

# FORMTRACER CS-3000

Bulletin No. 1811



**Dual measuring in one system:  
combined contour and surface measurement**

**Mitutoyo**

# Contour and surface inspection in one single measuring pass

**Increase your efficiency - reduce your costs. With Formtracer CS-3000**

The Formtracer CS-3000 combines the technologies of contour and surface measuring in one single system, saving space, time and costs. You gain the efficiencies of two technologies in one piece of equipment.

Together with an extremely advantageous price-performance-relation, the Formtracer CS-3000 opens up added productivity for quality assurance.

With Mitutoyo's Formtracer CS-3000, you gain the experience, the competence and the efficiency of a world-wide leading measuring technology company.

# Straightforward, precise, quick and reliable

## Align once - measure twice

Since both the reference parameters and the reference dimensions for both measuring variants are taken into account, on the Formtracer CS-3000 the workpiece needs only to be aligned once.

## High measuring speed

Time is money: With the Formtracer CS-3000, it is also possible to get remarkably high measuring speeds over long measuring distances. The basis for this is the possibility of determining the range for the contour evaluation and the surface analysis in different areas.

## Accuracy in the nm area

The Formtracer CS-3000 makes reliable contour and surface analyses with high resolution in the nm area possible, e.g. up to 0.8 nm in the Z axis.

## Lowering of costs

If the Formtracer CS-3000 is used, only one measuring system has to be calibrated - instead of two, as with different devices for surface and contour measurement. This reduces the set-up costs and time.

## A probe tip for both measuring tasks

From the contour detection via the contour evaluation and the surface analysis to the documentation of results, the Formtracer CS-3000 automates the entire measuring sequence. Without confusing programming work, it is simple, logical and quick.

## Ideal for the manufacturing floor or the lab

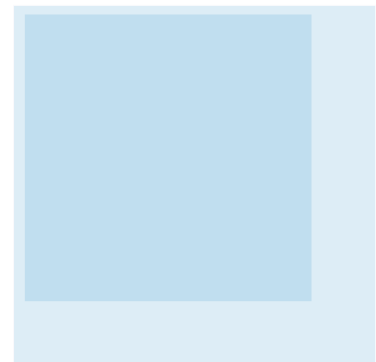
With its favorable price-performance-relation, the Formtracer CS-3000 is the ideal device for use in the fabrication area as well as for analysis purposes in the lab for precision measuring.

## Standard software

As a standard, the Formtracer CS-3000 is equipped with the highly developed FORMTRACEPAK soft-ware, with extensive functions for the professional evaluation as well as for the documentation of surface and profile measurement tasks.

## Conforming to standards

The Formtracer CS-3000 guarantees the evaluation of the surface parameters in accordance with DIN EN ISO 4287, 3274, as well as 13565-1 and -2.



# Two measurements - two evaluations

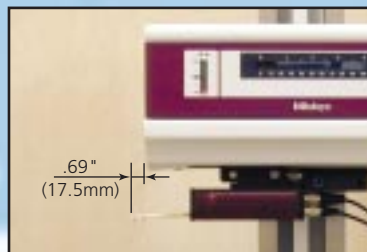
Measurement with the Formtracer CS-3000: detection of surface roughness and contour in a single, combined measuring sequence; evaluation and documentation either separately or combined.



Optional extension adapter (12AAD564)



• with extension adapter  
It is suitable for measuring a internal surface of large workpiece.



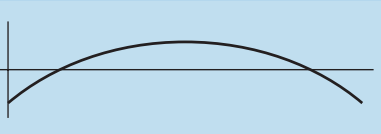
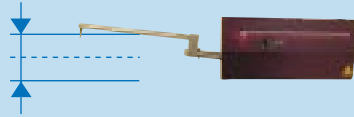
• Normal condition

Control box for remote operation



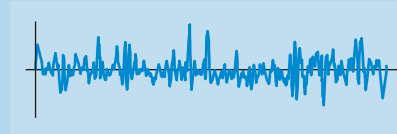
## Contracer CV-3000 Contour

Z-axis-range: 2 inch (50 mm)  
Resolution: 8  $\mu$ inch (0.2  $\mu$ m)



## Surftest SV-3000 Surface roughness

Z-axis-range: 0.03 inch (0.8 mm)  
Resolution: 0.4  $\mu$ inch (0.01  $\mu$ m)



