Precision measuring technology in three dimensions

Shop-floor Type CNC Coordinate Measuring Machine MeasurLink[®] ENABLED **MiSTAR 555**

Data Management Software by Mitutoyo

- Has achieved an accuracy guaranteed temperature range of 10 to 40 °C thanks to the combination of technologies such as a symmetric guide structure, uniform material and temperature compensation.
- Has achieved a contamination resistance more than 2 times better than Mitutoyo's conventional machine by adopting a newly developed absolute scale* that is highly resistant to the challenging production-line environment.
- * Absolute scale that provides an absolute XYZ-values relative to an internal reference point for each coordinate captured. This eliminates the need for an initialization operation.
- Adopts the horizontal-arm structure and installs the CMM controller and PC under the measuring table to save installation space. This has reduced the footprint to about 70% compared with that of the conventional moving bridge model.

MeasurLink' ENABLED

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).



Equipped with the **PH10MO** probe head



SPECIFICATIONS

Items		MiSTAR 555	
	X axis	570 mm	
Measuring range	Y axis	500 mm	
	Z axis	500 mm	
Maximum permissible length measurement error*1*2 ISO 10360-2: 2009		(2.2+3L/1000) μm	
Drive speed		5 - 350 mm/s (max. combined speed 606 mm/s) in CNC MODE	
Drive acceleration		1556 mm/s ² (max. combined acceleration 2695 mm/s ²)	
Workpiece	Max. height	660 mm	
vvorkpiece	Max. loading	120 kg	
Accuracy guaranteed temperature		10 °C - 40 °C	
Mass (including the control device and installation platform)		655 kg	

*1 Specifications vary by configuration, size, and thermal environment.

*2 L = Measuring length (unit: mm)

Note: 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.



Refer to the MiSTAR 555 Brochure (No. E16024) for more details.



MeasurLink' ENABLED

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

Standard CNC CMM MICROCORD CRYSTA-Apex V Series

- The CRYSTA-Apex V500/700/900 series, CNC CMMs deliver high accuracy (1.7 µm), high speed, and high acceleration. This series offers flexibility with a wide range of models to suit practically any size workpiece.
- Has achieved a contamination resistance more than 2 times better than Mitutoyo's conventional machine by adopting a newly developed absolute scale* that is highly resistant to the challenging production-line environment.
 - point. This eliminates the need for an initialization operation.

MeasurLink[®] ENABLED

Data Management Software by Mitutoyo

• Equipped with a temperature compensation system that guarantees the specified accuracy within a wide range of 16 °C to 26 °C under certain environmental conditions, although high-accuracy CMMs should ideally be installed in a temperature controlled room.



CRYSTA-Apex V 9106

SPECIFICATIONS

Measuring

range

Items	Model	CRYSTA-Apex V 544	CRYST	A-Apex V 574	CRYSTA-Apex	V 776	CRYSTA-Apex V 7106	
Managerian	X axis	500	500 mm			700 mm		
ivieasuring	Y axis	400 mm	700 mm		700 mm	l	1000 mm	
Tange	Z axis	400	400 mm		600 mm			
Items	Model	CRYSTA-Apex \ 9106 (Z600) / 9108 (2	/ Z800)	CRYSTA 9166 (Z600)	-Apex V /9168 (Z800)	9206	CRYSTA-Apex V (Z600)/9208 (Z800)	
	X axis	900 mm						

Note: 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.

1600 mm

600 mm/800 mm

Unit: µm

CRYSTA-Apex V Series Accuracy

Y axis

Z axis

		-			
Series	Probe used	Length measurement error* ¹ ISO 10360-2: 2009			
500/700/900 Series	SP25M	E0, MPE=1.7+3L/1000*2			
*1 Specifications vary by configuration, size, and thermal environment.					

1000 mm

*2 L = Measuring length (unit: mm)

2000 mm

Mitutoyo

Precision measuring technology in three dimensions

Standard CNC CMM MICROCORD CRYSTA-Apex S1200/1600/2000 Series

- The CRYSTA-Apex S1200/1600/2000 series are large-sized CNC CMMs developed for supporting quality evaluation of large parts.
- Equipped with a temperature compensation system that guarantees the specified accuracy within a wide range of 16 °C to 24 °C for CRYSTA-Apex S1600/2000 and 16 °C to 26 °C for **S1200** under certain environmental conditions, although high-accuracy CMMs should ideally be installed in a temperature controlled



CRYSTA-Apex S163012

SPECIFICATIONS

Ν

Items	Model	CRYSTA-Apex S 121210	CRYSTA-Apex S 122010	CRYSTA-Apex S 123010			
Manager	X axis		1200 mm				
Neasuring	Y axis	1200 mm	2000 mm	3000 mm			
range	Z axis		1000 mm				

ems	Model	CRYSTA-Apex S 162012(Z1200) / 162016(Z1600)	CRYSTA-Apex S 163012(Z1200)/163016(Z1600)	CRYSTA-Apex S 164012(Z1200)/164016(Z1600)		
A	X axis		1600 mm			
/leasuring	Y axis	2000 mm	3000 mm	4000 mm		
ange	Z axis	1200 mm/1600 mm				

Items	Items Model CRYSTA-Apex S 2030		CRYSTA-Apex S 204016
	X axis	2000	mm
Measuring	Y axis	3000 mm	4000 mm
Z axis		1600	mm

Note: 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.

