Mitutoyo

SURFACE MEASUREMENT

SOPHISTICATED, POWERFUL AND ECONOMICAL:

SURFACE MEASURING MACHINES FROM MITUTOYO.

FORM MEASUREMENT

PRE1164(7)

Mitutoyo

It's your job to deliver quality!

SURFACE MEASURING MACHINES

Precise surface testing requires in-depth technological expertise. As the world's most diversified supplier of production measuring technology, Mitutoyo sets the standard in knowledge and experience in its field. A carefully structured range of sophisticated solutions for modern surface measurement has been put together in this brochure. Users with difficult requirements will find here the right configuration for the perfect measurement of roughness and waviness in production and laboratory.

This brochure gives an overview of the multi-faceted Mitutoyo range of surface testing machines – from practical hand-held portable units through to stand-alone reference plane measuring systems that set the standard in their class. It will provide you with a fast, reliable and efficient guide to the best solution for your particular surface measuring requirements. More detailed machine-specific brochures will give you further guidance on configuring the system of your choice, the wide range of available accessories and the impressive range of software.

Whichever system you choose: a coordinate measuring machine from Mitutoyo means that you can draw on the experience, competence and performance of a world-leading measurement technology specialist, and on customer-focused service that will not fail to impress.

Mitutoyo: top of the class in measurement technology

EST

We'll help you achieve this goal, with top-class user and task-oriented surface measurement technology.

Skidded systems

Model	Description	
SURFTEST SJ-210	The portable solution for precise, effective and uncomplicated surface testing in the production environment. With a large, easily legible 2.4" (6 cm) color graphic LCD for the clear representation of measurement values.	
SURFTEST SJ-310	Portable surface testing instrument with touch-sensitive operation panel and integral printer. For rapid portable measurement in the production environment.	

Reference plane systems (skidless)

Model	Description	
SURFTEST SJ-410	Machines that can be used as portable or stationary units. For portable reference plane measurement of surface roughness and waviness as well as contact area ratio and amplitude distribution.	
SURFTEST SJ-500	Practice-relevant diversity for test room and laboratory. Economically efficient reference plane tester for portable and stationary use with an impressive range of features and excellent standard software.	

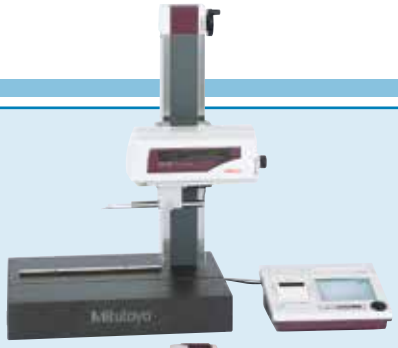
SURFTEST SJ

Features	Model	Traverse	Stand
• Intuitive menu navigation • High-resolution detector with broad measuring range • Removable traverse unit for measurements where space is restricted • Standard USB, RS232C, SPC interfaces	**SJ-210**	17.5 mm	optional
• Intuitive menu navigation • 5.7" (14,5 cm) color graphic LCD • 10 different measurement conditions can be stored internally; up to 500 with optional SD card • 16 languages supported	**SJ-310**	17.5 mm	optional

Features	Model	Traverse	Stand
• Intuitive menu navigation • 5.7" (14,5 cm) color graphic LCD • Analysis of primary profile (P), roughness profile (R), filterd waviness (W) • 16 languages supported	**SJ-411**	25 mm	optional
	SJ-412	50 mm	
• Top quality ceramic axis • Measuring head can swivel 90° for transverse measurement • Analysis of primary profile (P), roughness profile (R), filterd waviness (W) and geometric characteristics • TFT color display (touch screen) • USB, RS-232C, SPC interfaces	**SJ-500**	50 mm	optional
	SJ-500P	50 mm	optional

Complex reference plane in the Surftest SV series

Reference plane systems (skidless)

Model	Description	
SURFTEST SV-2100	Stationary reference plane for capturing primary, roughness and waviness profiles and geometric characteristics. The series comprises models with manual and servo-powered columns.	
SURFTEST SV-3200	Stationary reference plane measuring system for sophisticated measuring tasks to capture primary, roughness and waviness profiles in the test room. FORMTRACEPAK software for control of all servo-powered axes and comprehensive analysis of surface measurements.	
SURFTEST SV-3000CNC	High performance measuring system belonging to the MITUTOYO CNC EXTREME series. The stationary reference plane system is designed for sophisticated measuring tasks to capture primary, roughness and waviness profiles fully automatically. All axes are servo powered.	
SURFTEST SV-M3000CNC	High performance measuring system belonging to the MITUTOYO CNC EXTREME series. Fitted with a moving/measuring column, this reference plane system is designed for sophisticated measuring tasks to capture primary, roughness and waviness profiles fully automatically. All axes are servo powered. At the same time, they can be positioned at high speed.	

