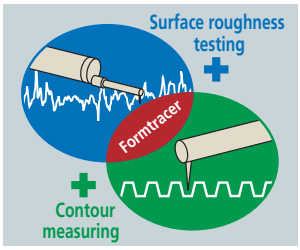
Formtracer

Hybrid machine with dual-role capability

Formtracer SV-C3200/4500
SERIES 525 — Surface Roughness and Contour Measuring Systems

MeasurLink® ENABLED
Data Management Software by Mitutoyo



SV-C3200L4 (with options)

SV-C3200S4

SPECIFICATIONS

Model No.		SV-C3200S4 / SV-C4500S4	SV-C3200H4 / SV-C4500H4	SV-C3200W4 / SV-C4500W4	SV-C3200L4 / SV-C4500L4	SV-C3200S8 / SV-C4500S8	SV-C3200H8 / SV-C4500H8	SV-C3200W8 / SV-C4500W8	SV-C3200L8 / SV-C4500L8
• Surface roughness measurement									
Measuring range	X-axis (drive unit)	100 mm				200 mm			
	Z1-axis (detector)	800 µm/80 µm/8 µm							
Straightness		(0.05+L/1000)µm L: traverse length (mm)				(0.1+0.002L)µm L: traverse length (mm)			
Resolution	Z1-axis (detector)	0.01 µm(800 µm), 0.001 µm(80 µm), 0.0001 µm(8 µm)							
Measuring force		0.75 mN (when the Code No. of the main unit ends with "-1") / 4 mN (when the Code No. of the main unit ends with "-2")							
Stylus tip shape		60°, 2 µmR (when the Code No. of the main unit ends with "-1") / 90°, 5 µmR (when the Code No. of the main unit ends with "-2")							
Applicable standards		JIS1982/ JIS1994/ JIS2001/ ISO1997/ ANSI/ VDA							
Parameter		Pa, Pq, Psk, Pku, Pp, Pv, Pz, Pt, Pc, PSm, PΔq, Pmr(C), Pmr, PδC, Ra, Rq, Rsk, Rku, Rp, Rv, Rz, Rt, Rc, RSm, RΔq, Rmr(C), Rmr, RδC, Wa, Wq, Wsk, Wku, Wp, Wv, Wz, Wt, Wc, WSm, WΔq, Wmr(C), Wmr, WδC, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rx, AR, R, Wx, AW, W, Wte, Ry, RyDIN, RzDIN, R3y, R3z, S, HSC, Lo, Ir, Δa, λa, λq, Vo, Htp, NR, NCRX, CPM, SR, SAR, NW, SW, SAW							
Assessed profile		Primary profile, Roughness profile, Filtered waviness profile, Waviness profile, Rolling circle waviness primary profile, Rolling circle waviness profile, Envelope residual profile, DF profile (DIN4776/ ISO13565-1), Roughness motif (Envelope waviness profile is displayed when evaluating the motif.)							
Analysis graph		Material ratio curve, Profile height amplitude distribution curve, Power spectrum chart, Auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, Slope distribution chart, Local peak distribution chart, Parameter distribution chart (Contour analysis function can analyze the area of abrasion amount and overlay.)							
Data compensation functions		Least squares straight line, R-surface compensation, Ellipse compensation, Parabola compensation, Hyperbolic compensation, Conic compensation, Polynomial compensation (auto or arbitrary 2nd to 7th), No compensation							
Filter		Gaussian filter, 2CRPC75, 2CRPC50, 2CR75, 2CR50, Robust spline filter							
• Contour measurement									
Measuring range	X-axis (drive unit)	100 mm				200 mm			
	Z1-axis (detector)	60 mm (±30 mm from the horizontal)							
Straightness		0.8 µm/100 mm				2 µm/200 mm			
Accuracy	X-axis (drive unit)	±(0.8+0.01L)µm L: traverse length (mm)				±(0.8+0.02L)µm L = traverse length (mm)			
	Z1-axis (detector)	SV-C3200 series: ±(1.4+|2H|/100)µm, SV-C4500 series: ±(0.8+|2H|/100)µm H: Probing height from the horizontal (mm)							
Resolution	X-axis (drive unit)	0.05 µm							
	Z1-axis (detector)	SV-C3200 series: 0.04 µm, SV-C4500 series: 0.02 µm							
	Z2-axis (column)	1 µm							
Measuring force		SV-C3200 series: 30 mN (adjustment using weights) SV-C4500 series: 10, 20, 30, 40, 50 mN (switching on the software)							
Face of stylus		SV-C3200 series: Vertical direction (up/down, single measurement) SV-C4500 series: Vertical direction (up/down, available for continuous measurement)							
• Common specification									
Z2-axis (column) travel range		300 mm	500 mm		700 mm	300 mm	500 mm		700 mm
X-axis Inclination range		±45°							
Drive speed	X-axis	0 to 80 mm/s or manual operation							
	Z2-axis (column)	0 to 30 mm/s or manual operation							
Measuring speed		0.02, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10, 20 mm/s							

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.

