

CRYSTA-Apex S Series

Catalog No. E16004



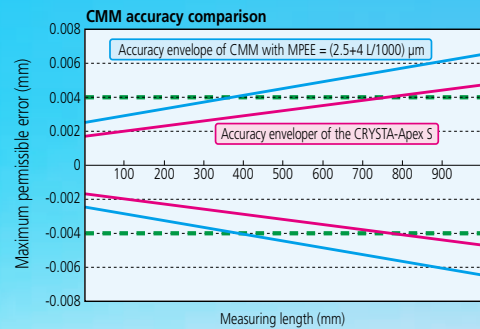
High-performance, low-price CNC coordinate measuring machine that meets global standards

Mitutoyo

CNC Coordinate Measuring Machine **CR**

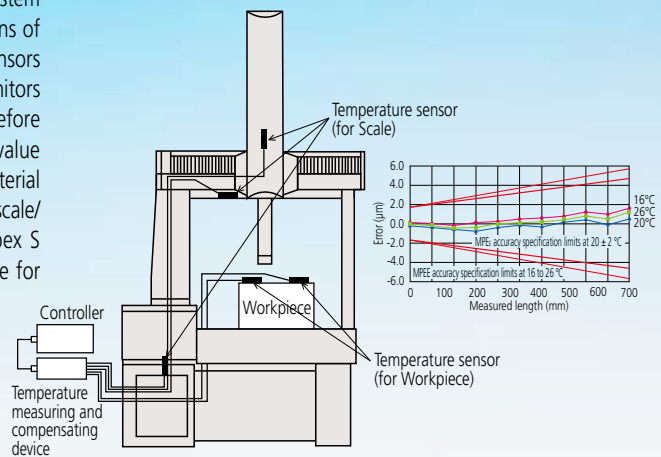
High accuracy in the 1.7 µm class

The CRYSTA-Apex S is a high-accuracy CNC coordinate measuring machine that guarantees a maximum permissible error of $MPE_E = (1.7 + 3L/1000) \mu\text{m}$ [500/700/900 Series]. Let's compare the CRYSTA-Apex S with CMMs offering MPE_E of approximately $(2.5 + 4L/1000) \mu\text{m}$. If, for example, the required tolerance on a dimension is $\pm 0.02 \text{ mm}$, then the measuring machine uncertainty should be no more than one-fifth (ideally one-tenth) of that, i.e. $4 \mu\text{m}$. This means that with a general-purpose CMM, when the measured length exceeds 375 mm, machine uncertainty exceeds one-fifth of the dimension tolerance in this case. In contrast, as shown in the figure on the right, with the CRYSTA-Apex S the measurement uncertainty remains within one-fifth of the dimension tolerance up to 766 mm. The higher accuracy specification of the CRYSTA-Apex S therefore gives it more than double the effective measuring range in terms of accuracy-guarantee capability in this case.



Temperature compensation system

The CRYSTA-Apex S comes equipped with a temperature compensation system that guarantees the accuracy of measurement under temperature conditions of 16 to 26 °C. This system, based on permanently installed temperature sensors on each scale working together with sensors placed on the workpiece, monitors scale and workpiece temperatures and, monitors the temperature and, before outputting the measurement result to the controller, corrects it to the value that would be measured at 20 °C, taking into account the workpiece material expansion coefficient as well as the CMM's characteristics. The combined scale/workpiece temperature compensation scheme used on the CRYSTA-Apex S gives markedly superior results compared to systems that only compensate for scale temperature.



500 Series



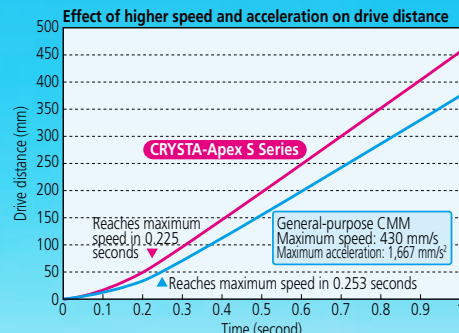
CRYSTA-Apex S544

CRYSTA-Apex S Series

High-speed, high-acceleration drive

The CRYSTA-Apex S Series offers a maximum drive speed of 519 mm/s and a maximum acceleration of 2,309 mm/s², resulting in an increase of almost 100 mm in drive distance in one second, when compared with general-purpose CNC coordinate measuring machines (with a maximum speed of 430 mm/s and a maximum acceleration of 1,667 mm/s²).

