Mitutoyo

Mitutoyo Quality

Coordinate Measuring Machines

High Accuracy CNC Coordinate Measuring Machine
STRATO-Apex Series

Catalog No. E16001(8)

STRATO-Apex Series: A state-of-the-art CNC coordinate combined with high-speed operation

The high drive speed and acceleration guarantee top scanning performance

Improved machine rigidity

- High speed and accuracy in measurement is ensured by a redesign of the machine body that has improved rigidity of the structure, and by a remodeled guide mechanism

Newly developed, built-in, high-performance controller

- Uses a digital servo system that processes all control loops for position, speed, and current as digital signals.
- The digital servo system offers the following benefits:
  1) Little drift or deterioration with time
  2) Wide dynamic range
  3) Easy implementation of various types of control algorithm

Scanning measurement technology

- High-performance scanning measurement has been achieved through the improved structural rigidity and incorporation of a newly developed compensation technology
  Scanning mode form error on sphere: $P_{Form.Sph.Scan:SS:\ Tact.MPE}$ = 1.3 µm
  Scanning mode time: $\tau_{Sph.Scan:\ PP:\ Tact.MPL}$ = 40 s
  (cf. Existing FALCIO Series: MPE_{THP} = 2.2 µm)
  MPT_{tHP} = 110 s)
  *Probe used: SP25M

measuring machine that achieves high accuracy

in a machine that also offers high-accuracy measuring in the 1 µm class

Internal heat generation minimized

- The controller is positioned outside the main unit, thereby eliminating the effect of the generated heat on the main unit.
- Compact layout has been achieved, resulting in a small footprint, even with the externally positioned controller.

STRATO-Apex 700/900 Series

Ultra-high precision glass scales

- An ultra-high precision crystallized glass scale which has practically no thermal expansion (coefficient of linear expansion 0.01×10^{-6}/ °C) is combined with a high-performance reflective linear encoder with resolution of 2/100 µm to create the ultra-high accuracy measurement unit installed on each axis of STRATO-Apex. This is basically the same unit as used in the LEGEX Series of ultra-high accuracy CNC coordinate measuring machines. (Applies to STRATO-Apex 700/900 Series).
- A unique securing method used for the scales minimizes the hysteresis error that can result from the difference in the coefficients of linear expansion between the installation plane and scale.

Vibration-damping unit included as a standard accessory

- Vibration of the floor where the unit is installed shows up as measurement value variations. The STRATO-Apex Series comes equipped with a vibration-damping unit that uses auto-leveling air springs. The vibration-damping unit not only prevents floor vibrations from reaching the main unit, but also has a function that uses a sensor to detect load changes caused by movements of the individual axes and placement of a workpiece and quickly restores the main unit to horizontal orientation.

▲Vibration-damping unit with auto-leveling air springs

▲Vibration-damping unit positioning

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STRATO-Apex 574

STRATO-Apex 574

Specifications

Model			STRATO-Apex 574
Measuring range	X axis		500 mm
	Y axis		700 mm
	Z axis		400 mm
Guide method			Air bearings on all axes
Drive speed	CNC mode		Moving speed: Max.300 mm/s for each axis (maximum combined speed: 519 mm/s)
			Measuring speed 1 – 3 mm/s
	J/S mode		Moving speed 0 – 80 mm/s
			Measuring speed 0 – 3 mm/s
			Fine speed 0 – 0.05 mm/s
Drive acceleration			1333 mm/s^2 for each axis (maximum combined acceleration: 2309 mm/s^2)
Measuring method			Linear encoder
Resolution			0.00002 mm
Work table	Material		Granite
	Size (table surface)		676×1420 mm
	Tapped inserts		M8×1.25
Workpiece	Maximum height		560 mm
	Maximum mass		180 kg
Machine mass (includes the vibration-damping platform and controller, but not workpiece)			1620 kg
Power supply specifications			Power supply voltage: AC100-120/200-240 V±10 %; power supply capacity: 700 W
Air supply	Pressure		0.4 MPa
	Consumption		60 L/min under normal conditions (air source: At least 120 L/min)
Guaranteed accuracy temperature environment	Temperature range		18 to 22 °C
	Temperature change	Per hour	1.0 °C
		Per 24 hours	2.0 °C
	Temperature gradient	vertical/horizontal	1.0 °C/m

