KEYENCE

NEW **Handheld Probe Coordinate Measuring Machine**
XM Series

Portable, Shop Floor

Coordinate Measuring Machine

The world's easiest-to-use coordinate measuring machine

NEW

Handheld Probe Coordinate Measuring Machine

XM Series

Anyone

Use freely and easily, just like a caliper

Handheld probe

Just touch the probe to the part

Small probe camera

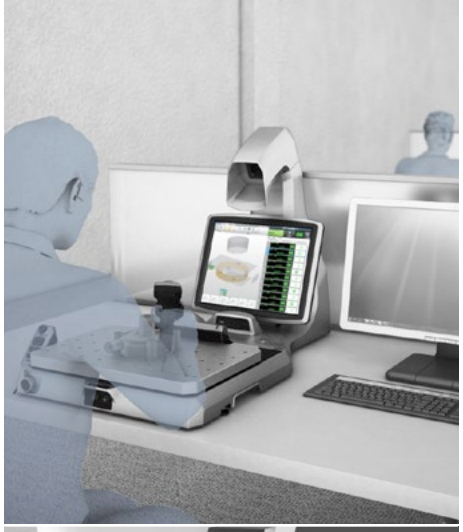
Minimal training time

Easy-to-use

New Function

Compare with 3D CAD data

Additional GD&T and advanced features are now available



Anywhere

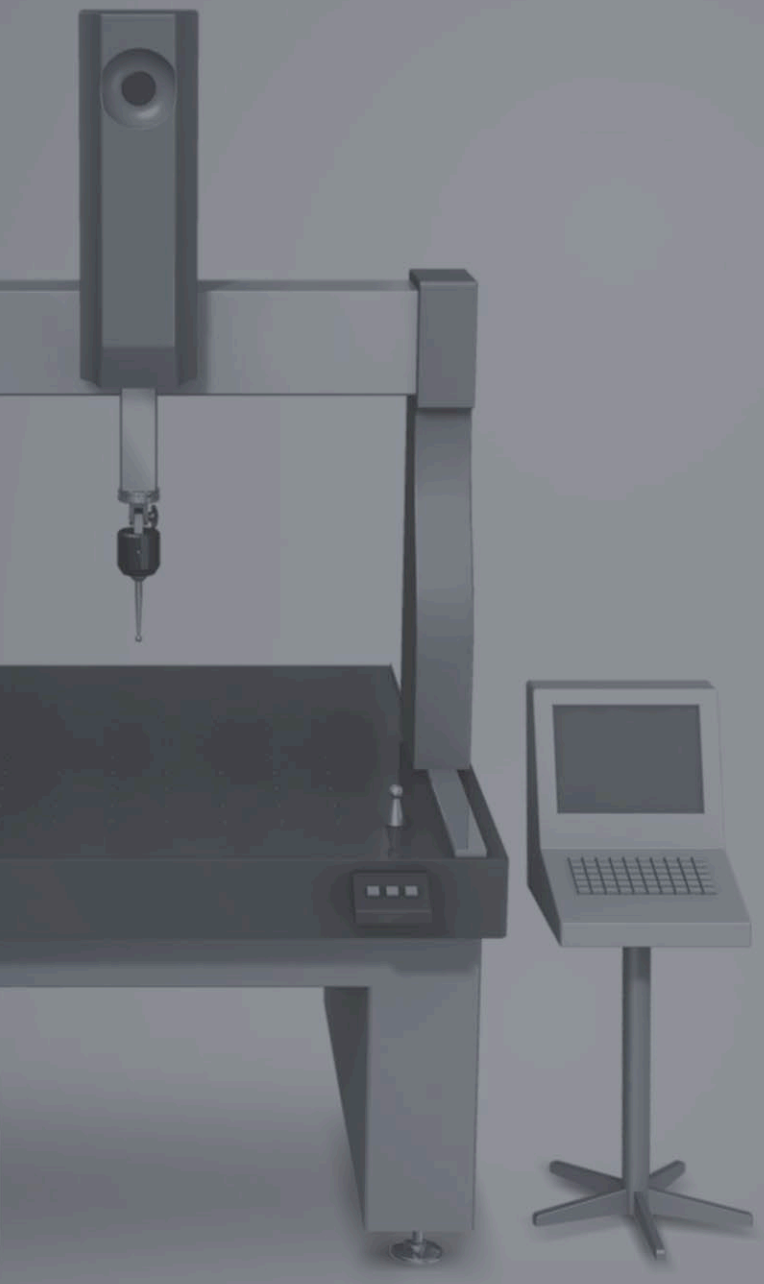
Turnkey system

All-in-one design

A larger measurement area for improved convenience

Xθ stage

The hurdles of implementing a conventional coordinate measuring machine



Conventional coordinate measuring machines

Ongoing costs

Maintenance and calibration
are costly ongoing needs.

Controlled environment

Needs a large space and a
regulated operation environment.

Difficult and complex

Required highly-trained operators and
time-consuming programming.

The XM Series is a portable coordinate measuring machine that anyone can use

Solution: XM Series

NEW

Handheld Probe Coordinate Measuring Machine

XM Series

No cost of ownership

Initial and running costs
are greatly reduced.

Small footprint

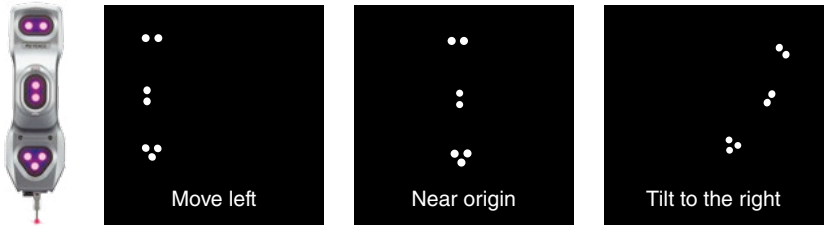
The XM Series can be moved on a cart and doesn't require additional equipment such as a granite table.

Easy-to-use

As simple to use as a set of calipers.

High-precision measurements are enabled through probe marker triangulation.

The XM Series uses a new concept that utilizes a camera that captures near-infrared light emitted by seven markers. This enables an accuracy of ±8 μm and repeatability of ±3 μm.



[Probe information captured by the ultra-robust camera]
Using the coordinate data from each marker, the machine is able to determine the position and orientation of the probe.