Furthermore, with a maximum measuring speed (i.e., the speed with which the stylus traces over the workpiece) of 8 mm/s, the CRYSTA-Apex S produces measurements much more quickly than ordinary CMMs (with a maximum measuring speed of 5 mm/s). Combining high speed and high acceleration, the CRYSTA-Apex S dramatically reduces measuring time, with the difference between the CRYSTA-Apex S and ordinary CMMs only increasing as the number of measuring points increases, resulting in a significant reduction in measuring cost.



Designed for high rigidity

As is the case with Mitutoyo's conventional CMMs, various structures are employed in the CRYSTA-Apex S in order to give the body higher rigidity. The Y-axis guide rail, which is attached to one side of the granite surface plate, shows very little deterioration with use, and thus promises to maintain high accuracy for a long time. The air bearings located on the bottom face, in addition to those at the front, rear, and upper surfaces of the slider unit of the X-axis, minimize vibration even during high-speed, high-acceleration movement, thus ensuring stable linear motion.



700 Series



CRYSTA-Apex S776

900 Series



CRYSTA-Apex S9106

Specifications



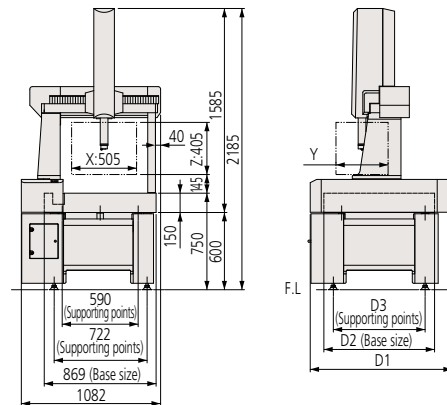
Model No.		CRYSTA-Apex S544	CRYSTA-Apex S574
Measuring range	X axis	505 mm	
	Y axis	405 mm	705 mm
	Z axis	405 mm	
Resolution	0.0001 mm (0.1 μm)		
Guide method	Air bearings on each axis		
Drive speed	8-300 mm/s (CNC mode), max. speed: 519 mm/s 0 - 80 mm/s (J/S Mode: High Speed) 0 - 3 mm/s (J/S Mode: Low Speed) 0.05 mm/s (J/S Mode: Fine Speed)		
Max. measuring speed	8 mm/s		
Max. drive acceleration	Each axis: 1,333 mm/s ² , max. combined acceleration: 2,309 mm/s ²		
Workpiece	Maximum height	545 mm	
	Maximum mass	180 kg	
Mass (including the control device and installation platform)	515 kg	625 kg	
Air supply	Pressure	0.4 MPa	
	Consumption	50 L/min under normal conditions (air source: 100 L/min)	

CRYSTA-Apex S500/700/900 Series Accuracy ISO 10360-2 unit: μm

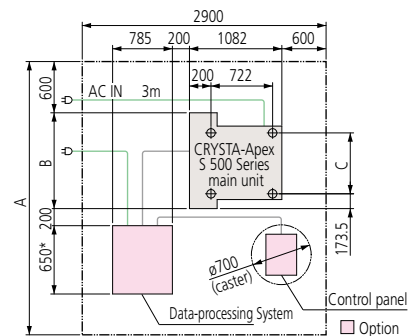
Probe used	Maximum permissible error (MPE _E)*	Maximum permissible probing error (MPE _P)
SP25M (Stylus: ø4 X 50mm)	1.7+3 L/1000 (temperature environment 1) 1.7+4 L/1000 (temperature environment 2)	1.7
TP200 (Stylus: ø4 X 10mm)	1.9+3 L/1000 (temperature environment 1) 1.9+4 L/1000 (temperature environment 2)	1.9
TP20 (Stylus: ø4 X 10mm)	2.2+3 L/1000 (temperature environment 1) 2.2+4 L/1000 (temperature environment 2)	2.2

* L = Selected measuring length (in mm). Table on opposite page describes temperature environments 1 and 2.