* While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

Accuracy

The following values are guaranteed when using the standard stylus.
Standard stylus (TP200: ø4×10, MPP-310Q: ø4×18, SP25M: ø4×50)

unit: µm

Title	Symbol	Standard	TP200	MPP-310Q*	SP25M
Length measurement error	$E_{0,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	1.4+2.5 L/1000	0.7+2.5L/1000	0.7+2.5 L/1000
	$E_{150,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	1.9+2.5 L/1000	0.7+2.5L/1000	0.7+2.5 L/1000
Repeatability (E_0)	$R_{0,MPL}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	1.2	0.7	0.7

Title	Symbol	Standard	TP200	MPP-310Q*	SP25M
Scanning mode form error on sphere	$P_{Form.Sph.Scan:SS:Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022		1.3	1.3
Scanning mode time	τ Sph.Scan: PP: Tact.MPL	ISO 10360-5: 2020 JIS B 7440-5: 2022		70 s	40 s

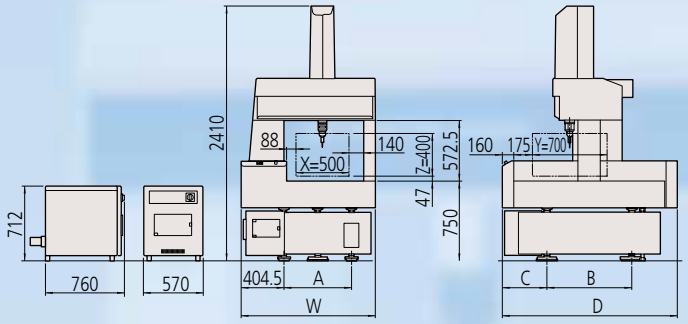
Title	Symbol	Standard	TP200	MPP-310Q*	SP25M
Single stylus form error	$P_{Form.Sph.1×25:SS:Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022	1.8	0.7	0.7

* Available by custom order only.

Length measurement error of $E_{0, MPE}$=0.7 + 2.5L/1000 (µm)

External dimensions

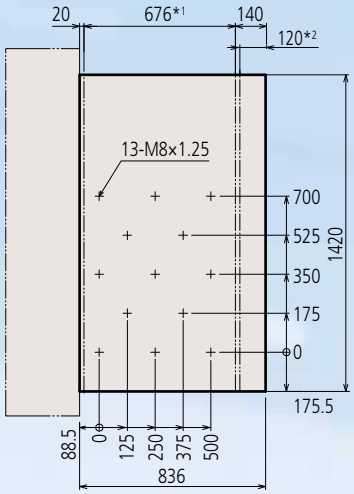
unit: mm



Item	STRATO-Apex 574
A	635
B	800
C	470
D	1700
W	1270

Tapped insert positions in the table surface

unit: mm



STRATO-Apex 574

*1 Workpiece loading area
*2 Y-axis guiding surface

Note: All models incorporate a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration has occurred or the machine has been relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating your machine after initial installation.

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STRATO-Apex 700/900 Series

STRATO-Apex 776

STRATO-Apex 9106

Specifications

Model			STRATO-Apex 776	STRATO-Apex 7106	STRATO-Apex 9106	STRATO-Apex 9166
Measuring range	X axis		700 mm		900 mm	
	Y axis		700 mm	1000 mm		1600 mm
	Z axis		600 mm			
Guide method			Air bearings on all axes			
Drive speed	CNC mode		Moving speed: Max.300 mm/s for each axis (maximum combined speed: 519 mm/s)			
			Measuring speed 1 – 3 mm/s			
	J/S mode		Moving speed 0 – 80 mm/s			
			Measuring speed 0 – 3 mm/s			
			Fine speed 0 – 0.05 mm/s			
Drive acceleration			1500 mm/s² for each axis (maximum combined acceleration: 2598 mm/s²)			
Measuring method			Linear encoder			
Resolution			0.00002 mm			
Work table	Material		Granite			
	Size (table surface)		862×1420 mm	862×1720 mm	1062×1720 mm	1062×2320 mm
	Tapped inserts		M8×1.25			
Workpiece	Maximum height		770 mm			
	Maximum mass		500 kg	800 kg		1200 kg
Machine mass (includes the vibration-damping platform and controller, but not workpiece)			1895 kg	2180 kg	2410 kg	3085 kg
Power supply specifications			Power supply voltage: AC100-120/200-240 V±10 %; power supply capacity: 700 W			
Air supply	Pressure		0.4 MPa			
	Consumption		60 L/min under normal conditions (air source: At least 120 L/min)			
Guaranteed accuracy temperature environment	Temperature range		19 to 21 °C			
	Temperature change	Per hour	1.0 °C			
		Per 24 hours	2.0 °C			
	Temperature gradient	vertical/horizontal	1.0 °C/m			