Contour

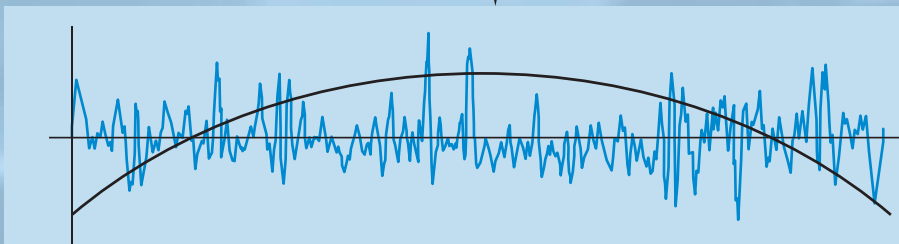
Surface roughness

# FORMTRACER

Contour & Surface roughness

Z-axis-range:  
0.2 inch (5 mm)  
0.02 inch (0.5 mm)  
0.002 inch (0.05 mm)

Resolution:  
3  $\mu$ inch (0.08  $\mu$ m)  
0.3  $\mu$ inch (0.008  $\mu$ m)  
0.03  $\mu$ inch (0.0008  $\mu$ m)



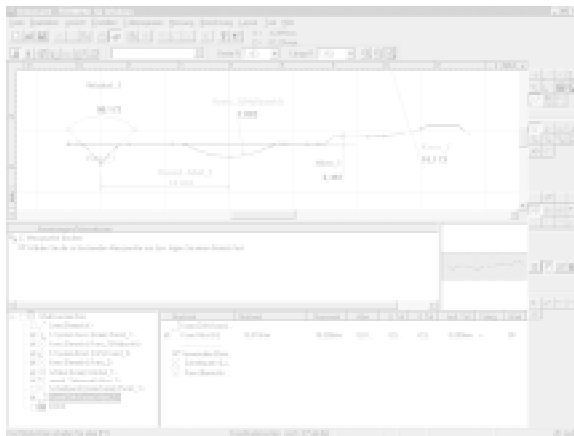
# FORMTRACEPAK

## Standard software with an extensive scope of capabilities

### The complete program: surface and contour analysis at a glance

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 proven Mitutoyo softwares FORMPAK for contour measurement and SURFPAK for surface analysis.

Here, FORMTRACEPAK both makes separate detection and representation of surfaces and contours possible as well as combining 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 of bitmap files - e.g. company logos.

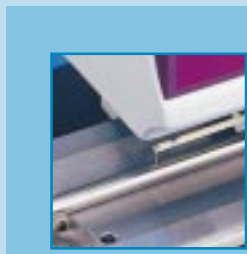


### Additionally:

- 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 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



Measuring lens



Measuring ball screw



Measuring bearing ring

### Measurement

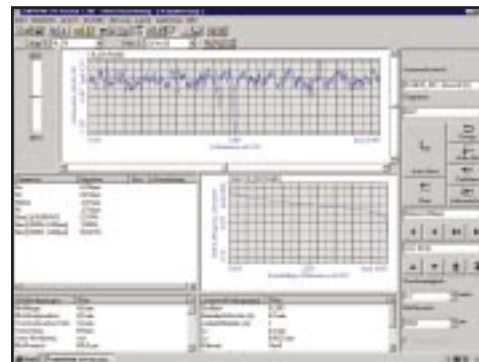


### Analysis

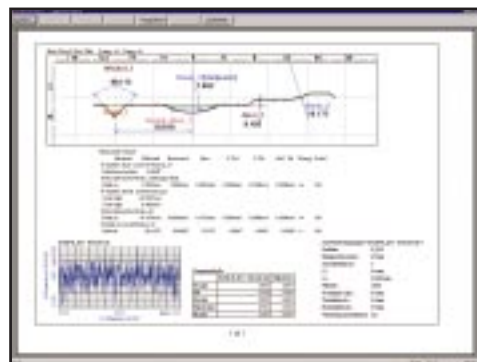
#### Contour



#### Surface roughness



### Report from layout editor

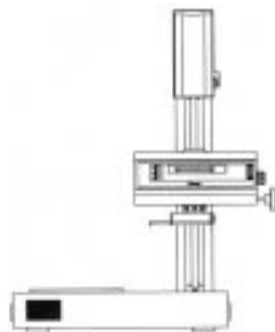


# Technical Data

Unit: inch (mm)

