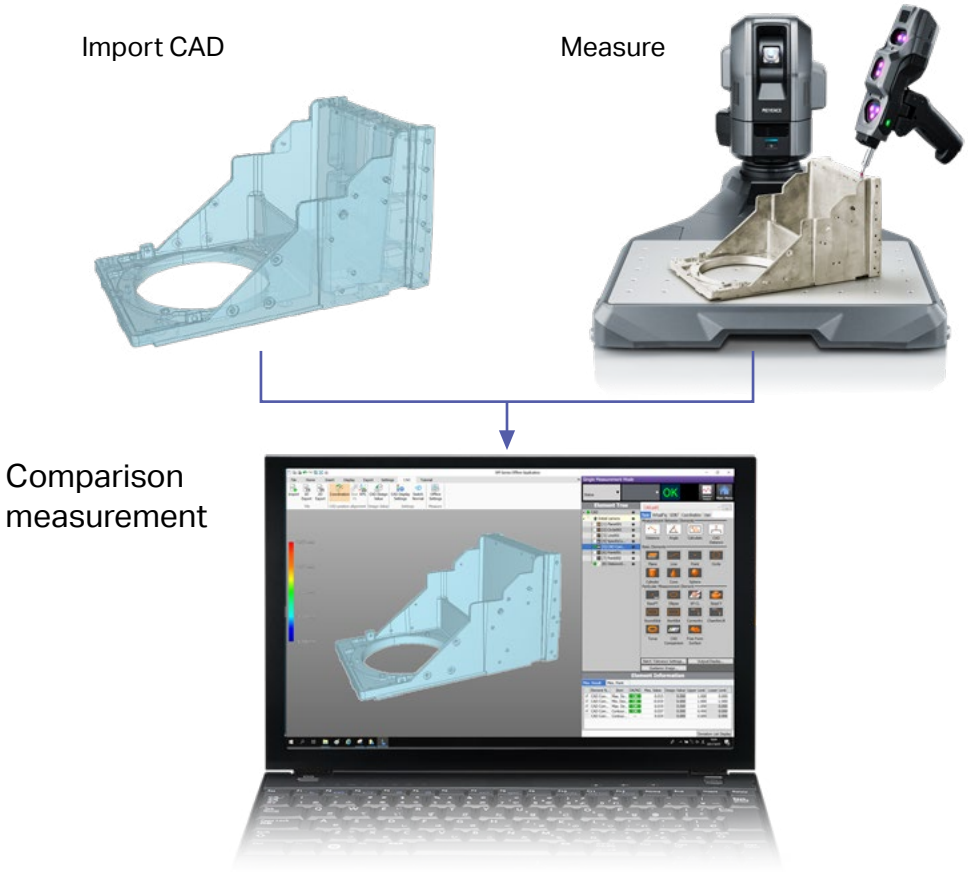






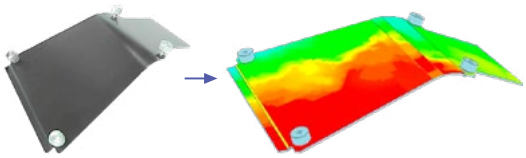
Compare with 3D CAD data

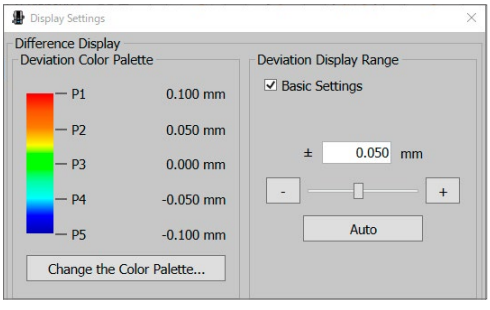
Optional accessory: **XM-H5C**



Comparison / colour map function

Comparative measurement of parts is possible using the shapes from imported 3D CAD files. The points of difference between the target and the 3D CAD data can also be displayed as a colour map.





Profile measurement

A surface profile tool has been added to GD&T measurement elements. This tool makes it possible to measure curved surface shapes.

