CNC FORM MEASURING INSTRUMENT SERIES

Catalog No. E4284

The world's leading range of CNC Form Measuring Machines ushers in a new age of automated measurement. Simply switching to the dedicated part program for each workpiece greatly improves measurement throughput and helps maximize productivity.

Mitutoyo

Towards improved measurement efficiency

CNC Surface Roughness Tester Surftest Extreme

CNC Surface Texture Measuring Instrument Formtracer Extreme

CNC Contour Measuring Instrument Contracer Extreme

Mitutoyo provides powerful solutions for improving measurement efficiency.

Existing measurement process

- Workpiece loading / unloading
- Workpiece leveling, etc.
- Positioning the measurement start point
- Measurement
- Analysis of recorded geometrical data
- Print

To be repeated for all workpieces.

Ties up the operator for an extended period of time.

CNC Measurement

- As soon as a workpiece pallet is loaded, measurement can be started.

A CNC measuring machine runs unmanned. Now the operator can commit to other tasks.

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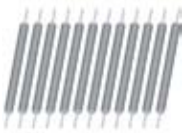
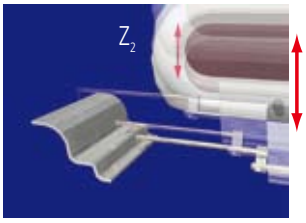
Applicable workpiece	Measurement conditions	Time for measurement
Crankshaft 	Number of measurement points: Approx. 40 points Measuring position: Pin/Journal/Thrust surface. Measuring direction: Along the axis of each cylindrical unit/On the surface of each thrust bearing. Preliminary arrangements: Shifting workpiece/Changing workpiece position/Alignment Analysis items: Surface roughness/Straightness *Alignment in the direction of measurement or mounting the shaft takes time, and can require two people!	**Manual: 90 minutes** ⬇ **CNC: 20 minutes**
Cylinder head 	Number of measurement points: Approx. 60 points Measuring position: Six surfaces and the inside diameter of each bore. Measuring direction: Multiple directions including the top, bottom, and side surfaces; and in the inclined holes. Preliminary arrangements: Shifting workpiece/Changing workpiece position/Alignment, etc. Analysis items: Surface roughness/Contour and profile *Since more than ten position changes are required to set the workpiece at the measuring point, the measurement efficiency is badly affected!	**Manual: 90 minutes** ⬇ **CNC: 30 minutes**
Transmission gear 	Number of measurement points: Approx. 4 points Measuring position: Near tip of tooth. Measuring direction: Tangent line Preliminary arrangements: Workpiece rotation/Workpiece positioning Analysis item: Contour and profile *Although the rotary positioning at every 90 degrees requires simple repetitive operations, a significant difference will result in the amount of time required and the accuracy depending on the operator's skill.	**Manual: 20 minutes** ⬇ **CNC: 5 minutes** (Each estimated time covers measurement of four teeth.)
Valve body 	Number of measurement points: Approx. 20 points Measuring position: Seating surface and holes Measurement direction: Top surface and the hole inside diameter in any of the three directions. Preliminary arrangements: Shifting workpiece/Changing workpiece position/Alignment, etc. Analysis items: Surface roughness *The seating surface can be measured easily after shifting the workpiece appropriately. However, it is not so easy to measure the inside surface roughness of a hole, since the measuring position may be difficult to see by the operator during positioning!	**Manual: 40 minutes** ⬇ **CNC: 15 minutes**
Printer roll 	Number of measurement points: Approx. 3 points/workpiece Measuring position: On the cylinder's generatrix. Measurement direction: Along the generatrix axis Preliminary arrangements: Workpiece change/Alignment Analysis items: Surface roughness/Straightness *Little time is required to measure only one piece. However, as the number of pieces to be measured within a day becomes large, so does the total time required for alignment, resulting in a time-consuming job!	**Manual: 50 minutes** ⬇ **CNC: 15 minutes** (Each estimated time covers measurement of ten rolls.)
Aspheric surface lens 	Number of measurement points: Approx. 2 points Measurement position: Along two lines crossing each other on the sectional plane perpendicular to the optical axis Measurement direction: In the direction of stylus retraction Preliminary Arrangements: Workpiece rotation/Workpiece leveling/Optical axis positioning Analysis items: Contour and profile/Tolerance zone measurement data/Surface roughness *It is critical to measure at the sectional profile, which is perpendicular to the optical axis and necessitates a significant amount of time for establishing the complete settings!	**Manual: 40 minutes** ⬇ **CNC: 5 minutes**
Rotor/Spindle for motors 	Number of measurement points: Approx. 2 points/workpiece Measuring position: On the cylinder's generatrix Measurement direction: Along the generatrix axis Preliminary arrangements: Workpiece change/Alignment Analysis items: Surface roughness/Straightness *It takes little time to measure only one piece. However, since it is often the case that many workpieces are measured during each job, the total setting time required may become too large for piece-by-piece setting!	**Manual: 40 minutes** ⬇ **CNC: 20 minutes** (Measurement of 20 workpieces is estimated within each time period.)

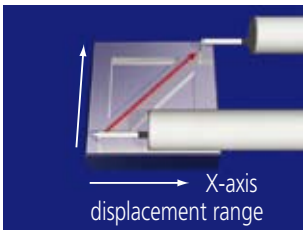
A Range of Functions Enhance Your Measurement Efficiency

Accelerating measurement efficiency through new measuring functions under CNC control

› Tracking measurement function
The Z_2-axis control makes the target range of form (contour) tracing measurement wider than that covered by only the detector unit.

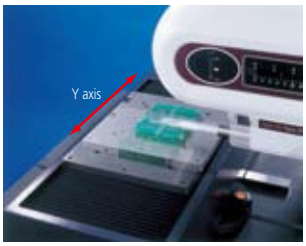


› Inclined plane measurement function (surface roughness)
Simultaneous control over the X axis and Y axis enables oblique-movement measurement to be performed.
Even continuous measurement can be achieved without re-setting the workpiece so that the measuring direction can be parallel to the drive unit.



Part program-guided automatic continuous measurement of multiple points/multiple workpieces

The use of the Y-axis table makes it possible to perform automatic continuous measurement of multiple workpieces (measurement points).



› Models with the α axis (incorporated with the drive unit tilting function) enable continuous measurement on multiple sections of surfaces including inclined portions without changing the initial set up.
› Installs the Automatic Leveling Function using the α axis or optional Auto Leveling Table. (Patent pending: Japan)

High-throughput measurement enabled by fast positioning

› Thanks to its high drive speed (a maximum of 200mm/s*), which is the fastest in the world, and multiple-axis simultaneous control, the detector can be positioned practically instantaneously on the target measurement point.
(* Maximum 40mm/s for CS-5000CNC)

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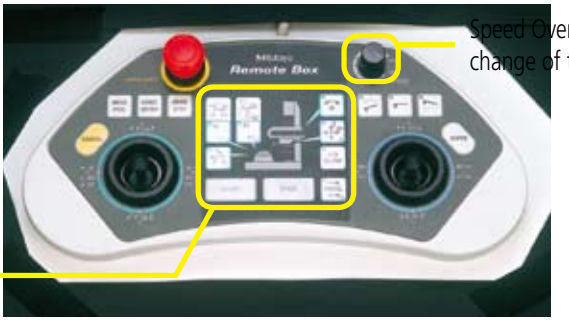
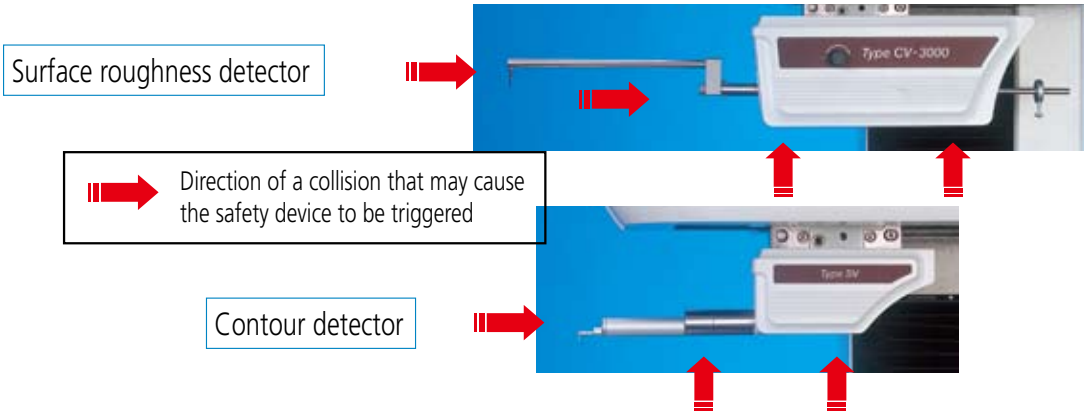
Easy-to-use Remote Box allows the operator to control the measuring unit at hand

› Easy-to-understand operation buttons identified by each icon marked on the top.
› Also provided with the Speed Override Knob, which allows the operator to change the traveling speed even during automatic execution.



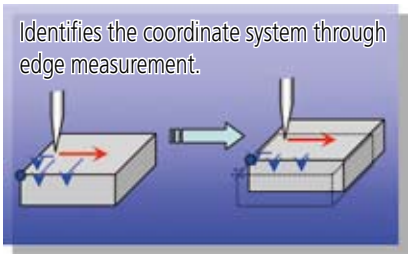
An anti-collision safety function is also provided to protect the operator, measuring unit, and/or workpiece from damage.

› This safety device will automatically stop the measuring unit should a collision occur.



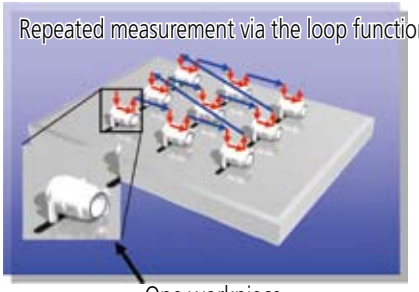
FORMTRACEPAK, the surface roughness/form analysis software that strongly supports CNC measurement

› Workpiece identification (coordinate system alignment)
It is possible to measure the same point even when the current workpiece is positioned in a place offset from that which was set at the time of creating the part program, if the operator establishes the workpiece coordinate system another time.



Supports multiple-part measurement.

› By repeatedly running one section of a part program using the loop function, it is possible to batch-measure more than workpiece having an identical form.