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).

PROPRIETARY INSPECTION CERTIFICATE

An inspection certificate is supplied as standard. Refer to page X for details.

- The combination of a surface roughness tester and contour measuring instrument saves installation space.

Surface roughness testing function

- Z1-axis detector provides highest resolution of 0.0001 µm (when the measuring range is 8 µm) is provided as standard.
- High-accuracy glass scales, built-in on the X-axis, directly read the drive unit movement. This greatly facilitates spacing parameter evaluation while achieving high-accuracy positioning.
- Measuring force for the detector is selectable from 4 mN or 0.75 mN.

Contour measuring function

- The Z1-axis (detector) is equipped with a high-precision arc scale and newly designed arm. The high-precision arc scale can directly read the arc track of the stylus tip to achieve high accuracy and resolution. The new arm has extended the Z1-axis measuring range by 10 mm while reducing the chance of interference with workpieces compared to conventional models. The arm mount can be attached/detached with a single touch on the magnet joint for improved ease of operation.

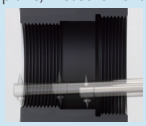
Z1-axis measuring range has been extended by 10 mm.

- The following two features have been added exclusively for the SV-C-4500 series as functions dedicated to contour measuring systems:

(1) Continuous measurement in the vertical direction (up/down) is available in combination with a double-tipped stylus.
Up/down continuous measurement data facilitates the analysis of the effective diameter of screw threads, which has been difficult to measure in the past.

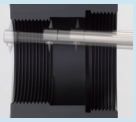
(2) The measuring force can be set in the **FORMTRACEPAK** software. Weight replacement and position adjustment are not required to adjust the measuring force.

Downward (Bottom plane) measurement

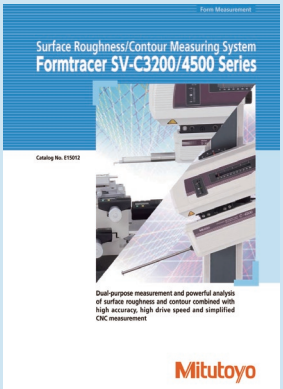


Upward/downward measurement direction is switchable in the software

Upward (Top plane) measurement



- The 700 mm Z2-axis (column) range models are new to the lineup.



Refer to the Formtracer SV-C3200/4500 series Catalog (No. E15012) for more details.

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MeasurLink ENABLED
Data Management Software by Mitutoyo

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PROPRIETARY INSPECTION CERTIFICATE

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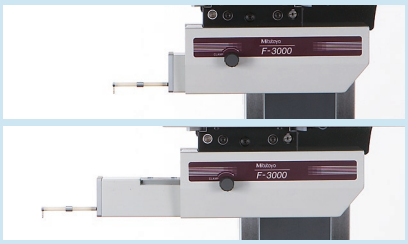
Formtracer CS-3200S4
SERIES 525 — Surface Roughness and Contour Measuring System

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- Equipped with a wide range and high resolution Z-axis detector.
- Measuring range
  Z1-axis (detector): 5 mm
  (Resolution: 0.0008 µm, for 0.05 mm measuring range)
  X-axis: 100 mm
  (Resolution: 0.05 µm)
- Overhang of the detector: Max. 70 mm
  (Fixable at a desired position)



- Uses the well-respected **FORMTRACEPAK** software to provide a rich variety of analysis functions to achieve excellent surface texture evaluation.

CS-3200S4

SPECIFICATIONS

Model No.			CS-3200S4
Measuring range/ Resolution	X-axis		100 mm/0.05 µm
	Z1-axis (detector)		5 mm/0.08 µm
			0.5 mm/0.008 µm
			0.05 mm/0.0008 µm
	Z2-axis (column)		300 mm/1 µm
Accuracy (20 °C)	X-axis		±(0.8+0.01L)µm L = measuring length (mm)
	Z1-axis (detector)		±(1.5+|2H|/100)µm H = probing height from the horizontal (mm)
Drive unit	Straightness (X-axis)	Under normal use	0.2 µm/100 mm
		When protruding to the maximum extent	0.4 µm/100 mm
	Measuring speed	Roughness measurement	0.02, 0.05, 0.1, 0.2 mm/s (4-step)
		Contour measurement	0.02, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0 mm/s (7-step)
	Drive speed	X-axis (horizontal direction)	0 to 80 mm/s or manual operation
		Z2-axis (vertical direction)	0 to 20 mm/s or manual operation
	Up/down movement		300 mm (motorized)
	Inclination range		±45°
Detector	Detection method		Differential inductance
	Measuring force		0.75 mN
	Stylus	Standard stylus (for roughness/ contour measurement)	Tip angle: 60° cone, Tip radius: 2 µm, Diamond tip
		Cone stylus (for contour measurement)	Tip angle: 30° cone, Tip radius: 25 µm, Sapphire
	Stylus up/down		Available (Stoppable at a mid-air position)

Note1: 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.
Note2: High column and 200 mm X-axis drive-unit models are also available. Please consult your local Mitutoyo office for applicable specifications.