* While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

Accuracy

The following values are guaranteed when using the standard stylus.
Standard stylus (TP200: ø4×10, MPP-310Q: ø4×18, SP25M: ø4×50)

unit: µm

Title	Symbol	Standard	TP200	MPP-310Q*	SP25M +SM25-1 +SH25-1	SP25M +SM25-2 +SH25-2	SP25M +SM25-3 +SH25-3	SP80*
Length measurement error	$E_{0,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	1.4+2.5 L/1000 (700 series) 1.5+2.5 L/1000 (900 series)	0.7+2.5L/1000	0.7+2.5L/1000	0.7+2.5L/1000		0.7+2.5L/1000
	$E_{150,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	1.9+2.5 L/1000 (700 series) 2.0+2.5 L/1000 (900 series)	0.7+2.5L/1000	0.7+2.5L/1000			0.7+2.5L/1000
	$E_{200,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013				0.7+2.5L/1000		
	$E_{280,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013					0.9+2.5L/1000	
Repeatability (E_0)	$R_{0,MPL}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	1.2	0.7	0.7	0.7	0.7	0.7

Title	Symbol	Standard	TP200	MPP-310Q*	SP25M +SM25-1 +SH25-1	SP25M +SM25-2 +SH25-2	SP25M +SM25-3 +SH25-3	SP80*
Scanning mode form error on sphere	$P_{Form.Sph.Scan:SS:\ Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022		1.6	1.8	1.8	1.8	1.8
Scanning mode time	$\tau_{\ Sph.Scan:\ PP:\ Tact.MPL}$	ISO 10360-5: 2020 JIS B 7440-5: 2022		70 s	45 s	45 s	45 s	45 s

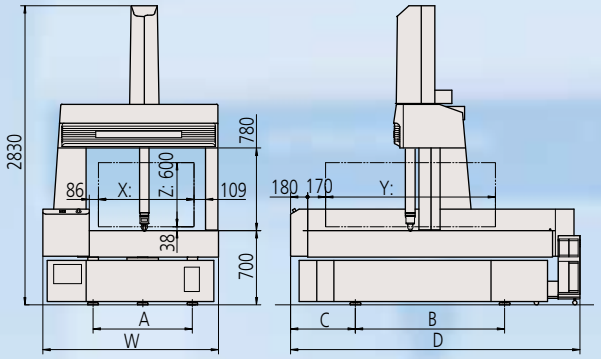
Title	Symbol	Standard	TP200	MPP-310Q*	SP25M +SM25-1 +SH25-1	SP25M +SM25-2 +SH25-2	SP25M +SM25-3 +SH25-3	SP80*
Single stylus form error	$P_{Form.Sph.1x25:SS:\ Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022	1.8	0.9	0.9	0.9	0.9	0.9

* Available by custom order only.

Providing the High Speed and Accuracy in Moving-Bridge Type Coordinate Measuring Machines Integration of Key Measurement Technologies