SURFTEST SV

Features	Model	Traverse	Height adjustment (servo powered)	Base plate dimensions
• Ceramic guideway with 100 mm measuring range • Measuring head can swivel 180° for top/bottom measurement • Analysis of primary profile (P), roughness profile (R), filterd waviness (W) and geometric characteristics • TFT color display (touch screen) • USB, RS-232C, SPC interfaces	**SV-2100M**	100 mm	350 mm	600 x 450 mm
	SV-2100M4P*			
	SV-2100S		350 mm	
	SV-2100H		550 mm	
	SV-2100W			1000 x 450 mm
	* manual			
• Ceramic guideway with 100 mm or 200 mm measuring range • Servo powered column with ABS scale • Measuring head with collision protection • Forward travel with angle adjustment • High positioning speed • FORMTRACEPAK software • Analysis of primary profile (P), roughness profile (R) and filterd waviness (W) • Different detector holder as option • Optional accessories like DAT unit and 3D/Y-axis • Z2 up to 700 mm	**SV-3200S4**	100 mm	300 mm	600 x 450 mm
	SV-3200H4		500 mm	600 x 450 mm
	SV-3200W4		500 mm	1000 x 450 mm
	SV-3200L4		700 mm	1000 x 450 mm
	SV-3200S8	200 mm	300 mm	600 x 450 mm
	SV-3200H8		500 mm	600 x 450 mm
	SV-3200W8		500 mm	1000 x 450 mm
	SV-3200L8		700 mm	1000 x 450 mm
• Ceramic guideway with 200 mm measuring range • Servo-powered axes can be positioned simultaneously • Collision protection • Highest positioning speed • Standard model with stand and active vibration damping system • FORMTRACEPAK software • Analysis of primary profile (P), roughness profile (R) and filterd waviness (W)	**SV-3000SCNC**	200 mm	300 mm	750 x 600 mm
	SV-3000HCNC		500 mm	
• Ceramic guideway for forward travel • Servo-powered axes can be positioned simultaneously • Collision protection • Highest positioning speed • Standard model with stand and active vibration damping system • FORMTRACEPAK software • Analysis of primary profile (P), roughness profile (R) and filterd waviness (W)	**SV-M3000CNC**	200 mm	500 mm	
	with 800 mm measuring Y axis (movable column)			

SJ-210 and SJ-310
Portable unit.

Portab

SJ-210

Detector stroke: 360 µm
Traverse: 17.5 mm

Main menu

Parameter display Ra with tolerance evaluation

SURFTEST SJ-210
With 2.4" (6,0 cm) color graphic LCD

- Intuitive menu navigation
- Measurement execution by single key operation
- Sturdy workshop design
- User friendly 2.4"(6,0 cm) color graphic LCD
- Display direction rotatable
- Support for EN ISO, VDA, ANSI, JIS, R-Motif
- Traverse: 17.5 mm
- The detachable drive unit gives excellent flexibility, especially when working space is restricted
- High capacity battery allows up to 1000 measurements without recharging
- Storage of 10 measurement conditions
- Automatic calibration function
- Micro SD card, USB Interface
- Two device variants cover an overall 21 languages
- Easy recalculation function
- 3 different models expand the range of application
- mm or mm/inch models

Extract from the wide range of parameters

Rz1max, Rmax (VDA), Ra, Rz, Rt, Rmr, Rmr(c), RSm, Rk, Rpk, Rvk
Motif: R, Rx, AR

Powerful, portable unit for precise, uncomplicated measurement in workshop and production environment – directly on the machine, directly on the workpiece