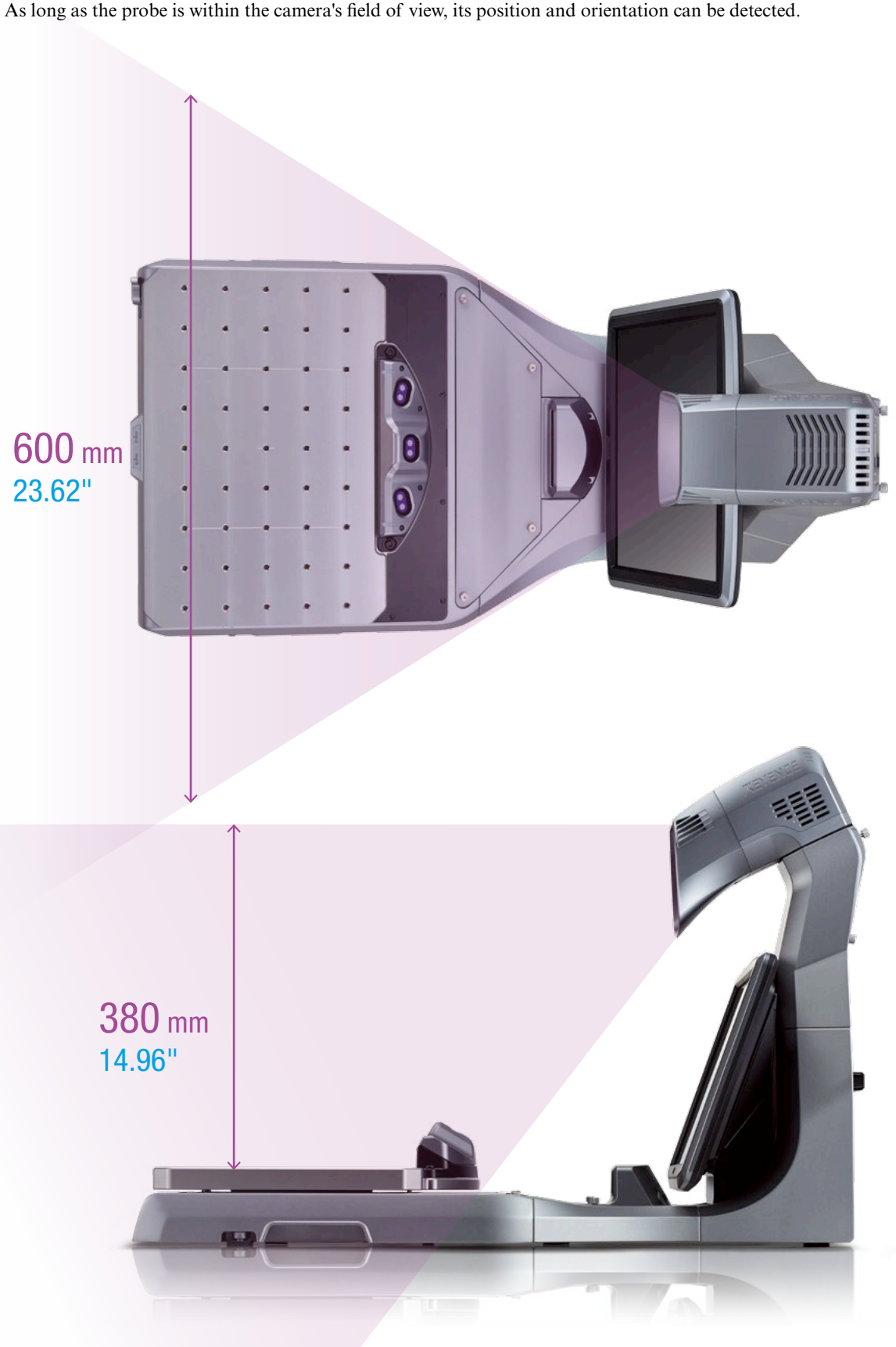

Ultra-robust camera
KEYENCE

Optical technology enables freedom of approach with no vertical or horizontal movement restrictions.

As long as the probe is within the camera's field of view,
you can approach the measurement location from any angle.

Compact body, wide camera angle

The camera detects only the near-infrared light emitted by the markers.
As long as the probe is within the camera's field of view, its position and orientation can be detected.

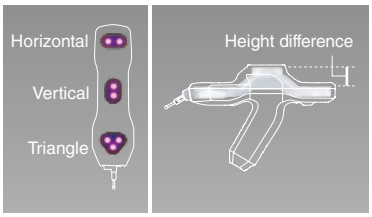


Use freely and easily, just like a caliper

Take highly accurate measurements

Probe marker position

KEYENCE achieved stable measurement accuracy by placing markers horizontally, vertically, and in a triangle, and at different heights along the probe.



Front view　Side view

Detection status confirmation LED

Green means you can measure

Prevents measurement errors and damage through contact pressure

All-in-one structure

Integrated construction reduces measurement errors. The cushion structure also prevents contact damage.

Hold probe naturally for optimal positioning

Ergonomically designed grip

The probe is designed to directly face the camera when the stylus is facing directly downward for optimal detection of the light from the markers. Made from oil-resistant PBT resin, the probe is suitable for use in any environment.

Change the stylus for an optimal approach to each measurement area

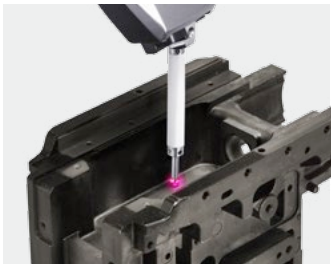
Change stylus position

Stylus position: down

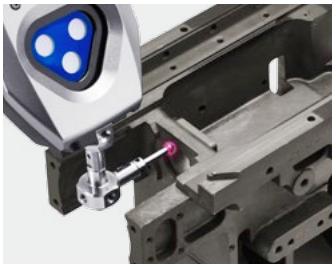
Stylus position: center

Stylus position: up

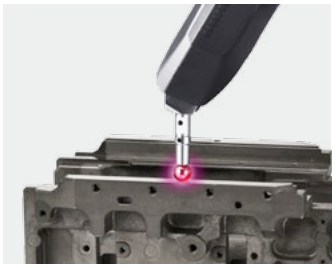
Choose different styluses *Compatible with commercially available products.



Extension

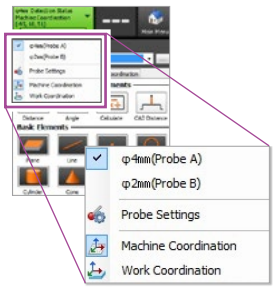


Star stylus



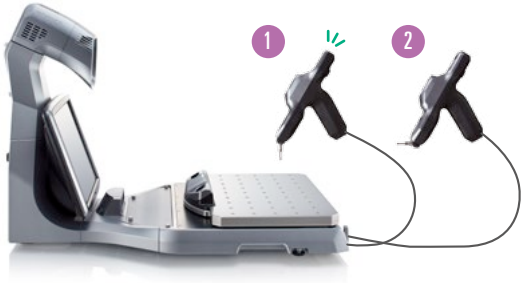
Larger diameter stylus

Connecting two probes simultaneously further improves usability



Quick probe selection

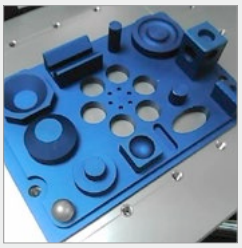
Simply use the pull-down menus on the screen to switch between two probes equipped with different stylus setups. There's no need to change (and calibrate) styluses during part measurement. The detection status confirmation LED shows which probe is active.