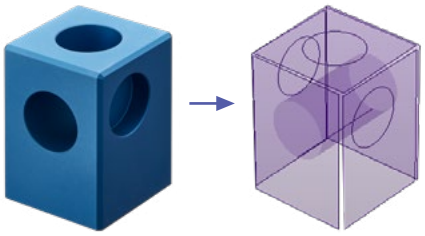
Contour profile

Item	OK/NG	Mes. Value	Design Value
Max. Deviation	OK	0.015	0.000
Min. Deviation	OK	-0.019	0.000
Max. Deviation...	OK	0.019	0.000
Contour Profile	OK	0.037	0.000
Contour Profile...	---	0.034	0.000

CAD data export

3D CAD export of measured elements

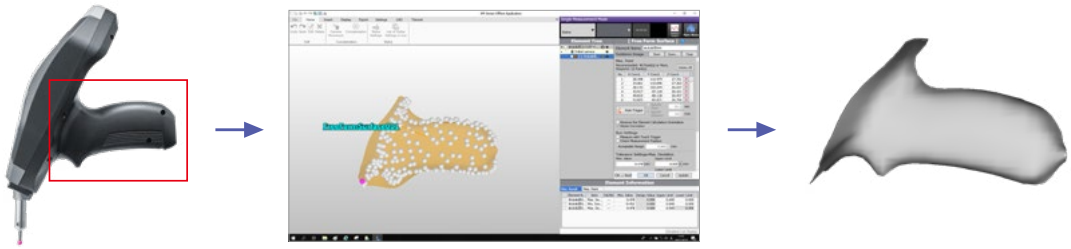
Measured elements such as planes, circles, and cylinders can be output accurately to 3D CAD files.



3D CAD export of free-form surfaces

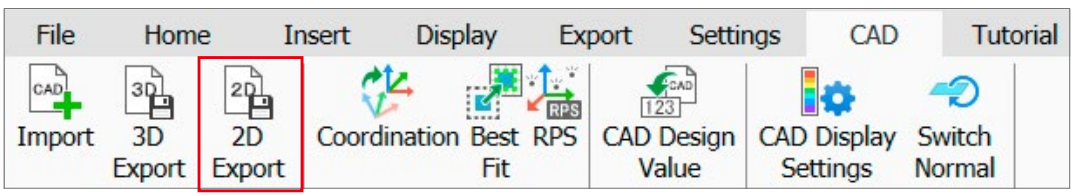
The XM-5000 can measure and output 3D CAD data even with curved objects simply by touching the probe to the part.

Actual product	Measure	Example of 3D export



CAD export of 2D elements

Circles and straight lines projected on a flat plane and their dimensions can be output as 2D CAD data (DXF files).



Statistical analysis function for summarising data

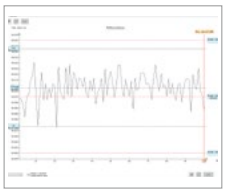
Run mode measurement results will be saved automatically to the control PC storage. Saved data can also be extracted for use with various statistical analyses.

Verification of statistics values

Key statistics values such as pass/fail count, max. value, min. value, average, σ, 3σ, 6σ, and Cpk for selected measurement items can be calculated automatically and displayed.

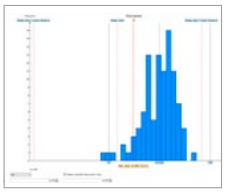
Trend graph

The trends for selected measurement items can be viewed in a graph. This allows for visualisation of such trends as increased variation, upward/downward measurement trends, and periodic fluctuations.



Histogram

The variations for each selected measurement item can be viewed in a graph. The graph, which shows the range of measurements as the horizontal axis and the frequency as the vertical axis, allows users to see whether the measurements are centring on any values in particular and how the measurements vary.



Traceability system diagram

The laser interferometer used for inspection and calibration has been calibrated by a UKAS accredited company for a traceability system that meets international standards.

International standard	National Physical Laboratory
Accredited organisation	UKAS accredited contractor
Reference standard	Iodine-stabilised HeNe laser
Practical standard	Laser interferometer
Reference measuring machine	XM-5000 Handheld Probe Coordinate Measuring Machine

Calibration certificate

Follow up support

Delivery

After the product arrives, your local system specialist will provide training and assist with system implementation.

Practice material

Improve proficiency by using the practice materials included with the system.

Practice material

Technical support

KEYENCE employs dedicated staff who provide coordinate measuring machine support by phone or email.

Calibration

With the XM-5000, there is no need to worry about periodic calibration. Simply place the probe and camera in the dedicated case and send them to KEYENCE. KEYENCE will provide temporary replacement units (probe, camera) while the original machine is being calibrated.