N-5

Unit: µm

CRYSTA-Apex S Series Accuracy

Series	Probe used	Length measurement error *1 ISO 10360-2: 2009
1200 Series		E0, MPE=2.3+3L/1000*2
1600 Series	SP25M	E0, MPE=3.3+4.5L/1000 (4.5+5.5L/1000)*2*3
2000 Series		E0, MPE=4.5+8L/1000*2

*1 Specifications vary by configuration, size, and thermal environment.

*2 L = Measuring length (unit: mm) *3 () indicates Z: 1600 mm specification





Brochure (No. E16009) for more details.

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).



Standard CNC CMM MICROCORD CRYSTA-Apex EX 1200R Series Data Management Software by Mitutoyo

- CRYSTA-Apex EX 1200R series products are advanced CNC CMMs equipped with the REVO probe head and a choice of probes to create a range of standard 5-axis measuring machines.
- 5-axis operation reduces the time required for probe repositioning movements and allows more flexible positioning. This also facilitates access to complex workpieces and saves time during both programming and measurement.

MeasurLink[®] ENABLED

- Allows ultra high-speed 5-axis scanning (max. 500 mm/s), far surpassing conventional 3-axis control. Support for high-speed sampling of up to 4,000 points per second allows acquisition of densely spaced measurement points, even during fast scanning.
- Internal implementation of laser sensing technology ensures high-accuracy measurement, even with long styli (up to 500 mm*).
- * Distance from probe rotation center to stylus tip



CRYSTA-Apex EX 123010R

SPECIFICATIONS

Items	Model	CRYSTA-Apex EX 121210R	CRYSTA-Apex EX 122010R	CRYSTA-Apex EX 123010R
Maaguring	X axis		1200 mm	
range	Y axis	1200 mm	3000 mm	
	Z axis			

Note: 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.

CRYSTA-Apex EX 1200R Series Accuracy

CRYSTA-Apex EX 1200R Series Accuracy				
Probe used	Length measurement error*1 ISO 10360-2: 2009			
REVO+RSP2+RSH250	E0, MPE=2.9+4L/1000*2			
REVO+RSP3-3+RSH3-3	Eo, MPE=2.5+3L/1000* ²			

*1 Specifications vary by configuration, size, and thermal environment.

*2 L = Measuring length (unit: mm)



Precision measuring technology in three dimensions

High Accuracy CNC CMM MICROCORD STRATO-Apex Series

- The **STRATO-Apex** series of CNC CMMs offer improved structural rigidity and guide systems to guarantee very high accuracy measurement. High drive speed and high acceleration provide lower cycle times in critical measurement applications.
- **MeasurLink**[®] ENABLED Data Management Software by Mitutoyo
- Ultra-high precision linear encoders (manufactured by Mitutoyo) are used on each axis to provide a higher resolution and accuracy that complements the improved overall performance.



STRATO-Apex 9106

SPECIFICATIONS

STRATO-Apex 163016

Items	ms Model STRATO-Apex 574		STRATO-Apex 776 STRATO-Apex 7106		
Manager	X axis	500 mm	700	mm	
ivieasuring	Y axis	700 mm	700 mm	1000 mm	
Z ax	Z axis	400 mm	600	mm	

Items	Model	STRATO-Apex 9106	STRATO-Apex 9166	STRATO-Apex 162012	STRATO-Apex 162016	STRATO-Apex 163012	STRATO-Apex 163016
X axis		900	mm	1600 mm			
rango	Y axis	1000 mm	1600 mm	2000	mm	3000	mm
Tallye	Z axis	600	mm	1200 mm	1600 mm	1200 mm	1600 mm

Note: 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.

STRATO-Apex Series Accuracy

STRATO-Apex Series Accuracy Un				
Series	Probe used	Length measurement error * ¹ ISO 10360-2: 2009		
574 Series		E0, MPE = 0.7+2.5L/1000*2		
700/900 Series	SP25M	E0, MPE = 0.9+2.5L/1000*2		
1600 Series		E0,MPE = 2.5+4.0L/1000 (3.0+4.0L/1000)*2*3		

*1 Specifications vary by configuration, size, and thermal environment. *2 L = Measuring length (unit: mm) *3 () indicates Z: 1600 mm specification







Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).



Mitutoyo

Refer to the STRATO-Apex Series Brochure (No. E16001) for more details.

MeasurLink' ENABLED

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

- These series are equipped with a system to automatically restore accuracy deterioration (MOVAC) caused by foundation deformation as a standard feature.
- Equipped with a temperature compensation system that guarantees the specified accuracy within a wide range of 18 °C to 22 °C under certain environmental conditions, although high-accuracy CMMs should ideally be installed in a temperature controlled room.
- Safety devices such as a Z-axis beam sensor, tape switch, and area sensor are available as options.