External dimensions

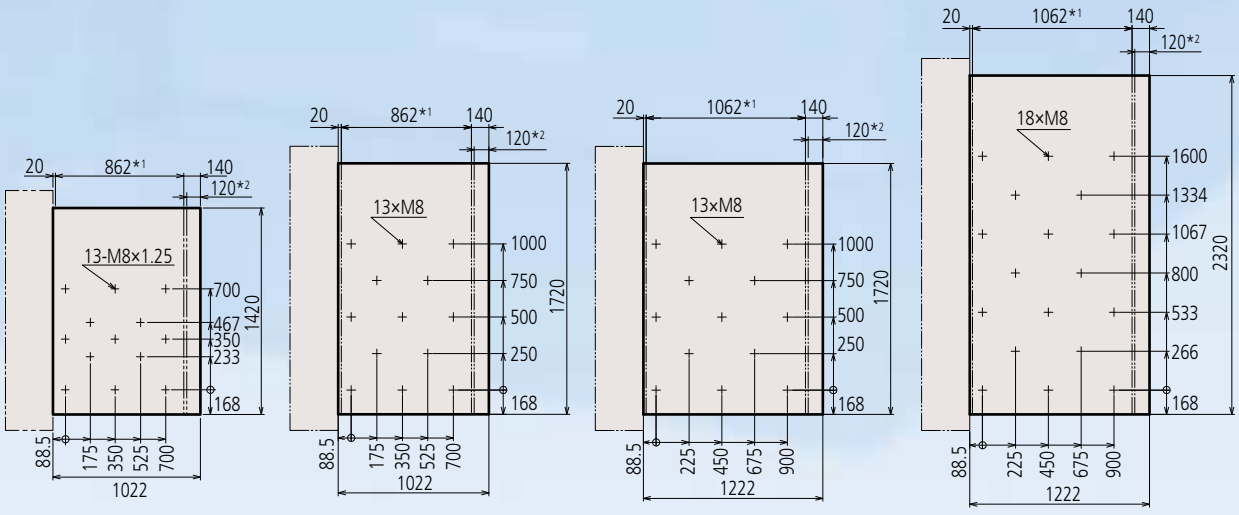
unit: mm



Item	STRATO-Apex 776	STRATO-Apex 7106	STRATO-Apex 9106	STRATO-Apex 9166
A	740		940	
B	700	1000		1410
C	590			682.5
D	1910	2210		2810
W	1460		1660	

Tapped insert positions in the table surface

unit: mm



STRATO-Apex 776 **STRATO-Apex 7106** **STRATO-Apex 9106** **STRATO-Apex 9166**

*1 Workpiece loading area
*2 Y-axis guiding surface

Note: All models incorporate a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration has occurred or the machine has been relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating your machine after initial installation.

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STRATO-Apex 1600 Series

STRATO-Apex 1600 Series

Specifications

Model			STRATO-Apex 162012	STRATO-Apex 162016	STRATO-Apex 163012	STRATO-Apex 163016
Measuring range	X axis		1600 mm			
	Y axis		2000 mm		3000 mm	
	Z axis		1200 mm	1600 mm	1200 mm	1600 mm
Scale unit			Linear encoder			
Drive speed	CNC mode		Moving speed: Max.350 mm/s for each axis (maximum combined speed: 606 mm/s)			
			Measuring speed 1 – 3 mm/s			
	J/S mode		Moving speed 0 – 80 mm/s			
			Measuring speed 0 – 3 mm/s			
			Fine speed 0 – 0.05 mm/s			
Drive acceleration			780 mm/s^2 for each axis (maximum combined acceleration: 1,350 mm/s^2)			
Resolution			0.00005 mm			
Gide merhod			Air bearings on all axes			
Work table	Material		Granite			
	Size (table surface)		1850×3280 mm		1850×4280 mm	
	Tapped inserts		M8×1.25			
Workpiece	Maximum height		1350 mm	1750 mm	1350 mm	1750 mm
	Maximum mass		3500 kg		4000 kg	
Machine mass (includes the vibration-damping platform and controller, but not workpiece)			11150 kg	11200 kg	15300 kg	15350 kg
Power supply specifications			Power supply voltage: AC100-120/200-240 V±10 % power supply capacity: 1500 W			
Air supply	Pressure		0.4 MPa			
	Consumption		100 L/min under normal conditions (air source: At least 250 L/min)			
Guaranteed accuracy temperature environment	Temperature range		18 to 22 °C			
	Temperature change	Per hour	1.0 °C			
		Per 24 hours	2.0 °C			
	Temperature gradient	vertical/horizontal	1.0 °C/m			

* While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

Accuracy

STRATO-Apex 162012/163012

The following values are guaranteed when using the standard stylus.
Standard stylus (TP200: ø4×10, MPP-310Q: ø4×18, SP25M: ø4×50)

unit: µm

Title	Symbol	Standard	TP200	SP25M	SP80*
Length measurement error	$E_{0,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	3.5+4.0 L/1000	2.5+4.0 L/1000	2.5+4.0 L/1000
	$E_{150,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	3.5+4.0 L/1000	2.5+4.0 L/1000	2.5+4.0 L/1000
Repeatability (E_0)	$R_{0,MPL}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	3.5	2.5	2.5

Title	Symbol	Standard	TP200	SP25M	SP80*
Scanning mode form error on sphere	$P_{Form.Sph.Scan:SS:\ Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022		2.5	2.5
Scanning mode time	τ Sph.Scan: PP: Tact.MPL	ISO 10360-5: 2020 JIS B 7440-5: 2022		60 s	60 s

Title	Symbol	Standard	TP200	SP25M	SP80*
Single stylus form error	$P_{Form.Sph.1\times25:SS:\ Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022	3.5	2.3	2.3

* Available by custom order only.