Dedicated case

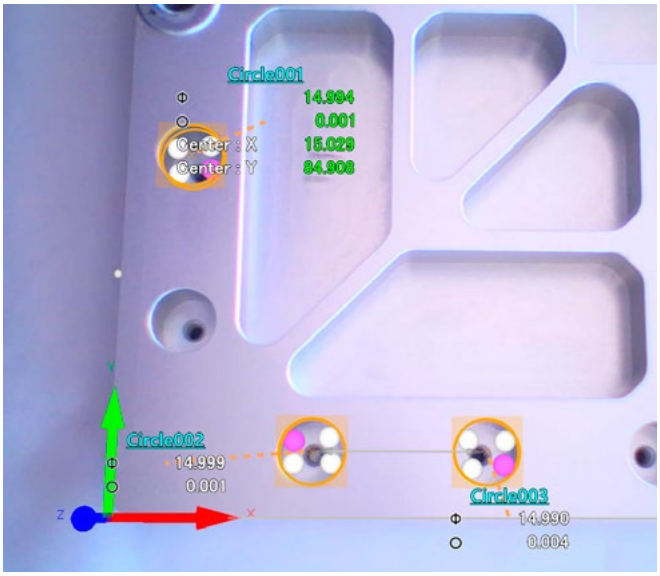
Simple stylus calibration

Simply place the stylus ball tip in the cone of the dedicated jig and measure at least 13 different orientations to complete calibration.

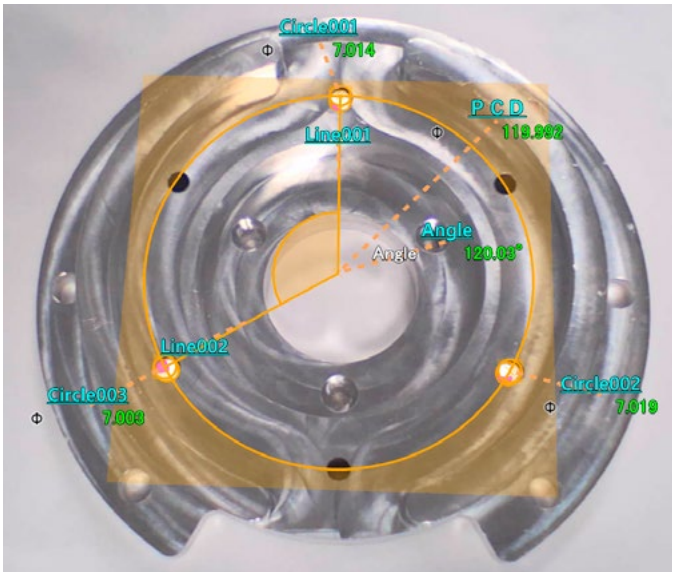
Easy calibration using the dedicated calibration jig

Application Examples

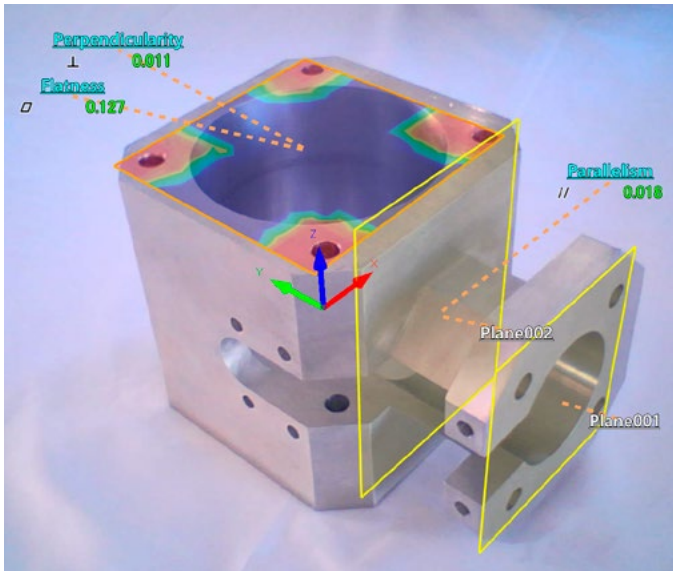
Machined and turned parts



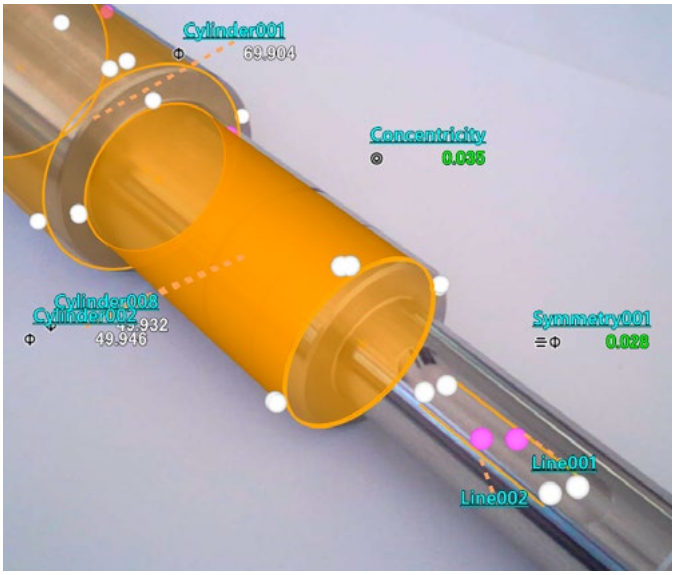
Hole distance, circularity, XY coordinates