Refer to the Formtracer CS-3200 Catalog (No. E15025) for more details.

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Hybrid machine with dual-role capability

Formtracer Extreme
SV-C4500CNC/SV-C4500CNC HYBRID TYPE1
SERIES 525 — CNC Surface Roughness and Contour Measuring Systems

MeasurLink® ENABLED
Data Management Software by Mitutoyo

SV-C4500CNC (Contour detector shown mounted together with the inclinable drive unit and Y-axis table)

SV-C4500CNC HYBRID TYPE1
(Mounting example of non-contact detector)

SV-C4500CNC Specifications*

Model No.			SV-C4500CNC
X1-axis (Drive unit)		Measuring range	200 mm
		Resolution	0.05 µm
		Scale type	Reflective-type linear encoder
	Contour	Straightness	2 µm/200 mm
		Accuracy (20 °C)	±(0.8+4L/200)µm L: Measuring length (mm)
	Surface roughness	Straightness	0.5 µm/200 mm
Z1-axis (Detector)	Contour	Measuring range	60 mm (±30 mm from the horizontal)
		Resolution	0.02 µm
		Scale type	Arc
		Accuracy (20 °C)	±(0.8+|2H|/100)µm H: Measuring height from horizontal position (mm)
	Surface roughness	Measuring range	800 µm/80 µm/8 µm
		Resolution	0.01 µm/0.001 µm/0.0001 µm
Z2-axis (Column)		Drive range	Specification is selectable from 300 mm or 500 mm.
		Resolution	0.05 µm

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.

SV-C4500CNC HYBRID TYPE1 Specifications*

Model No.			SV-C4500CNC HYBRID TYPE1
X1-axis (Drive unit)		Measuring range	200 mm
		Resolution	0.05 µm
		Scale type	Reflective-type linear encoder
	Contour	Straightness (20 °C)	2 µm/200 mm
		Accuracy	±(0.8+4L/200)µm L: Measuring length (mm)
	Surface roughness	Straightness	0.5 µm/200 mm
	Non-contact type	Straightness	0.5 µm/200 mm
		Accuracy	±(0.8+4L/200)µm L: Measuring length (mm)
Y-axis		Measuring range	200 mm
		Resolution	0.05 µm
		Maximum table loading	20 kg
Z1-axis	Contour	Measuring range	60 mm (±30 mm from the horizontal)
		Resolution	0.02 µm
		Scale type	Arc
		Accuracy (20 °C)	±(0.8+|2H|/100)µm H: Measuring height from horizontal position (mm)
	Surface roughness	Measuring range	800 µm/80 µm/8 µm
		Resolution	0.01 µm/0.001 µm/0.0001 µm
	Non-contact type detector CPS2525*1	Measuring range	1.2 mm
		Resolution	25 nm
	Non-contact type detector CPS0517*1	Measuring range	0.1 mm
		Resolution	5 nm
Z2-axis		Drive range	500 mm
		Resolution	0.05 µm

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.
*1: Select either CPS2525 or CPS0517.

MeasurLink® ENABLED Data Management Software by Mitutoyo

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PROPRIETARY INSPECTION CERTIFICATE

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SV-C4500CNC

- High-accuracy stylus type CNC Surface Roughness / Contour Measuring System that allows measurement of surface roughness and form/contour with one unit through detector replacement.
- For models with the α-axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X1-axis. In addition, automatic measuring force adjustment function of Z1-axis detector for contour measurement enables automatic measurement with constant measuring force even with the X1-axis tilted.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces through positioning in the Y-axis direction.
- Since the Z1-axis detector incorporates an anti-collision safety device, the machine will automatically stop if the detector touches a workpiece or jig.
- Optional external control function (Ext I/O) through bidirectional communication (RS-232C) with the PLC (programmable logic controller) is available.

SV-C4500CNC HYBRID TYPE1

- CNC Surface Roughness/Contour Measuring System equipped with a non-contact type detector as well as a contact type surface roughness contour measuring detector.
- Equipped with the Y-axis table, it is possible to expand the measuring range for multiple workpieces through positioning in the Y-axis direction.
- Since the Z1-axis detector incorporates an anti-collision safety device, the machine will automatically stop if the detector touches a workpiece or jig.
- Optional external control function (Ext I/O) through bidirectional communication (RS-232C) with the PLC (programmable logic controller) is available.

