Contour and Surface Roughness Measuring System

FORMTRACER CS-3100 Series

Catalog No. E4243-525

Double performance in one system: combined contour and surface measurement CS-3100 delivers high accuracy, high drive speed and simplified CNC measurement.

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Diverse Functions to Enhance Your Measurement Efficiency

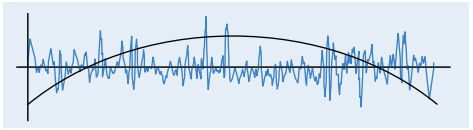
Highest Measurement Accuracy in its Class.

X axis: ±(1+0.01L) µm [2 µm / 100 mm, 1.25 µm / 25mm]
Z1 axis: ±(2+l4Hl/100) µm
Designed to handle workpieces calling for high accuracy.

Wide Measuring Range and High Resolution

To detect surface roughness and contour in a single measurement the Z1-axis detector unit of CS-3100 has a wide measuring range and high resolution.

Z1-axis range	Resolution
5 mm	0.08 µm
0.5 mm	0.008 µm
0.05 mm	0.0008 µm

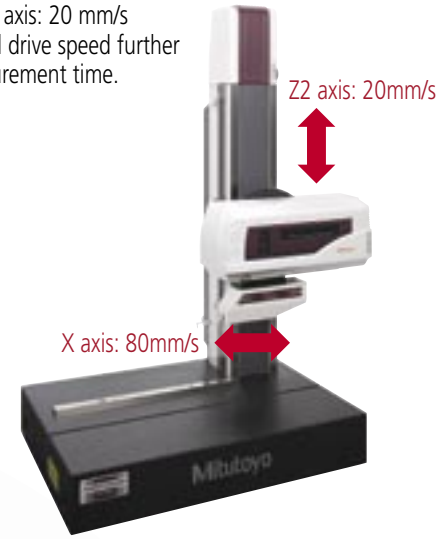


Superb Durability

In order to maintain the traverse linearity specification for an extended period of time, Mitutoyo has adopted highly rigid ceramic guides that combine the characteristics of smallest secular change and remarkable resistance to abrasion.

Improved Measurement Efficiency and the Highest Drive Speed in its Class

X axis: 80 mm/s, Z2 axis: 20 mm/s
Drastically increased drive speed further reduces total measurement time.



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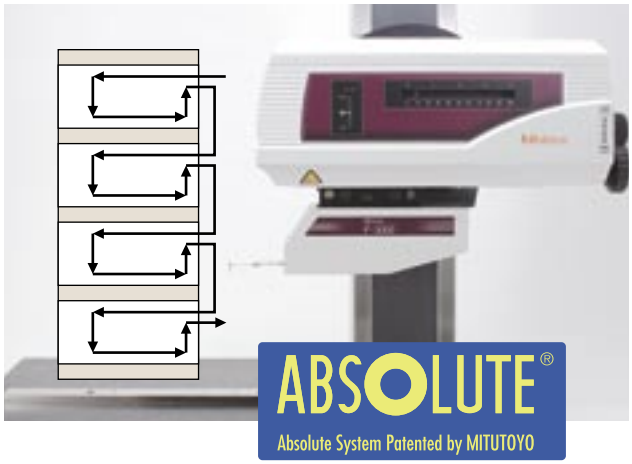
Remarkable Ease of Operation

- Incorporation of an ABS scale in the Z2 axis eliminates the need for wearisome origin point re-setting conventionally required for every step of repeated measurements over stepped or multiple sections.



- Small holes and inclined planes can be efficiently measured using the inclined X-axis drive unit and fine-feed handles on the X and Z2 axes.

Easy positioning by fine feed handle for the small hole measurement

Remote Control Box

Safety Functions to Protect Operator, Measuring Unit, and Workpiece

- To enhance safety during fast traverse, the Z-axis detector unit incorporates a safety device (Automatic Stop-On-Collision Mechanism) and the new remote control box features an easily reached emergency stop switch next to the drive speed control knob.

Remote Control Box

- All detector and drive unit cables are housed inside the main unit to eliminate any risk of abrasion and guarantee trouble free, high-speed operation.

Drive Unit Tilting Function

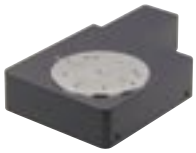
- Orientation of the drive unit can be inclined by ±45°. This allows CS-3100 to measure a surface speedly inclined.