Just touch
the probe to the part

The XM Series overlays the 3D image with probe camera image
to simultaneously display the measurement information right on a live image of the part.
Even users with no previous coordinate measuring machine experience
can intuitively understand what is being measured.

Small probe camera



Probe camera image

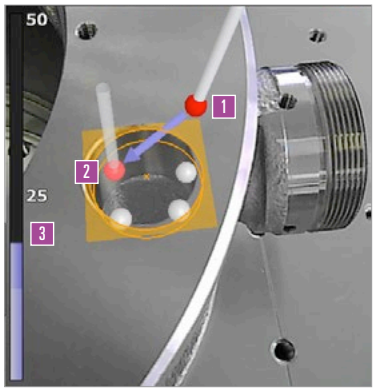
3D image

Composite image

Augmented reality measurement guidance

Anyone can measure the features the same way it was originally measured. Simply place the probe against the location displayed on the composite image. The XM Series reduces subjectivity by automatically detecting if measurements were taken correctly.

Guidance measurement window



1 Current position display
Displays position of measuring probe tip

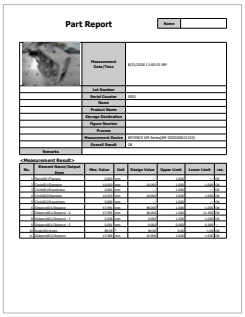
2 Measurement point display
The next measurement point flashes

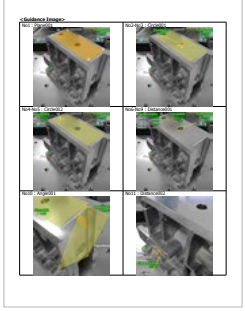
3 Distance indicator
The distance between the next measurement point and the active probe tip is displayed as a bar graph

After measurement: the OK/NG result window

Automatically creates inspection reports with images attached for easy comprehension

The XM Series comes standard with a function for creating inspection reports that include camera images. The measurement locations and measurements are automatically formatted, greatly reducing the time required to create inspection reports.



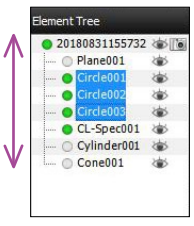


Minimal training time

Coordinate measuring machine interfaces are often a mess of complex and unfamiliar commands. The XM Series, however, uses images, icons, and animations to help anyone easily understand how to operate the system.

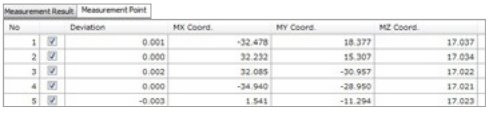
Sortable elements tree

Elements are displayed in a tree in the order in which they were measured. Intuitively correct measurements and change the order in which they are displayed.



Measurement location detail display area

GD&T measurements and coordinates are simultaneously calculated for each element. The deviation for each measurement point can also be displayed.

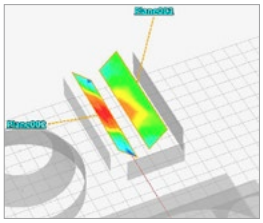


New Function

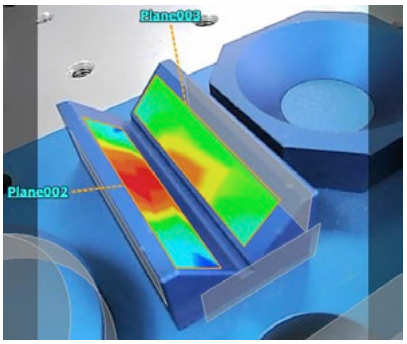
Color map display

Option: **XM-H1C**

Shapes such as planes and cylinders can be displayed as a color map. Use the camera image as an overlay to intuitively detect warpage.



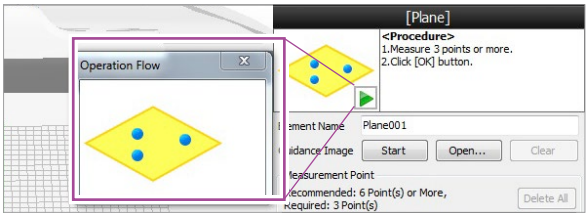
3D image



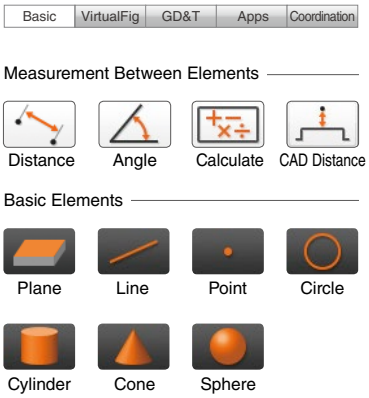
Composite image

Easy-to-understand measurement tools

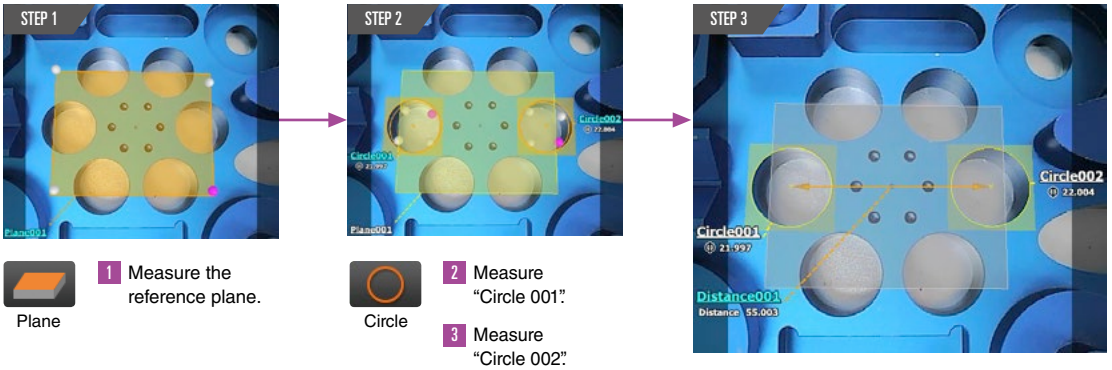
Frequently used basic elements such as planes, lines, points, circles, cylinders, cones, and spheres are consolidated into a single tab. Each tool comes with video instructions.