PCD, dividing angle

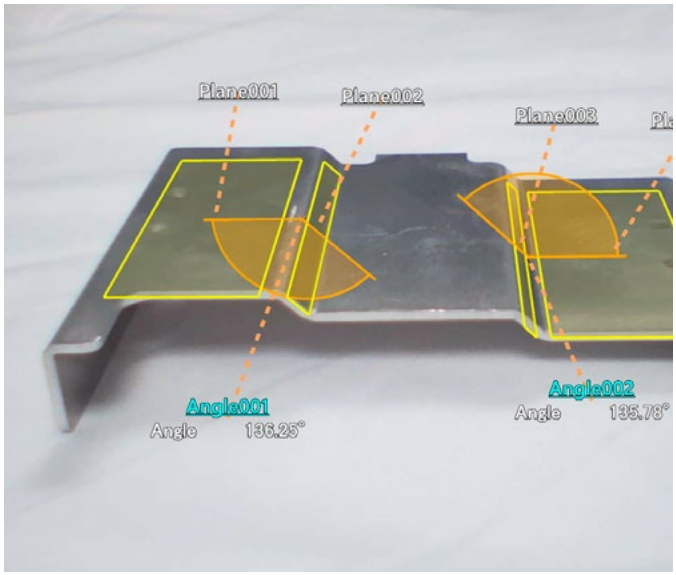


Flatness, perpendicularity, parallelism

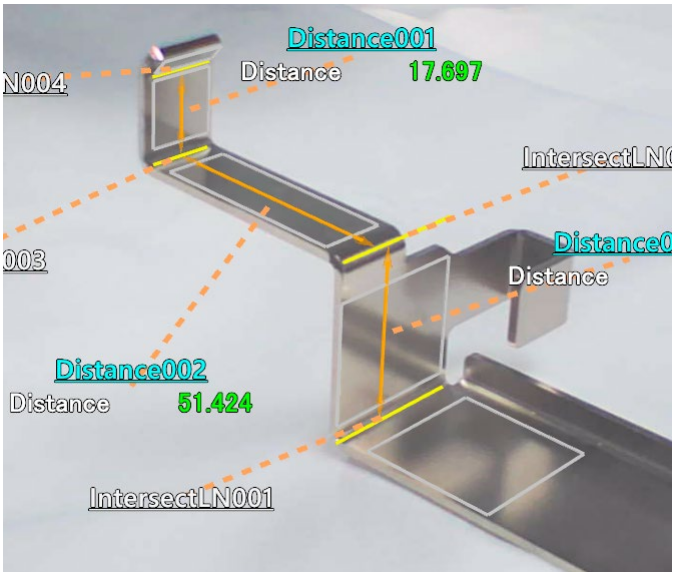


Coaxiality, symmetry

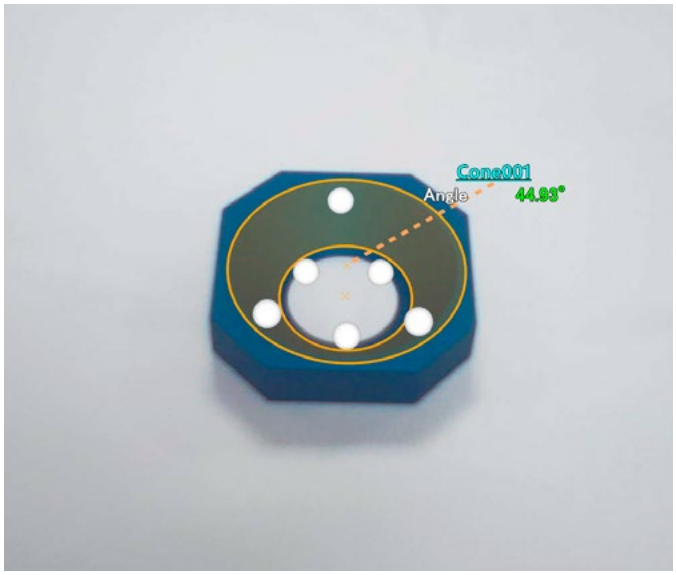
Stamped and plastic parts



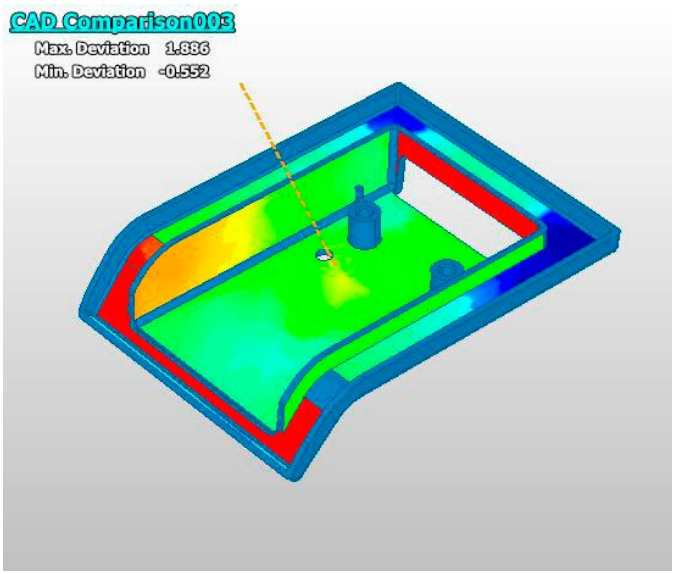
Bending angle



Distance between curved virtual lines



Taper



3D CAD comparison

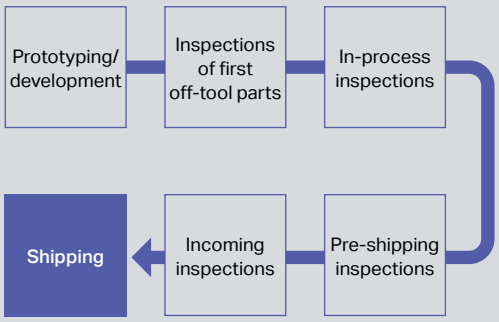
A small coordinate measuring machine with the power to bring about big changes

Improved efficiency through quick and accurate inspections

Significantly reduce inspection time by empowering any employee to measure anywhere. This allows for more time dedicated to other critical tasks, enabling shorter delivery times and overall improved work efficiency.

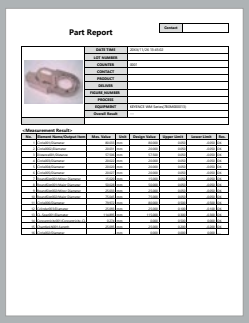
Reduced costs through inspection process improvements

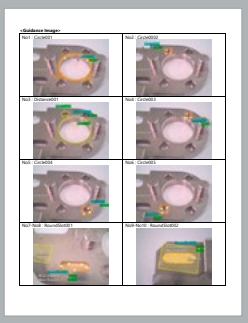
The ability to perform in-house inspection can help improve initial yield rates and reduce costs. Delays before shipping and inspection can also be eliminated by performing prompt inspections and quality evaluations during each process.



Improved reliability

Manufacturing instructions are becoming more strict every year, and being able to inspect complicated drawing locations can improve reliability with business partners. Moreover, inspection results issued by suppliers can also be reviewed through in-house inspections for greater clarity of process responsibility.