CNC Form Measuring Instrument Line-Up

Contributes greatly to your productivity improvement by increasing measurement throughput. The world's leading range of CNC Form Measuring Machines ushers in a new age of automated measurement.

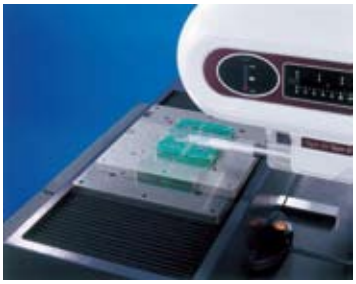
- Your measurement efficiency can be enhanced with the new measuring functions (tracking measurement/inclined plane measurement) under CNC control.
- Multiple parts mounted on a palette and single parts with multiple measurement points can be inspected/measured efficiently.
- Mitutoyo has achieved the world's fastest maximum drive speed of 200mm/s together with multiple axis simultaneous control, resulting in ultrafast movement to the target measurement point. The drive speed has been raised to 40 times that of a conventional instrument (5mm/s → 200mm/s).
- Supplied with an easy-to-use Remote Box allowing the operator to control the measuring process by hand.
- Provided with an anti-collision safety function to protect the operator, measuring unit, and/or workpiece from damage.
- FORMTRACEPAK, surface roughness/form analysis software, strongly supports CNC measurement.
- CNC operation ensures that every user performs measurement under the same conditions and with equal application of skill.
- Mitutoyo's wide-ranging product line-up includes not only single-purpose surface roughness measuring instruments and contour/form measuring instruments, but also dual-purpose surface roughness/form measuring machines and numerous additional peripheral options, all of which enable the user to choose the best instrument for the measurement tasks in hand.

Mitutoyo

CNC Surface Roughness Measuring Instrument
Surftest Extreme SV-3000CNC

Features

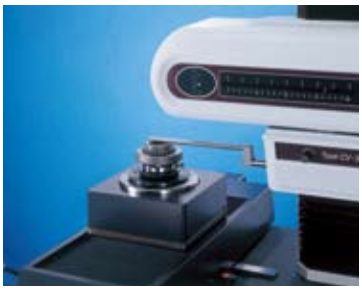
- High-accuracy stylus type CNC surface roughness tester
- X_1, (Y), and Z_2 axes have a maximum drive speed of 200mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- Enables inclined plane measurements through 2-axis simultaneous control in X- and Y-axis directions.
- For models with the α axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X_1 axis.
- For models with a Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- For the Z_1-axis detector, one of two types with a measuring force of 4 mN or 0.75 mN can be selected.
- All connecting cables are neatly housed in the measuring unit, which ensures measurement without any interference from the cables.
- Since the Z_1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis section is via USB.



CNC Contour Measuring Instrument
Contracer Extreme CV-3000CNC / 4000CNC

Features

- High-accuracy stylus type CNC contour/form measuring instrument
- X_1, (Y), and Z_2 axes have a maximum drive speed of 200mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models with the α axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X_1 axis.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- The Z_1 axis is provided with a digital detector (CV-4000CNC: incorporating the Mitutoyo Laser Holoscale) that covers a wide measurement range and can be used for high-accuracy measurement.
- Enables inclined plane measurements through 2-axis simultaneous control in the X- and Y-axis directions.
- Since the Z_1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis section is via USB.



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CNC Surface Roughness/Form Measuring Instrument Formtracer Extreme SV-C3000CNC / C4000CNC

Features

- High-accuracy stylus type CNC Surface Roughness/Form Measuring Instrument that allows both measurement of surface roughness and form/contour with one unit.
- X_1, (Y), and Z_2 axes have the maximum drive speed of 200mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models with the α axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X_1 axis.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- The CV-type Z_1-axis is provided with a digital detector (SV-C4000CNC: incorporating the Mitutoyo Laser Holoscale) that covers a wide measurement range and can be used for high-accuracy measurement.
- Enables inclined plane measurements through 2-axis simultaneous control in the X- and Y-axis directions.
- When the detector for form/contour measurement is replaced with that for surface roughness measurement, or vice versa, it is a simple, one-touch replacement without re-routing of the connecting cables.
- Since the Z_1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis section is via USB.

CNC Surface Texture Measuring Instrument
Formtracer Extreme CS-H4000CNC / CS-5000CNC / CS-H5000CNC

Features

- High-accuracy stylus type CNC Surface Measuring Instrument that allows simultaneous measurement of surface roughness and form/contour.
- The X_1 axis has a maximum drive speed of 40mm/s, and (Y) and Z_2 axes have a maximum drive speed of 200mm/s, respectively. This permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- A Mitutoyo Laser Holoscale is incorporated in the X_1 axis and Z_1 axis so that high resolution [X_1 axis: 6.25nm, Z_1 axis: 1nm (4nm/8nm: CS-5000CNC, 1nm/2nm: CS-H5000CNC)] is achieved and batch measurement of form/contour and surface roughness can be made.
- The active control method is employed for the Z_1-axis detector to implement a wide-range measurement capability wherein the variation in dynamic measuring force is restricted.
- Since the Z_1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- For models with the α axis*, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X_1 axis. *Not available only for CS-H4000CNC
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- Supplied with the easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Uses USB for communicating with the Data Processing/Analysis Unit (optional).

CS-H4000CNC

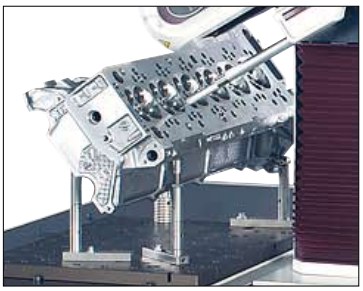
CS-H5000CNC

Mitutoyo

Y-axis Column Moving Type Surface Roughness Tester Surftest Extreme SV-M3000CNC

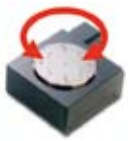
Features

- CNC Surface Roughness Tester that covers measurement of large/heavy workpieces such as engine blocks, crankshafts, etc.
- In combination with the rotation of the detector unit, it is possible to measure continuously in the horizontal and vertical planes.
- Supplied with either the large table for supporting a load of 100kg or a large θ2 table, depending on the order.
- Suitable for automatic surface roughness measurement on large and heavy workpieces.
- Employs the column-moving type configuration that is not restricted by workpiece size.
  This is advantageous for measuring heavy workpieces such as engine blocks, crankshafts, etc.
- Provides 800mm of Y-axis stroke. This makes it possible to measure multiple profiles on large workpieces.
- Load table has a self-contained structure to ensure that various size workpieces, jigs, auto-feed devices, etc., are easily accommodated and can be specified, if required, by special order.
- Surface roughness detector rotating unit, S-3000AR (optional), covers continuous measurement over the bottom and side surfaces of a workpiece.
- Compatible with the Large-size Rotary Table (optional).
  Enables continuous automatic measurement of large-size workpiece.

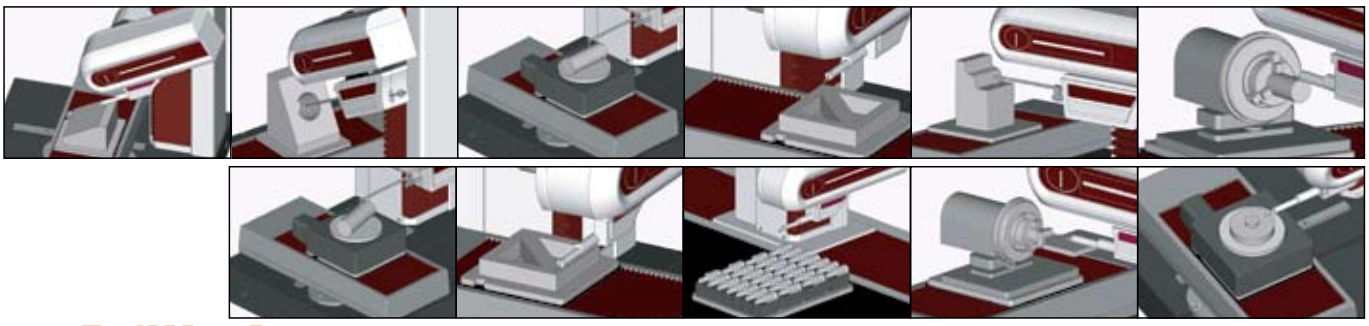


Wide choice of optional accessories expands the application range - 1

Examples of optimal combinations of accessories

Optional accessory **Function** *1: Applicable only to form/contour measurement *2: Applicable only to surface roughness measurement *3: Applicable only for SV-M3000CNC	**Y-axis Table** 	**θ1 Table** 	**θ2 Table** 	**Drive unit tilting function** (Patent pending: Japan) 	**Large θ Table** 	**Rotary-type detector holder** 
Automatic leveling	—	—	—	○	—	—
Automatic alignment (Patent registered: Japan)	○	○	—	△	—	—
Multiple workpiece batch measurement	△	—	—	—	—	—
Measurement in the Y-axis direction	○	—	—	—	—	—
Oblique measurement of XY plane *2	○	—	—	—	—	—
Outside 3D surface roughness measurement/evaluation *2	○	—	—	△	—	—
Multiple-piece measurement in the Y-axis direction (Positioning in the Y-axis direction)	○	—	—	—	—	—
Multiple-piece measurement in the radius direction (Positioning in the rotating direction of XY plane)	△	○	—	—	—	—
Tracking measurement in the Z-axis direction *1	—	—	—	—	—	—
Inclined surface measurement in the X-axis direction	△	—	—	○	—	—
Inclined hole inside measurement in the X-axis direction	△	—	—	○	—	—
Multiple cylinder generatrices measurement	△	—	○	—	—	—
Measurement of both top and bottom surfaces	△	—	○	—	—	—
Rotary positioning of large workpiece *3	—	—	—	—	○	—
Upward/downward and frontward/backward measurement of large workpiece *3	—	—	—	—	—	○

○: Essential △: Better to provide with — : Not necessary



Mitutoyo

Cross-travel Table

Stage size: 280x180mm
Travel range: 100x50mm

218-001

Stage size: 280x152mm
Travel range: 50x25mm

218-041

Chucks

Holding range: Objects with outside diameter 1.5mm or less

211-031

Holding range:
Internal jaws: Objects with outside diameter 1-36mm
Internal jaws: Objects with inside diameter 14-70mm
External jaws: Objects with outside diameter 1-75mm