SJ-310

Detector stroke: 360 µm
Traverse: 17.5 mm

SURFTEST SJ-310

With 5.7" (14,5 cm) color graphic LCD

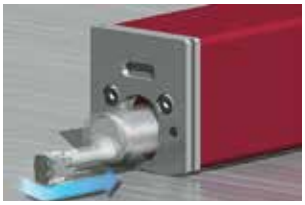
- Intuitive menu navigation
- Touch – sensitive operation panel
- Complies with many industry standards like EN ISO, VDA, ANSI, JIS as well as customized
- 10 different conditions can be stored inside the SJ-310, up to 500 with optional SD-card
- Colored tolerance judgment
- 2 different evaluation conditions within 1 measurement
- Each function separately protectable by password
- 16 languages supported
- Integrated printer

S-type drive unit for transverse scanning for SJ-210/SJ-310

The S-type drive unit is designed to enable transverse scanning; for example, measuring a shrouded bearing surface in the axial direction rapidly and reliably. The transverse scanning function simplifies surface-roughness measurement even in very restricted areas, which has hitherto been a problem for conventional measuring units limited to longitudinal scanning.

Drive units SJ-210/SJ-310

Standard



R-type

S-type (Traverse: 5.6 mm)

Extract from the wide range of parameters

Rz1max, Rmax (VDA), Ra
Rz, Rt, Rmr, Rmr(c), RSm
RK, RpK, RvK, A1, A2
Mr1, Mr2, etc.
Motif: R, Rx, AR, etc.

Software USB Communication Tool is available as a free download on **www.mitutoyo.eu**

SJ-410: Rapid, portable reference plane measurement of surface roughness and waviness. On site and on the move, stationary or portable.

SJ-410

Detector stroke: 800 µm
Traverse: 25 mm (SJ-411)
50 mm (SJ-412)

SJ-411

Touch-sensitive display

With optional auto set unit

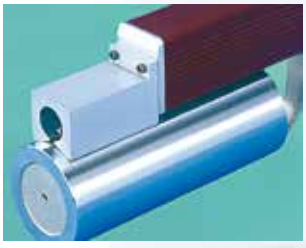
SURFTEST SJ-410

With automatic compensation for radius and inclination

- 5.7" (14,5 cm) color graphic LCD
- Easy & intuitive to navigate through measurement conditions, results and analysis graphics
- Touch – sensitive operation panel
- Skidless detector to measure primary profile (P), roughness profile (R), filtered waviness profile (W) and more
- Complies with many industry standards like EN ISO, VDA, ANSI, JIS as well as customized
- 10 different conditions can be stored inside the SJ-411 / SJ-412, up to 500 with optional SD-card
- Colored tolerance judgment
- 2 different evaluation conditions within 1 measurement
- Each function separately protectable by password
- 16 languages supported
- Integrated printer
- Optionally auto set unit as well as X-axis adjustment and digital leveling unit

Extract from the wide range of parameters

Rz1max, Rmax (VDA), Ra, Rz, Rt, Rmr, Rmr(c), RSm, Rk, Rpk, Rvk
Pt, Pa, Pz
Wt
Motif: R, Rx, AR, W, Wx, AW, Wte



Software USB Communication Tool is available as a free download on **www.mitutoyo.eu**

ationary or portable

SJ-412

SJ-411

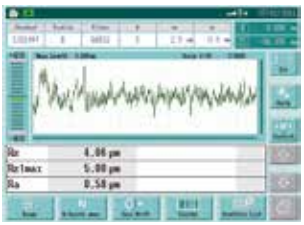
Traverse rate 25 mm (SJ-411) to 50 mm (SJ-412)

SJ-411 with optional granit stand

SJ-500: Peak performance for portable use

SJ-500

Detector stroke: 800 µm
Forward travel: 50 mm



Presentation of roughness result

Selection of indicators

Definition of measurement variables

Extract from the wide range of parameters

Rz1max, Rmax (VDA), Ra, Rz, Rt, Rmr, Rmr(c), RSm, Rk, Rpk, Rvk
Pt, Pa, Pz1max
Wt
Motif: R, Rx, AR, W, Wx, AW, Wte

Software USB Communication Tool is available as a free download on **www.mitutoyo.eu**

SURFTEST SJ-500

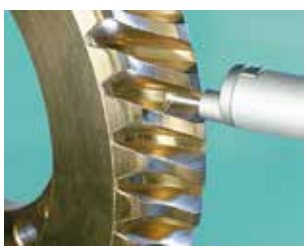
Reference plane measuring system for analyzing:

- **Roughness profile**
- **Waviness profile**
- **Primary profile**
- **Evaluation of geometric characteristics**

- Suitable for portable and stationary use
- Ceramic straightness guide
- Straightness deviation 0.2 µm / 50 mm
- Height adjustment (parallel adjustment) of the detector system over 15 mm
- The detector system can be mounted laterally for transverse measurement
- Automatic calibration function
- Detector stroke 800 µm
- Storage of up to 10 measurement variables
- Integrated statistics function
- **User friendly display and simple operation**
  Equipped with a 7.5" (19 cm) high-resolution TFT color display with touch screen for user friendly and simple operation.