High-accuracy Separate Guide Type MICROCORD FALCIO Apex 2000G/3000G Series Data Management Software by Mitutoyo

- The FALCIO Apex 2000G / 3000G series are CNC CMMs that use Mitutoyo's standard structure for large machines which are designed to be used for measuring large and heavy workpieces with high accuracy. The picture below gives a good idea of how large the machine is. The measuring accuracy and drive speed are the world's highest in the X-axis measuring range of 2000 mm and 3000 mm.
- **MeasurLink**[®] ENABLED
- Ultra-high precision linear encoders (manufactured by Mitutoyo) are used on each axis to provide a higher resolution and accuracy that complements the improved overall performance.



SPECIFICATIONS

Items	Model	FALCIO Apex 203015G	FALCIO Apex 204015G	FALCIO Apex 205015G	FALCIO Apex 305015G
	X axis	2000 mm	2000 mm	2000 mm	3000 mm
Measuring	Y axis	3000 mm	4000 mm	5000 mm	5000 mm
lange	Z axis	1500 mm	1500 mm	1500 mm	1500 mm

Note: 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.

FALCIO Apex Series Accuracy			
Probe used	Length measurement error*1 ISO 10360-2: 2009		
SP25M	E0. MPF=3.5+4L/1000*2		

*1 Specifications vary by configuration, size, and thermal environment.

*2 L = Measuring length (unit: mm)





Mitutoyo

Refer to the Large Bridge and Gantry CNC Coordinate Measuring Machines Brochure (No. E16009) for more details.

Precision measuring technology in three dimensions

Ultra-high Accuracy CNC CMM MICROCORD LEGEX 574/774/776/9106

- The **LEGEX** series is an ultra-high precision CNC CMM with the world's highest level of accuracy, made possible by rigorous analysis of all possible errorproducing factors and the elimination or minimization of their effects.
- The fixed bridge structure and precision air bearings running on highly rigid guideways ensure superior motion stability and ultra-high geometrical accuracy. Thorough testing, using FEM structure analysis simulation, guarantees geometric motion accuracy with minimal errors due to fluctuations in inertial loading and other variables. In addition, other technologies have been utilized in the structure of the drive unit, minimizing vibration, etc., to provide ultra-high accuracy.

MeasurLink® ENABLED Data Management Software by Mitutoyo

- The combination of a Mitutoyo ultrahigh accuracy crystallized glass scale with a coefficient of thermal expansion of almost zero and a high resolution, high-performance reflection type linear encoder provides excellent position detection for premium performance.
- Many optional systems are available, including probes (contact and non-contact types), data processing units, and many other items to support the ultra-high accuracy measurement of a wide variety of workpieces.

MeasurLink® ENABLED Data Management Software by Mitutoyo Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).



SPECIFICATIONS

Items	Model	LEGEX 574	LEGEX 774	LEGEX 776	LEGEX 9106
Measuring range	X axis	500 mm	700 mm	700 mm	900 mm
	Y axis	700 mm	700 mm	700 mm	1000 mm
	Z axis	450 mm	450 mm	600 mm	600 mm
	L dxis	430 [[][[]	450 [1][1]		000 mm

N-9

Note: Choose either a cast iron or a ceramic coated measuring table

Main unit accuracy	l Unit: μm
Probe used	Length measurement error* ¹ ISO 10360-2: 2009
MPP-310Q	E0, MPE=0.28+L/1000*2

*1 Specifications vary by configuration, size, and thermal environment. *2 L = Measuring length (unit: mm)



Ν

Mitutoyo



Refer to the **LEGEX** Series Brochure (No. E16012) for more details.

MeasurLink ENABLED

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).



Measurement example for dual-ram type (Simultaneous use of touch-trigger probe and line laser probe)



Mitutoyo

Refer to the CARB Series Brochure (No. E16014) for more details.

Car Body Measuring System MICROCORD CARBstrato Series

• The world's largest class of CMM The CARBstrato series is a lineup of horizontalram type CNC CMMs, offering the world's largest measurement range that even makes it possible to measure car bodies.

MeasurLink[®] ENABLED

Data Management Software by Mitutoyo

- Single- & Dual-ram systems Single- and dual-ram types are available to suit the intended use. Single-ram type: Measures a workpiece using a single ram
- Dual-ram type: Measures a workpiece placed between two simultaneously controlled rams



CARBstrato 601624D (Dual-ram type)

Car Body Measuring System MICROCORD CARBapex Series

• The world's largest class of CMM

The **CARBapex** series is a lineup of cost-effective horizontal-ram type, large CNC CMMs, and offers the world's largest measurement range that even makes it possible to measure car bodies.

• Single- & Dual-ram systems

Single- and dual-ram types are available to suit the intended use.

Single-ram type: Measures a workpiece with a single-ram

Dual-ram type: Measures a workpiece placed between two simultaneously controlled rams

Also, since the height of the X-axis bases of both the single-ram type and the dual-ram type are set lower, the required depth for the foundation before installation is comparatively shallow.