Part Report



Acquisition of new customers

The more advanced a manufacturing request is, the more important access to a coordinate measuring machine is. Being able to tell customers that you have access to a coordinate measuring machine makes it possible to ensure greater quality and to increase the number of handled projects without having to send work to other companies.

Enjoy even more advantages with the XM-5000

System Configuration

XM-5000

XM-5000A

Main unit accessories

ø5 mm standard stylus
OP-88421

Stylus extension

Star stylus attachment
OP-88658

Probe stand

Stylus
calibration jig

Camera unit
USB cable
OP-88420

Camera unit
AC adapter
OP-88369

Probe cable
OP-88667

Mouse

Training part

External devices

Control laptop PC

Control desktop PC

XM-5000 accessories

Probe battery
XM-B1

Battery charger
XM-BC1

Optional accessories

Camera unit tripod
XM-S1

Camera mounting
attachment
XM-AT

Camera unit
extension pole
XM-EX1

ø2.5 mm small
stylus
OP-88701

Auxiliary
measurement tools
OP-88233

Magnetic plate
XM-MP

M6 base plate
OP-88080

Sticky plate
OP-87946

Probe mounting
attachment
XM-RB

Needle stylus jig
OP-88550

Clamp set
972352

3D CAD import module	**XM-H5C**
3D CAD import module (CATIA-compatible)	**XM-H5C2**
Offline CAD software	**XM-H5P**
Data transfer software	**XM-H5T**