High accuracy combined with wide measuring range
Best suited for highly accurate measurement of large workpieces

STRATO-Apex 162016/163016

unit: µm

Title	Symbol	Standard	TP200	SP25M	SP80*
Length measurement error	$E_{0,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	4.0+4.0 L/1000	3.0+4.0 L/1000	3.0+4.0 L/1000
	$E_{150,MPE}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	4.0+4.0 L/1000	3.0+4.0 L/1000	3.0+4.0 L/1000
Repeatability (E_0)	$R_{0,MPL}$	ISO 10360-2: 2009 JIS B 7440-2: 2013	4.0	2.5	2.5

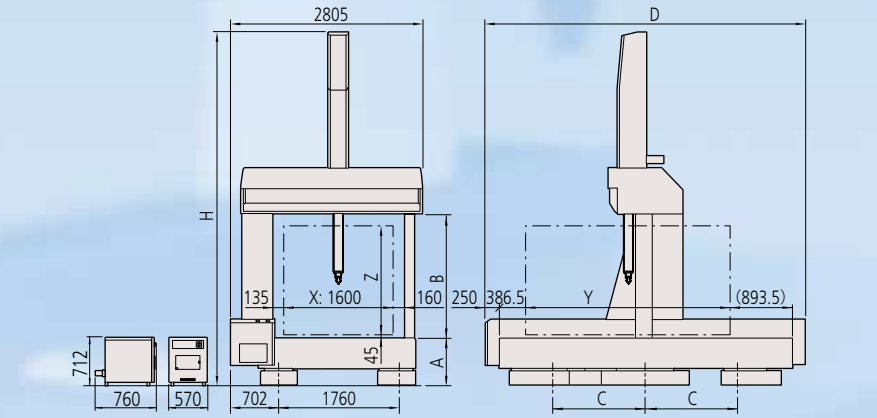
Title	Symbol	Standard	TP200	SP25M	SP80*
Scanning mode form error on sphere	$P_{Form.Sph.Scan:SS:Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022		3.0	3.0
Scanning mode time	τ Sph.Scan: PP: Tact.MPL	ISO 10360-5: 2020 JIS B 7440-5: 2022		60 s	60 s

Title	Symbol	Standard	TP200	SP25M	SP80*
Single stylus form error	$P_{Form.Sph.1\times25:SS:Tact.MPE}$	ISO 10360-5: 2020 JIS B 7440-5: 2022	4.0	2.8	2.8

* Available by custom order only.

External dimensions

unit: mm

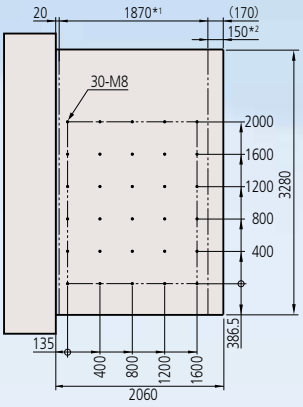


Item	STRATO-Apex 162012	STRATO-Apex 162016	STRATO-Apex 163012	STRATO-Apex 163016
A	650		700	
B	1415	1815	1415	1815
C	1000		1350	
D	3740		4740	
H	4340	5140	4390	5190

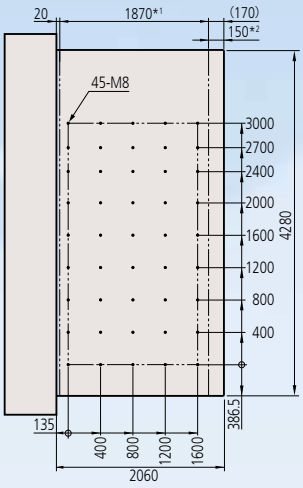
Tapped insert positions in the table surface

unit: mm

STRATO-Apex 162012/162016



STRATO-Apex 163012/163016



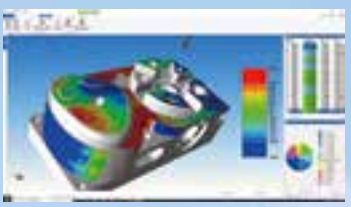
*1 Workpiece loading area
*2 Y-axis guiding surface

Note: All models incorporate a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration has occurred or the machine has been relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating your machine after initial installation.