211-032

Rotary Vise

Type: Double acting
Jaw opening: 60mm
Angular graduations: 1°

218-003

Type: Single acting
Max. workpiece diameter: ø60mm
Angular graduations: 5°

172-144

V-block & clamp

Accessory for the Cross-travel Table
Max. workpiece diameter: 50mm (172-234), 25mm (172-378)

172-234

172-378

Possible range of setting: 1mm-160mm
For mounting on accessories such as the cross-travel table

998291

Precision Vise

Jaw opening: 36mm
For mounting on accessories such as the cross-travel table

178-019

Cross-travel table (analog XY adjustment)

Table size: 130x100mm
Angle of tilt: ±1.5°
X-, Y-axis displacement: ±12.5mm

178-043-1

Cross-travel table (digital XY adjustment)

Same as XY leveling table (analog)

178-042-1

3-axis Adjustment Table

178-047

Leveling Table

Table size: 130x100mm
Angle of tilt: ±1.5°

178-016

Adjustable clamps

Accessory for the Cross-travel Table
Max. holding height: 35mm

176-107

Swivel Center Support

Max. workpiece diameter: 85mm (where the tilt angle is 0°) , 65mm (where the angle of tilt is 10°)
Maximum workpiece length: 140mm

172-197

Center Support Riser

Total height: 60mm

172-143

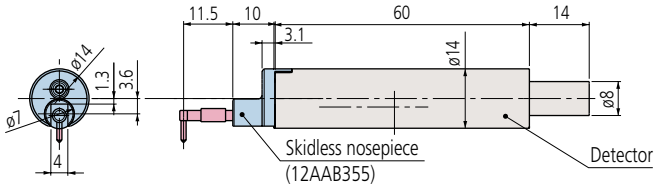
Center Support

Maximum allowable workpiece length: 120mm
Max. workpiece diameter: 120mm

172-142

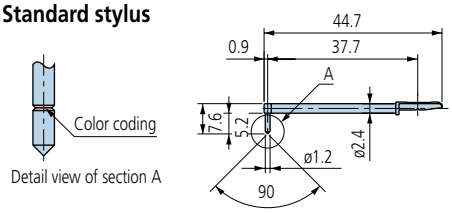
Wide choice of optional accessories expands the application range - 2

Styli for SV-3000CNC, SV-C3000CNC, SV-C4000CNC and SV-M3000CNC



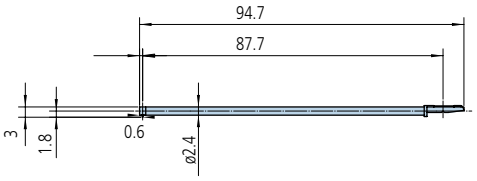
Styli

Standard stylus



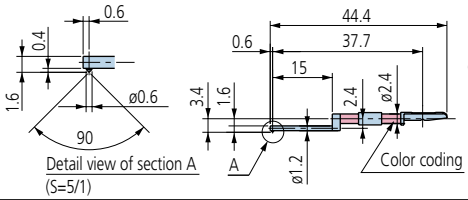
12AAE882 (1µm)*1
12AAE924 (1µm)
12AAC731 (2µm)*1
12AAB403 (5µm)
12AAB415 (10µm)
12AAE883 (250µm)*1
( ): Tip radius

Double-length for deep hole



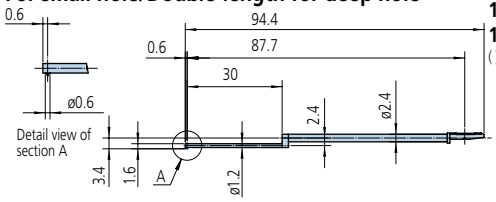
12AAE898 (2µm)*1
12AAE914 (5µm)
( ): Tip radius

For small hole



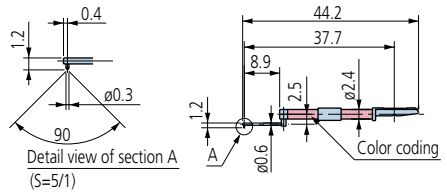
12AAC732 (2µm)*1
12AAB404 (5µm)
12AAB416 (10µm)
( ): Tip radius

For small hole/Double-length for deep hole



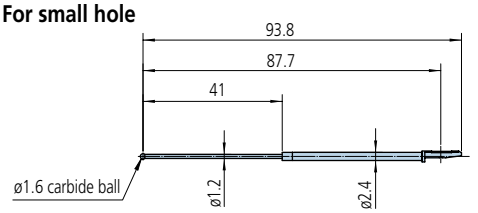
12AAE892 (2µm)*1
12AAE908 (5µm)
( ): Tip radius

For extra small hole



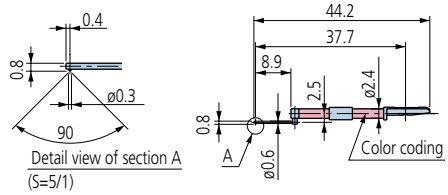
12AAC733 (2µm)*1
12AAB405 (5µm)
12AAB417 (10µm)
( ): Tip radius

For small hole



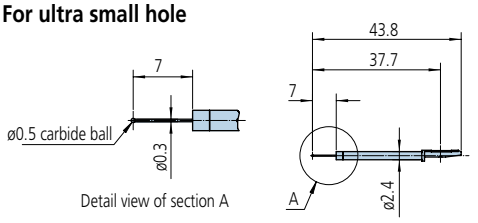
12AAE884
(ø1.6mm)

For extra minute hole



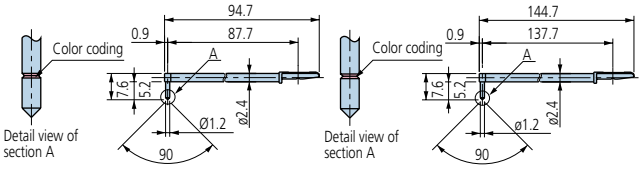
12AAC734 (2µm)*1
12AAB406 (5µm)
12AAB418 (10µm)
( ): Tip radius

For ultra small hole



12AAE885
(ø0.5mm)

For deep hole

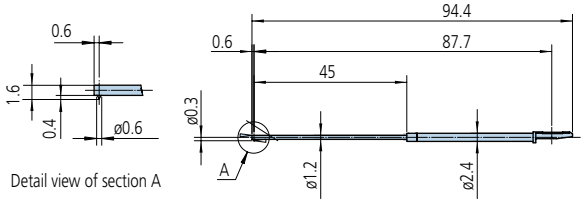


Double length
12AAC740 (2µm)*1
12AAB413 (5µm)
12AAB425 (10µm)
( ): Tip radius

Triple length
12AAC741 (2µm)*1
12AAB414 (5µm)
12AAB426 (10µm)
( ): Tip radius

For small slotted hole

12AAE938 (2µm)*1
12AAE940 (5µm)

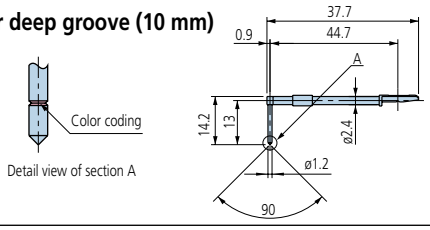


*1 Tip angle: 60°

Mitutoyo

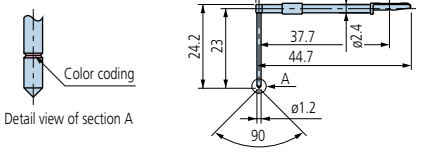
Styli

For deep groove (10 mm)



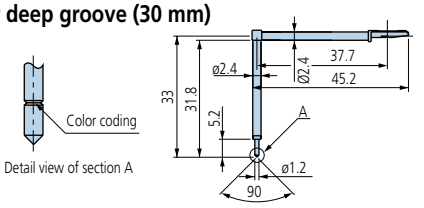
12AAC735 (2µm)*1
12AAB409 (5µm)
12AAB421 (10µm)
( ): Tip radius

For deep groove (20 mm)



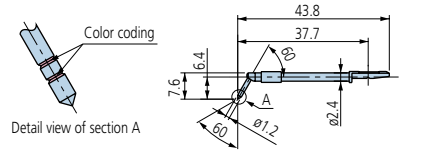
12AAC736 (2µm)*1
12AAB408 (5µm)
12AAB420 (10µm)
( ): Tip radius

For deep groove (30 mm)



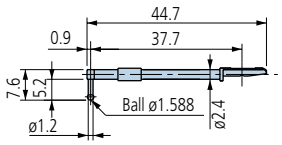
12AAC737 (2µm)*1
12AAB407 (5µm)
12AAB419 (10µm)
( ): Tip radius

For gear tooth



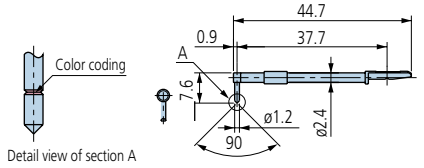
12AAB339 (2µm)*1
12AAB410 (5µm)
12AAB422 (10µm)
( ): Tip radius

For rolling circle waviness surface



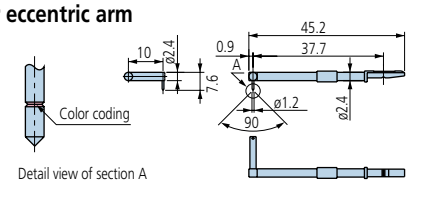
12AAB338
(0.8mm)

For knife-edge detector



12AAC738 (2µm)*1
12AAB411 (5µm)
12AAB423 (10µm)
( ): Tip radius

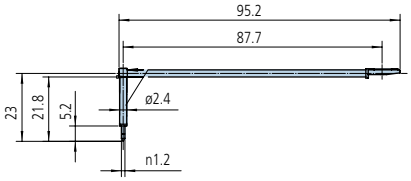
For eccentric arm



12AAC739 (2µm)*1
12AAB412 (5µm)
12AAB424 (10µm)
( ): Tip radius

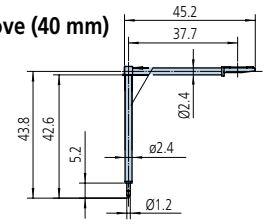
*1 Tip angle: 60°

For deep groove (20 mm)



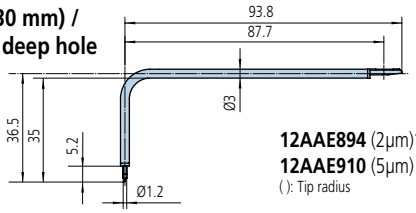
12AAC736 (2µm)*1
12AAB408 (5µm)
12AAB420 (10µm)
( ): Tip radius