Precision measuring technology in three dimensions

In-line Type CNC CMM MICROCORD MACH-3A 653

• In-line type CNC CMM (Horizontal-ram type) Incorporating the CMM controller and the host computer in the main unit results in a compact space-saving footprint for the shop floor. This series is designed for 24-hour operation with high stability remarkable durability.



In-line Type CNC CMM MICROCORD MACH-V9106

• The **MACH-V** has been refined and has evolved over time to maximize CNC-machine-tool utilization by performing in-line or near-line, high-speed coordinate measurement to match the speed of machining. These high throughput machines can be incorporated within the manufacturing line and can provide pre/post machining feedback to your machine tools for process tuning.





MeasurLink[®] ENABLED

Data Management Software by Mitutoyo

MACH-3A 653 The indexing table shown is optional

MeasurLink[®] ENABLED

Data Management Software by Mitutoyo



MACH-V9106 The sub-plate shown is optional

Agile Measuring System MACH Ko-ga-me

- Can be used in standalone applications or integrated into work cells.
- If required, the system can measure workpiece features that exceed the **Ko-ga-me**'s X stroke by mounting the workpiece, or the **Ko-ga-me**, on an auxiliary X axis.
- Ideal for inspection of large or small workpieces and offers a wide choice of measuring probes including touch-trigger and scanning types. (Note: Probe choice may be restricted, depending on the application.)

MeasurLink® ENABLED Data Management Software by Mitutoyo

SPECIFICATIONS

Items	Model	MACH-3A 653	
Managerian	X axis	600 mm	
range	Y axis	500 mm	
lange	Z axis	280 mm	
Accuracy*1*2	19 to 21 °C	Eo, мре = 2.5+3.5L/1000 µm* ³	
Accuracy	5 to 40 °C	Eo, MPE = 3.9+6.5L/1000 µm* ³	

*1 Specifications vary by configuration, size, and thermal environment.

- *2 Using a **TP7M** (Stylus: ø4×20mm)
- *3 L = Measuring length (unit: mm)

Note: For information about guaranteed accuracy within a temperature range other than 5 to 40 °C, contact your local Mitutoyo sales office.

MeasurLink® ENABLED Data Management Software by Mitutoyo Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

SPECIFICATIONS

Items	Model	MACH-V9106
Manager	X axis	900 mm
ivieasuring	Y axis	1000 mm
lange	Z axis	600 mm
Accuracu*1*2	19 to 21 °C	Eo, MPE = 2.5+3.5L/1000 μ m* ³
Accuracy	5 to 35°C	Eo, мре = 3.6+5.8L/1000 µm* ³

*1 Specifications vary by configuration, size, and thermal environment.

*2 Using a TP7M (Stylus: ø4×20mm)

*3 L = Measuring length (unit: mm)

Note: For information about guaranteed accuracy within a temperature range other than 5 to 35 °C, contact your local Mitutoyo sales office.

MeasurLink[®] ENABLED Data Management Software by Mitutoyo Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

Standalone system



The stand shown is optional

SPECIFICATIONS

Items	Model	KGM888-B	KGM12128-B
	X axis	80 mm	120 mm
Measuring	Y axis	80 mm	120 mm
lange	Z axis	80 mm	80 mm
	19 to 21 °C	EO, MPE = 2.4+5	5.7L/1000 µm* ³
Accuracy*1*2	15 to 25 °C	EO, MPE = 2.7+6	5.4L/1000 µm* ³
Accuracy	10 to 30 °C	Ео, мре = 3.1+7	7.2L/1000 µm*3
	10 to 35 °C	EO, MPE = 3.4+7	⁷ .9L/1000 µm* ³
1.4.C 10 11	1	C	I.d

¹ Specifications vary by configuration, size, and thermal environment.

*2 Using a TP200 or SP25M

*3 L = Measuring length (unit: mm)



11111 11111

Ν

MeasurLink' ENABLED

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).

- Manual floating type CMMs developed in the quest for high-accuracy, low cost and easy operation.
- Ultra-high-precision linear encoders (manufactured by Mitutoyo) are used on each axis to provide high performance.

Manual Type CMM MICROCORD Crysta-Plus M Series

• The **Crysta-Plus M700** series is equipped with a mobile clamp so that one-touch clamping on each axis can be performed by hand. Continuous fine feed over the entire measuring range can be performed.

MeasurLink[®] ENABLED

Data Management Software by Mitutoyo

- Equipped with a temperature compensation system that guarantees the specified accuracy within a wide range of temperature under certain environmental conditions, although CMMs should ideally be installed in a temperature controlled room.
- Available options include the auto-leveling air-spring vibration isolator and the illuminator unit for the probe.



