# Surftest SV-2000/3000

Bulletin No. 1713

**Surface Roughness Measuring System
Powerful and easy to use**

**Mitutoyo**

## Surface Roughness Testing System

# Surftest
# SV-2000/3000

- **Mitutoyo's Surftest SV-2000/3000 Series provides high accuracy, high-level analysis and multi-functionality in 3D surface roughness analysis and finely detailed contour measurements, as well as conventional 2D surface roughness measurements.**
- **Optional accessories, such as the auto-leveling table and three-axis adjustment table, are available to enhance operability and to enable automatic measurement.**
- **SURFPAK®, a dedicated data-analysis software package, is installed as standard equipment. This gives data management a consistent format from the work site to the laboratory.**
- **TCON, the easy-to-use Touch-Panel Controller, makes high-level analysis affordable.**

## Easy-to-use Surface Roughness and Contour Evaluation Software!

- Various data analyzing programs are available to satisfy a wide range of measuring needs: SURFPAK®-SV evaluates workpiece surface roughness two-dimensionally, while SURFPAK®-PRO does the same in three dimensions. FORMPAK®-SV evaluates surface contours.
- An ample selection of internationally recognized surface roughness parameters is provided.
- From a simple measurement to high-level data analysis, operations can be performed easily and speedily just by pointing and clicking.
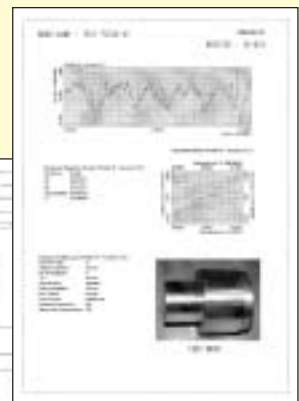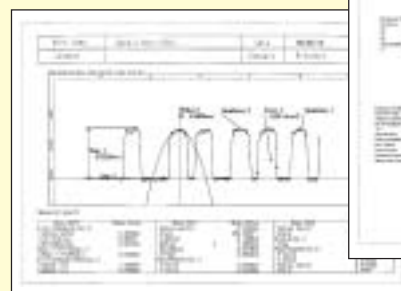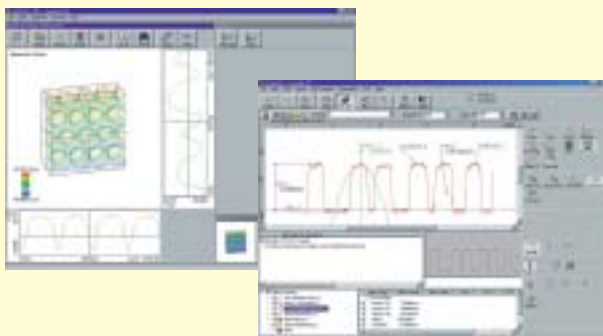
### Convenient Report-Generation Function

- Surface roughness evaluation results can be output to a printer as an Evaluation Report.

**SV-3000M4**
Traverse range:
100mm (4")
Vertical travel:
300mm (11.8")
Base size (WxD):
610x450mm
(24"x17.7")

**SV-2000S2**
Traverse range:
50mm (2")
Vertical travel:
300mm (11.8")
Base size (WxD):
610x450mm
(24"x17.7")

**SV-2000N2**
Traverse range:
50mm (2")
Vertical travel:
—
Base size (WxD):
—

**SV-3000S4**
Traverse range:
100mm (4")
Vertical travel:
300mm (11.8")
Base size (WxD):
610x450mm
(24"x17.7")

**SV-3000W8**
Traverse range:
200mm (8")
Vertical travel:
500mm (19.7")
Base size (WxD):
1010x450mm
(40"x17.7")

**SV-3000H4**
Traverse range:
100mm (4")
Vertical travel:
500mm (19.7")
Base size (WxD):
610x450mm
(24"x17.7")

**SV-3000H8**
Traverse range:
200mm (8")
Vertical travel:
500mm (19.7")
Base size (WxD):
610x450mm
(24"x17.7")

**SV-3000W4**
Traverse range:
100mm (4")
Vertical travel:
500mm (19.7")
Base size (WxD):
1010x450mm
(40"x17.7")

**SV-3000S8**
Traverse range:
200mm (8")
Vertical travel:
300mm (11.8")
Base size (WxD):
610x450mm
(24"x17.7")

# Choose from a Variety of Models!

**Select the model that best fits your needs — different base size, portable type, etc.**
**Mitutoyo offers a full line of SV-2000/3000 Series surface measuring machines to choose from in accordance with the size of workpiece and evaluation method. Various optional accessories are also available.**