Secure positioning
A joystick integrated into the control unit allows secure and rapid positioning of the detector. Manual fine adjustment using the hand wheel to finely position the detector, for example when measuring small bores.

Extensive choice of analysis options
46 surface parameters are available to analyze surface roughness (e.g. Rmax, Rz1max), together with a wide range of form analyses, such as: radius, angle, and coordinate difference.



SURFTEST SJ-500

SJ-500 with optional granit stand

SURFTEST SJ-500P

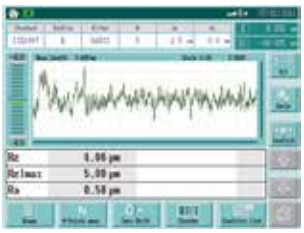
PC model with Software FORMTRACEPAK

FORMTRACEPAK offers total support for measurement system control, surface roughness analysis, even small contour analysis and inspection reports.

Surftest SV-2100

SV-2100M

Detector stroke: 800 µm
Forward travel: 100 mm



Presentation of roughness result

Joystick activation

Retrieval of up to 10 measurement variables

Selection of indicators

Extract from the wide range of parameters

Rz1max, Rmax (VDA), Ra, Rz, Rt, Rmr, Rmr(c), RSm, Rk, Rpk, Rvk; Pt, Pa, Pz1max; Wt
Motif: R, Rx, AR, W, Wx, AW, Wte

SURFTEST SV-2100M (semi-automatic)

Reference plane measuring system with manual height adjustment for analyzing
- **Roughness profile**
- **Waviness profile**
- **Primary profile**
- **Evaluation of geometric characteristics**

User friendly display and simple operation
- Equipped with a 7.5" (19 cm) high-resolution TFT color display with touch screen for user friendly and simple operation.

Secure positioning
- A joystick integrated into the control unit allows secure and rapid positioning of the detector. Manual fine adjustment using the joystick to finely position the detector, for example when measuring small bores.

Extensive choice of analysis options
- 46 surface indicators are available to analyze surface roughness (e.g. Rmax according to VDA), together with a wide range of analyses, such as: radius, angle, steps and coordinate difference.

Thermal printer
- Integrated high-speed printer with high graphic resolution.

SURFTEST SV-2100M4P

PC model with Software FORMTRACEPAK

- FORMTRACEPAK offers total support for measurement system control, surface roughness analysis, even small contour analysis and inspection reports.

SURFTEST SV

SV-2100S/H/W

SURFTEST SV-2100S/H/W (semi-automatic)

Reference plane measuring system with manual height adjustment for analyzing
- **Roughness profile**
- **Waviness profile**
- **Primary profile**
- **Evaluation of geometric characteristics**

User friendly display and simple operation
- Equipped with a 7.5" (19 cm) high-resolution TFT color display with touch screen for user friendly and simple operation.

Secure positioning
- A joystick integrated into the control unit allows secure and rapid positioning of the detector. Manual fine adjustment using the joystick to finely position the detector, for example when measuring small bores.

Extensive choice of analysis options
- 46 surface indicators are available to analyze surface roughness (e.g. Rmax according to VDA), toge ther with a wide range of form analyses, such as: radius, angle, steps and coordinate difference.

Thermal printer
- Integrated high-speed printer with high graphic resolution.

User-defined interface

Software USB Communication Tool is available as a free download on **www.mitutoyo.eu**

Stand-alone performance: stationary reference plane system setting standards in test room and laboratory analysis.