Optional Accessories for Automatic Measurement

Automatic Measurement Function

- With the support for a wide range of optional peripherals designed for use with the CNC Form Measuring Unit enables simplified CNC measurement.

θ 1 table:
Automatic circular form measurement

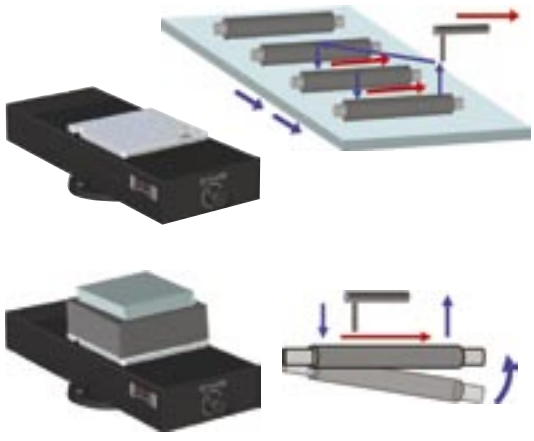


θ 2 table:
Automatic multiple-section continuous measurement on cylindrical workpieces

Y-axis table:
Automatic Y-axis movement

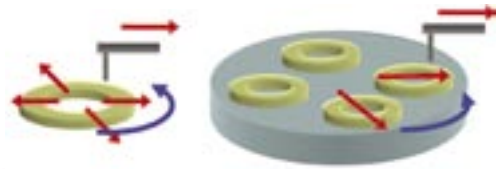
2D/3D auto-leveling table:
Automatic 2D/3D leveling

- Application 1: Using Y-axis table and 2D/3D auto-leveling table Multiple workpieces measurement

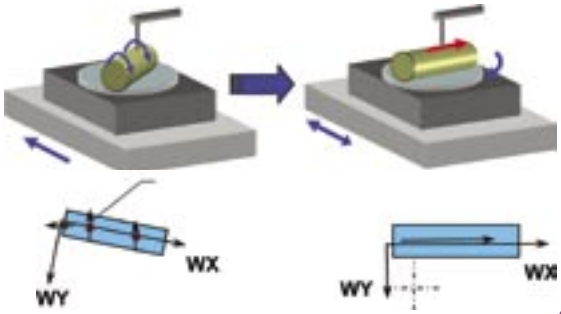


Y-axis table for automatic leveling

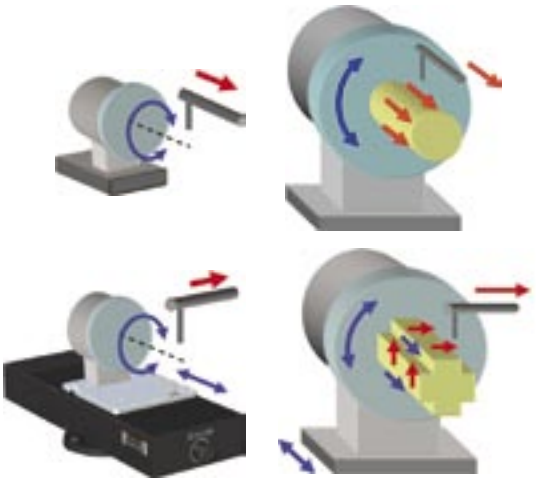
- Application 2: Using θ 1 table and Y-axis table Cylindrical workpiece with multiple measuring points



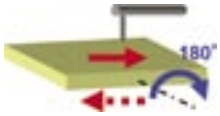
Y-axis table for automatic alignment



- Application 3: Using θ 1 table and Y-axis table Cylindrical workpiece measurement by multiple sections



Y-axis table for multiple surfaces with automatic leveling



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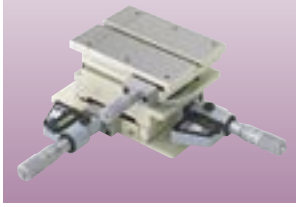
for Expand the Application Range

Rotary vise:

218-003
- Two slide jaw type.
- Max. workpiece size: Ø 60 mm
- Minimum reading: 1˚

Digimatic XY levelling Table with swivel:

178-042-1 (mm)
178-052-1 (inch)
- Table top: 130 x 100 mm
- Levelling range: ± 1.5˚
- XY travel: ±12.5 mm