Specifications

Camera unit

Model		XM-5000	XM-5000A
Maximum measurement length	W × D × H	2000 × 1200 × 1000 mm	500 × 300 × 200 mm
Indication error accuracy		±(7 + 9L/1000) μm*1	±(7 + 9L/1000) μm*2
Repeatability		±3 μm	
Minimum display unit	Distance	0.0001 mm	
	Angle	0.0001 degrees	
Camera unit rotation angle	Theta rotation	±40°	±25°
	Tilt rotation	±25°	±20°
Weight		Approx. 8 kg	
External input	2 inputs	Maximum applied voltage: 26.4 V, ON voltage: 19 V or more, OFF current: 0.1 mA or less	
External output	7 outputs (OK/NG/FAIL/ MEASURE/ERROR/TOUCH/ STROBE)	Maximum applied voltage: 30 V, Maximum sink current: 50 mA, Leakage current: 0.1 mA or less, Residual voltage: 1.4 V or less (50 mA) / 1.0 V or less (20 mA)	
Probe	Number of possible connections	1	
Communication unit	WLAN communication	IEEE 802.11b/g/n	–
	USB communication	USB 3.0	
	Infrared communication	945 nm	
Power supply		Supplied from dedicated AC adapter	
Rating	Rated voltage	24 VDC	
	Current consumption	1.7 A	
Environmental resistance	Operating ambient temperature	10 to 35°C	
	Operating ambient humidity	20 to 80% RH (no condensation)	

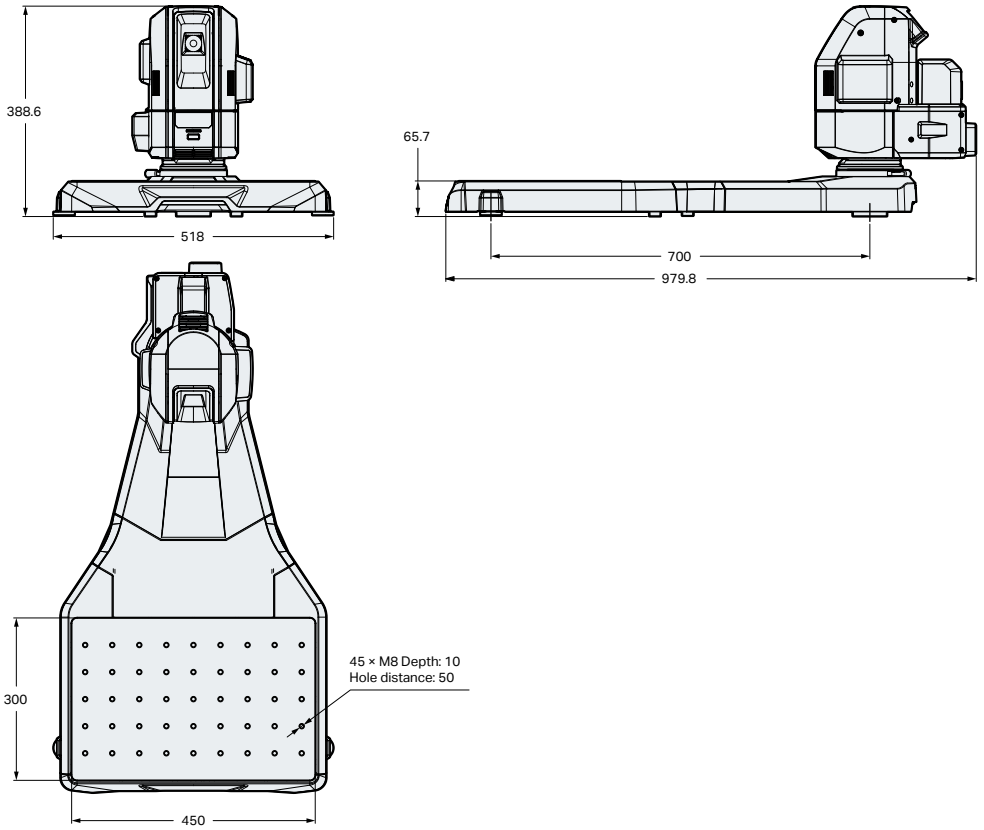
*1 Refer to ISO 10360-2 (in the range of 800 × 400 × 500 mm and when the ambient temperature is 20°C ±1°C; "L" represents the measurement length (Unit: mm))
*2 Refer to ISO 10360-2 (in the range of 200 × 200 × 150 mm and when the ambient temperature is 20°C ±1°C; "L" represents the measurement length (Unit: mm))

