

SURFACE MEASUREMENT

Bulletin No. 1752



Portable and benchtop surface measurement solutions – from Mitutoyo

Mitutoyo

Our mission is to help you achieve maximum precision for highest levels of quality.

Reaching highest levels of surface quality measurement takes you to the leading edge of technology.

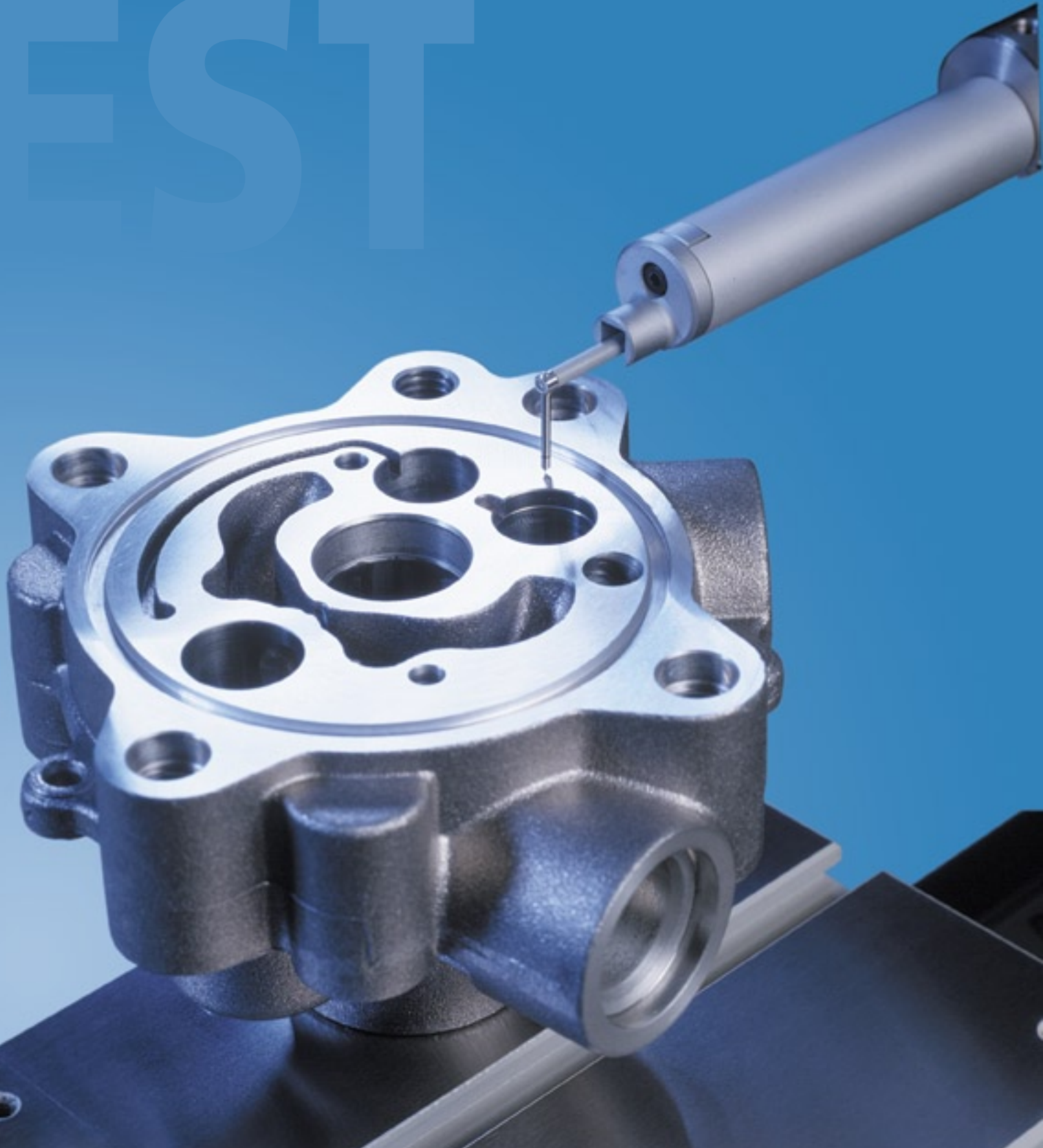
Surface measurement presents challenges. Advances in optics, electronics, lasers and computer science are continually enlisted to improve the technology. The ability to build tools that can make the most precise and rapid surface measurements, not only in the laboratory but under the arduous conditions of the production line, requires technological competence and accuracy. Mitutoyo, as the world's leading producer of production measurement technology, defines the standard in this field. With this competence, Mitutoyo developed their current state-of-the-art solutions for surface measurement.