Clicking the green "▶" on the screen will bring up a window showing video instructions.



Measurement procedure example: Distance between centers of circles



Plane

1 Measure the reference plane.

Circle

2 Measure "Circle 001."

3 Measure "Circle 002."

Distance

4 Use the Distance element and select Circle 001 and Circle 002 to display the center-to-center distance

Additional GD&T and advanced features are now available New Function

Compare with 3D CAD data

Option: **XM-H1C**

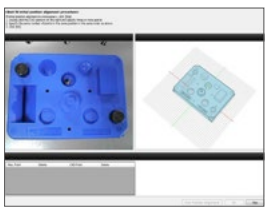
The XM Series can import 3D CAD files.
To carry out a comparative measurement, simply place the probe against the part.
The XM Series will display the differences in shape between the part and the imported 3D CAD data.

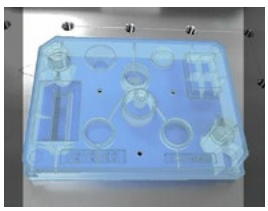
1 Read

2 Compare

Simple positioning

Anyone can easily match positions on the part to the 3D CAD object. You can match positions using part coordinates or best fit.





1 Read

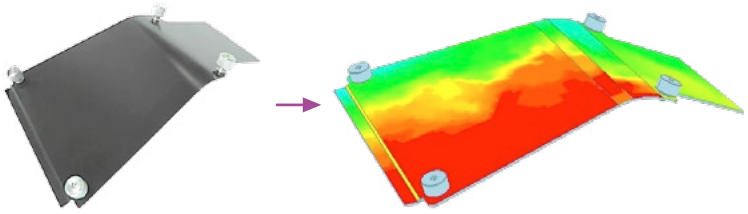
Batch import of design values and tolerances

Simply read the 3D CAD file and select the target elements to import design values and tolerances directly, enabling you to work much faster. (PMI import)

2 Compare

Comparing the shape of a part with 3D CAD data

You can perform a comparison measurement of the part you are measuring and the shape read from the 3D CAD file. You can display points of difference between the part and the 3D CAD data as a color map.



Measure the profile of a surface

Add "profile of a surface" to GD&T measurement.
Curved surface shapes can also be measured.

Profile of a surface

Item	OK/NG	Mes. Value
Max. Dev...	---	0.010
Min. Devi...	---	-0.020
Max. Dev...	---	0.020
Contour ...	---	0.040
Contour ...	---	0.030

Turnkey system

15" LCD monitor

Measurement results and image files can be viewed directly on the built-in high-definition monitor. This allows users to measure and check the data on the spot.

External interfaces

The XM Series can also be connected to an external monitor, printer, and any in-house LAN.

Xθ stage with a wide measurement range

The stage can be moved up to 100 mm 3.94" to the right and left and ±60° in the θ direction. This allows installation space to be kept to a minimum while providing a wide range of measurement.

Measure anywhere

Thanks to its compact design, the XM Series fits not only next to measurement tables and machines in the workplace but also in offices. That means no more carrying parts to a measuring room to be measured, and no more waiting around for measurement to finish backlog. The XM Series can also be placed on a cart.

On-site work

Office work

No need for a specialized measuring room and operating environment

The components of the XM Series were designed and built to withstand harsh, shop floor environments. (Works in temperatures of 10 to 35°C 50 to 95°F, and a humidity of 20% to 80%) The XM Series does not need an environmentally controlled quality lab because KEYENCE made a CMM that could be used anywhere.

Probe interior (quartz glass)

KEYENCE-designed lenses and housing

Works even in challenging environments

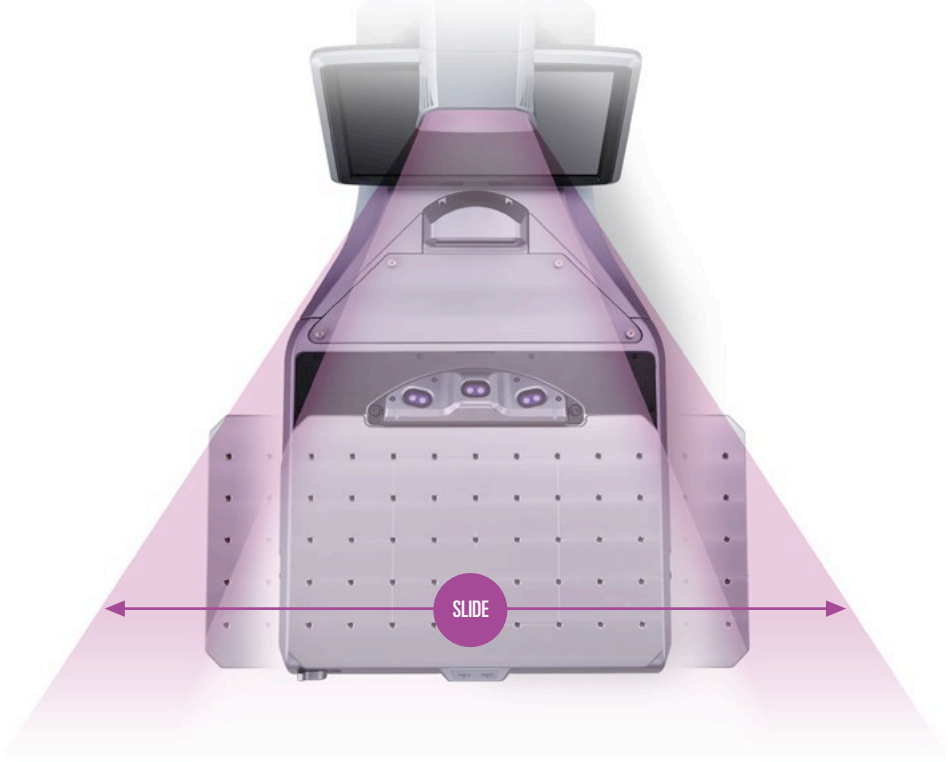
Common coordinate measuring machines need to be used in clean environments to prevent dust and contaminants from entering the measurement components (bridge). The XM series has no delicate bridge, making it suitable for use even in challenging workplace environments.

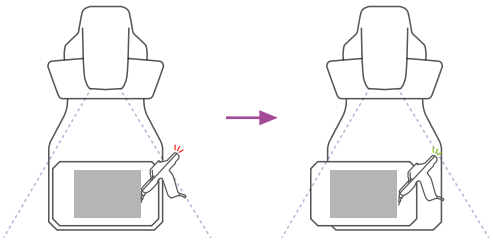
Optical operation concept with no bridge

Expanded measurement area for improved convenience

A wide measurement area that is double the width of conventional models

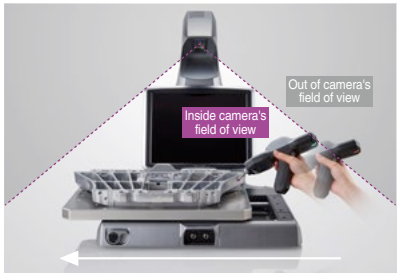
The stage of the XM Series can move ±100 mm ±3.94" to the left and the right, giving it double the left-right measurement range of conventional model and enabling you to always stay in front of the camera while measuring.