Order No.	<b>525-790A</b>	
Measuring range/Resolution	X-axis	4 inch (100 mm)/0.002 μinch (0.05 μm)
	Z-axis	0.2inch (5 mm)/3 μinch (0.08 μm) ; 0.02 inch (0.5 mm)/0.3 μinch (0.008 μm) 0.002 inch (0.05 mm)/0.03 μinch (0.0008 μm)
Accuracy(at 20°C)	X-axis*	± (40+20L) μinch, ± (1+2L/100) μm, L=traverse length
	Z-axis*	± 120 μinch (3 μm)/0.2 inch (5 mm)
Straightness	X-axis	8 μinch (0.2 μm)/4 inch (100 mm)
Drive unit	Measuring speed	Roughness: 0.0008 inch/s (0.02 mm/s) to 0.008inch/s (0.2 mm/s), can be specified by 4 steps Contour: 0.0008 inch/s (0.02 mm/s) to 0.04 inch/s (1mm/s), can be specified by 6 steps
	Traverse speed	0.004 inch/s (0.1 mm/s) to 0.2 inch/s (5 mm/s) , can be adjusted manually with a joystick box
	Column range	12 inch (300 mm), power drive
	inclining range	± 45°
Detector	Detecting method	Differential inductance
	Measuring force	0.75 mN, it will vary according to the stylus used
	Standard stylus roughness and contour	Tip radius curvature: 80 μinch (2 μm) Tip form: 60° cone Tip material: Diamond
	Standard stylus contour	Tip radius curvature: 0.001 inch (25 μm) Tip form: 30° cone Tip material: Sapphire
Digital data output	via RS-232C interface	
Operation temperature	59°F to 77°F (15°C to 25 °C)	
Power supply	AC 100 V to AC240 V	
Power consumption	Max. 150 VA (except for PC and printer)	
Mass	Measuring unit	308 lbs. (140 kg)
	Control unit	14.3 lbs. (6.5 kg)
	Control box	1.76 lbs. (0.8 kg)

\*Not using the extension adapter (12AAD564).



Main unit (W x D x H):  
28inch x 17.7inch x 35.6inch (710 x 450 x 905 mm)



Control box (W x D x H):  
9.6inch x 4.6inch x 3.1inch (245 x 116 x 78 mm)



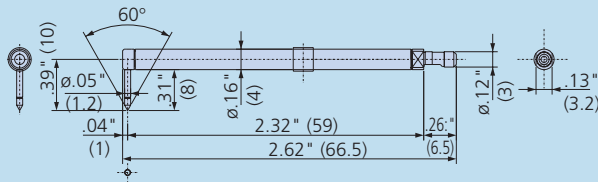
Control unit (W x D x H):  
7.1inch x 15inch x 11.8inch (180 x 380 x 300 mm)

# Stylus

## Standard stylus: No. 12AAD554

Unit: inch (mm)

Radius of tip curvature: 80  $\mu$ inch (2  $\mu$ m)  
 tip form: 60° cone  
 Tip material: Diamond

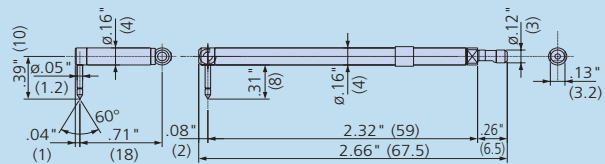


For contour/surface roughness measurement  
 Measurable depth: 0.27 inch (7 mm) max.

## Standard stylus: No. 12AAD558

Unit: inch (mm)

Radius of tip curvature: 80  $\mu$ inch (2  $\mu$ m)  
 tip form: 60° cone  
 Tip material: Diamond

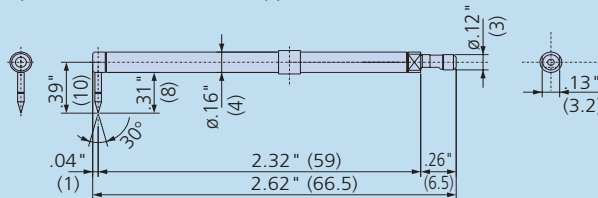


For contour/surface roughness measurement  
 Offset from center line: 0.7 inch (18 mm)

## Cone stylus: No. 12AAD552

Unit: inch (mm)

Radius of tip curvature: 1000  $\mu$ inch (25  $\mu$ m)  
 tip form: 30° cone  
 Tip material: Sapphire

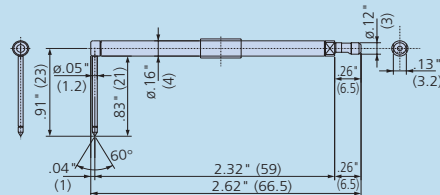


For contour measurement  
 Measurable depth: 0.27 inch (7 mm) max.