Crysta-Plus M443



Crysta-Plus M574

Mitutoyo





Refer to the **Crysta-Plus M** Series Brochure (No. E16013) for more details

SPECIFICATIONS

Items	Model	Crysta-Plus M443	Crysta-Plus M544	Crysta-Plus M574	Crysta-Plus M776	Crysta-Plus M7106
	X axis	400 mm	500 mm		700 mm	
Measuring range	Y axis	400 mm	400 mm	700 mm	700 mm	1000 mm
	Z axis	300 mm	400 mm		600 mm	
Accuracy *1*2	EO, MPE	3.0+4L/1000 µm	3.5+4L/1	1000 μm	4.5+4.5L	/1000 µm
Accuracy	P FTU, MPE	4.0 µm	4.0	μm	5.0	μm

Crysta-Plus M7106

*1 According to ISO 10360-2 methods. L = Measuring length (unit: mm)

*2 When using the touch-trigger probe MH20i/MH20/TP20 and stylus (L 10 mm)

Note: 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.



Mitutoyo

Precision measuring technology in three dimensions

Portable Articulated Arm Coordinate Measuring System MeasurLink[®] ENABLED SpinArm-Apex



SPECIFICATIONS

SpinArm-Apex H series (High accuracy, 6-axis model)

Model No.	SpinArm-Apex 186H	SpinArm-Apex 246H	SpinArm-Apex 306H	SpinArm-Apex 366H
Measuring envelop (Probe reaching diameter) *1	1800 mm	2400 mm	3000 mm	3600 mm
Repeatability *2 *4	±0.021 mm	±0.026 mm	±0.044 mm	±0.060 mm
Accuracy (Arm type) *2 *4	±0.028 mm	±0.035 mm	±0.058 mm	±0.072 mm

SpinArm-Apex H series (High accuracy, 7-axis model)

Model No.	SpinArm-Apex 247H	SpinArm-Apex 307H	SpinArm-Apex 367H
Measuring envelop (Probe reaching diameter) *1	2400 mm	3000 mm	3600 mm
Repeatability *2 *4	±0.031 mm	±0.051 mm	±0.071 mm
Accuracy (Arm type) *2 *4	±0.042 mm	±0.072 mm	±0.103 mm

SpinArm-Apex S series (Standard, 6-axis model)

Model No.	SpinArm-Apex 186S	SpinArm-Apex 246S	SpinArm-Apex 306S	SpinArm-Apex 366S
Measuring envelop (Probe reaching diameter) *1	1800 mm	2400 mm	3000 mm	3600 mm
Repeatability *2*3	±0.040 mm	±0.050 mm	±0.080 mm	±0.100 mm
Accuracy (Arm type) *2 *3	±0.055 mm	±0.065 mm	±0.100 mm	±0.135 mm

SpinArm-Apex S series (Standard, 7-axis model)

Model No.	SpinArm-Apex 247S	SpinArm-Apex 307S	SpinArm-Apex 367S
Measuring envelop (Probe reaching diameter) *1	2400 mm	3000 mm	3600 mm
Repeatability *2 *3	±0.055 mm	±0.090 mm	±0.110 mm
Accuracy (Arm type) *2*3	±0.080 mm	±0.135 mm	±0.165 mm

1 Measurement range is expressed as a diameter value at the maximum reach using software with the Sø10 mm standard probe mounted. *2 According to Mitutoyo's acceptance procedure. The accuracy guaranteed value above is determined when MS5-5R11G probe is mounted

N-13

*3 Guaranteed accuracy temperature: 16 °C - 24 °C (temperature gradient: 2 °C per hour) *4 Guaranteed accuracy temperature: 18 °C - 22 °C (temperature gradient: 2 °C per hour)



Data Management Software by Mitutoyo

Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink (refer to page A-5 for details).



- SpinArm-Apex is a fully articulated coordinate measuring system featuring a wide range of measurement. The highly portable design of **SpinArm-Apex** enables the system to be positioned at any point within reach of the workpiece.
- Enables measurement of workpieces of complex shape in any direction.
- Brake mechanism greatly enhances usability.
- Counterbalance for easier operation.
- Supports both non-contact line laser probes and contact probes concurrently.



SurfaceMeasure Series

Note: Not for use in, or export to, to the United States of America



Mitutoyo

Refer to the SpinArm-Apex Series Brochure (No. E16006) for more details.





 It is unnecessary to learn any special code since measurement can be performed by selecting the icons or the pull-down menu to select functions in the same manner as for Windows OS operation.

CAT1000S [Curved surface evaluation program]

This software is used for free-form surface evaluation and online/offline teaching. It is possible to display measurement results on CAD data in various ways.



SURFPAK-SP [Analysis program]

This is a software program as used for the roughness probe SURFTEST for a CMM. With this program, surface roughness analysis conforming to standards such as ISO, JIS, ANSI, and VDA are available. Cooperation with MCOSMOS enables fully automatic dimensional measurement and surface roughness measurement.



MAFIS [Blade evaluation program]

This software is used for evaluation of sectional contours of blades to be used in jet engines for aircraft.





Refer to the MCOSMOS Software Brochure (No. E16008) for more details.