Before moving the stage:
Out of range

After moving the stage:
In range



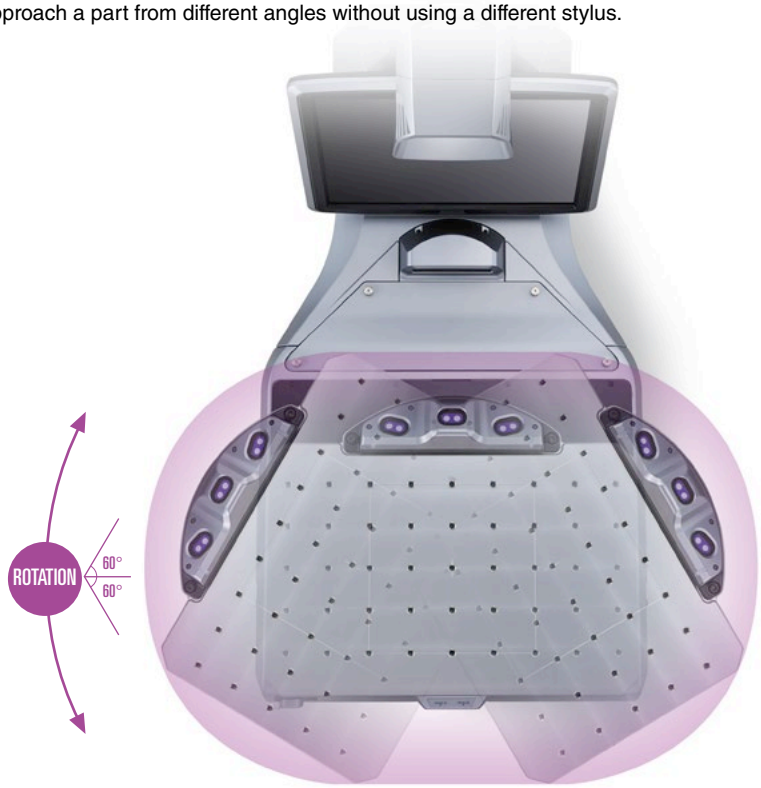
The stage moves to keep the probe in the camera's field of view

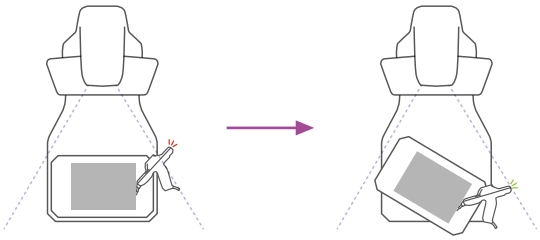
Stage markers enable high-precision position measurement

The stage is fitted with markers that enable high-precision recognition of movements and angles when you move the Xθ stage. When you are measuring long parts or the measurement position moves outside the camera's field of view, you can move the measurement position back.

Rotate the stage for easier measurement

Rotate the stage ±60° in the θ direction to keep measuring a part without repositioning it. You can also rotate the stage to approach a part from different angles without using a different stylus.





Before rotating the stage:
Out of range

After rotating the stage:
In range

Rotate the stage to keep the probe in the camera's field of view

Stable placement and smooth operation

The XM series is designed to have a low center of gravity and has a θ mechanism in a highly robust shaft. The machine's stable placement gives it wider range of measurement in a space that is virtually identical to that taken up by conventional models. Also, the stage can be moved just as easily regardless of how much weight is resting on it, enabling you to easily measure even heavy parts.

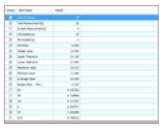
Highly robust stage that can withstand loads up to 25 kg

Statistical analysis function for summarizing data

Following run mode, measurement results will be saved and analyzed automatically using the system's built in SPC software.

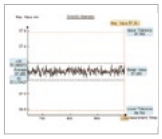
Verification of statistics values

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



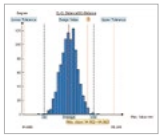
Trend graph

With the XM Series, the trends for selected measurement items can be viewed in a graph. This allows for visualization of such trends as increased variation, upward/downward trending measurements, and periodic fluctuation.



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 centering on any values in particular and how the measurements vary.



Traceability system diagram

The reference step gauge used for inspection and calibration has been calibrated by a DAkkS accredited company for a traceability system that meets international standards.

Inspection report

Calibration certificate

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

Follow up support

Delivery

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

Practice material

You can improve your proficiency using the practice materials included with the system.

Practice material

Technical support

Our offices employ dedicated staff who provide coordinate measuring machine support by phone or email.

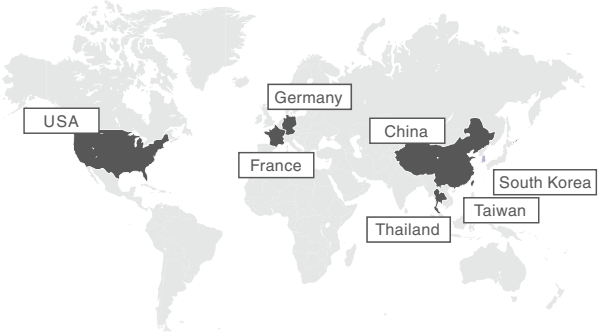
Calibration

No need to worry about handling periodic calibration of your machine. Simply place the probes, camera, and stage markers in the dedicated case and send them to KEYENCE. We will lend you temporary replacement units (probes, camera, stage markers) while your machine is being calibrated.

Dedicated case

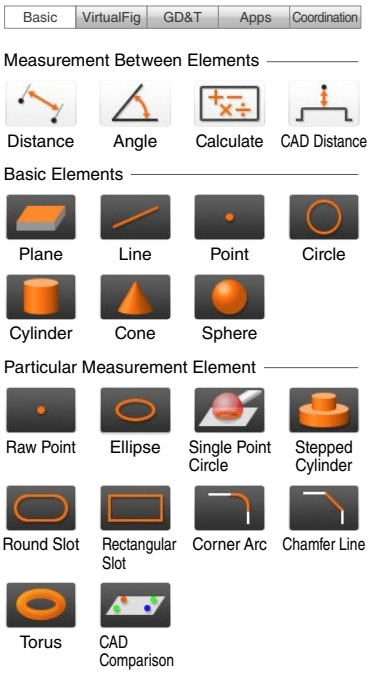
Wherever you work, global support is there to help

Local system specialists, dedicated XM technical support, and international personnel stand ready to support you.