This brochure presents an overview of the extensive range of Mitutoyo's surface measurement instruments and systems. It includes instrument specifications, configurations, additional equipment options and software solutions. Within this selection even the most demanding customers will find an off-the-shelf instrument or system that suits their needs, or one that can be customized appropriately for the task at hand. The range of instruments and systems extends from cost-effective and versatile hand-held portable instruments to a high-precision desktop reference model. All models are suitable for measuring surface roughness and waviness either in the laboratory or on the production line.

Single product brochures are available upon request, to provide detailed information on the system of your choice.

Whichever model you choose, Mitutoyo's surface measurement instruments empower you with the experience, competence and high performance of a world leader in measurement technology. And, as always, with Mitutoyo you can be assured of first-class, customer-friendly service.

FEST



World-class solutions for every surface measurement application.

Model/Series

Profile

SURFTEST SJ-201 P

Portable solution for precise, effective and easy surface measurements in a production environment. Large, easy-to-read display for clear presentation of results.



SURFTEST SJ-201

SURFTEST SJ-301

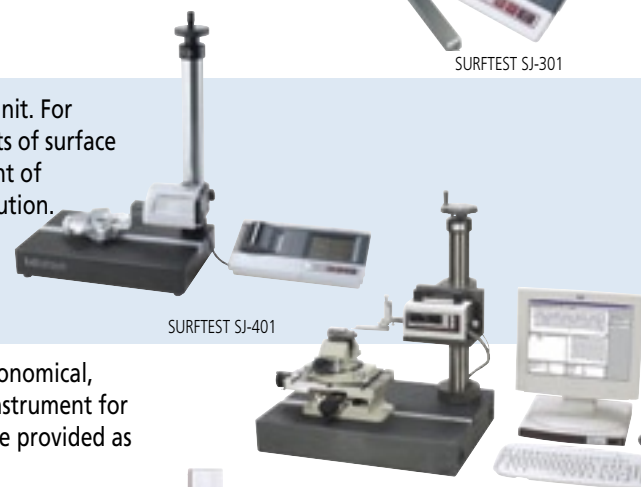
Portable, battery-powered surface roughness tester with dustproof, touch-sensitive operating panel and built-in printer. For quickly performing measurements in a production environment.



SURFTEST SJ-301

SURFTEST-SJ 401 SURFTEST-SJ 402

Can be used as either a portable or benchtop unit. For battery-powered, reference-level measurements of surface roughness and waviness as well as measurement of percentage contact area and amplitude distribution.



SURFTEST SJ-401

SURFTEST SV-2000

For quality control room and laboratory. An economical, high-performance reference-level measuring instrument for portable or desktop use with premium software provided as standard equipment.



SURFTEST SV-2000

SURFTEST SV-3000 SURFTEST SV-3000 3D

Laboratory or quality control room benchtop system for maximum performance in reference level measurements. A 3D model is also available for complex topographical evaluations.



SURFTEST SV-3000

Combination measuring instruments:

FORMTRACER SERIES

The Formtracer series combines the technologies of surface and contour measurement in one single, space-saving system. With this series, you benefit from the advantage of high-performance in both kinds of measurement – in a package that takes up the bench space of just one machine. You can read all about this efficient and economical solution in our Formtracer brochure.



FORMTRACER

Mitutoyo offers a variety of models for various applications.