Software for Manual/CNC Coordinate Measuring Machines **MCOSMOS**

MCOSMOS software modules

	GEOPAK	CAT1000P	CAT1000S	SCANPAK
MCOSMOS-1	1			
MCOSMOS-2	1	1	1	
MCOSMOS-3	1	1	1	1

GEOPAK [General purpose measurement program]

This is the basic software for dimension measurement. The enhanced graphic functionality allows real time drawing of the measurement result, and the best-fit function, previously optional, and even the geometrical deviation drawing function are now provided as standard.



SCANPAK [Contour measurement program]

This software enables measurement/evaluation of two-dimensional sectional contours. The data output function to CAD, etc. that had been optional before is now provided as standard.



ROUNDPAK-CMM

The functionality of analysis software as used for roundness measuring machines is now available on **MCOSMOS**. As well as roundness and cylindricity evaluation, various filters are also available.



GEARPAK-Worm [Gear evaluation program]

This is a program for evaluation of tooth form based on worm measurement data obtained from CNC CMMs.

GEARPAK-Bevel/Hypoid [Gear production support/evaluation program]

This is a program for evaluation of tooth form, pitch error, etc., based on measurement data from bevel or hypoid gears obtained by CNC CMM.



 MCOSMOS is the data processing program family for the CMM that runs on Windows.

CAT1000P [On-/Off-line teaching program]

This software is used for on-/off-line teaching. The interference check function is also added so that programming error when off-line can be prevented. In addition to SAT and STEP (standard functions) as CAD data that can be imported, CATIA V4/V5, PARASOLID, Creo, etc. are supported (optional).



FORMTRACEPAK-AP [Analysis program]

This program is used for minutely analyzing two-dimensional curved lines captured by SCANPAK.



GEARPAK-Cylindrical [Gear evaluation program]

This is a program for evaluation of involute gear teeth obtained from CNC CMMs, and tooth profile based on cylindrical gear measurement data.



[Result drawing]

MAFIS Express [Blade measurement/Evaluation program]

This software program enables creation of measurement programs and measurement and analysis of blades and blisks. A part program for measurement can be automatically created just by selecting required contents and evaluation conditions. The measurement results will be displayed in a report including 2D graphics.



Precision measuring technology in three dimensions

Automatic measurement program generation software **MiCAT Planner**

One-click programming that changes the relationship between people and precision measurement

- Through its optimization function, the software estimates the shortest route for measurement with the minimum of probe repositioning and tool changing, and creates a program that enables measurement in the minimum possible time.
- Utilizing the rule editor function to set the measurement rules prevents variation in measurement quality between program writers.

• Identifies tolerance information included in

Information (PMI), defines measurement

locations and creates a measurement

program fully automatically.

3D models with Product and Manufacturing

Also, even with the 3D CAD model without tolerance information, the measurement

program can be created automatically just

A "right to execute" for one 3D measuring machine is included in the MiCAT Planner.

Tolerance information add function Lets you add tolerances in the software even for 3D CAD models containing no tolerance information. Automatically create optimal measuring programs

Available in 15 languages (Japanese, English (US, UK), German, French, Spanish, Portuguese, Italian, simplified Chinese, traditional Chinese, Korean,

based on the added tolerance specifications.

by adding tolerance information on the MiCAT Planner. This is more efficient than

the conventional teaching model. Note: To use a measuring program created by the MiCAT Planner you will need a special

"right to execute"

Supported languages

Polish, Czech, Dutch, and Turkish)



An optimized measurement program for MCOSMOS

Case study

Ν

Compare the measurement part-programming time for a test piece.

- 1: Programming in 2D drawing: 45-60 minutes
- 2: Programming using 2D drawing + 3D CAD: 15-20 minutes
- 3: Create with MiCAT Planner (using 3D CAD model + PMI): approx. 3 minutes!

N-15

Note: The measurement rules are defined in advance.



Part-programming time Reduced by up to 95% !!

Guarantee a dramatically reduced development phase and at the same time improve

product quality.

Mitutoyo



• Three lasers used with the cross type line laser enable batch scanning. Complicated form can be measured efficiently (in the case of **SurfaceMeasure 606T**).

Less changing of the probe orientation contributes to the improvement of measurement efficiency





Without change of orientation Laser selection is available

Scanning from three directions enables simultaneous measurement of the top surface and inner surface



The laser light is emitted from three obligue directions.

• The flying spot type is capable of scanning difficult parts, such as this impeller, precisely and achieves highest scanning accuracy in the class (in the case of **SurfaceMeasure 201FS**).



SPECIFICATIONS

Non-contact type laser probe SurfaceMeasure

• Ultra-high speed data collection SurfaceMeasure is a laser probe that collects coordinate values of the surface of the workpiece by moving and irradiating laser light over the workpiece.

* When using SurfaceMeasure 606/610/1010

• Advantages of non-contact type Non-contact measurement enables measurement of materials that can be easilydeformed by contact measurement, including resin or thin, elastic parts.



• Powder-less measurement

Automatic configuration of the camera sensitivity and the laser intensity settings according to the environment and materials enable establishing a simple and comfortable laser-scanning environment since measurement is now powder and spray free.