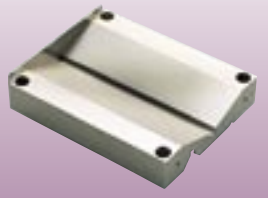


V-block with clamp:

172-234
- Used with a cross-travel table or rugged table
- Max. workpiece dia.: 50 mm

V-block:

998291
- Workpiece diameter: 1 mm to 160 mm
- Can be mounted on a levelling table



Step gage:

178-611 (mm)
178-612 (inch)
- Steps: 2 µm, 10 µm

Roughness specimen:

178-601 (mm)
178-602 (inch)

Cross-travel table:

218-001 (mm)
218-011 (inch)
- Table top: 280 x 180 mm
- XY travel: 100 x 50 mm

Precision vise:

178-019
- Max. workpiece size: 36 mm
- Can be mounted on a levelling table

Vibration isolator

178-025
- Dimensions (W x D x H): 750 x 550 x 59 mm
- Stand is optional: **178-024**

Calibration stand:

12AAG175
Mount the roughness specimen or the step gage at calibration.

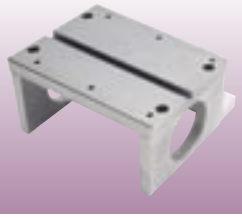
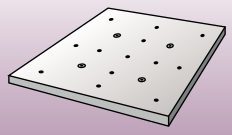


Table top extension for θ1 table:

12AAE286
Plate size: 200 x 200 mm

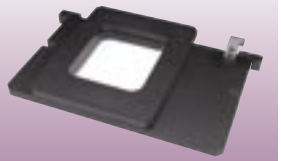


θ1 table mounting plate:

12AAE630
Required to mount the θ1 table on the base.

θ2 table mounting plate:

12AAE718
Required to mount the θ2 table on the base.



θ2 table mounting plate:

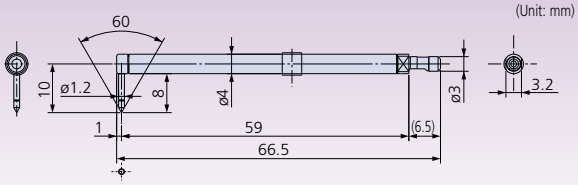
12AAE705
Required to mount the θ2 table on the θ1 table.

Optional Styli

Standard stylus: No. 12AAD554

Radius of tip curvature: 2 µm
tip form: 60° cone
Tip material: Diamond

(Unit: mm)

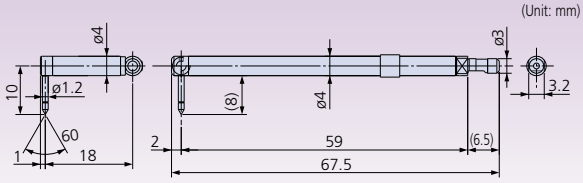


For contour/surface roughness measurement
Measurable depth: 7 mm max.

Standard stylus: No. 12AAD558

Radius of tip curvature: 2 µm
tip form: 60° cone
Tip material: Diamond

(Unit: mm)

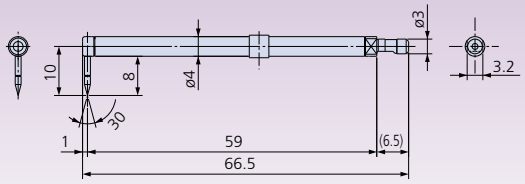


For contour/surface roughness measurement
Offset from center line: 18 mm

Cone stylus: No. 12AAD552

Radius of tip curvature: 25 µm
tip form: 30° cone
Tip material: Sapphire

(Unit: mm)

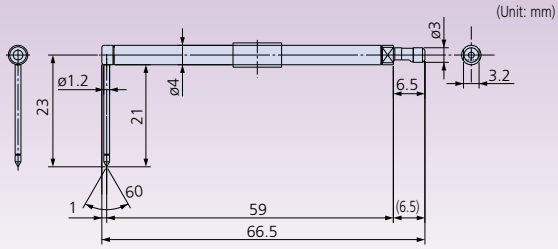


For contour measurement
Measurable depth: 7 mm max.