Inch(mm)

Highlights

- Automatic, dynamic calibration function
 - Interchangeable styli with various tip sizes and a large measuring range
 - Removable drive unit for measurements in confined spaces
 - Inverted measurement capability
- Easy storage of up to five different measuring conditions as well as measurement and statistical data sets (up to 20 with optional memory card)
 - Data output via integrated thermo printer and in various other formats via external processor
 - Standard RS-232-C interface as well as DIGIMATIC data port
- Determines a wide range of surface parameters plus percentage contact area and amplitude distribution measurements for display on large, touch-screen monitor
 - Output on high-speed built-in printer
 - Standard RS-232-C interface and DIGIMATIC data port
- Optional connection to TCON system or PC
 - High-straightness accuracy ceramic guides
 - Wide range of easily-replaceable styli to handle any measuring task
- Straightness of traverse (0.05+0.15L/100) μm
 - Wide range of accessories for varied measuring tasks
 - Automatic 3D levelling table
 - Equipped with SURFPAK-PRO software as standard for topographical evaluations (SV-3000 3D)

Model	Traverse	Height adjustment & method	Base plate dimensions
SJ-201 P	.49" (12.5 mm)	optional	optional
SJ-301	.49" (12.5 mm)	optional	optional
SJ-401	.98" (25mm)	optional	optional
SJ-402	1.97" (50mm)	optional	optional
SV-2000 N2	1.97" (50mm)	optional	optional
SV-2000 S2	1.97" (50mm)	11.81" (300mm) motor-driven	24.02"x17.72" (610x450mm)
SV-3000 M4	3.94" (100mm)	11.81" (300mm) manual	24.02"x17.72" (610x450mm)
SV-3000 S4	3.94" (100mm)	11.81" (300mm) motor-driven	24.02"x17.72" (610x450mm)
SV-3000 H4	3.94" (100mm)	19.69" (500mm) motor-driven	24.02"x17.72" (610x450mm)
SV-3000 W4	3.94" (100mm)	19.69" (500mm) motor-driven	39.76"x17.72" (1010x450mm)
SV-3000 S8	7.87" (200mm)	11.81" (300mm) motor-driven	24.02"x17.72" (610x450mm)
SV-3000 H8	7.87" (200mm)	19.69" (500mm) motor-driven	24.02"x17.72" (610x450mm)
SV-3000 W8	7.87" (200mm)	19.69" (500mm) motor-driven	39.76"x17.72" (1010x450mm)

Standard profile measurements

This table shows coverage of the ISO standard profiles.

Profile	Description	SJ-201 P	SJ-301	SJ-401/402	SV-2000	SV-3000
P	Unfiltered roughness profile according to ISO 3274	●	●	●	●	●
R	Filtered roughness profile according to ISO 4287	●	●	●	●	●
W	Filtered waviness profile according to ISO 4287	—	—	●	●	●
DF	Special filtering for roughness profile according to ISO 13565	—	—	●	●	●

SJ-201 and SJ-301 — Portable shop floor solutions

The port

SJ-201 P

Stylus stroke: 350µm
 Traverse: .5" (12.5mm)



Instrument display during calibration procedure



Value of Rz parameter displayed

SURFTEST SJ-201

With automatic dynamic calibrating function.

- Measurements and results display conform to international standards
- Robust instrument design suitable for workshop use
- Excellent price-performance ratio
- Single-key measurements
- Clear display with large, easily-read characters
- Parameters not required can be masked
- Automatic calibrating function for all styli
- Automatic transport protection for the stylus
- Removable drive unit allows measurements in restricted space
- Overhead measurements possible
- Stylus stroke 350µm
- Resolution 0.01µm
- Minimum cut-off .01" (0.25mm)
- 10 different measuring set-ups can be stored
- PC link with SURFPAK-SJ software (optional)
- Wide range of accessories available
- Power adapter and rechargeable battery
- Output of profiles and measuring values on external printer possible (optional)



19 parameters

Ra, Rq, Ry, Rz, R3z, Rt, Rp, S, Sm, Pc, mr, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo



Portable, precise surface measurement –
for workshop, or on the production floor.

table solution.



SJ-301

Stylus stroke: 350µm
Traverse: .5" (12.5mm)

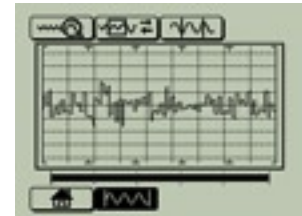


SURFTTEST SJ-301

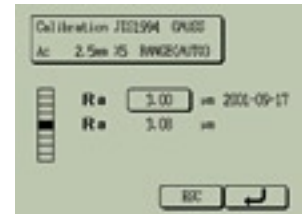
With touch-panel display and built-in printer.