• Evaluation cases

The collected point cloud data can be used by various optional software in a wide range of applications, such as editing, plane creation, comparison using CAD data and more.





Measurement of color sample plate





403/606/610/1010 606T

201FS

		SurfaceMeasure 403 *1	Surface Measure 606	Surface Measure 610	Surface Measure 1010	Surface Measure 606T	Surface Measure 201FS		
Laser irradiat	ion method		Line Lase	er (single)	Line Laser (cross)	Flying spot			
Max. scan w	idth	40 mm	60 mm	60 mm	Max. 100 mm	3×65 mm	Max. 23 mm		
Max. scan de	Max. scan depth		60 mm	100 mm	100 mm	65 mm	15 mm		
Working dist	ance	66 mm	123 mm	165 mm	165 mm	203.5 mm	57.5 mm		
Scanning err	or *2	8 µm	12 µm	15 µm	18 µm	17 µm	1.8 µm		
Max. Acquisition rate		60,000 points/sec		75,000 points/sec	3×25,500 points/sec	25,000 points/sec			
Mass		430 g	430 g	400 g	400 g	480 g	480 g 500 g		
Laser Class	EN/IEC	Class2 [EN/IEC 60825-1 (2014)]							
	JIS	Class2 [JIS C 6802: 2014]							
	Laser Type	Red-light semiconductor					Semiconductor		
Line Laser	Wave length	660 nm					670 nm		
	Power output	4 mW					1 mW		
Point Laser	Wavelength	—	— 635 nm				_		
	Power output	_	1 mW			_			

*1 Made-to-order models

*2 According to Mitutoyo's acceptance procedure. (1 σ /sphere measurement, probe alone)





Unit: µm

201FS

Mitutoyo

147.5

5

Ν

Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

N-16

Precision measuring technology in three dimensions

Point Cloud Processing Software for Coordinate Measuring Machines **MSURF**

MSURF software modules

Softwa	re	On-line			Off-line			
Software	^{Je} MSURF-S RUN	MSURF-S 1	MSURF-S 2	MSURF-S 3	MSURF-G 1	MSURF-G 2	MSURF-G 3	MSURF-I PRO
MSURF-S	1	1	1	1				
MSURF-G					1	1	1	
MSURF-I								~
MSURF-I Option			1	1		1	1	
MSURF-MESH PRO			1	1		1	1	1
MSURF-PLANNER*		1		1	1		1	
MSURF-PLANNER RUN	* 🗸							

* To run a measurement macro created by MSURF-PLANNER, the module "MSURF-PLANNER RUN" is required separately.

MSURF-S

Calculates point cloud data measured by CNC CMM with SurfaceMeasure. It generates scanning paths by defining the scanning start position, length, and width.

MSURF-I

Conducts analysis or comparison verification of measured point cloud data in reference to nominal data (supporting CAD data import).

3.90mm 3.47mm 11.03mm

Section evaluation (dimensional calculation)





Evaluation of step/clearance

Surface curvature evaluation

MSURF-MESH PRO

This software is provided with various functions such as filtering point cloud data and mesh data. The software is enhanced by adding functions to standard ones. It also enables functions such as mesh data thinning-out, highlighting, interpolation and outlier removal that are unavailable as standard. Note: MSURF-MESH PRO has the optional functions of MSURF-I.

MSURF-PLANNER RUN

N-17

MSURF-PLANNER RUN is optional software required to execute and edit measurement macros created by MSURF-PLANNER.

- Note 1: MSURF-PLANNER RUN is optional software added to MSURF-S or MSURF-G.
- Note 2: This optional software is not required for a PC with **MSURF-PLANNER** installed.



• **MSURF** is a software program that enables users to perform operations from measurement to evaluation on the same platform when the non-contact line laser probe, SurfaceMeasure, is used. Eight software modules are provided according to the task.





Note: If not using the ACR3 probe changer, probe replacement is performed manually.

MSURF-PLANNER

MSURF-PLANNER is software to automatically create measurement macros (surface form, feature form) for the line laser probe from 3D CAD data.

Optimized data (travel path, number of probe head revolutions, etc.) of a measurement path will contribute to improvements in productivity.



Automatic z of measurement macros by MSURF-PLANNER

MSURF-G

Ν

MSUR-G is the off-line version of MSURF-S. It allows users to create measurement programs in advance of actual measurements on a CMM by using CAD data. Therefore, users can start measurement immediately at the time a real workpiece is ready. Since **MSURF-S** is a standalone PC application, only requiring installation by the user, it helps preserve valuable CMM time exclusively for productive measurement.

Note: MSURF-G cannot be combined with MSURF-S.

Mitutoy

SP25M

Compact high accuracy type scanning probe

This compact, multifunctional and highly accurate scanning probe is only 25 mm in diameter, which enables it to access shrouded workpiece features. Data collection is by scanning measurement, ultra-high precision point measurement and center alignment point measurement. The probe can be attached to a probe head (**PH10M/10MQ**) to automatically change the orientation allowing for maximum flexibility in measurement.