For deep groove (40 mm)



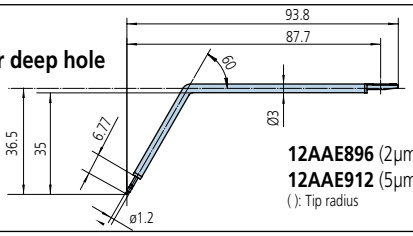
12AAE895 (2µm)*1
12AAE911 (5µm)
( ): Tip radius

For deep groove (30 mm) / Double-length for deep hole



12AAE894 (2µm)*1
12AAE910 (5µm)
( ): Tip radius

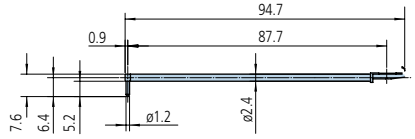
For gear tooth / Double-length for deep hole



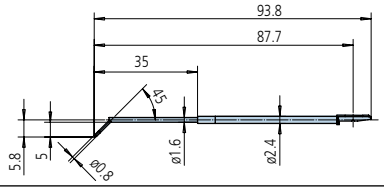
12AAE896 (2µm)*1
12AAE912 (5µm)*1
( ): Tip radius

For rolling circle waviness/ Double-length for deep hole

12AAE886 (250µm)

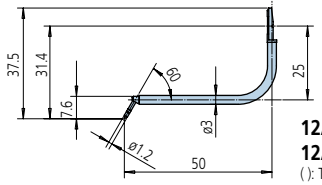


For corner hole/Double-length for deep hole



12AAE897 (2µm)*1
12AAE913 (5µm)
( ): Tip radius

For bottom surface of hole



12AAE899 (2m)*1
12AAE915 (5m)
( ): Tip radius

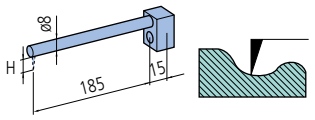
12AAE939 (2µm)*1
12AAE941 (5µm)
( ): Tip radius

* Compatible with styli made to special specifications.

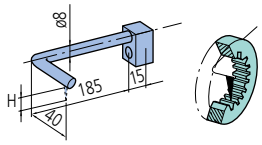
Wide choice of optional accessories expands the application range - 3

Arms and styli for CV-3000CNC, CV-4000CNC, SV-C3000CNC, SV-C4000CNC

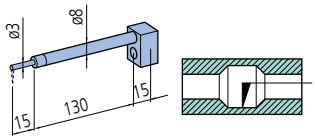
Straight arm



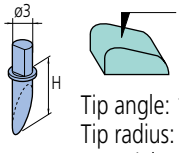
Eccentric arm



Arm for small hole

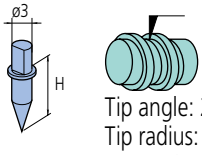


One-sided cut stylus



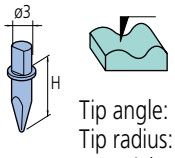
Tip angle: 12°
Tip radius: 25µm
Material: Carbide

Conical stylus



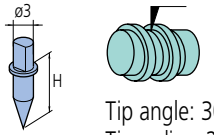
Tip angle: 20°
Tip radius: 25µm
Material: Carbide

Intersecting cut stylus



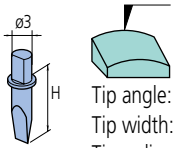
Tip angle: 20°
Tip radius: 25µm
Material: Carbide

Conical stylus



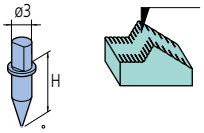
Tip angle: 30°
Tip radius: 25µm
Material: Sapphire or carbide

Knife-edge stylus



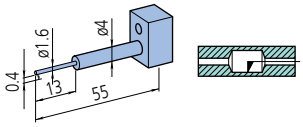
Tip angle: 20°
Tip width: 3mm
Tip radius: 25µm
Material: Carbide

Ball stylus

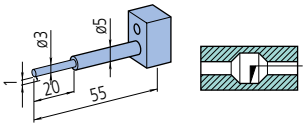


Tip ball diameter: 1 mm
Tip material: Carbide

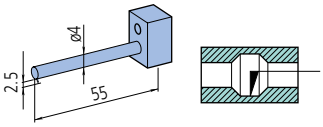
Small hole stylus **SPH-11/21/31**



Small hole stylus **SPH-12/22/32**



Small hole stylus **SPH-13/23/33**



Arm Applicability Table

Arm	Model	**Part No.**	Applicable Stylus No.	H (mm)
Straight	ABH-53	**12AAE294**	SPH-51, 52, 53, 54, 55, 57	6
	ABH-63	**12AAE295**	SPH-61, 62, 63, 64, 66, 67	12
	ABH-71*	**996506**	SPH-71, 72, 73, 74, 75, 77	20
	ABH-81	**996507**	SPH-81, 82, 83, 84, 85, 87	30
	ABH-91	**996508**	SPH-91, 92, 93, 94, 95, 97	42
Eccentric	ABH-52	**996509**	SPH-51, 52, 53, 54, 55, 57	6
	ABH-62	**996510**	SPH-61, 62, 63, 64, 65, 67	12
	ABH-72	**996511**	SPH-71, 72, 73, 74, 75, 77	20
	ABH-82	**996512**	SPH-81, 82, 83, 84, 85, 87	30
	ABH-92	**996513**	SPH-91, 92, 93, 94, 95, 97	42
Arm for small hole	ABH-21	**12AAE296**	SPH-21, 22, 23	—

*Standard accessories (CV-3000/4000 series, SV-C3000/4000)

Stylus Applicability Table

Arm	Model	**Part No.**	Applicable Stylus No.	H(mm)
One-sided cut stylus	SPH-51	**354882**	ABH-52	14
	SPH-61	**354883**	ABH-62	20
	SPH-71	**354884**	ABH-71 · 72	28
	SPH-81	**354885**	ABH-81 · 82	38
	SPH-91	**354886**	ABH-91 · 92	50
Intersecting cut stylus	SPH-52	**354887**	ABH-52	14
	SPH-62	**354888**	ABH-62	20
	SPH-72	**354889**	ABH-71 · 72	28
	SPH-82	**354890**	ABH-81 · 82	38
	SPH-92	**354891**	ABH-91 · 92	50
Conical stylus Tip angle: 20° (Carbide)	SPH-57	**12AAE865**	ABH-52 · 53	14
	SPH-67	**12AAE866**	ABH-62 · 63	20
	SPH-77	**12AAE867**	ABH-71 · 72	28
	SPH-87	**12AAE868**	ABH-81 · 82	38
	SPH-97	**12AAE869**	ABH-91 · 92	50
Conical stylus Tip angle: 30° (Sapphire)	SPH-53	**354892**	ABH-52	14
	SPH-63	**354893**	ABH-62	20
	SPH-73	**354894**	ABH-71 · 72	28
	SPH-79	**355129**	ABH-71 · 72	28
	SPH-83	**354895**	ABH-81 · 82	38
	SPH-93	**354896**	ABH-91 · 92	50
Conical stylus Tip angle: 30° (Carbide)	SPH-56	**12AAA566**	ABH-52	14
	SPH-66	**12AAA567**	ABH-62	20
	SPH-76*	**12AAA568**	ABH-71 · 72	28
	SPH-86	**12AAA569**	ABH-81 · 82	38
	SPH-96	**12AAA570**	ABH-91 · 92	50
Knife-edge stylus	SPH-54	**354897**	ABH-52	14
	SPH-64	**354898**	ABH-62	20
	SPH-74	**354899**	ABH-71 · 72	28
	SPH-84	**354900**	ABH-81 · 82	38
	SPH-94	**354901**	ABH-91 · 92	50
Ball stylus	SPH-55	**354902**	ABH-52	14
	SPH-65	**354903**	ABH-52	20
	SPH-75	**354904**	ABH-52	28
	SPH-85	**354905**	ABH-52	38
	SPH-95	**354906**	ABH-52	50
Small hole stylus (One-sided cut)	SPH-21	**12AAE297**	ABH-21	2
	SPH-22	**12AAE298**	ABH-21	4
	SPH-23	**12AAE299**	ABH-21	6.5

* Standard accessories (CV-3000/4000 series, SV-C3000/4000)

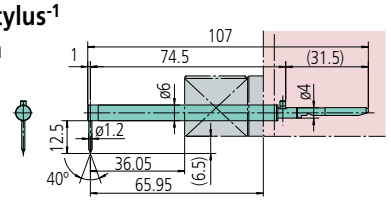
Mitutoyo

Styli for CS-H4000CNC, CS-500CNC and CS-H5000CNC

Standard-length styli

Standard-length stylus[-1]

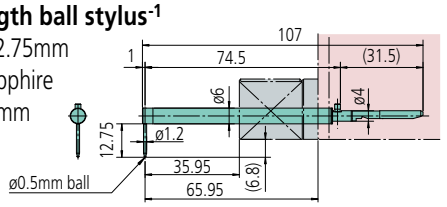
Stylus length: 12.5mm
Tip material: Diamond
Tip shape: 40° cone
Tip radius: 5µm (31.5)



***Parts No.: 12AAJ037 / 12AAD543 / 12AAJ037**

Standard-length ball stylus[-1]

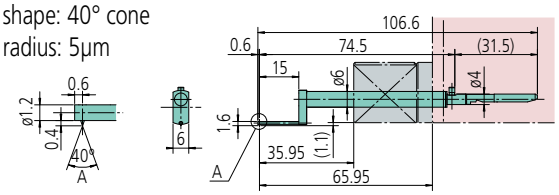
Stylus length: 12.75mm
Tip material: Sapphire
Tip ball dia: 0.5mm



Parts No.: 12AAD544

Standard-length stylus for small hole

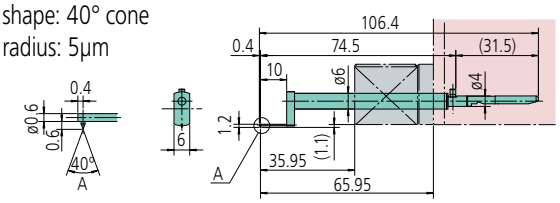
Stylus length: 15mm
Tip material: Diamond
Tip shape: 40° cone
Tip radius: 5µm