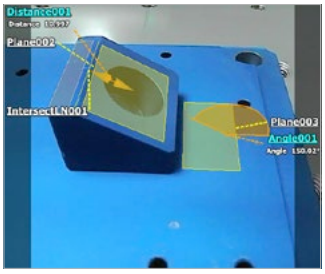


Basic measurement

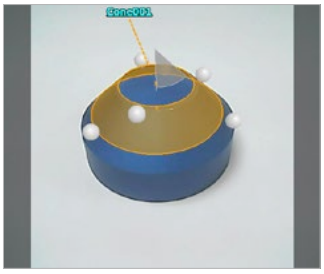
Measure anything from essentials such as circle diameters, surface-to-surface distance and angles to special cases such as donut shapes.



Circle center distance from curve angle and line intersection

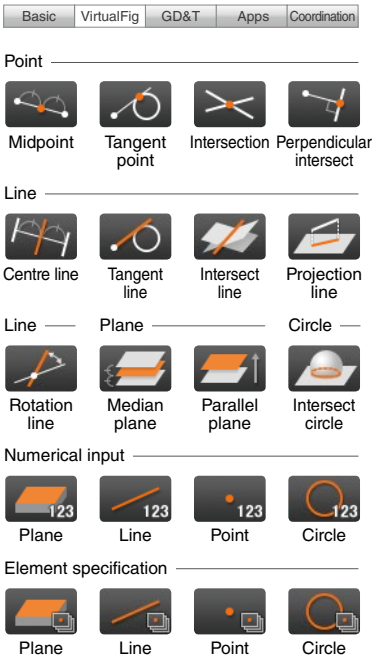


Taper angle measurement

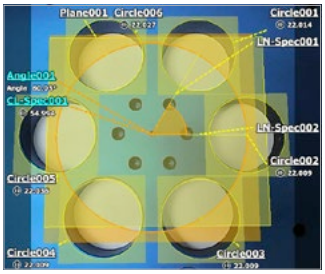


Virtual figures

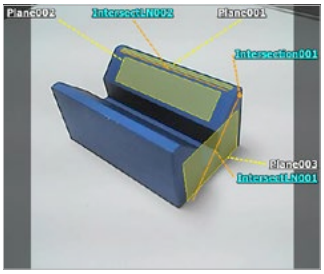
This menu is used to create virtual elements such as intersect lines and points. Measurement can then be performed based on these created elements.



P.C.D. and distribution angle

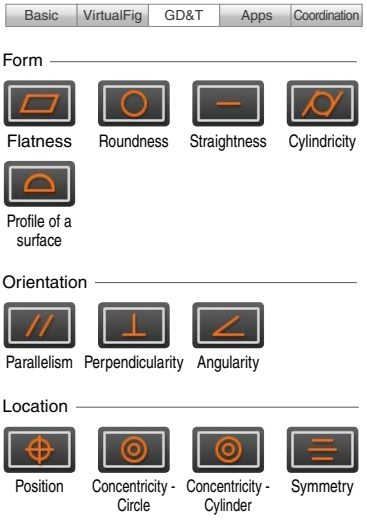


Create line intersections, points of intersection, and centerlines

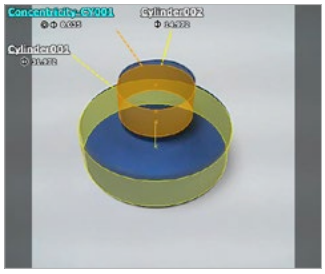


GD&T

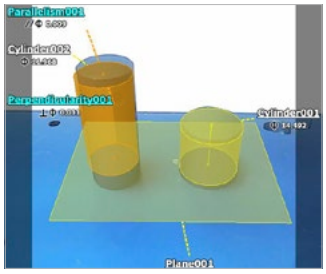
GD&T includes measurements based on form, orientation, and location.



Roundness, coaxiality

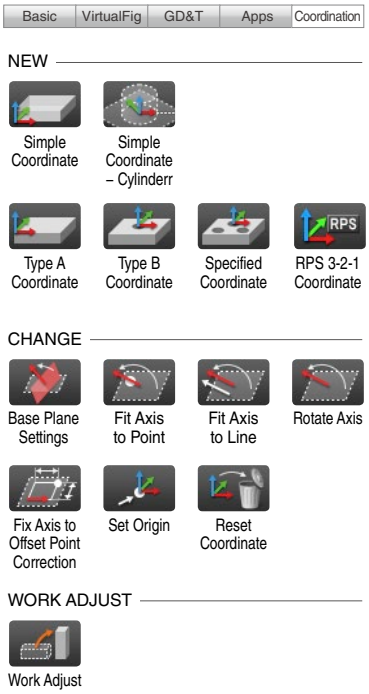


Parallelism, perpendicularity

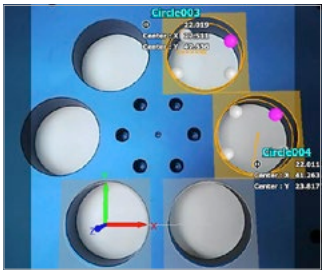


Coordinate system

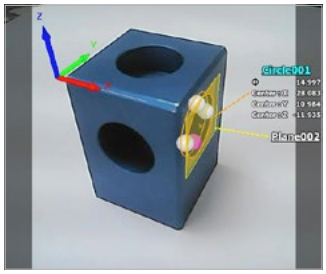
Setting the X, Y, and Z axes as a reference within the measurement target allows for creation of a coordinate similar to any illustrations.



XY position from specified origin



XYZ position of side holes from the specified origin



With Xθ stage

XM-1200/1500
XM-T1200/1500

XM-1500
Controller

XM-1200
Measuring unit
(1 probe)

XM-T1200
Measuring unit
(2 probes)

Main unit accessories

Probe
XM-P1000

ø4 mm ø0.16" stylus
OP-87944

Stylus calibration jig
OP-87947

Console
OP-87945

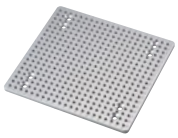
Probe stand

Wired mouse/
keyboard

Optional

ø2 mm ø0.08" stylus
OP-88083

Extension cable
OP-88186



M6 base plate
OP-88080

Sticky plate
OP-87946

Auxiliary measurement tools
OP-88233

Fixed stage

XM-1000/1500
XM-T1000/1500

XM-1500
Controller

XM-1000
Measuring unit
(1 probe)

XM-T1000
Measuring unit
(2 probes)

Interfaces

Front: USB port (2 ports)