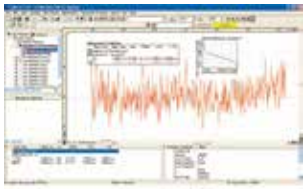
SV-3200

Detector stroke: 800 µm
Traverse: 100 mm
200 mm

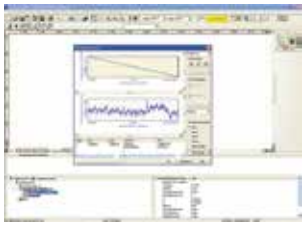
SURFTEST SV-3200

The high-end solution for the most exacting demands in surface testing

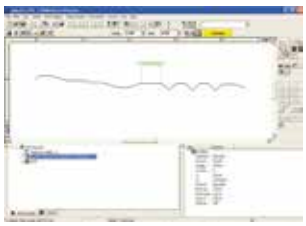
- Measurement of primary profile (P), roughness profile (R) and filtered waviness (W)
- Automatic calibration function
- Detector stroke 800 µm
- Traverse 100 or 200 mm
- Setting up of very small cut-off possible (0.025 mm)
- Ceramic guideway
- Wide range of styli available for various measurement tasks
- Simple exchange of styli
- Wide range of accessories
- ABS scale in Z2 axis
- High-speed positioning
- Collision prevention
- Software FORMTRACEPAK supports CNC functions
- Additional axis available at any time
- Z1 up to 700 mm
- Different detector holder as option
- 3D/Y-axis as option



Evaluation screen FORMTRACEPAK



Compensation function



FORMTRACEPAK calculation area for a contour

Detector holders

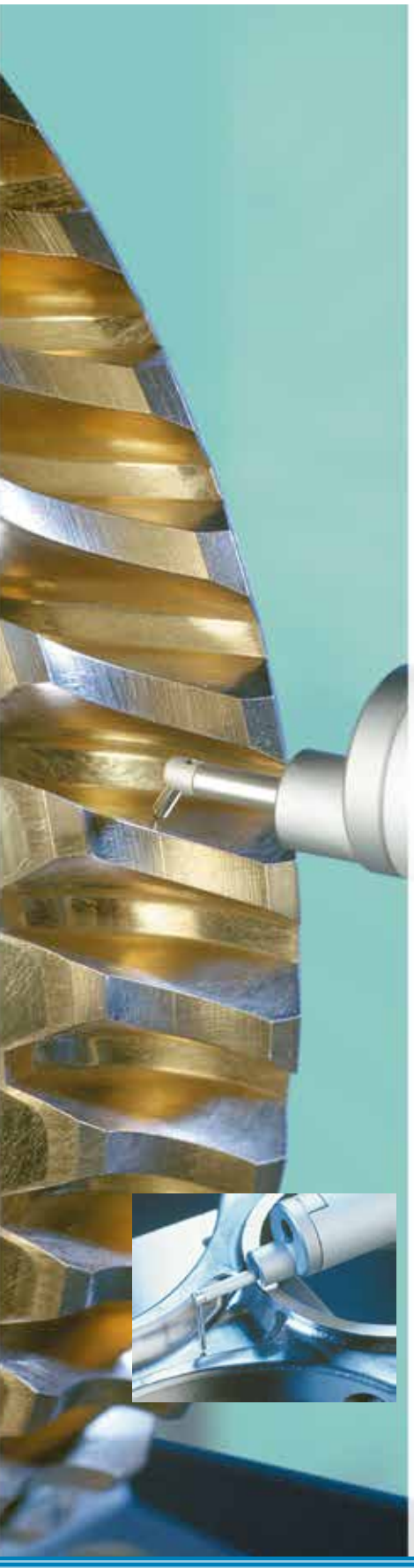
S-3000 Standard

S-3000 C Crankshaft

S-3000 CR Crankshaft + upward/downward

S-3000 MR upward/downward + 100 mm extension

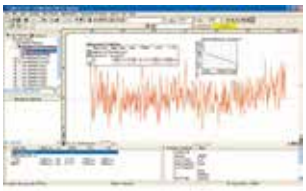
nd-alone



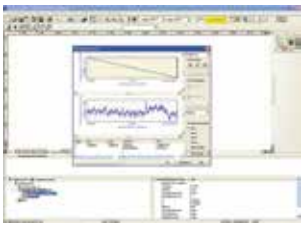
CNC measuring system

SV-3000CNC

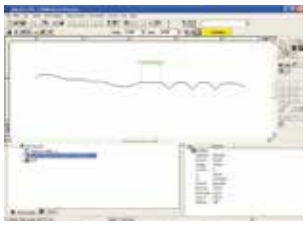
Detector stroke: 800 µm
Forward travel: 200 mm



Analysis screen



Compensation function



FORMTRACEPAK calculation area for a contour

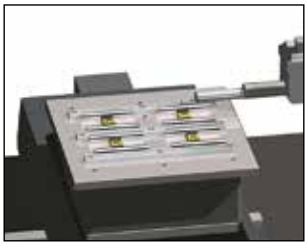
SURFTEST SV-3000CNC

The system offers the same impressive features as the SV-3200 basic model but enhanced with innovative CNC technologies – coupled with the tangible cost benefits of standard production.