Parts No.: 12AAD651

Standard-length stylus for extra-small hole

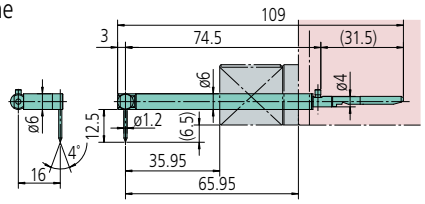
Stylus length: 10mm
Tip material: Diamond
Tip shape: 40° cone
Tip radius: 5µm



Parts No.: 12AAD652

Standard-length eccentric stylus

Stylus length: 12.5mm
Tip material: Diamond
Tip shape: 40° cone
Tip radius: 5µm

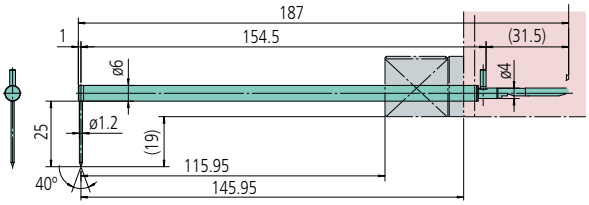


Parts No.: 12AAD653

Double-length styli

Double-length stylus[-2]

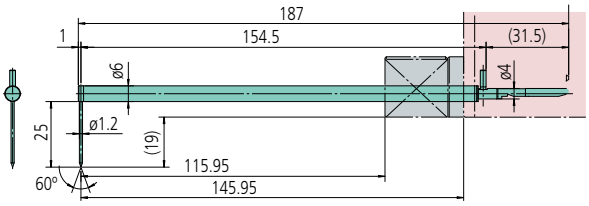
Stylus length: 25mm
Tip material: Diamond
Tip shape: 40° cone
Tip radius: 5µm



***Parts No.: ------ / 12AAD545 / 12AAJ039**

Double-length stylus[-3]

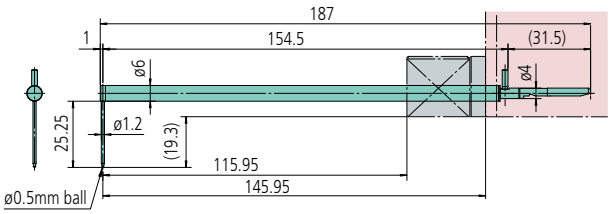
Stylus length: 25mm
Tip material: Diamond
Tip shape: 60° cone
Tip radius: 2µm



***Parts No.: ------ / 12AAG155 / 12AAJ041**

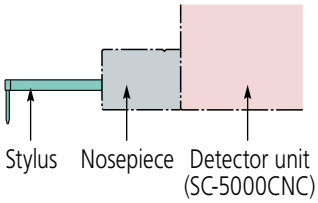
Double-length ball stylus[-2]

Stylus length: 12.75mm
Tip material: Sapphire
Tip ball dia: 0.5mm



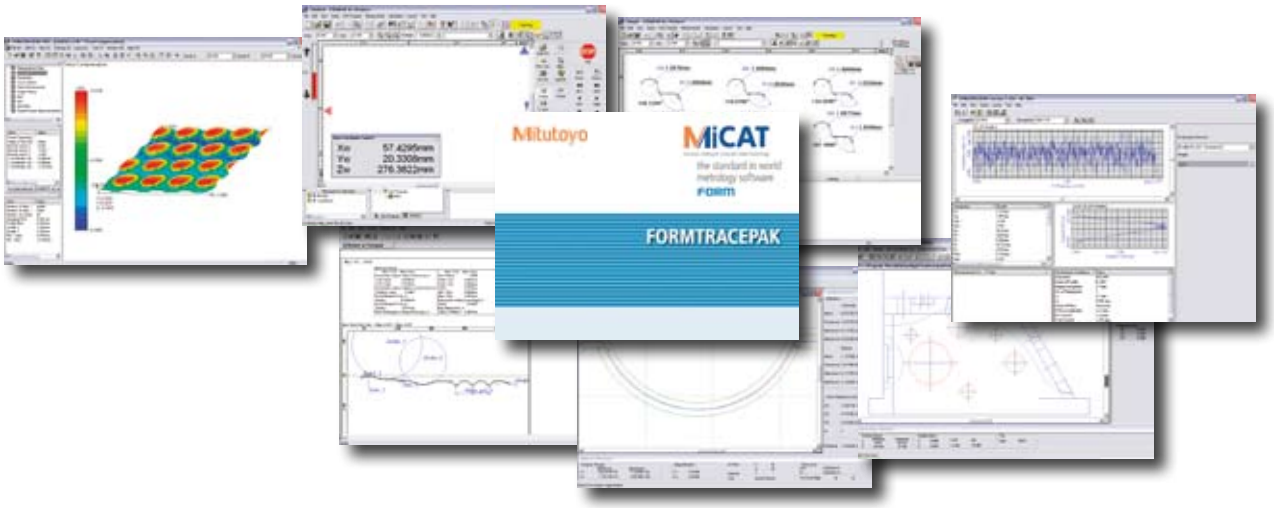
***Parts No.: ------ / 12AAD546 / 12AAD546**

Unit: mm



*Parts No.: for CS-H4000CNC / for CS-5000CNC / for CS-H5000CNC
-1: Standard accessory of CS-H4000CNC, CS-5000CNC and CS-H5000CNC
-2: Standard accessory of CS-5000CNC and CS-H5000CNC
-3: Standard accessory of CS-H5000CNC

Software FORMTRACEPAK



Measurement Control

› The Measurement Control screen has various command buttons appropriately arranged. They are required for creating and executing measurement procedures (part programs). Since the buttons and display areas not frequently used can be optionally set for display or no-display, the operator is permitted to arbitrarily customize the screen layout as easily as possible for operation.

› Any operation procedure can be accessed through a simple selection from the pull-down menu so as to be quickly ready for measurement.

› To aid effective measurement procedure (part program) creation, the arrangement of the control buttons is consistent with those on the Remote Box.

› The "Workpiece Identification Function", for example, that detects the amount of offset brought up during datum setting and mechanically fine-adjusts each axis to the optimum setting position for the measurement, as well as the "Coordinate System Alignment" commands that generate the optimum coordinate system for each measurement part allow fully automatic running.

› With the multi-axis translation command that simultaneously controls the movement along a maximum of six axes it is now possible to reduce the operation time required by the measuring instrument to a minimum and to further reduce the tracing time.

› For measuring multiple parts arranged on the palette, the use of the multiple-part loop function that repeats a set of movement, measurement, and analysis commands can reduce the time required to create the specific measurement steps.

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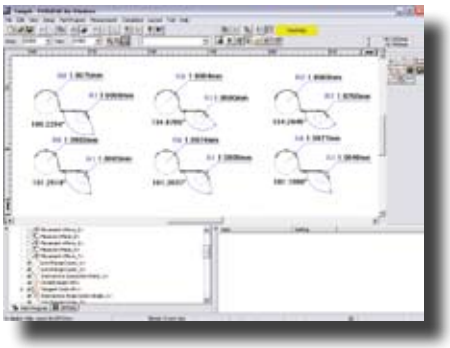
Profile Analysis Function



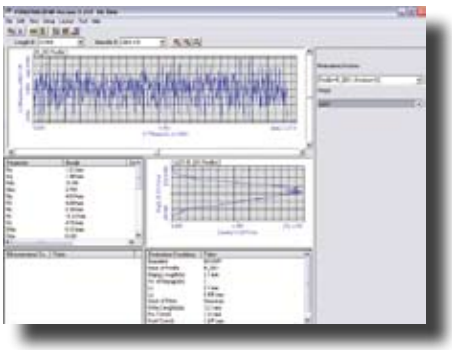
› Various commands including the point command (10 kinds), line command (6 kinds), and circle command (6 kinds) are provided to cover the basic elements of analysis. Standard calculation commands that combine these elements for angle, pitch, and distance calculations are also provided.
The display method used by additional commands that are not regularly used can be optionally tailored by the customization function, e.g. "Hide", can be applied to the calculation command button to suit the application environment.

› With the useful Automatic Circle/Line Application command it is possible to automatically calculate all circles and lines that are included in the data without pressing the command button multiple times. (Patent pending: Japan)

› The Outlier Removal Function is very useful, for example, to automatically remove irregular flaws from the data and set the calculation range for a section in which the boundary between a circle and a line can not be easily identified.

› Calculation results will be output as text (in the csv or txt format). The geometrical measurement data can be either output as a text file of point-series data or a CAD file (in the DXF or IGES format) or copied onto the clipboard. It is also possible to use some commercial documentation software and statistical processing software to share the data on a PC that is not equipped with Mitutoyo-original analysis software or if reverse engineering is intended with CAD.

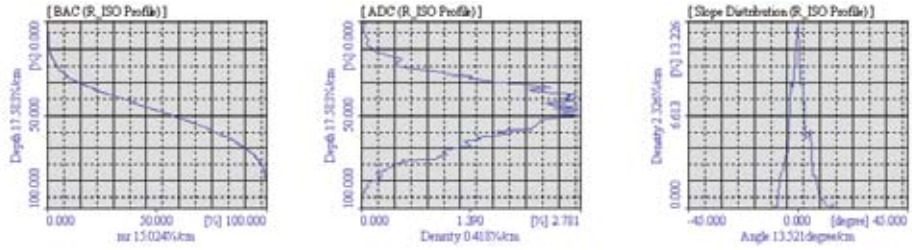
Surface Roughness Analysis Function



› Using the surface roughness measurement data it is possible to conduct analysis that conforms to global standards including ISO, JIS ('82, '94, '01), ANSI, VDA, etc.

› This software has integrated not only parameter calculating functions but also comprehensive graphical analysis functions, which can be widely used in daily quality control and R&D operations.

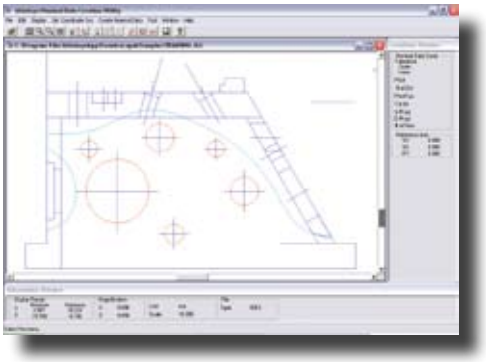
› Also enhanced with the data correction function (applicable to inclination and a curved surface) and data elimination function, etc.