Standard stylus: No. 12AAD560

Radius of tip curvature: 2 µm
tip form: 60° cone
Tip material: Diamond

(Unit: mm)

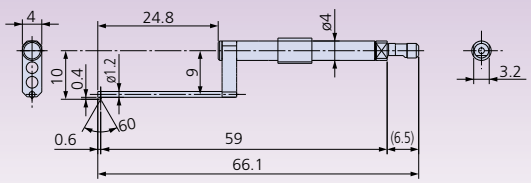


For contour/surface roughness measurement
Measurable depth: 15 mm max.

Small hole stylus: No. 12AAD556

Radius of tip curvature: 2 µm
tip form: 60° cone
Tip material: Diamond

(Unit: mm)

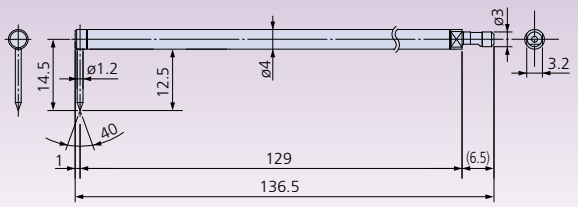


For contour/surface roughness measurement
Applicable hole: ø2 mm min.

2x-long stylus: No. 12AAD562

Radius of tip curvature: 5 µm
tip form: 40° cone
Tip material: Diamond

(Unit: mm)



For contour/surface roughness measurement
Measurable depth: 10 mm max.

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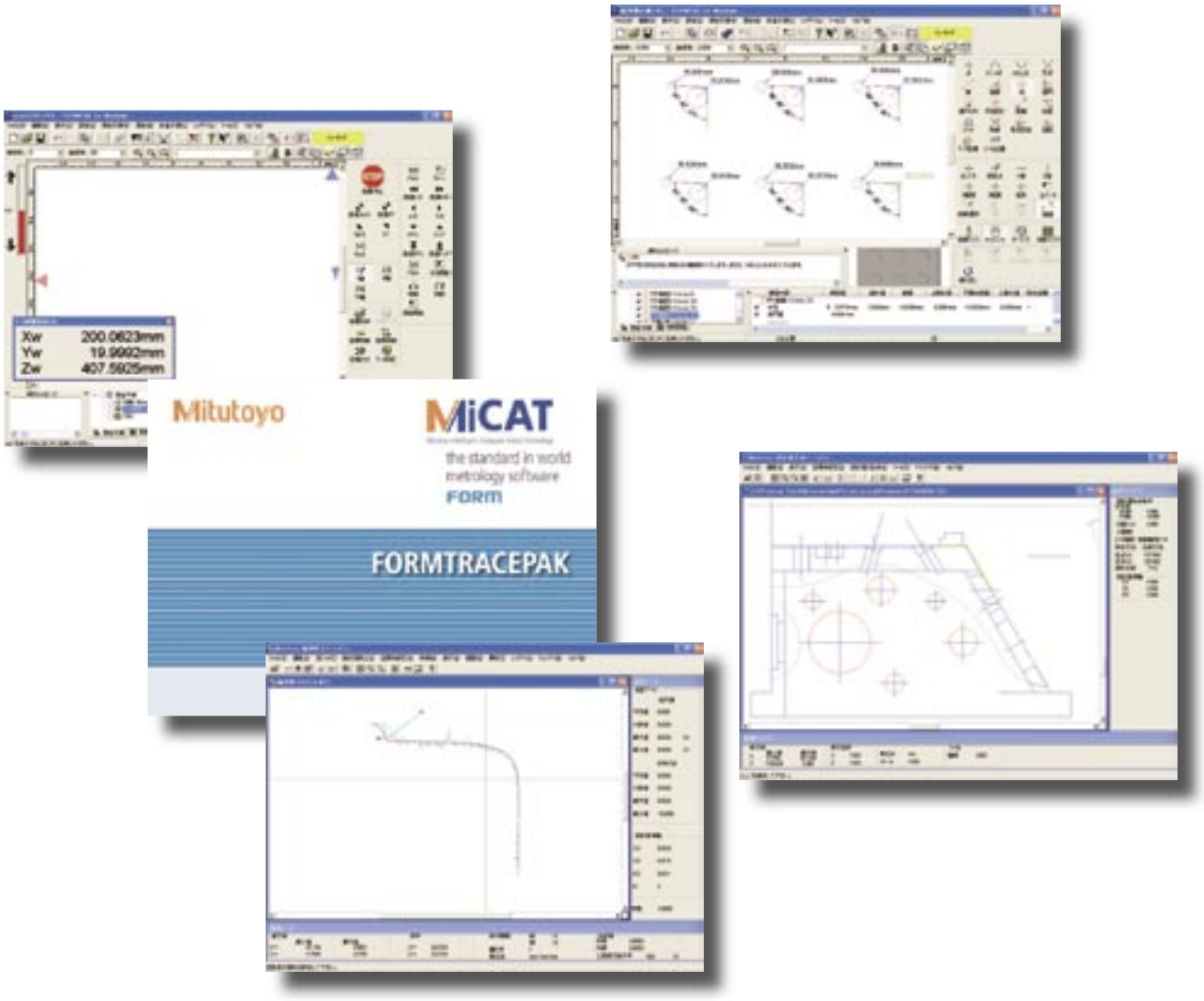
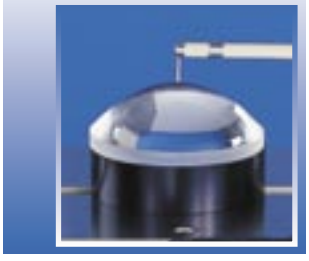
Software, FORMTRACEPAK

MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world metrology software
FORM





Measuring lens

Measuring ball screw

Measuring bearing ring

Software, FORMTRACEPAK

The complete program: surface and contour analysis at a glance

Uncomplicated, many-sided, practice-orientated: With the standard analysis software FORMTRACEPAK, the Formtracer CS-3000 becomes a true multi talent as far as operability and professional evaluation are concerned. FORMTRACEPAK unites the functions and qualities of the well tried Mitutoyo software FORMPAK for contour measurement and SURFPAK for surface analysis.
Here, FORMTRACEPAK both makes the separate detection and representation of surfaces and contours possible as well as the combines evaluation of both measurement results, summarized in a single protocol. Of course, FORMTRACEPAK allows for the creation of individual layouts and protocol heads as well as the integration bitmap files - e.g. company logos.

Furthermore:

- Can run under MS Windows
- It is possible to read in DXF and IGES formats
- It is possible to output DXS and IGES formats
- Graphical comparison of nominal value - actual value
- Evaluation of the measurement data for DXF or IGES nominal value contours
- Individual creation of protocols
- Automatic part program sequence
- Editing of part programs
- User-defined settings
- Graphical display during the measurement
- Control of the measurement system via software and joystick
- Individual result output (protocol, ASCII, CSV)
- Connection of individual measurements
- Representation and evaluation of various contours as well as of surfaces on one screen
- Best-fit function for a graphical comparison nominal value - actual value and part program measurement
- Conformity with international standards
- Simple calibration
- Straightness compensation
- Recalculation
- Data compensation
- Contour tolerancing
- Icon processing
- Well arranged, practice-orientated data administration