At last: high precision surface measurement can be incorporated cost efficiently straight into rapid production processes.
Additional capabilities are provided for quick use in a CNC manufacturing environment, such as the ability to use six different axes, or full collision protection.

- High-speed positioning up to 200 mm/s
- Ceramic X-axis guideway, straightness deviation 0.5 µm/200 mm
- As many as 6 axes can be operated simultaneously.
- Standard model equipped with active vibration damping system
- High performance FORMTRACEPAK software for controlling all axes and analyzing primary profile (P), roughness profile (R) and filtered waviness (W)

Additional axis



Y-axis

Theta 1

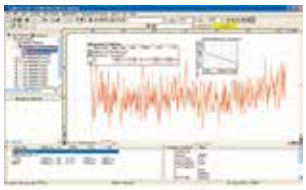
Theta 2

SURFTEST SV

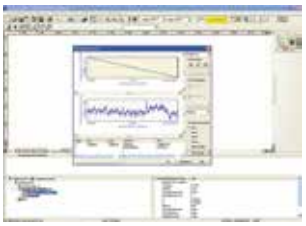
CNC measurement system with measuring column

SV-M3000CNC

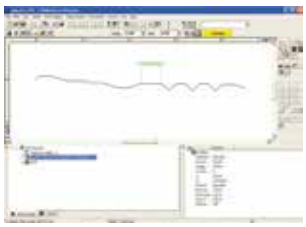
Detector stroke: 800 µm
Forward travel: 200 mm
Y-axis measurement range: 800 mm



Analysis screen



Compensation function



FORMTRACEPAK calculation area for a contour

SURFTEST SV-M3000CNC

This system offers all the outstanding features the Surftest SV-3000 CNC basic model.

Special feature: This high precision surface roughness measuring instrument is equipped with a movable measuring Y axis.
The entire Z2 axis can move in Y direction of measurement when measuring large work pieces, for example. Allowing measurements to be performed over a large area at points that are otherwise difficult to access, even on large workpieces.

Positioning speed is an astonishing 200 mm/s.
The straightness of the Y axis is excellent: 2 µm / 800 mm and 0.5 µm / 50 mm.

- Fully automatic measurement of complex components
- Measuring Y axis (movable column) over 800 mm
- Equipped with active vibration damping system
- Optionally available with rotation detector unit (for top, bottom and lateral measurements)
- High performance FORMTRACEPAK software for controlling all axes and analyzing roughness, waviness and primary profiles

SURFTEST SV

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

SOFTWARE

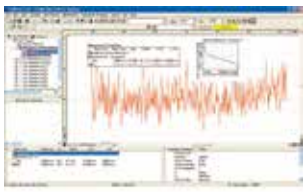
FORMTRACEPAK

Extension module

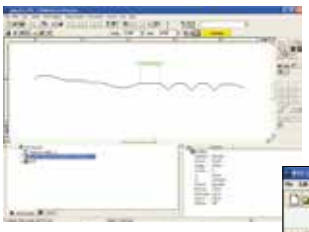
MeasurLink
Module for managing statistical measurement data and analyzing and storing measurement data.