Scanning probes MPP-3100

Ultra-high accuracy and low measuring force scanning probe This ultra-high precision scanning probe

Initiating politicity of the politic politic politic politicity of the politicity of

MPP-10 Probe for effective thread-depth measurement

This is the only probe in the world that is dedicated to measure effective screw-thread depth on a CNC CMM. The probe can also attach to a probe head (**PH10M/10MQ**) to change the orientation to measure bores in various directions.

Non-contact probes SurfaceMeasure

Non-contact type laser probe This compact, high accuracy, non-contact type laser probe is designed for use with CNC CMMs. The scanning probe automatically adjusts to workpiece surface characteristics to deliver highly efficient measurements. Automatic laser intensity and camera sensitivity adjust according to the environment and the workpiece material, for simpler and more comfortable laser scanning.

QVP

QUICK VISION probe

This CNC CMM Quick Vision Probe utilizes Mitutoyo's technology in a vision measuring machine for totallyautomated video measurement.



SP80

High accuracy scanning probe (supports long styli)

A highly accurate stylus up to 500 mm in length (both horizontally and vertically) can be installed on this probe. This ultra-high precision scanning probe allows data collection by scanning measurement, ultra-high precision point measurement and center alignment point measurement.

REVO-2

High speed 5-axis scanning head This high-speed scanning head delivers high accuracy measurement while delivering highthroughput. Contact measurement with a stylus that can be up to 500 mm in length increases flexibility and makes simultaneous 5-axis measuring with non-step indexing possible.







Gurtee

SurfaceMeasure606T 201FS

CF20 Centering microscope for CMMs This centering microscope enables

SurfaceMeasure606

This centering microscope enables measurement of small holes or elastic bodies that are very difficult to measure using a contact measurement method such as with a touch-trigger probe. It also allows a CMM to be used as a very large microscope.



CCTV Monitor System for CMM (optional)

A probe for roughness measurement SURFTEST PROBE

Probe for surface roughness measurement

Mounting this probe on a CMM enables surface roughness measurement and analysis to be included in fully automatic CNC measurement cycles. This probe is compatible with an automatic probe changer, and therefore can be automatically replaced with another type of probe for 3D coordinate measurement. A wide variety of roughness analyses can be performed using the dedicated evaluation program.

Touch-trigger probes



High accuracy touch-trigger probe This high-accuracy touch-trigger probe has a high repeatability figure of of $2\sigma \le 0.25 \mu m$. A long stylus, up to 150 mm in length, can be installed.

TP200



Compact high-accuracy touch-trigger probe This compact, high accuracy, touch-trigger probe is only 13.5 mm in diameter, making it an ideal choice where high-accuracy measurement inside narrow or shrouded workpiece features is needed. Styli auto-changing (optional) is supported.



TP20



Compact touch-trigger probe This compact touch-trigger probe is only 13.5 mm in diameter, making it an ideal choice for probing deep inside narrow or shrouded workpiece features. Styli auto-changing (optional) is supported when mounted on a CNC CMM.



Ν

N-18

Precision measuring technology in three dimensions

MH20i

Touch-trigger probe with manual probe head

This touch-trigger probe equipped with a manual probe head is designed for use with manual CMMs. The probe head may be manually indexed to 168 positions.

UMAP-CMM

Micro touch-trigger probe A stylus with an ultra-small diameter of 0.1 mm or 0.3 mm can be used. Measurement of miniscule form is possible by mounting on the PH10MQ.

Probe heads PH10M / 10MO

Motorized probe head

The probe allows automatic control of positioning (up to 720 directions) of the mounted probe. It is possible to mount not only a touch-trigger probe but also any scanning probe, vision probe, laser probe, screw-thread depth probe, etc. Auto-changing is available (optional).

PH1

Ν

Manual probe head This manual probe head is designed for use with the TP200/TP20 touch-trigger probes.

The attached probe is manually positioned in the desired orientation to suit the measuring task

Clamping System

• A workpiece can be mounted on a CMMs measuring table using a variety of combinations of Eco-Fix clamping components. A dedicated fixturing jig isn't necessary.

MH20

Touch-trigger probe with manual probe head

This touch-trigger probe equipped with a manual probe head is designed for use with manual CMMs. The probe head can be manually positioned to the desired orientation.

PH20

5-axis control touch-trigger system

Thanks to unique "head touches", it is possible to measure by movement of the probe head itself instead of moving the CMM elements. Also, measuring time can significantly be shortened by means of 5-axis concurrent control and stepless positioning angle.

MIH





PH6M

Fixed probe head A fixed probe head with autojoint connector for use with TP7M or SP25M.

• Economical starter kits "Eco-fix Kit S" and

"Eco-fix Kit L" are available as shown below.





Mitutoyo

Refer to the Probes for Coordinate Measuring Machines Brochure (No. E16005) for more details.

Eco-fix Kit S 551111 / I

A kit includes a 250 mm × 250 mm base plate and a variety of clamping components.



A kit includes a 500 mm × 400 mm base plate and a variety of clamping components.

N-19