Probe

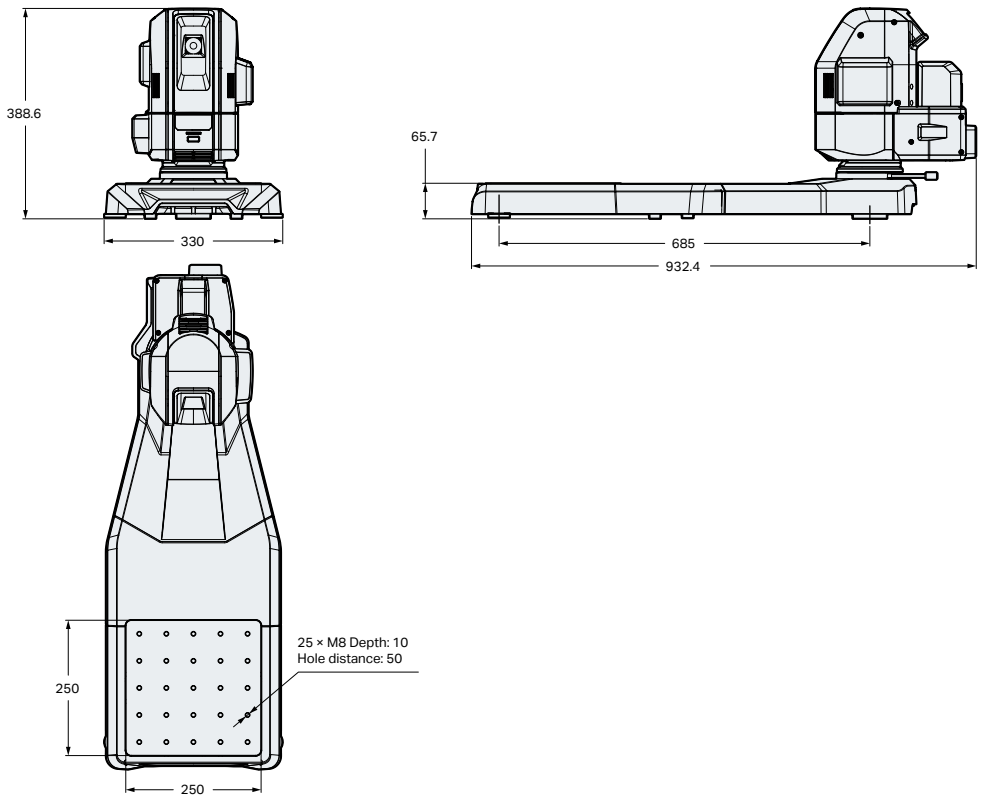
Model			XM-5000	XM-5000A
Marker		Number of markers	7	
Light source			870 nm	
Applicable stylus			M5	
Display		Display method	OLED	
		Resolution	96 × 39 pixels	
Hardware keys			MEASURE, OK, CANCEL, CAMERA, Trigger, Power	
Communication unit		WLAN communication	IEEE 802.11b/g/n	–
		USB communication	USB 2.0	
		Infrared communication	945 nm	
Power supply		Battery	Dedicated lithium-ion battery pack	–
		Capacity	3250 mAh	–
		Charging time	Approx. 6 hours	–
		Continuous usage time	Approx. 8 hours	–
Rating	USB connection	Rated voltage	5 VDC	
		Current consumption	1 A	
	Battery	Rated voltage	3.6 VDC	–
		Current consumption	1.25 A	–
Environmental resistance		Operating ambient temperature	10 to 35°C	
		Operating ambient humidity	20 to 80% RH (no condensation)	
Weight			Approx. 630 g	