CRYSTA-Apex S500 Series Dimensions (unit: mm)



Installation floor space (unit: mm)



* When a mouse table is used: 850 mm
When a 2-monitor dedicated rack is used: 1,000 mm

Model No.	A	B	C	D1	D2	D3	Y
CRYSTA-Apex S544	3200	1122	713	1122	860	713	405
CRYSTA-Apex S574	3500	1458	1013	1458	1160	1013	705

CRYSTA-Apex S776		CRYSTA-Apex S7106		CRYSTA-Apex S 9106 (Z600) / 9108 (Z800)		CRYSTA-Apex S 9166 (Z600) / 9168 (Z800)		CRYSTA-Apex S 9206 (Z600) / 9208 (Z800)			
705 mm				905 mm							
705 mm		1005 mm		1005 mm		1605 mm		2005 mm			
605 mm				605 mm / 805 mm							
0.0001 mm (0.1 μm)				0.0001 mm (0.1 μm)							
Air bearings on each axis				Air bearings on each axis							
8 - 300 mm/s (CNC mode), max. speed: 519 mm/s 0 - 80 mm/s (J/S Mode: High Speed) 0 - 3 mm/s (J/S Mode: Low Speed) 0.05 mm/s (J/S Mode: Fine Speed)				8 - 300 mm/s (CNC mode), max. speed: 519 mm/s 0 - 80 mm/s (J/S Mode: High Speed) 0 - 3 mm/s (J/S Mode: Low Speed) 0.05 mm/s (J/S Mode: Fine Speed)							
8 mm/s				8 mm/s (3 mm/s for Type Z800)							
Each axis: 1,333 mm/s ² , max. combined acceleration: 2,309 mm/s ²				Each axis: 1,333 mm/s ² (1,000 mm/s ² Type Z800), max. combined acceleration 2,309 mm/s (1,732 mm/s ² Type Z800)							
800 mm				800 mm (Z=605 mm) / 1000 mm (Z=805 mm)							
800 kg		1000 kg		1200 kg		1500 kg		1800 kg			
1675 kg		1951 kg		2231 kg (Z=600 mm)		2868 kg (Z=600 mm)		3912 kg (Z=600 mm)			
				2261 kg (Z=800 mm)		2898 kg (Z=800 mm)		3942 kg (Z=800 mm)			
0.4 MPa				0.4 MPa							
60 L/min under normal conditions (air source: 120 L/min)				60 L/min under normal conditions (air source: 120 L/min)							

CRYSTA-Apex S500/700/900 Series Accuracy ISO 10360-4 unit: μm

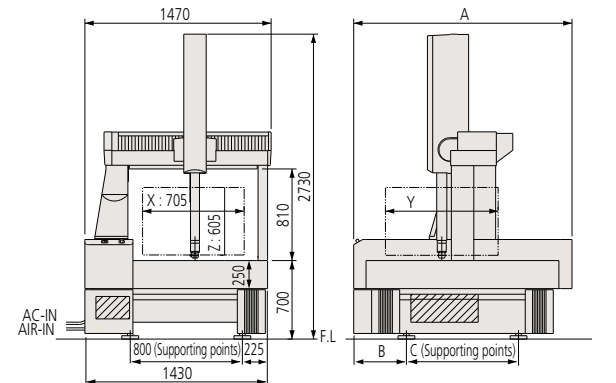
Probe used	Max. permissible scanning error (MPE _{THP})
SP25M (Stylus: ø4 X 50 mm)	2.3

CRYSTA-Apex S500/700/900 Series Installation Temperature

		Temperature environment 1	Temperature environment 1
Limits within which accuracy is guaranteed	Temperature Range	20±2 °C	16 - 26 °C
	Rate of change	1 °C per hour or less 2 °C in 24 hours or less	1 °C per hour or less 5 °C in 24 hours or less
	Gradient	1 °C or less per meter	1 °C or less per meter

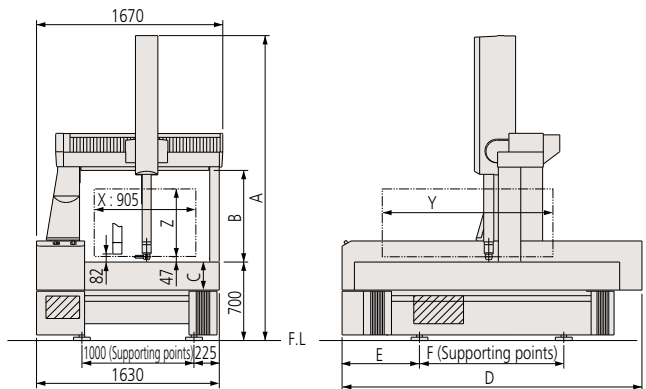
Note: This machine incorporates a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating this machine after initial installation.