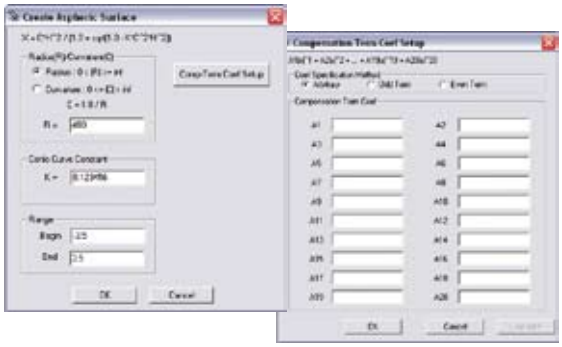
Software FORMTRACEPAK

Design Data Generation Function

Design data can be created from a CAD file (DXF- or IGES-formatted).
Measurement data from this Measuring Machine can also be converted into design data. If the measurement data of parts before they are used (before test) is stored as design data, it is possible to check the extent of wear after use (after test).
In addition, lens design data, critical in the rating of aspheric lenses, can be created not only from the input (maximum 20 degrees) of a generic formula for the aspheric surfaces of revolution but also from the CSV-formatted text file.



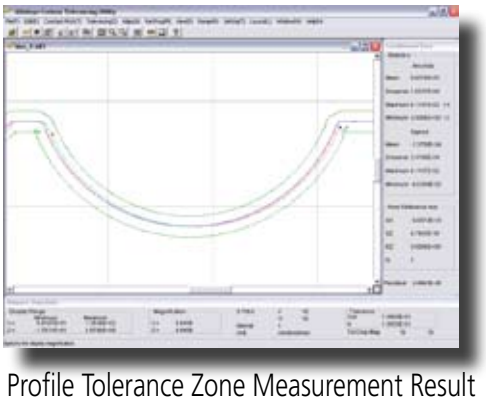
Design data generation



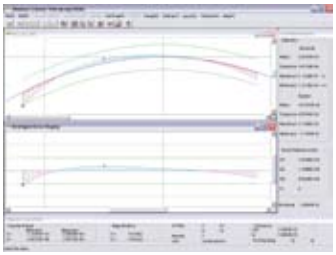
Generation of aspheric surface design values

Profile Tolerance Zone Measurement Function

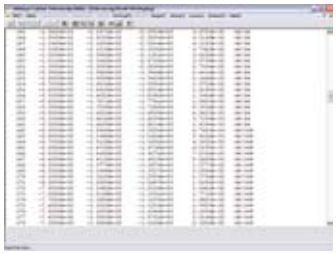
This application serves to collate the measurement data with the design data created in the process of design data generation. The Best-Fit Function that allows both the design data and measurement data to be translated to their optimal coordinates is provided as standard.
From this profile tolerance zone measurement result, it is not only possible to present a visual form of geometrical data and the amount of error at each coordinate but also to output in text-file format, which can be applied for feedback to a machine tool, etc.



Profile Tolerance Zone Measurement Result



Example profile tolerance zone measurement results of an aspheric surface lens



Output example of profile tolerance zone measurement result values

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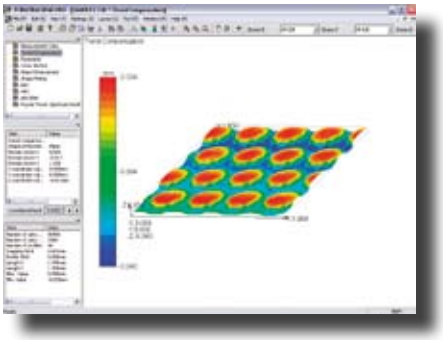
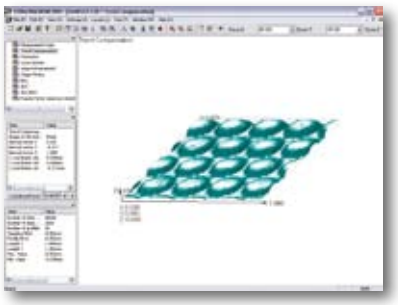
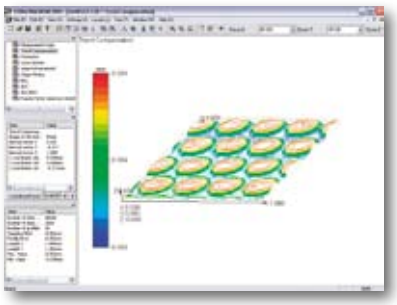
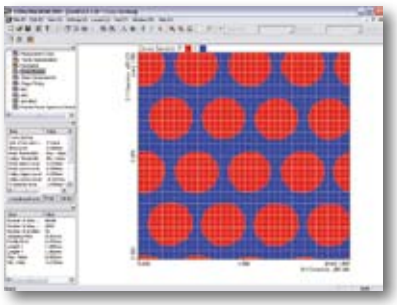
3D Data Analysis Program, FORMTRACEPAK-Pro(optional)

This software will analyze the three-dimensional surface roughness data collected from coordinate measurement with the Y-axis table.
It can offer various visual representation methods, such as shading display, mesh display, and contour-line display.
Thus, the user can analyze the target surface texture from various angles by making use of not only the 3D Roughness Parameter Calculation, Profile Analysis (area, volume), but also Bearing Area Curve (BAC), Amplitude Distribution Curve and Power Spectrum Analysis, etc.



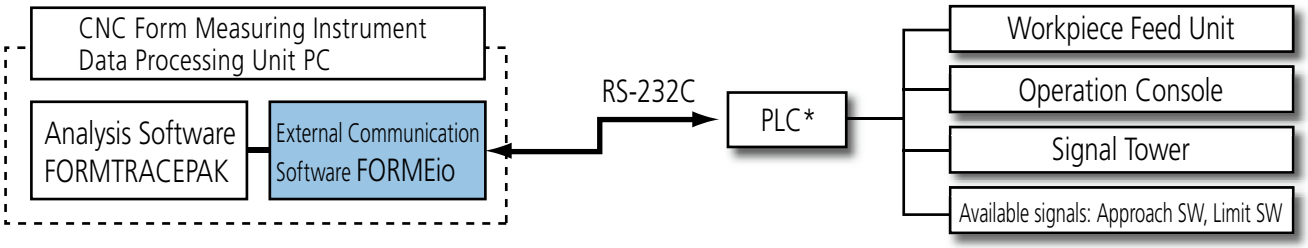






External Communication Program, FORMEio (optional)

This is optional software for installing the external control function in the CNC form measuring instrument.
With this function it is possible to monitor and control the measuring instrument conditions via RS-232C communication from PLC.



* Programmable Logic Controller

Specifications

SV-3000CNC

Main unit

X_1 axis	Measuring range		200mm
	Resolution		0.05µm
	Scale unit		Reflective-type Linear Encoder
	Drive speed	CNC mode	Max. 200mm/s
		Joystick control mode	0-50mm/s
	Measuring speed		0.02-2mm/s
	Measuring direction		Retracting direction
	Traverse linearity		0.5µm/200mm
Z_2 axis(column)	Travel range	Standard column type	300mm
		High column type	500mm
	Resolution		0.05µm
	Scale unit		Reflective-type Linear Encoder
	Drive speed	CNC mode	Max. 200mm/s
		Joystick control mode	0-50mm/s
	Base size (WxD)		750x600mm
	Base material		Granite
External dimensions (WxDxH)		Standard column type	800x620x1000mm
		High column type	800x620x1200mm
Mass		Standard column type	240kg (not including the Y-axis Table unit and Vibration Insulating Stand)
		High column type	250kg (not including the Y-axis Table unit and Vibration Insulating Stand)
Operating temperature and humidity ranges			15-25°C, 20-80% RH (without condensation)
Storage temperature and humidity ranges			-10-50°C, 5-90% RH (without condensation)

Controller (common to all models)

External dimensions (WxDxH)	250x427x517mm
Mass	28kg
Communication interface	USB
Power supply specifications	100-120V, 200-240V ±10%, AC50/60Hz
Power consumption	500W

Remote Box (common to all models)

External dimensions (WxDxH)	300x143x71mm
Mass	1.5kg

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Vibration Insulating Stand (optional)

Vibration insulating mechanism	Diaphragm air spring
Natural frequency	2.5-3.5Hz
Damping mechanism	Orifice
Leveling mechanism	Automatic control with mechanical valves
Air supply pressure	390kpa
Allowable loading capacity	350kg
External dimensions (WxDxH)	1000x895x715mm
Mass	280kg

Cabin (optional)

External dimensions (WxDxH)	Standard column type	1000x750x1100mm
	High column type	1000x750x1300mm
Mass	Standard column type	46kg
	High column type	53kg

α-axis unit (common to only the installed models)

Inclination angle	-45° (counterclockwise), +10° (clockwise)
Rotating speed under inclined condition	1rpm
Resolution of inclination angle	0.000225°
Mass	9kg

Y-axis table unit (common to only the installed models)

Measuring range		200mm
Minimum reading		0.05μm
Scale unit		Reflective-type Linear Encoder
Drive speed	CNC mode	Max. 200mm/s
	Joystick control mode	0-50mm/s
Maximum loading capacity		20kg (the center of gravity should be placed within 50mm from the table center)
Traverse linearity	Surface roughness mode	0.5μm/200mm
	Contour mode	2μm/200mm
Linear displacement accuracy (at 20°C, contour mode)		±(2+2L/100)μm L: Dimension between two measured points (mm)
Table size		200x200mm
External dimensions(WxDxH)		320x646x105mm
Mass		35kg

Specifications

CV-3000CNC / CV-4000CNC

Main unit

Model			CV-3000CNC	CV-4000CNC
X_1 axis L: Measurement length (mm)	Measuring range		200mm	
	Resolution		0.05µm	
	Scale unit		Reflective-type Linear Encoder	
	Drive speed	CNC mode	Max. 200mm/s	
		Joystick control mode	0-50mm/s	
	Measuring speed		0.02-2mm/s	
	Measuring direction		Forward/backward direction	
	Traverse linearity		2µm/200mm	
	Linear displacement accuracy (at 20°C)		±(1+4L/200)µm	
Z_1 axis (detector unit) H: Measurement height (mm)	Measuring range		50mm (±25mm from the horizontal plane)	
	Resolution		0.2µm	0.05µm
	Stylus up/down operation		Arc movement	
	Scale unit		Reflective-type Linear Encoder	Laser Holoscale
	Linear displacement accuracy (at 20°C)		±(3+2H/25)µm	±(0.8+I0.5HI/25)µm
	Measuring force		30mN	
	Traceable angle		70° for ascent, 70° for descent (depending on the surface texture)	
	Stylus tip		Refer to page 15.	
	Face of stylus		Downward	
Z_2 axis (column)	Travel range	Standard column type	300mm	
		High column type	500mm	
	Resolution		0.05µm	
	Scale unit		Reflective-type Linear Encoder	
	Drive speed	CNC mode	Max. 200mm/s	
		Joystick control mode	0-50mm/s	
	Base size (WxD)		750x600mm	
	Base material		Granite	
External dimensions (WxDxH)		Standard column type	800x620x1000mm	
		High column type	800x620x1200mm	
Mass (not including the Y-axis Table unit and Vibration Insulating Stand)		Standard column type	240kg	
		High column type	250kg	
Operating temperature and humidity ranges			15-25°C, 20-80% RH (without condensation)	
Storage temperature and humidity ranges			-10-5°C, 5-90% RH (without condensation)	

Controller	Common to all models, refer to page 21.
Remote Box	Common to all models, refer to page 21.
α-axis	Common to only the installed models, refer to page 22.
Y-axis table unit	Common to only the installed models, refer to page 22.
Main unit dimensions	Refer to page 27.
Vibration Islating Stand	Standard accessory, refer to page 22.
Cabine	Standard accessory, refer to page 22.