Dimensions

Measuring unit **XM-5000/XM-H5000**

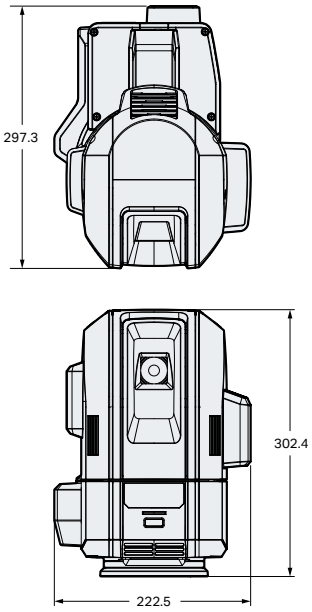


Measuring unit **XM-5000A/XM-H5000A**



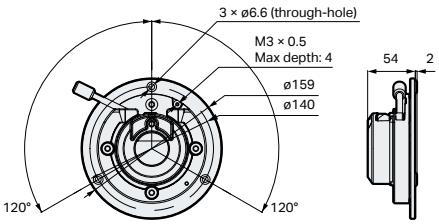
Unit: mm

Camera unit



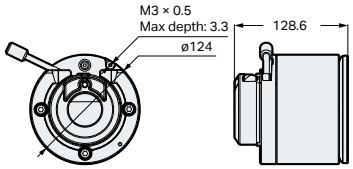
Camera mounting attachment

XM-AT



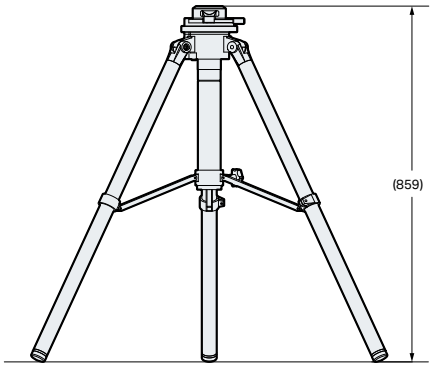
Camera unit extension pole

XM-EX1

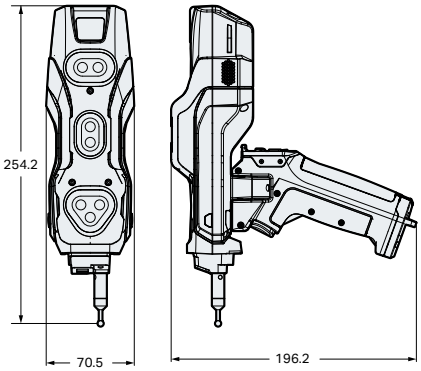


Camera unit tripod

XM-S1

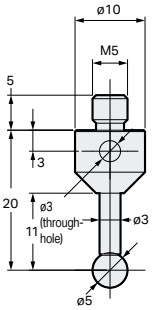


Probe

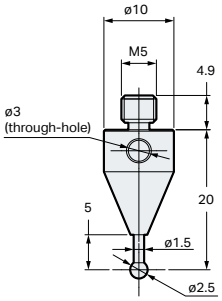


Stylus

OP-88421

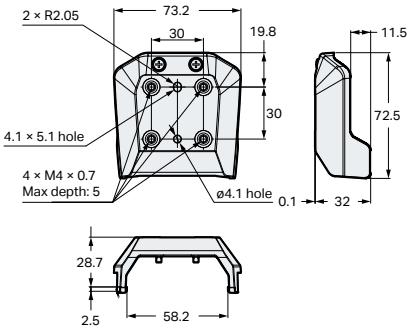


OP-88701



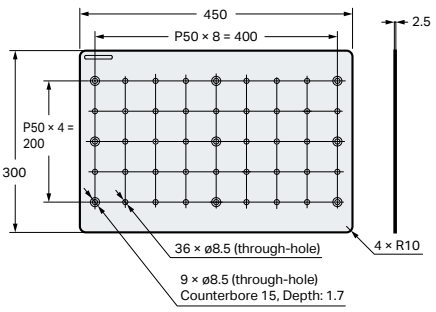
Probe mounting attachment

XM-RB



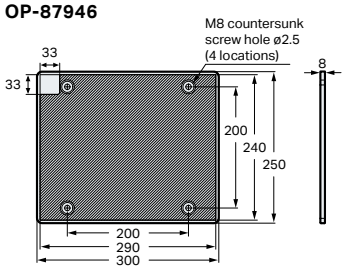
Magnetic plate

XM-MP



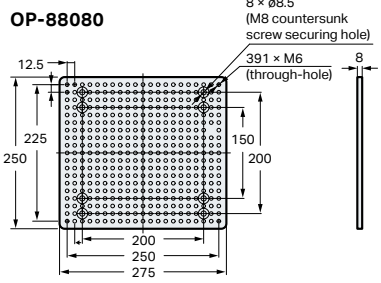
Sticky plate

OP-87946



M6 base plate

OP-88080



Your Personal Coordinate Measuring Machine

KEYENCE CORPORATION

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