CRYSTA-Apex S700 Series Dimensions (unit: mm)



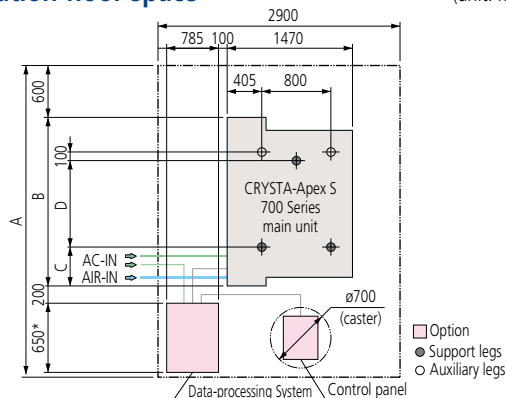
Model No.	A	B	C	Y
CRYSTA-Apex S776	1650	420	800	705
CRYSTA-Apex S7106	1950	470	1000	1005

CRYSTA-Apex S900 Series Dimensions (unit: mm)



Model No.	A	B	C	D	E	F	Y	Z	
CRYSTA-Apex S9106	2730	800	250	1950	470	1000	1005	605	
CRYSTA-Apex S9166			250	2690	700	1320	1605		2005
CRYSTA-Apex S9206			300	3090	800	1500	2005		
CRYSTA-Apex S9108	3130	1000	250	1950	470	1000	1005	805	
CRYSTA-Apex S9168			250	2690	700	1320	1605		2005
CRYSTA-Apex S9208			300	3090	800	1500	2005		

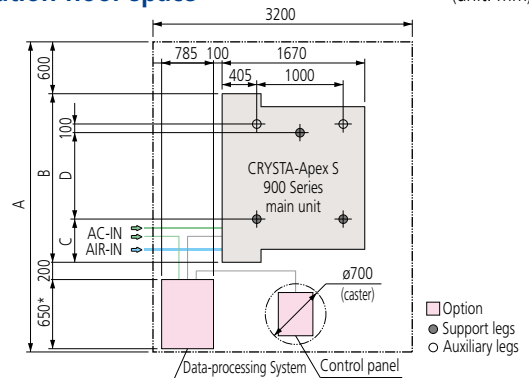
Installation floor space (unit: mm)



* When a mouse table is used: 850 mm
When a 2-monitor dedicated rack is used: 1,000 mm

Model No.	A	B	C	D
CRYSTA-Apex S776	3300	1650	420	800
CRYSTA-Apex S7106	3600	1950	470	1000

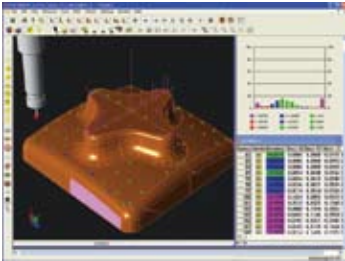
Installation floor space (unit: mm)



* When a mouse table is used: 850 mm
When a 2-monitor dedicated rack is used: 1,000 mm

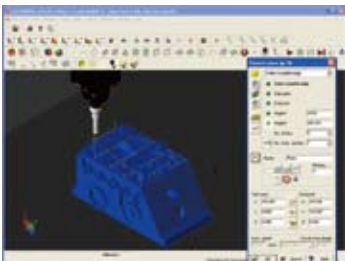
Model No.	A	B	C	D
CRYSTA-Apex S9106/9108	3600	1950	470	1000
CRYSTA-Apex S9166/9168	4300	2690	700	1320
CRYSTA-Apex S9206/9208	4700	3090	800	1500

Group of options that enable various kinds of measurements



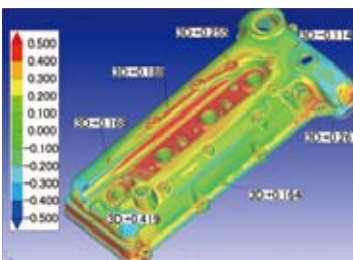
CAT1000S (freeform surface evaluation program)

Checks and compares the workpiece with the CAD data containing freeform surfaces and directly outputs the results in the form of CAD data in various formats. Software to directly convert from/to various types of CAD data is available as an option.