Software options handle all kinds of measurement

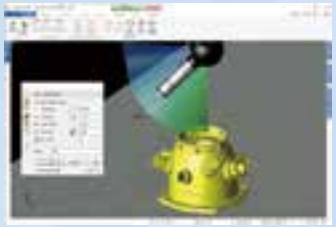
CAT1000S (freeform surface evaluation program)

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.



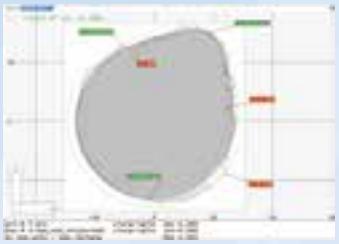
CAT1000P (offline teaching program)

This module enables the user to use CAD data and on-screen simulation to create parts programs for making automated measurements (offline 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.



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 interelement calculations based on a desired range of measurement data specified by the user.



GEARPAK Express (Gear Measurement and Evaluation Software for CNC Coordinate Measuring Machines)

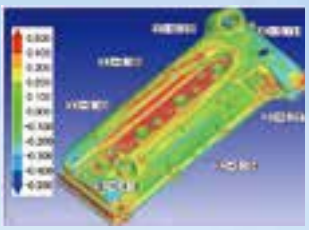
A 3D model created from the provided gear specifications enables you to visually and easily check whether measurement will be performed as intended. Furthermore, automatic program creation and on-screen measurement guidance help quick and easy setting of the coordinate system.

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.

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.



MeasurLink (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., wear or damage to 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.

MPP-310Q (scanning probe)

A 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.

MRT320

MiCAT Planner

<Automatic measurement program generation software for CMMs>
This software package dramatically reduces part-programming creation time by automatically generating the part program. Tolerance information from a 3D CAD model is read to determine which features of the part should be measured to verify conformance to specification. Compared to conventional methods (teaching), this method creates more-efficient measurement programs as well as saving time.

Watch this video for more details

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.

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.

SurfaceMeasure Series (non-contact laser probe)

A 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.

201FS

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SURFTEST PROBE (Probe for surface roughness measurement)

The SURFTEST PROBE is a highly sensitive detector for measuring surface roughness using a CNC coordinate measuring machine. It is compatible with automatic probe-changing systems and therefore can be handled just as easily as the usual touch trigger or scanning probes. This new probe provides the ability to perform combined, automatic measurement of dimension, form and surface roughness on one machine at one setup. Mitutoyo will endeavor to meet requests for assistance with custom measurement applications by providing dedicated software making best use of its wide range of optional detectors.

Status Monitor

Remote machine monitoring

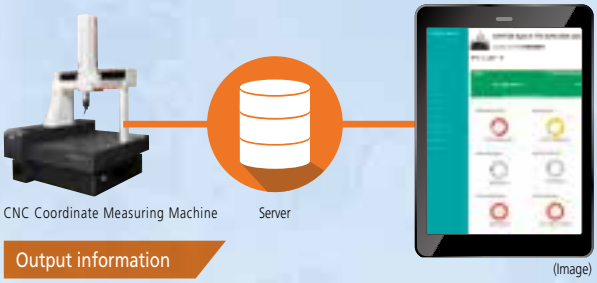
MTConnect®

Server

- Collects and visualizes operational status data
- Supports MT Connect communication

Condition Monitor

Conduct preventive maintenance through CMM status monitoring



CNC Coordinate Measuring Machine

Server

(Image)

Output information

- Slideway distance travelled
- Temperature log
- Number of probe inputs
- Other selectable information

→ Preventive maintenance through status monitoring

Note: Please contact the nearest Mitutoyo sales office for adaptable countries and regions.

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. The introduction of the auto probe changing system allows normal dimensional measurements as well as effective screw depth measurements to be made automatically.

099 2212(8) A(CH)NE-(/P13), Printed in Japan

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Optical Measuring

Sensor Systems

Test Equipment

Digital Scale and DRO Systems

Small Tool Instruments and Data Management

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Find additional product literature and our product catalogue

https://www.mitutoyo.co.jp/global.html

Our products are classified as regulated items under Japanese Foreign Exchange and Foreign Trade Law.
Please consult us in advance if you wish to export our products to any other country.
If the purchased product is exported, even though it is not a regulated item (Catch-All controls item), the customer service available for that product may be affected. If you have any questions, please consult your local Mitutoyo sales office.

Mitutoyo

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