## Standard stylus: No. 12AAD560

Unit: inch (mm)

Radius of tip curvature: 80  $\mu$ inch (2  $\mu$ m)  
 tip form: 60° cone  
 Tip material: Diamond

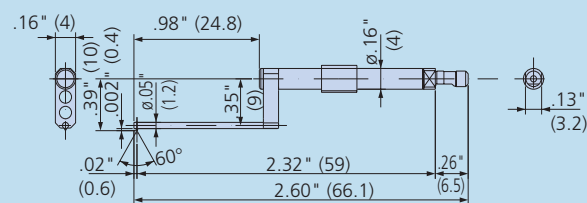


For contour/surface roughness measurement  
 Measurable depth: 0.59 inch (15 mm) max.

## Small hole stylus: No. 12AAD556

Unit: inch (mm)

Radius of tip curvature: 80  $\mu$ inch (2  $\mu$ m)  
 tip form: 60° cone  
 Tip material: Diamond

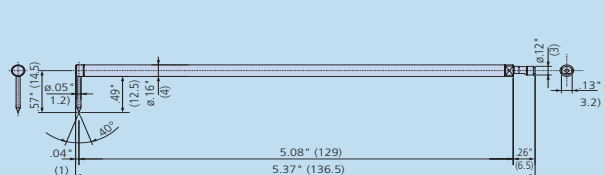


For contour/surface roughness measurement  
 Applicable hole:  $\phi$  0.78 inch (2 mm) min.

## 2x-long stylus: No. 12AAD562

Unit: inch (mm)

Radius of tip curvature: 200  $\mu$ inch (5  $\mu$ m)  
 tip form: 40° cone  
 Tip material: Diamond

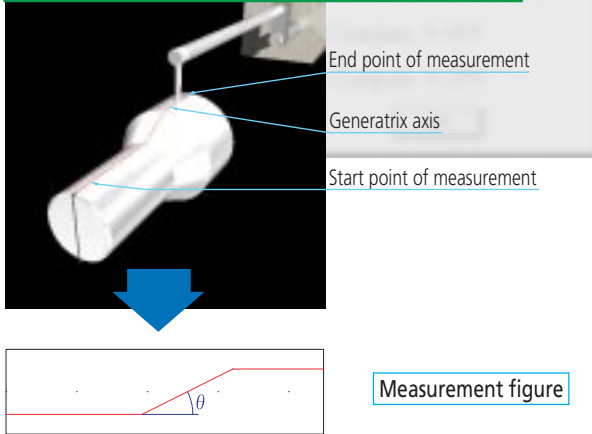


For contour/surface roughness measurement  
 Measurable depth: 0.39 inch (10 mm) max.

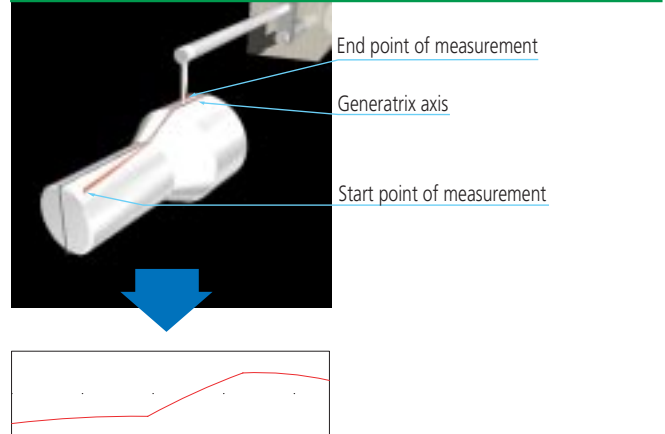
Extension adapter: No.12AAD564

# Leveling table

If perfectly aligned, correct data will be obtained



Without correct alignment, reliable data cannot be obtained



## Manual three-axes-adjusting table

Makes the manual fine positioning of the workpiece via Digimatic micrometer heads easier. The information necessary for the alignment are displayed by the software. Furthermore, the three-axes-adjusting table makes it possible to perfectly align cylindrical workpieces with relation to the measurement axis - thus the measuring error can be avoided in a reliable way by deviating from the center line of cylindrical workpieces.