CAT1000P (off-line teaching program)

This module enables the user to use CAD data and on-screen simulation to create parts programs for making automated measurements (off-line teaching). This module allows the user to begin creating a parts program as soon as the design data has been finalized, shortening the entire process.



MSURF (non-contact laser measurement and evaluation program)

MSURF-S is used for obtaining measured point cloud data with the SurfaceMeasure (non-contact laser probe), while MSURF-I is used for comparing this data with the master model data, and for making dimensional measurements. Furthermore, MSURF-G for offline teaching allows the user to create a measurement macro even without the actual workpiece, improving the measuring machine's uptime.



GEOPAK (high-functionality general-purpose measurement program)

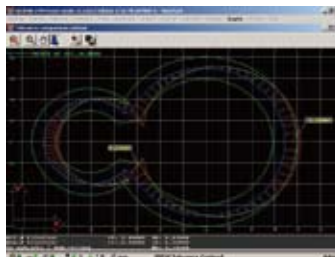
This module is the heart of the MCOSMOS software system and is used to measure and analyze geometric elements. All the functions are provided by icons or pull-down menus, so even novices can promptly select desired functions. Its main features include easier viewing of measuring procedures and results such as realtime graphic display of measurement results and a function for direct call-up of elements from results graphics.



SurfaceMeasure606

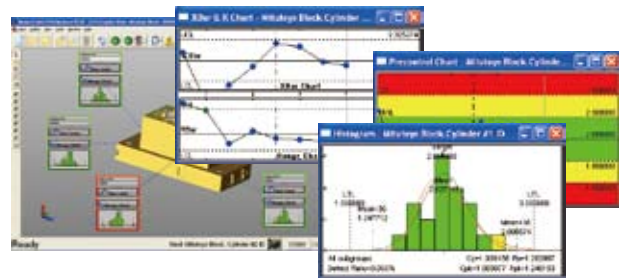
SurfaceMeasure606 (non-contact laser probe)

Lightweight, high-performance, non-contact probe developed for CNC coordinate measuring machines. Powder spray-less measurement has been achieved through automatic setting of appropriate laser intensity and camera sensitivity according to environment or material, providing a simpler and more comfortable laser scanning environment.



SCANPAK (contour measurement program)

Software for scanning and evaluating workpiece contours (2D). Evaluates contour tolerance between measurement data and design data, and performs various types of element and inter-element calculations based on a desired range of measurement data specified by the user.



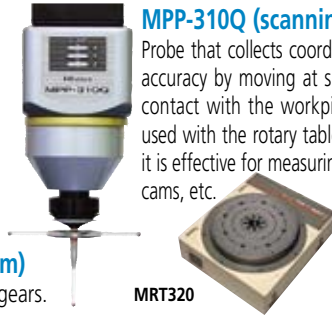
MeasurLink STATMeasure Plus (statistical-processing and process-controlling program)

Performs various types of statistical computations using measurement results. In addition, by displaying a control diagram on a real-time basis, this program allows defects that may occur in the future (e.g., wearing or damaging of cutting tools) to be discovered early on. This program can also be linked to a higher-level network environment to build a central control system.



GEARPAK (gear evaluation program)

For evaluating the most types of involute gears.