(1) Serial output port
(2) DVI connector
(3) MONITOR connector
(4) POWER connector
(5) LAN port
(6) USB ports (4 ports on rear)
(7) Main power switch
(8) AC power input connector
(9) Camera control port (2 ports)

Specifications

Measuring unit

Model	Measuring unit		XM-1000	XM-T1000	XM-1200	XM-T1200
Camera	Image pickup device		4 megapixel CMOS image sensor			
	Wavelength at light receiving center		Near-infrared			
Measuring range			300 mm × 250 mm × 150 mm 11.81" × 9.84" × 5.91"		600 mm × 300 mm × 200 mm 23.62" × 11.81" × 7.87"	
Min. display unit	Distance		1 µm			
	Angle		0.0001 degrees			
Measurement accuracy	Repeatability	Stage locked	±3 µm		±3 µm	
		Stage unlocked	-		±4 µm	
	Indication error	Stage locked	±8 µm*1		±8 µm*1	
		Stage unlocked	-		± (10 + L/100) µm*2	
Stage	Withstand load		25 kg			
	X-axis movable range		-		±100 mm ±3.94"	
	Rotation range		-		±60°	
Probe	No. of probes		1	2	1	2
Stage marker	No. of markers		-		6	
	Marker light source		-		Near-infrared LED (870 nm)	
Probe connection port			2 inputs			
Console input			Dedicated console			
External remote input			Non-voltage input (with and without tangent point): 2 inputs			
Display	Built-in display		15" LCD monitor (1024 × 768)			
Interfaces	Communication (external communication)		USB 2.0 Series A: 3 ports			
Environmental resistance	Ambient temperature		+10 to +35°C 50 to 95°F			
	Ambient humidity		20 to 80% RH (no condensation)			
Power supply	Power supply voltage		Supplied from controller			
	Connector type		Dedicated connector			
Weight	Head		Approx. 28.2 kg (including camera and cable)		Approx. 39.6 kg (including camera and cable)	
	Console		Approx. 150 g (including cable)			

*1. In reference to ISO 10360-2 (within the range of 200 × 200 × 150 mm 7.87" × 7.87" × 5.91" at an operating ambient temperature of 23 ±1°C 73.4 ±1.8°F)
*2. In reference to ISO 10360-2 (within the range of 500 × 200 × 150 mm 19.69" × 7.87" × 5.91" at an operating ambient temperature of 23 ±1°C 73.4 ±1.8°F)

Controller

Model	Controller	XM-1500
HDD		320 GB
Interfaces	Measuring unit	Dedicated cable
	Communication (external communication)	RS-232C
		USB 2.0 Series A: 6 ports (Front: 2, rear: 4)
		LAN RJ45 (10BASE-T/100BASE-TX/1000BASE-T)
Display	External output	DVI-D
Power supply		100 to 240 VAC 50/60 Hz
Power consumption		250 VA max.
Weight		Approx. 7.7 kg
Environmental resistance	Ambient temperature	+10 to +35°C 50 to 95°F
	Ambient humidity	20 to 80% RH (no condensation)

Probe

Model	Probe	XM-P1000*3
Marker	No. of markers	7
Housing material	Marker body	Quartz glass
	Probe housing	PBT plastic
Light source		Near-infrared LED (870 nm)
Applicable stylus		M4 (Commercially available styluses can be used)
Camera		Compact CMOS image sensor
Status LED		Green: Measurement possible Yellow: Probe camera image capture possible Red: Measurement impossible Off: Not selected
Weight		Approx. 370 g (including the cable)

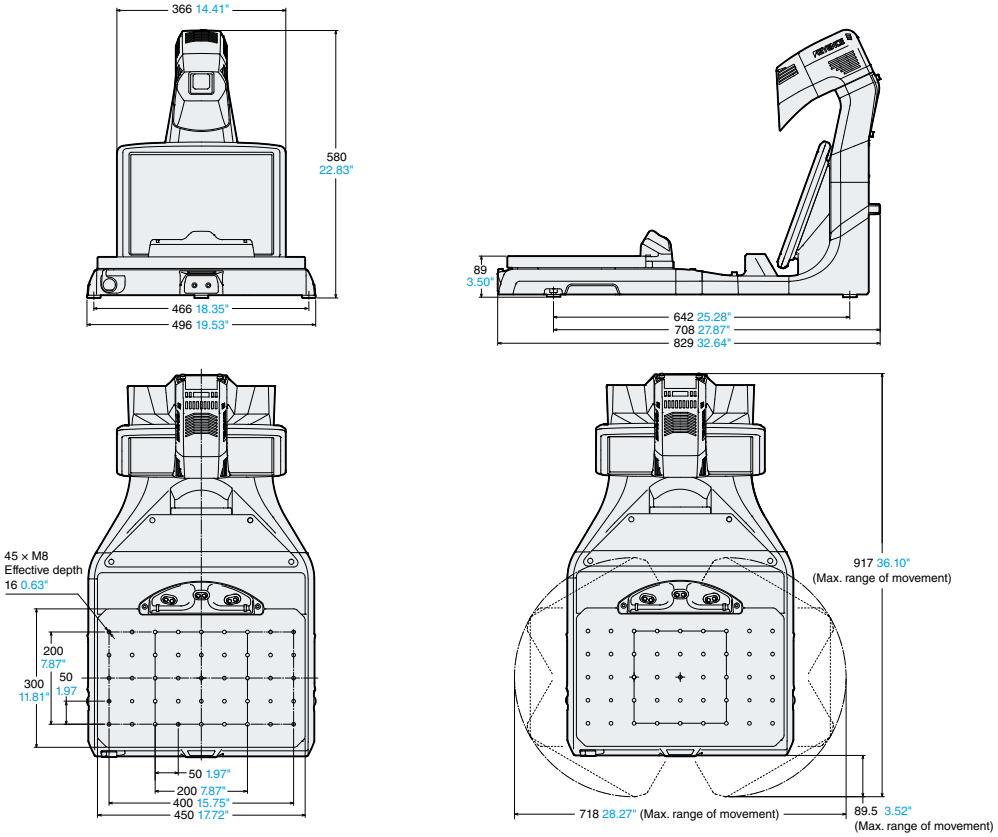
*3. Included with XM-1000/XM-T1000/XM-1200 and XM-T1200 models.