Performance spectrum identical to SURFTTEST SJ-201 P, plus:

- Output of measured values and profiles on display and built-in printer
- Data output via external processor possible
- RS-232-C interface as well as DIGIMATIC data port
- Touch panel and including pen
- Storage of up to five measuring and statistical data sets (up to 20 with optional memory card)
- Built-in statistics function
- PC link with SURFPAK-SJ software



Surface profile display



Auto calibration function



Selecting a customized function

32 parameters

RA, Rq, Ry, Rz, R3z, Rt, Rp, Rk, Rpk, Rvk, Mr1, Mr2, S, Sm, Pc, mr, A1, A2, Rv, R, Rx, W, Wx, Wte, mrd, HSC, AW, AR, Vo, a, q, Ku



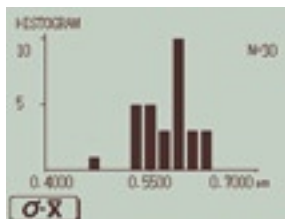
Fast, accurate roughness and waviness measurement – portable or for the benchtop.

SJ-400

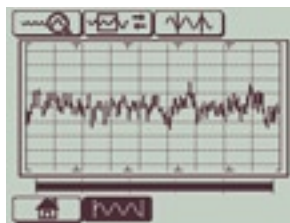
Stylus stroke: 800 μ m
 Traverse: SJ-401
 .98" (25mm)
 SJ-402
 1.97" (50mm)



Selecting a customized function



Histogram display



Surface profile display

SURFTEST SJ-400

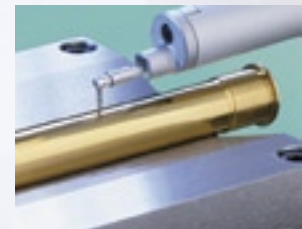
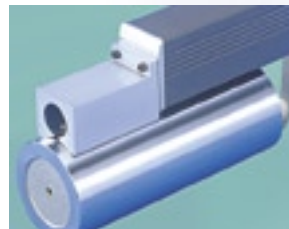
With automatic compensation for surface curvature and inclination.

- Measurements and results display conform to international standards as well as print-out of measured values and profiles
- Measures roughness, waviness and profiles
- Robust instrument design suitable for workshop use
- Clear display with large, easily-read characters
- Parameters not required can be masked
- Automatic calibrating function for all styli
- Height adjustment of stylus in portable applications more than .39" (10mm)
- Inclination adjustment
- Measurement with or without skids
- Inverted measurement possible
- Stylus stroke 800 μ m
- Resolution 0.0001 μ m
- Traverse optionally .98" (25mm) or 1.97" (50mm)
- Minimum cut-off .003" (0.08mm)
- Five different measuring set-ups can be stored
- Built-in statistics function
- PC link with SURFPAK-SJ software (optional)
- Wide range of accessories available
- Power adapter and rechargeable battery



35 parameters

Ra, Rq, Ry, Rz, R3z, Rt, Rp, Rk, Rpk, Rvk, Mr1, Mr2, S, Sm, Pc, mr, A1, A2, Rv, R, Rx, W, Wx, Wte, mrd, HSC, AW, AR, Vo, a, q, Ku, c, Lo, Sk



nchtop or portable



SJ-402

SJ-401

Traverse from .98" (25mm) (SJ-401) to 1.97" (50mm) (SJ-402)



Surface measurement technology for the most demanding quality control applications.

SV-2000

Stylus stroke: 800 μ m

Traverse: 1.97" (50mm)

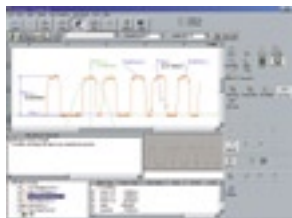
SURFTEST SV-2000

Reference level measurements in portable and benchtop applications.