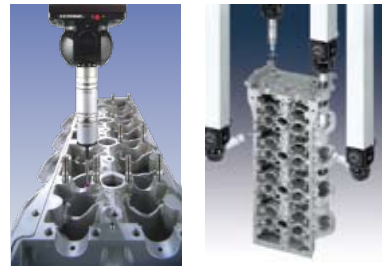
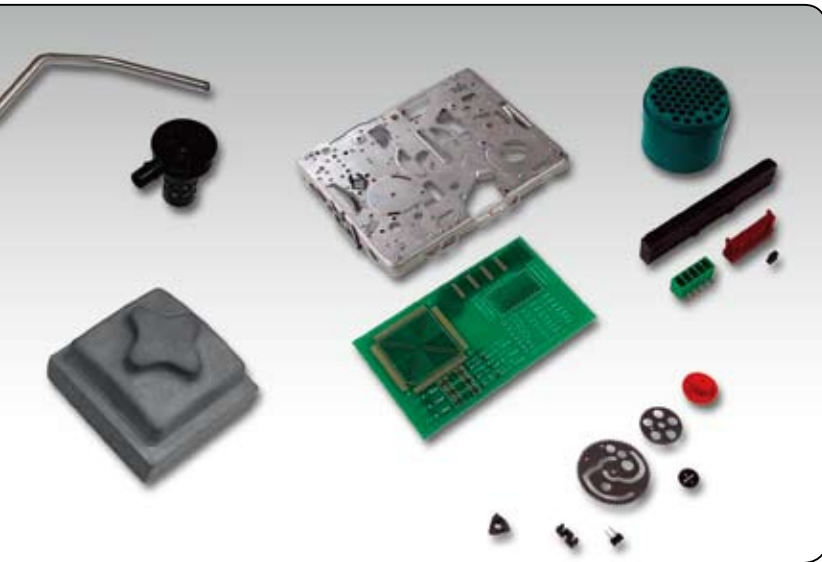
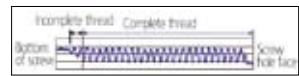
MPP-310Q (scanning probe)

Probe that collects coordinate values (point cloud data) at high accuracy by moving at speeds of up to of 120 mm/s while in contact with the workpiece. Because MPP-310Q can also be used with the rotary table (MRT320) for synchronous scanning, it is effective for measuring gears, blades, ball screws, cylindrical cams, etc.



MPP-10 (probe for effective screw depth measurement)

The probe that made it possible for a coordinate measuring machine to measure effective screw depth for the first time in the world. The introduction of the auto probe changing system allows normal dimensional measurements as well as effective screw depth measurements to be made automatically.



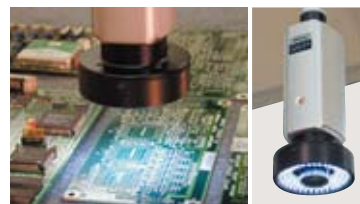
SP25M (compact high-accuracy scanning probe)

This is a compact, high-accuracy, multi-function scanning probe with a 25-mm outside diameter that makes scanning measurements, high-accuracy point measurements, and centripetal point measurements (optional function). The SP25M is used with the PH10MQ/10M auto probe head to provide a high degree of measurement freedom.



UMAP-CMM

This head makes it possible to use an ultra-small diameter stylus (0.1- or 0.3-mm diameter). It can be installed on PH10MQ to measure the shape and dimensions of microfabricated products from multiple directions.



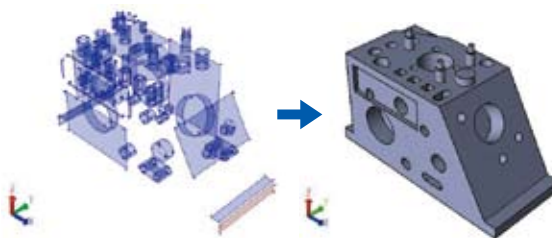
QVP (vision probe)

This probe automatically detects edges from image data of the workpiece magnified by a CCD camera. It is extremely useful for measuring microfabricated products that cannot be measured using a contact-type probe and soft objects that cannot be subjected to any measurement force. The QVP can also be used for measuring height based on autofocusing.



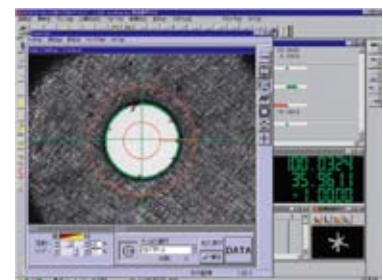
NC-Auto measure

This program generates CAD data from NC data.



Solid Model Developer

This program generates CAD data from data measured using MCOSMOS.



VISIONPAK (vision measurement program)

This program controls QVP and performs various computational analyses on captured images.



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Mitutoyo Corporation
 20-1, Sakado 1-Chome,
 Takatsu-ku, Kawasaki-shi,
 Kanagawa 213-8533, Japan
 T +81 (0) 44 813-8230
 F +81 (0) 44 813-8231
<http://www.mitutoyo.co.jp>



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