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SV-C3000CNC / SV-C4000CNC

Main unit

:Surface roughness mode (when the surface roughness detector holder is used)
:Form/contour mode (when the CV-3000 / CV-4000 detector is used)

Model			SV-C3000CNC	SV-C4000CNC
X_1 axis	Measuring range		200mm	
	Resolution		0.05µm	
	Scale unit		Reflective-type Linear Encoder	
	Drive speed	CNC mode	Max. 200mm/s	
		Joystick control mode	0-50mm/s	
	Measuring speed		0.02-2mm/s	
	Measuring direction		Forward/backward direction	
L: Measurement length (mm)	Traverse linearity		2µm/200mm	
	Linear displacement accuracy (at 20°C)		±(1+4L/200)µm	
	Measuring direction		Retracting direction	
	Traverse linearity		0.5µm/200mm	
Z_1 axis(detector unit)	Measuring range		50mm (±25mm from the horizontal plane)	
	Resolution		0.2µm	0.05µm
	Stylus up/down operation		Arc movement	
	Scale unit		Reflective-type Linear Encoder	Laser Holoscale
H: Measurement height (mm)	Linear displacement accuracy (at 20°C)		±(3+2H/25)µm	±(0.8+I0.5HI/25)µm
	Measuring force		30mN	
	Traceable angle		70° for ascent, 70° for descent (depending on the surface texture)	
	Stylus tip		Refer to page 15.	
	Face of stylus		Downward	
Z_2 axis (column)	Travel range	Standard column type	300mm	
		High column type	500mm	
	Resolution		0.05µm	
	Scale unit		Reflective-type Linear Encoder	
	Drive speed	CNC mode	Max. 200mm/s	
		Joystick control mode	0-50mm/s	
	Base size (WxD)		750x600mm	
	Base material		Granite	
External dimensions (WxDxH)		Standard column type	800x620x1000mm	
		High column type	800x620x1200mm	
Mass (not including the Y-axis Table unit and Vibration Insulating Stand)		Standard column type	240kg	
		High column type	250kg	
Operating temperature and humidity ranges			15-25°C, 20-80% RH (without condensation)	
Storage temperature and humidity ranges			-10-5°C, 5-90% RH (without condensation)	

Controller	Common to all models, refer to page 21.
Remote Box	Common to all models, refer to page 21.
α-axis	Common to only the installed models, refer to page 22.
Y-axis table unit	Common to only the installed models, refer to page 22.
Main unit dimensions	Refer to page 27.
Vibration Islating Stand	Standard accessory, refer to page 22.
Cabine	Standard accessory, refer to page 22.

Specifications

CS-H4000CNC / CS-5000CNC / CS-H5000CNC

Main unit

Model			CS-H4000CNC	CS-H5000CNC / CS-5000CNC
X_1 axis	Measuring range		100mm	200mm
	Resolution		0.00625µm	
	Scale unit		Laser Holoscale	
	Drive speed	CNC mode	Max. 40mm/s	
		Joystick control mode	0-40mm/s	
	Measuring speed		For surface roughness: 0.02-0.2mm/s, for form/contour: 0.02-2mm/s	
	Measuring direction		Forward/backward direction	
L: Measurement length (mm)	Traverse linearity	Using standard-length stylus	(0.05+0.0003L)µm	(0.05+0.0003L)µm / (0.1+0.0015L)µm
		Using double-length stylus	———	(0.1+0.0015L) / (0.2+0.0015L)µm
	Linear displacement accuracy (at 20°C)		±(0.16+0.001L)µm	±(0.16+0.001L)µm / ±(0.3+0.002L)µm
Z_1 axis (detector unit)	Measuring range	Using standard-length stylus	12mm	12mm
		Using double-length stylus	———	24mm
	Resolution	Using standard-length stylus	1nm	1nm / 4nm
		Using double-length stylus	———	2nm / 8nm
	Stylus up/down operation		Arc movement	
H: Measurement height (mm)	Scale unit		Laser Holoscale	
	Linear displacement accuracy (at 20°C)		±(0.07+0.02H)µm	±(0.07+0.02H)µm / ±(0.3+0.02H)µm
	Measuring force	Using standard-length stylus	4mN constant	4mN constant
		Using double-length stylus	———	0.75mN constant
	Traceable angle		60° for ascent, 60° for descent (depending on the surface texture)	
	Stylus tip		Refer to page 16.	
	Face of stylus		Downward	
Z_2 axis (column)	Measuring range	Standard column type	300mm	300mm
		High column type	———	500mm (only for CS-5000CNC)
	Resolution		0.05µm	
	Scale unit		Reflective-type Linear Encoder	
	Drive speed	CNC mode	Max. 200mm/s	
		Joystick control mode	0-50mm/s	
	Base size (WxD)		600x550mm	750x600mm
	Base material		Granite	Granite
External dimensions (WxDxH)		Standard column type	600x570x992mm	800x620x1000mm
		High column type	———	800x620x1200mm (only for CS-5000CNC)
Mass (not including the Y-axis Table unit and Vibration Insulating Stand		Standard column type	190kg	240kg
		High column type	———	250kg (only for CS-5000CNC)
Operating / storage temperature and humidity ranges			15-25°C / -10-5°C, 20-80% RH / 5-90% RH (without condensation)	

Controller	Common to all models, refer to page 21.
Remote Box	Common to all models, refer to page 21.
α-axis	Common to only the installed models, refer to page 22.
Y-axis table unit	Common to only the installed models, refer to page 22.
Vibration Islating Stand	Standard accessory, refer to page 22.
Cabine	Standard accessory, refer to page 22.

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SV-M3000CNC

Main unit

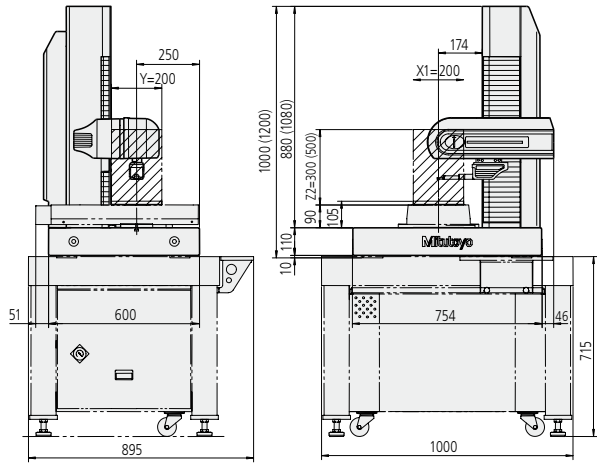
X_1 axis	Measuring range			200mm
	Resolution			0.05μm
	Scale unit			Reflective-type Linear Encoder
	Drive speed	CNC mode		Max. 200mm/s
		Joystick control mode		0-50mm/s
	Measuring speed			0.02-2mm/s
	Traverse linearity	Using standard-type detector		0.5μm/200mm
		Using llong-type detector		0.7μm/200mm
		Using rotary-type detector	Up/down direction	0.5μm/200mm
			Forward/backward direction	0.7μm/200mm
Z_2 axis (column)	Measuring range			500mm
	Resolution			0.05μm
	Scale unit			Reflective-type Linear Encoder
	Measuring force	CNC mode		Max. 200mm/s
		Joystick control mode		0-50mm/s
Y-axis	Measuring range			800mm
	Resolution			0.05μm
	Scale unit			Reflective-type Linear Encoder
	Drive speed	CNC mode		Max. 200mm/s
		Joystick control mode		0-50mm/s
	Measuring speed			0.02-2mm/s
	Traverse linearity	Using standard-type detector		Narrow range: 0.5μm/50mm, Wide range: 2μm/800mm
		Using llong-type detector		Narrow range: 0.7μm/50mm, Wide range: 3μm/800mm
		Using rotary-type detector (up/down direction)		Narrow range: 0.7μm/50mm, Wide range: 3μm/800mm
Base unit		Base size (WxD)		600x1500mm
		Base material		Steel
		Allowable loading capacity		300kg
Vibration isolating unit		Air supply pressure		0.4MPa
		Vibration insulating mechanism		Diaphragm air spring
		Natural frequency		4.0-5.0Hz
		Damping mechanism		Orifice & Oil damper
		Leveling mechanism		Automatic control with mechanical valves
External dimensions (WxDxH)				1085x1695x1922
Mass (including the vibration isolating unit)				1600kg
Operating temperature and humidity ranges				15-25°C, 20-80% RH (without condensation)
Storage temperature and humidity ranges				-10-5°C, 5-90% RH (without condensation)

Controller	Common to all models, refer to page 21.
Remote Box	Common to all models, refer to page 21.
α-axis	Common to only the installed models, refer to page 22.
Y-axis table unit	Common to only the installed models, refer to page 22.