Functions

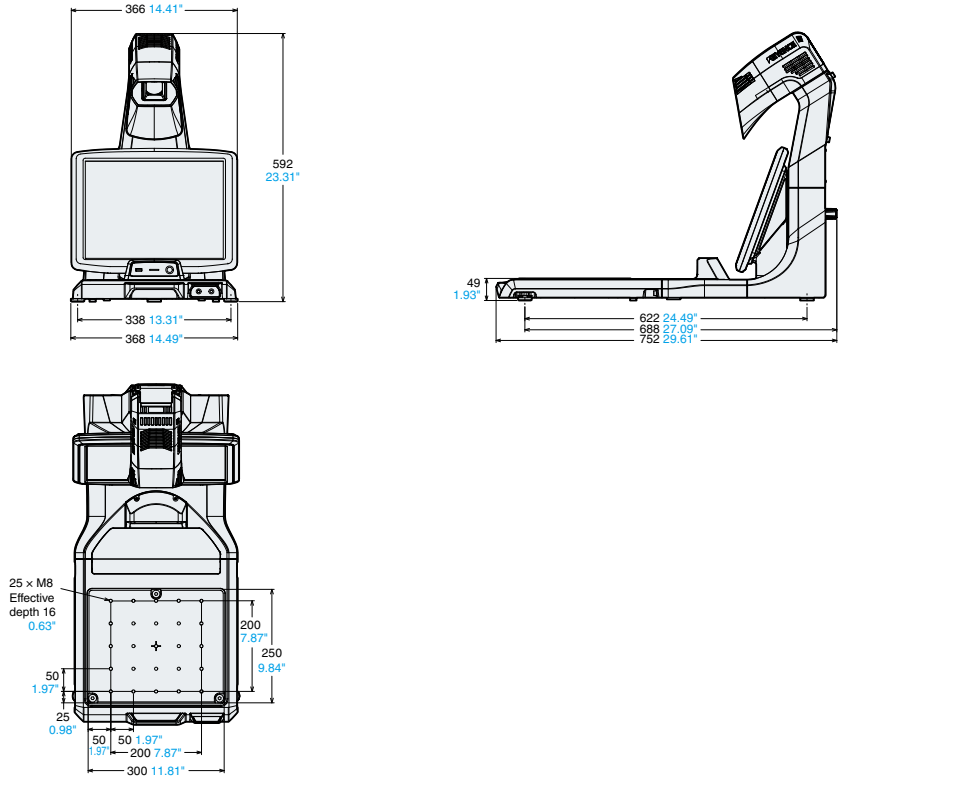
Item	Subitem	Specifications
Measuring mode		Program mode/Run mode/Statistic analysis/Single measurement
No. of configurable elements		500 (excluding comment elements)
Maximum measurement points		200 points (per element)
Basic	**Measurement Between Elements**	Distance/angle/calculate/CAD Distance
	Basic Elements	Plane/line/point/circle/cylinder/cone/sphere
	Particular Measurement Element	Raw Point/ellipse/Single Point Circle/Stepped Cylinder/ Round Slot/Corner Arc/Chamfer Line/Torus/CAD Comparison
Virtual figures	**Point**	Midpoint/Contact point/Intersection/Perpendicular/ Numerical input/Element specification
	Line	Median line/Tangent line/Intersect line/Projection line/ Rotation line/Numerical input/Element specification
	Plane	Median plane/Parallel plane/Numerical input/Element specification
	Circle	Intersect circle/Numerical input/Element specification
GD&T	**Form**	Flatness/Roundness/Straightness/Cylindricity/profile of a surface
	Orientation	Parallelism/Perpendicularity/Angularity
	Location	Position/Concentricity/Coaxiality/Symmetry
Coordination	**New**	Simple coordinate/Type A coordinate/Type B coordinate/ Specified coordinate/RPS 3-2-1 coordinate system
	Change	Base plane settings/Fit axis to point/Fit axis to line/Rotate axis/ Fix axis to offset point/Set origin/Reset coordinate
	Work adjust	Work adjust
Apps	**Distance**	Plane-to-point height/Plane-to-plane distance/Hole position
	Angle	Dihedral angle/Edge to edge angle
	Diameter	Diameter/Pitch circle diameter/Lower diameter/Upper diameter
	Position	Hole position/V groove
Batch settings		Batch tolerance settings/Batch settings for output/ display Items/Guidance image batch settings/List edit
No. of measurement macro settings		100
No. of probe settings		32
Average times of measurement		1/2/4/8/16
Check measurement position		Available
Print/file output		Inspection specifications/Single object report/Single object report (with guidance image)/Screen image/Graphic display image/ Probe camera image/CSV output
Import/Export		Move/Copy/Delete
Other		Comment/Other measurement results

Dimensions (unit: mm inch)

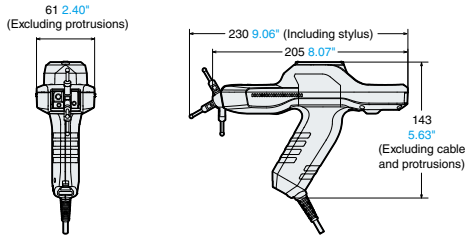
Measuring unit **XM-1200/XM-T1200**



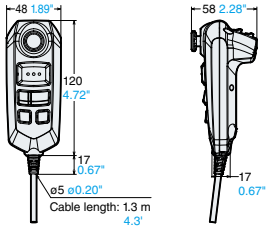
Measuring unit **XM-1000/XM-T1000**



Probe **XM-P1000**

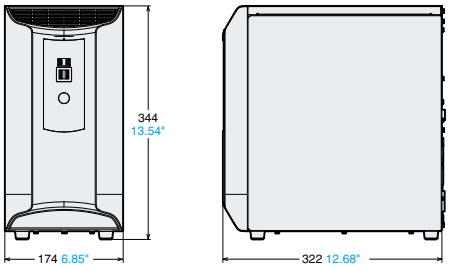


Console **OP-87945**



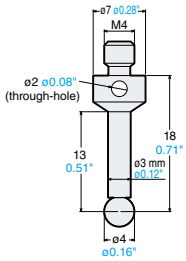
*When stylus OP-87944 is equipped.

Controller **XM-1500**

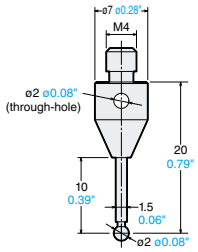


Stylus

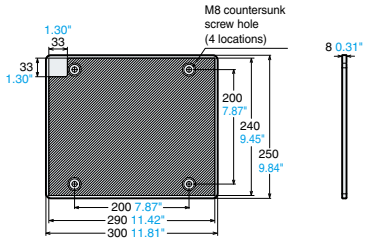
OP-87944



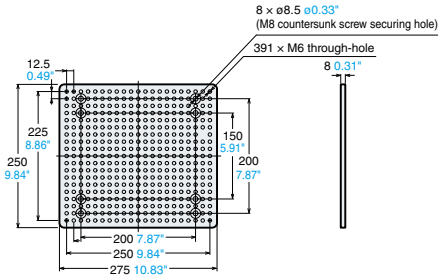
OP-88083



Sticky plate **OP-87946**



M6 base plate **OP-88080**



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