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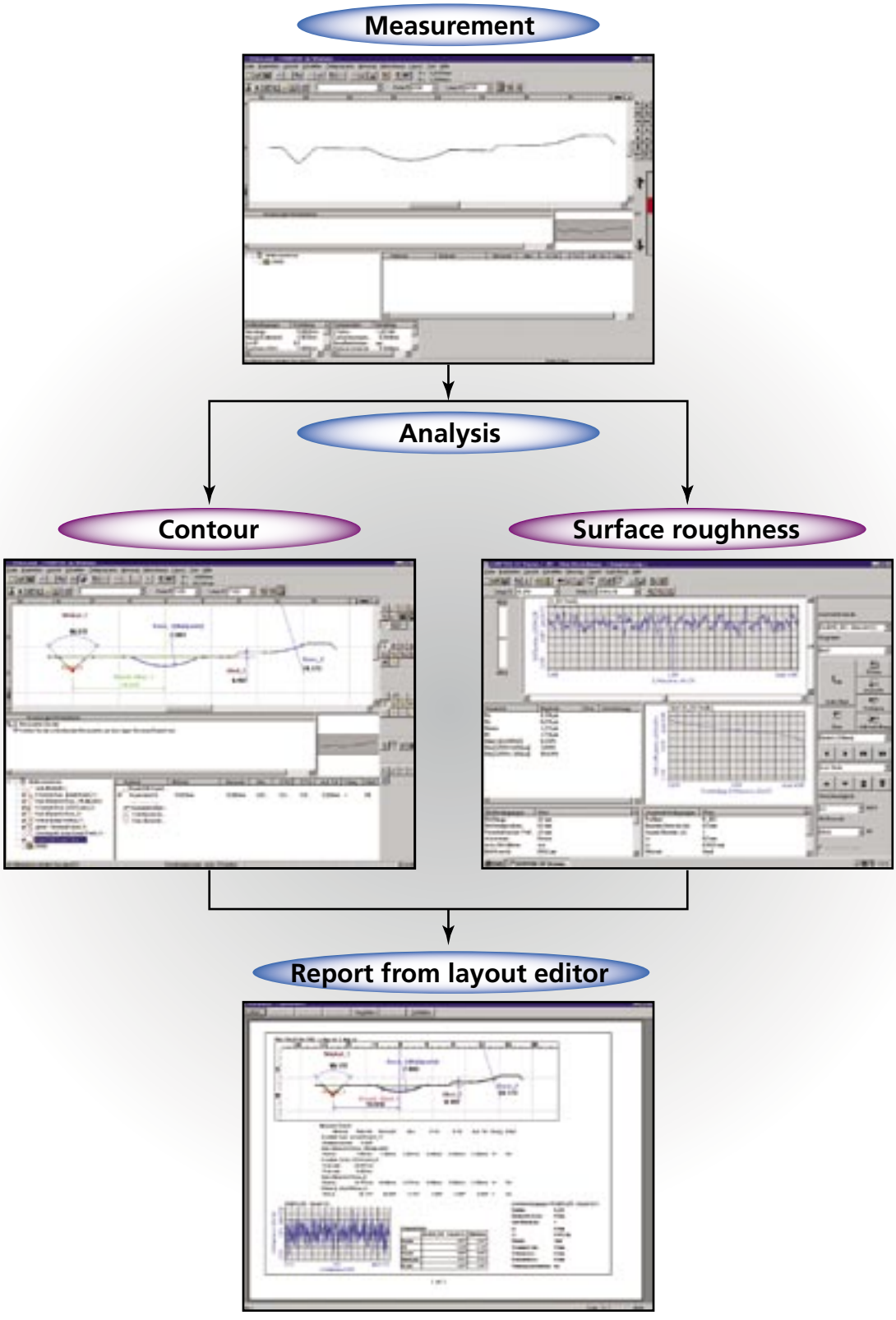
Measurement
Analysis
Contour
Surface roughness
Report from layout editor

Technical information

Specifications

		CS-3100S4
Measuring range	X axis	100 mm
	Z1 axis (detector unit)	5 mm (±2.5 mm from the horizontal position)
Z2 axis (column) travel		300 mm
X axis inclining range		±45°
Scale unit	X axis	Linear encoder
	Z1 axis (detector unit)	Linear encoder
	Z2 axis (column)	ABS scale
Resolution	X axis	0.05 µm
	Z1 axis (detector unit)	0.08 µm / 5 mm, 0.008 µm / 0.5 mm, 0.0008 µm / 0.05mm
	Z2 axis (column)	1 µm
Drive speed	X axis	0 - 80 mm/s and manual
	Z2 axis (column)	0 - 20 mm/s and manual
Measuring speed		0.02 – 2 mm/s (in contour measurement), 0.02 – 0.2 mm/s (in surface roughness measurement)
Traverse linearity (with the X axis in horizontal orientation)		0.2 µm / 100 mm
Linear displacement accuracy (at 20°C) CV-3100 series	X axis	±(1+0.01L) µm L = Drive length (mm) Wide range: 2 µm / 100 mm, Narrow range: 1.25 µm / 25 mm
	Z1 axis (detector unit)	±(2+I4HI/100) µm H: Measurement height from the horizontal position (mm)
Stylus up/down operation		Arc movement
Measuring direction		Forward/backward
Face of stylus		Downward
Measuring force		0.75 mN
Traceable angle		Ascent: 65°, descent: 65° (using the standard one-sided cut stylus and depending on the surface roughness)
Stylus tip (Standard accessory)		Tip radius: 2 µm, diamond tip (standard stylus), 25 µm, sapphire tip (cone stylus)
Base size (width x depth)		600x450mm
Base material		Granite
External dimensions (width x depth x height)	Main Unit	756x482x966mm
	Controller Unit	221x344x490mm
	Remote Control Box	248x102x62.2mm
Mass	Main unit	140kg
	Controller Unit	14kg
	Remote Control Box	0.9kg
Operating temperature range		15 to 25°C (within a temperature variation of ±1°C between temperatures at calibration and measurement)
Operating humidity range		20 – 80%RH (without condensation)
Storage temperature range		-10 – 50°C
Storage humidity range		5 – 90%RH (without condensation)
Power supply specifications		100 – 120V, 200 – 240V ±10%, AC50/60Hz
Power consumption (Main unit only)		400W