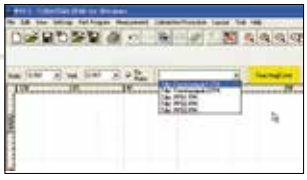
FORMTRACEPAK
FORMTRACEPAK performs the following tasks:

- Control of all servo-powered axes
- Definition of measurement variables
- Analysis of primary profile (P) roughness profile (R), waviness profile (W)
- Wide choice of indicators for each respective profile
- Definition of tolerance limits
- Automatic part program sequence
- Automatic calibration
- Creating test reports
- Export and archiving of results
- Contour measurement features within range of stylus


Analysis screen


Machine Control


FORMTRACEPAK calculation area for a contour

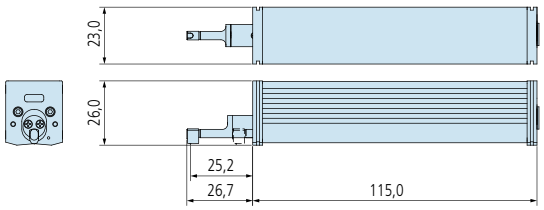

Part program selection from pull-down menu

Sample accessories for skidded systems and styli for reference plane systems

Skidded systems

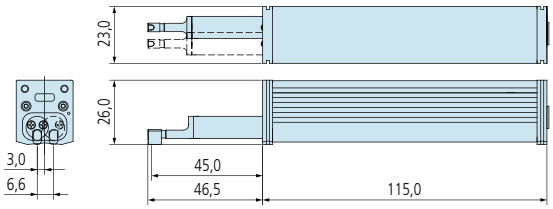
Standard drive unit
For SJ-210/SJ-310

Basic model for standard traverse direction



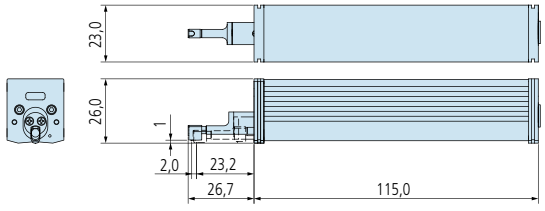
Transverse drive unit
For SJ-210S/SJ-310S

The S-type drive unit is dedicated to measurements in the Y direction (orthogonal to the standard direction of measurement).



Lifting drive unit
For SJ-210R/SJ-310R

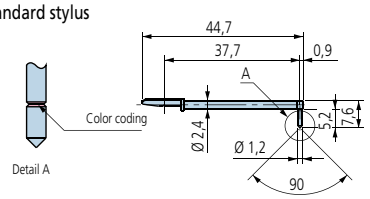
The R-type drive unit is designed for measurements where it is necessary to lift the stylus from the measured surface before and after measurement.



The stylus tip is not touching the work piece at the start of measurement. Once measuring begins, the detector lowers the stylus onto the surface of the workpiece and the traverse begins. Once measurement is complete, the stylus initially remains on the surface of the work piece. The detector is raised from the workpiece surface during the return traverse and before the measurement start position is reached.

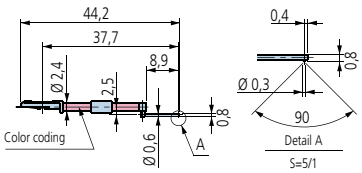
Styli (Extract from the wide range of skidless styli)

Standard stylus



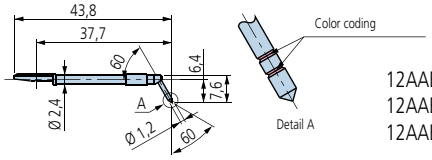
12AAC731 (2 µm)
12AAB403 (5 µm)
12AAB415 (10 µm)

Small holes



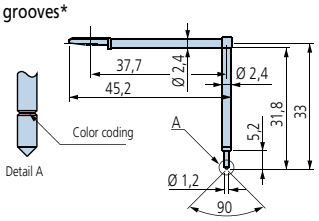
12AAC734 (2 µm)
12AAB406 (5 µm)
12AAB418 (10 µm)

Gear tooth systems



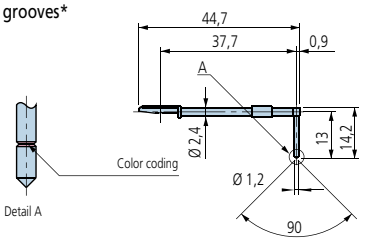
12AAB339 (2 µm)
12AAB410 (5 µm)
12AAB422 (10 µm)

Deep grooves*



12AAC737 (2 µm)
12AAB407 (5 µm)
12AAB419 (10 µm)

Deep grooves*



12AAC735 (2 µm)
12AAB409 (5 µm)
12AAB421 (10 µm)

*Measurement force is not guaranteed if this stylus is used.
Tip angle 60° for tip radius of 2 µm
Tip angle 90° for tip radius of 5 µm or 10 µm

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Optical Measuring

Sensor Systems

Test Equipment and Seismometers

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