- Measurements and results display conform to international standards as well as print-out of measuring values and profiles
- Measures roughness, waviness and profiles
- Automatic calibrating function for all styli
- Stylus stroke 800 μ m
- Resolution 0.0001 μ m
- Minimum cut-off .001" (0.025mm)
- Straightness 0.3 μ m per 1.97" (50mm)
- High-straightness accuracy ceramic guides
- Numerous stylus tips for various measuring tasks available
- Simple stylus tip replacement
- Option of connection to TCON system or PC
- SURFPAK software provided as standard
- Wide range of accessories available



SURFPAK-SV in action



FORMPAK-SV display

55 parameters

RA, Rq, Ry, Rz, R3z, Rt, Rp, Rk, Rpk, Rvk, Mr1, Mr2, S, Sm, Pc, mr, A1, A2, Rv, R, Rx, W, Wx, Wte, mrd, HSC, AW, AR, Vo, a, q, Ku, c, Lo, Sk, Rti, R3zi, R3y, Rc, Rpmax, Rpi, Rvmax, plateau ratio, Ia, Iq, Lr, SR, SAR, NR, NCRX, CPM, SW, SAW, NW, Vo



Room and laboratory



No-compromise, reference-class system for quality control and lab applications.

ben

SV-3000

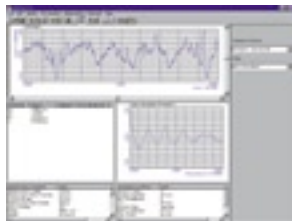
Stylus stroke: 800 μ m

Traverse: 3.94" (100mm)

7.87" (200mm)

SURFTEST SV-3000

The high-end solution for peak reference-level performance in surface testing.



SURFPAK-SV in action



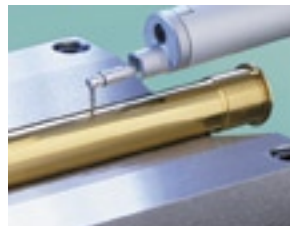
FORMPAK-SV display

- Measurements and results display conform to international standards as well as print-out of measuring values and profiles
- Measures roughness, waviness and profiles
- Automatic calibrating function for all styli
- Stylus stroke 800 μ m
- Resolution 0.0001 μ m
- Minimum cut-off .001" (0.025mm)
- Straightness (0.05+0.15L/100) μ m
- High-straightness accuracy ceramic guides
- Numerous stylus tips for various measuring tasks available
- Simple stylus tip replacement
- Contact-free measurement (optional)
- Option of connection to TCON system or PC
- SURFPAK software provided as standard
- Wide range of accessories available
- Automatic levelling table (optional)



55 parameters

RA, Rq, Ry, Rz, R3z, Rt, Rp, Rk, Rpk, Rvk, Mr1, Mr2, S, Sm, Pc, mr, A1, A2, Rv, R, Rx, W, Wx, Wte, mrd, HSC, AW, AR, Vo, a, q, Ku, c, Lo, Sk, Rti, R3zi, R3y, Rc, Rpmax, Rpi, Rvmax, plateau ratio, Ia, Iq, Lr, SR, SAR, NR, NCRX, CPM, SW, SAW, NW, Vo



Mitutoyo

chtop

SV-3000 3D

Stylus stroke: 800 μ m
Traverse: 3.94" (100mm)
7.87" (200mm)

SURFTEST SV-3000 3D

The specialist for high precision, three-dimensional topography evaluations.

Performance spectrum identical to SV-3000, plus:

- Topography evaluation capable
- Motor-driven Y table
- Y-table straightness 0.2 μ m per 3.94" (100mm)
- Automatic 3D levelling table
- SURFPAK-PRO software for topographical evaluations



World-class, fully functional software SURFPAK-SJ, SURFPAK-SV, SURFPAK-PRO.

Software

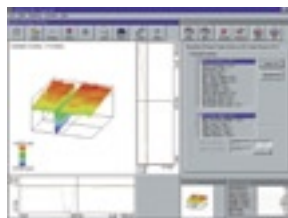
SURFPAK is user-friendly, easy-to-use software for evaluating surface roughness.