Order No.	178-047
Table top	5" x 4" (130 x 100 mm)
Workpiece weight	33 lbs. (15 kg) at max.
Workpiece Diameter	0.04" to 6.3" (1 mm to 160 mm)
Levelling range	± 1.5°
Swivel range	± 2°
Y-axis adjustment	± 0.5" (± 12.5 mm)
Height	6" (152.5 mm)
Mass	19.8 lbs. (9 kg)
Remarks	V-block (998291) is provided

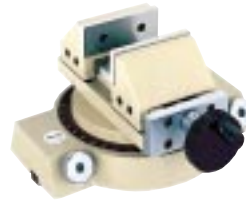
## Automatic 3D leveling table

Innovative technology, patented in Japan, for the perfect skidless measurement – unique to Mitutoyo. After determining the workpiece position by the measurement system, software calculates the position of the test piece and thus the automatic input for the 3D leveling table. Thus, an optimum fit of the workpiece into the measuring range is ensured.



Order No.	178-047	178-028
Table top	5" x 4" (130 x 100 mm)	11" x 10" (280 x 250 mm)
Levelling range	± 2°	± 2°
Max. work-piece load	15.4 lbs. (7 kg)	44 lbs. (20 kg)
Dimensions (W x D x H)	5.31" x 4.13" x 2.24" (135 x 105 x 57 mm)	11.30" x 9.92" x 9.35" (287 x 252 85 mm)

# Accessories



**Rotary vise**  
**218-003**

- Two slide jaw type.
- Max. workpiece size: Ø 2.4" (60 mm)
- Minimum reading: 1°

**V-block with clamp**  
**172-234**

- Used with a cross-travel table or rugged table
- Max. workpiece diameter: 2" (50 mm)



**Digimatic XY levelling Table with swivel**

- 178-042-1 (mm)
- 178-052-1 (inch)
- Table top: 5" x 4" (130 x 100 mm)
- Levelling range: ± 1.5°
- XY travel: ± 0.5" (± 12.5 mm)

**V-block**  
**998291**

- Workpiece diameter: 0.04" to 6.3" (1 mm to 160 mm)
- Can be mounted on a labelling table



**Step gage**

- 178-611** (mm)
- 178-612** (inch)
- Steps: 79 µinch (2µm), 394 µinch (10 µm)

**Roughness specimen**

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

**Cross-travel table**

**218-001** (mm)

**218-011** (inch)

- Table top: 11" x 7" (280 x 180 mm)
- XY travel: 4" x 2" (100 x 50 mm)



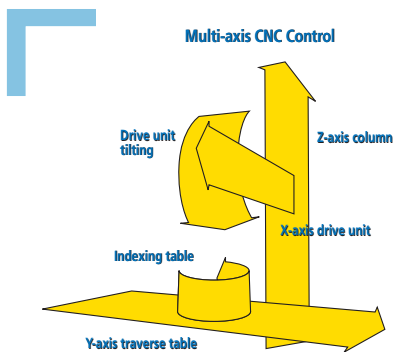
**Precision vise**  
**178-019**

- Max. workpiece size: 1.42" (36 mm)
- can be mounted on a levelling table

**Vibration isolator**  
**178-025**

- Dimensions (W x D x H): 30" x 22" x 2.3" (750 x 550 x 59 mm)
  - Stand is optional
- 178-024**





# Formtracer Extreme CS-5000 CNC



**Note:**

All our product details, in particular the illustrations, drawings, dimension and performance details and other technical specifications contained in this publication are to be considered to be approximate average values. To this extent, we reserve the right to make changes in design, technical data, dimensions and weight. Our specified standards, similar technical rules and technical specifications, descriptions and illustrations of the products are correct at the time of printing. The current version of our general terms and conditions also apply. Only offers which we have submitted can be considered to be definitive.

- Coordinate Measuring Machines
- Vision Measuring Systems
- Surface, Form and Contour Measurement
- Optical Measuring
- Sensor Systems
- Hardness Measuring
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

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**Precision is our Profession**