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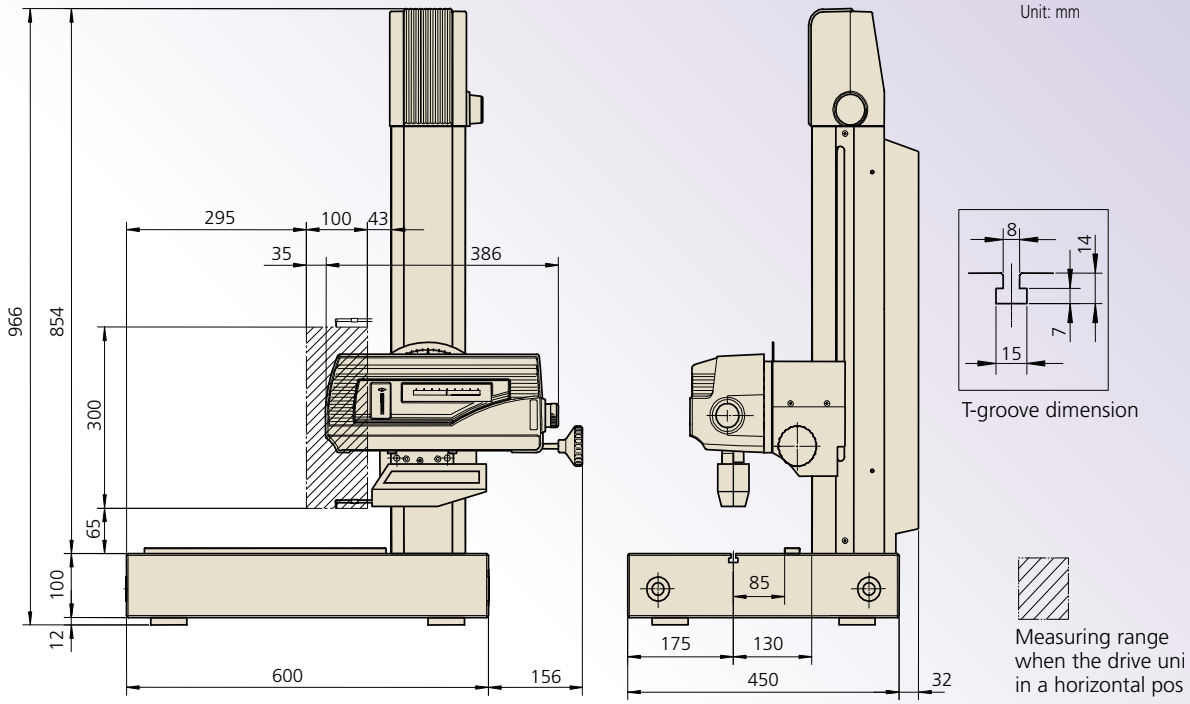
Dimensions


Unit: mm
295
100
43
35
386
966
854
300
65
100
12
600
156
85
175
130
450
32
8
14
7
15
T-groove dimension
Measuring range
when the drive uni
in a horizontal pos

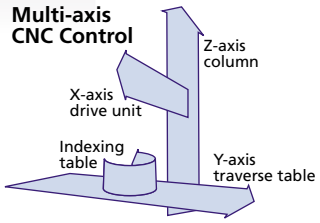
CNC Model for Ultimate Accuracy & Efficiency

Formtracer EXTREME CS-5000CNC / CS-H5000CNC provides ultimate efficiency in measurement with multi-axis CNC control.

±(0.16+0.001L) µm

X-axis unit accuracy at 20°C
(L=Measured length)

Formtracer EXTREME CS-H5000CNC



- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Test Equipment and Seismometer
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

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Specifications are subject to change without notice.

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