SURFPAK-SJ is the software solution for the portable instruments, the SJ-200, SJ-300 and SJ-400 series, that offers the same outstanding features as provided for the benchtop models. For instance, SURFPAK-SJ provides you with the ability to rapidly evaluate a large number of roughness parameters enhanced, in many cases, by on-screen graphics that allow rapid assimilation of results. Superfluous data can easily be eliminated and particular surface characteristics, including step height and length, can be measured. A complete set of surface characteristics can also be evaluated. Using this highly capable software, even Mitutoyo's portable form measuring instrument can be transformed into a high-class desktop evaluation system.

The SURFPAK-SV package evaluates the workpiece surface as two-dimensional sections, whereas the SURFPAK-PRO version handles the complete 3D topography of the part.



Evaluation screen for SURFPAK-SJ or SV



Evaluation screen for SURFPAK-PRO

Complete the picture.

Accessories



DIGIMATIC levelling table



DIGIMATIC levelling table with precision vice



Automatic levelling tables for automatically aligning the workpiece with the reference plane



TCON



2 μm and 10 μm step specimens



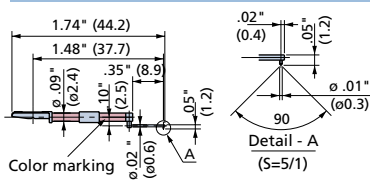
3 μm and 10 μm Ra roughness specimens



Special accessories for SURFTEST models SJ-201 P and SJ-301

Stylus tips

For small holes



Color marking

Detail - A
(S=5/1)

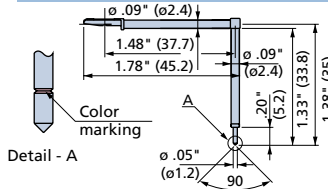
Order No.

Stylus tip radius

12AAC733	*2μm
12AAB405	5μm
12AAB417	10μm

*Stylus tip angle 60°

For extra deep grooves



Detail - A

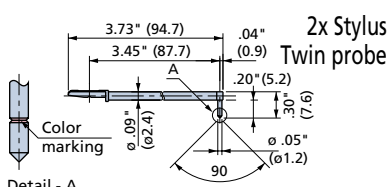
Order No.

Stylus tip radius

12AAC737	*2μm
12AAB407	5μm
12AAB419	10μm

*Stylus tip angle 60°

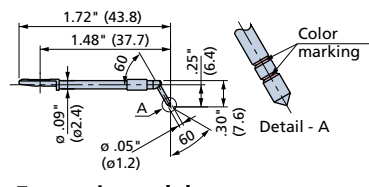
For deep holes



Detail - A

12AAC740	2μm
12AAB413	5μm
12AAB425	10μm

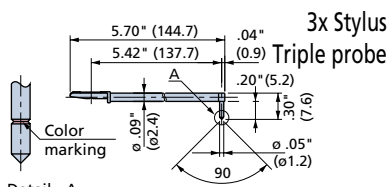
For gears



Detail - A

12AAC339	*2μm
12AAB410	5μm
12AAB422	10μm

*Stylus tip angle 60°

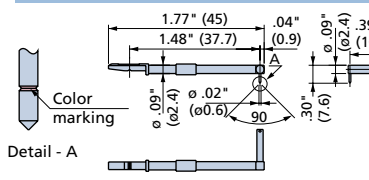


Detail - A

12AAC741	*2μm
12AAB414	5μm
12AAB426	10μm

*Stylus tip angle 60°

Eccentric model



Detail - A

12AAC739	*2μm
12AAB412	5μm
12AAB424	10μm

*Stylus tip angle 60°

Additional overview brochures on Mitutoyo's form, contour and surface measuring systems and solutions are available upon request.

FORM MEASUREMENT

Individual solutions for all your needs in the area of high-performance measurement of rotation-symmetric work-pieces. From the ergonomic and easy-to-handle portable instrument with built-in printer, to the high-precision, reference-level model.

CONTOUR MEASUREMENT

Profile contour measuring solutions for performance-oriented results. Whether you need a solution for portable applications or only for benchtop use, Mitutoyo has the right instrument for your solution.

COMBINATION OF CONTOUR AND SURFACE MEASUREMENT: FORMTRACER

The Formtracer series combines the technologies of surface and contour measurement in one single, space-saving system. This gives you the advantage of high-performance measurement in a package that takes up the bench space of just one machine. The optimum combination of efficiency and economy.

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 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