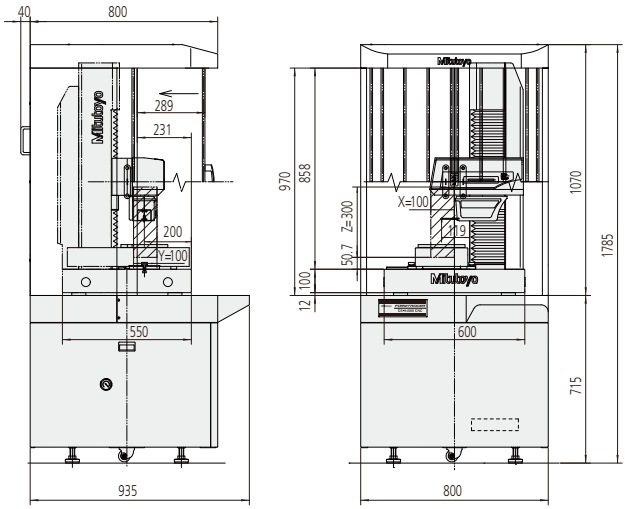
External dimensions of main unit

Common to SV-3000CNC/CV-3000CNC/
CV-4000CNC/SV-C3000CNC/SV-C4000CNC

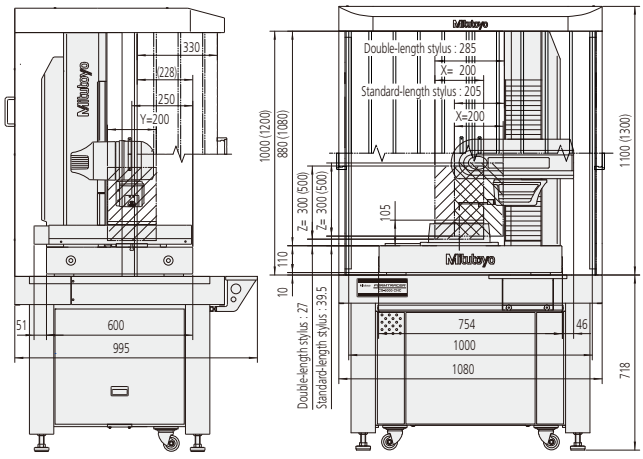
Unit: mm



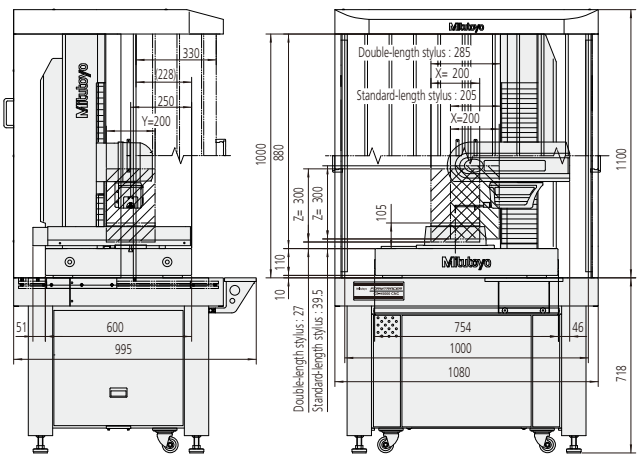
CS-H4000CNC



CS-5000CNC



CS-H5000CNC



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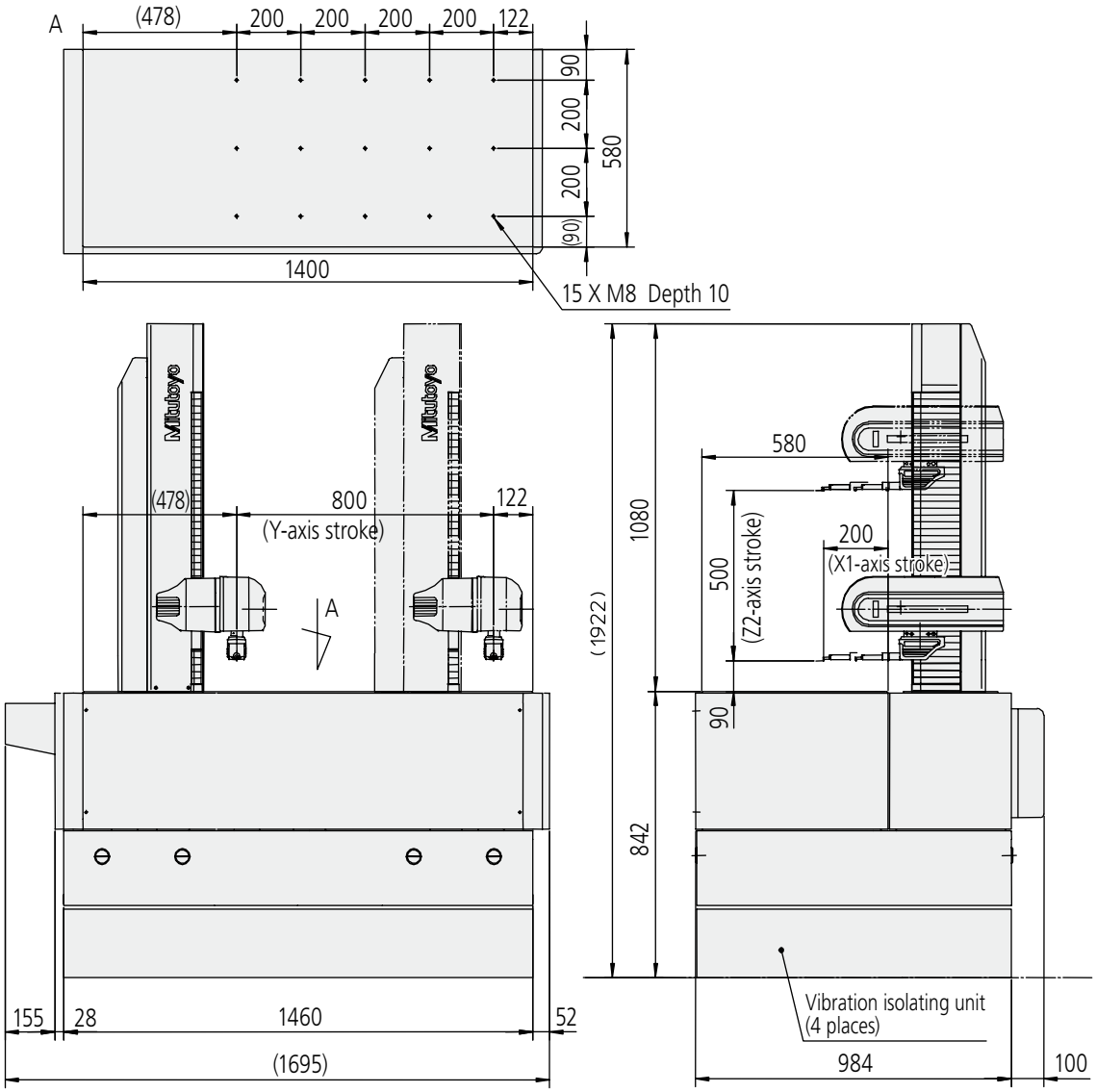
SV-M3000CNC

Unit: mm



Roundtest Extreme

CNC Roundness/Cylindrical-Form Measuring Instrument greatly contributes to productivity improvement and enhanced measurement efficiency

High-accuracy and easy-to-use oriented turntable

Mitutoyo has achieved high rotational accuracy in the radial direction together with high linear displacement accuracy in the axial direction. Thanks to this precision mechanism not only the roundness/cylindricity but also the flatness of a workpiece can be measured with high accuracy. Moreover, since the standard turntable is a type that enables automatic centering/leveling, the operator is freed from conventional centering and leveling operations on the workpiece, which are time-consuming and tedious.
(Patent registered: Japan)

Detector position change function that enables Automatic Measurement (CNC)

With precision control over the position (vertical/horizontal) of the holder arm unit that supports the detector in addition to the detector tilting mechanism (ranging from 0° to 270°, in 1° increments), continuous automatic measurement on the outside diameter, inside diameter, top surface, and bottom surface is possible.
The enhanced off-line teaching function also makes it easy to create part programs.

Positioning sensor critical to actualize High-Accuracy Automatic Measurement (CNC)

A Mitutoyo linear scale is used as the positioning sensor for the X-axis drive unit. It can directly sense the amount of detector unit displacement and perform high-accuracy positioning essential for automatic measurement.

Mode			RA-2100S CNC	RA-2100H CNC	RA-H5100S CNC	RA-H5100H CNC
Turn Table Unit	Rotational accuracy JISB7451-1997	Radial direction	(0.02+3.8H/10000)μm*		(0.02+4H/10000)μm*	
		Vertical direction	(0.02+3.8x/10000)μm**		(0.02+6x/10000)μm**	
	Rotational speed		2, 4, 6, 10rpm		2, 4, 6, 10rpm (At automatic centering: Max. 20 rpm)	
	Effective table diameter		ø235mm		ø300mm	
	Range of centering/leveling adjustment		±3mm, ±1°		±5mm, ±1°	
	Maximum loading capacity		30kg		80kg (At automatic centering: 65kg)	
	Maximum diameter for measurement/loading		ø256mm, 580mm		ø356mm, ø680mm	
Vertical Column Unit	Linearity of vertical movement (λc: 2.5mm)	Narrow range	0.12μm/100mm		0.05μm/100mm	
		Wide range	0.18μm/300mm	0.3μm/500mm	0.14μm/350mm	0.2μm/550mm
	Parallelism with the rotation axis (On the generatrix basis)		0.7μm/300mm	1.2μm/500mm	0.2μm/350mm	0.32μm/550mm
	Travel speed		Max. 35mm/s		Max. 60mm/s	
	Maximum measurement height (at I.D. or O.D. measurement)		300mm	500mm	350mm	550mm
	Maximum measurement depth (When the standard stylus is used)		ø12.7xDepth of 26mm ø32xDepth of 104mm			
Radial direction	Straightness (λc: 2.5mm)		0.7μm/150mm		0.4μm/200mm	
	Perpendicularity to the rotation axis (On the generatrix basis)		1.0μm/150mm		0.5μm/200mm	
	Amount, speed of travel		175mm, Max. 20mm/s		225mm, Max. 50mm/s	
Detector	Measuring force		40mN			
	Stylus tip shape, material		ø1.6mm carbide ball		ø1.6mm carbide ball	
	Detection range (normal/tracing)		±400μm, ±5mm		±400μm, ±5mm	
	Tilting mechanism		0-270° (at 1° increments)		0-270° (at 1° increments)	
Available air pressure			0.39MPa		0.39MPa	
Radial direction	Normal state		30L/min		45L/min	
	Air supply source		80L/min or more		120L/min	
Mass (including the main unit and mounting stand)			180kg	200kg	650kg, 100kg	670kg, 100kg

* H=Height above surface of turntable ** x=Distance from turntable axis

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CNC

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CNC Surface Texture Measuring Instrument Formtracer Extreme
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optional accessory

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Software
FORMTRACEPAK

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