MeasurLink ENABLED
Data Management Software by Mitutoyo

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PROPRIETARY INSPECTION CERTIFICATE

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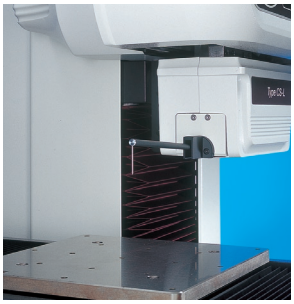
Formtracer Extreme CS-5000CNC/CS-H5000CNC SERIES 525 — CNC Surface Roughness and Contour Measuring Systems

MeasurLink® ENABLED
Data Management Software by Mitutoyo

- High-accuracy stylus type CNC Surface Measuring System that allows batch measurement of surface roughness and form/contour.
- The X1- and Z2-axes have maximum drive speeds of 40 mm/s and 200 mm/s, respectively. This permits high-speed positioning that can potentially result in a large increase in the throughput of multiple-profile / multiple-workpiece measurement tasks.
- A Mitutoyo Laser Holoscale is incorporated in the X1- and Z1-axes so that high resolution is achieved and batch measurement of form/contour and surface roughness can be made.
- The active control method is employed for the Z1-axis detector to implement a wide-range measurement capability wherein the variation in dynamic measuring force is restricted.
- Since the Z1-axis detector incorporates an anti-collision safety device, the machine will automatically stop if the detector touches 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 X1-axis. (**CS-5000CNC** only)
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces through positioning in the Y-axis direction.
- Optional external control function (Ext I/O) through bidirectional communication (RS-232C) with the PLC (programmable logic controller) is available.

CS-H5000CNC
(with Y-axis table)



Wide range detector employing active control technology

SPECIFICATIONS

Model No.			CS-5000CNC	CS-H5000CNC
X1-axis	Measuring range		200 mm	
	Resolution		0.00625 µm	
	Scale type		Laser Holoscale	
	Drive speed	CNC mode	Max. 40 mm/s	
		Joystick mode	0 to 40 mm/s	
	Measuring speed		0.02, 0.05, 0.1, 0.2 mm/s (surface roughness), 0.02, 0.05, 0.1, 0.2, 0.5, 1.0, 2.0 mm/s (form/contour)	
	Measuring direction		Forward / backward	
	Straightness	(with standard stylus)	(0.1+0.0015L)µm L: traverse length (mm)	(0.05+0.0003L)µm L: traverse length (mm)
		(with 2X-long stylus)	(0.2+0.0015L)µm L: traverse length (mm)	(0.1+0.0015L)µm L: traverse length (mm)
	Accuracy (20 °C)		±(0.3+0.002L)µm L: traverse length (mm)	±(0.16+0.001L)µm L: traverse length (mm)
α-axis	Inclination range		-45°(CCW), +10°(CW)	—
Z1-axis (Detector)	Measuring range	(with standard stylus)	12 mm	
		(with 2X-long stylus)	24 mm	
	Resolution	(with standard stylus)	0.0008 µm	
		(with 2X-long stylus)	0.0016 µm	
	Vertical movement of the stylus		Arc motion	
	Scale type		Transmission-type linear encoder	
	Accuracy (20 °C)		±(0.3+|0.02H|)µm H: probing height (mm)	±(0.07+|0.02H|)µm H: probing height (mm)
	Measuring force	(with standard stylus)	4 mN (Fixed)	
		(with 2X-long stylus)	0.75 mN (Fixed)	
	Traceable angle		Ascent: 60°, Descent: 60°, (Depends on the surface texture.)	
	Stylus tip shape	Standard stylus	Tip angle: 40°, Tip radius: 5 µm, Diamond tip	
		Standard ball stylus	Tip ball radius: 0.25 mm, Sapphire	
		2X-long stylus	Tip angle: 40°, Tip radius: 5 µm, Diamond tip	
		2X-long stylus	—	Tip angle: 60°, Tip radius: 2 µm, Diamond tip
		2X-long ball stylus	Tip ball radius: 0.25 mm, Sapphire	
	Face of stylus		Downward	
Z2-axis (Column)	Travel range	Z2-axis (column, type S)	300 mm	
		Z2-axis (column, type H)	500 mm	—
	Resolution		0.05 µm	
	Scale type		Reflective-type linear encoder	
	Drive speed	CNC mode	Max. 200 mm/s	
		Joystick mode	0 to 50 mm/s	
	Base size (width×depth)		750×600 mm	
	Base material		Gabbro	

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

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