# 2D

Photo: **SV-300S4**
with personal
computer system



# SV-3000S4
# SV-3000H4
# SV-3000W4

Photo: **SV-2000N2**
with TCON

# SV-2000N2

# High Accuracy Mechanical Design

- Ceramic, well known for its superb anti-abrasive properties, is used as the X-axis drive unit guide. No lubrication of the guide is required.
- High-accuracy glass scales (X-axis resolution: 0.05µm, Y-axis resolution: 1µm) are built-in to the X- and Y-axes to insure high-accuracy positioning. The SV-3000 series demonstrate high-reliability, especially in the horizontal roughness parameters (S, Sm), that require highly accurate X-axis movement.
- Equipped with high-accuracy detector stylus.
- Equipped with several advanced functions: such as the 'straightness compensation' function, which improves the linear accuracy of the X-axis; the 'circular compensation' function for the vertical movement of the stylus; and the 'stylus-tip diameter compensation' function.
- The stylus and the skid can be replaced easily. Optional styli and skids are available for a wide variety of roughness measurement applications, such as measurement of small holes, deep holes, etc.
- An easy-to-operate Control Box is provided for the SV-2000S2, SV-3000S4/H4/W4/S8/H8/W8. The Control Box, independently of the main unit, allows positioning, measurement start/stop, retracting, and other operations to be performed remotely. The Drive Unit up/down position and the X-axis traverse can be fine-controlled manually.

Photo: **SV-3000M4**
with personal
computer system

# SV-3000M4

Photo: **SV-2000S2**
with TCON

# SV-2000S2

# Surface roughness-analyzing program
# SURFPAK®-SV

- **Enhanced with various control functions to support automatic measurement.**
- **Equipped with a variety of evaluation parameters conforming to most of the world standards and analysis functions.**
- **Allows the operator to perform a complicated measurement easily and speedily just by pointing and clicking.**

**Assessed profile window:**
The size of the assessed profile display can be freely changed.

**Measurement result window:**
Provides a great variety of parameters conforming to most of the international standards.

**Measuring condition setting window**
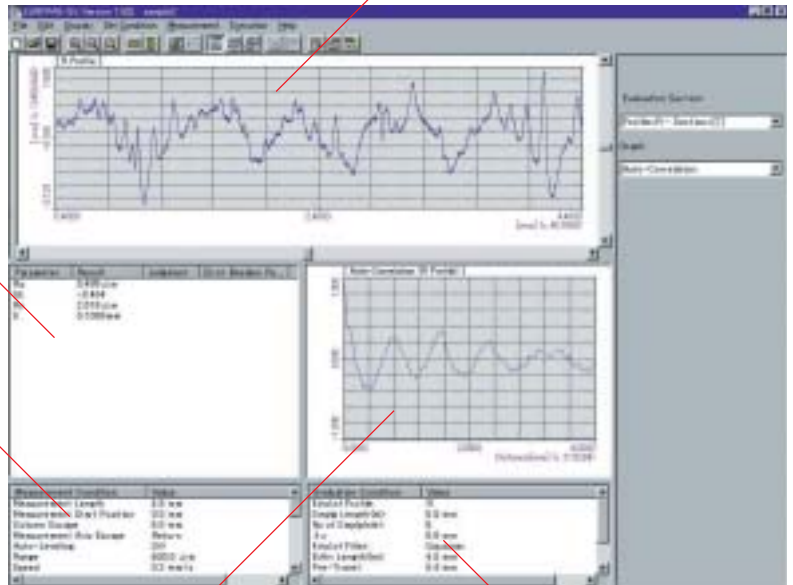
**Analysis graph window:**
Various analysis graphs can be created.

**Evaluation conditions window:**
For various recalculations of the measured data.

**Printout examples**
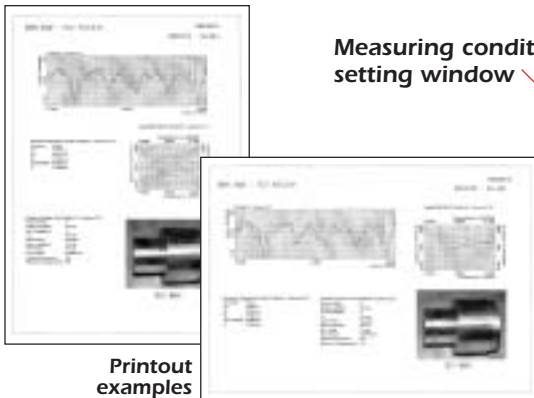
## Report Generation Function

- The assessed profiles, calculation results, measuring conditions and comments can be freely formatted and printed out as reports.
- Cut and paste can be used not only on measurement data but also on image files (bit-map) to create unique reports with photos and company logos.
- Create one layout and use it repeatedly for other measurements.
- Reports can be printed on large-size paper or in color using the optional color printer.
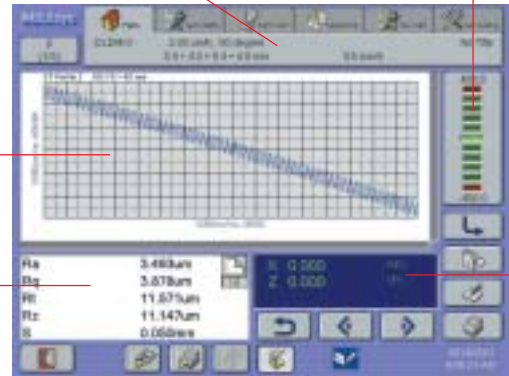
## SURFPAK® Series

- All the SURFPAK® Series surface roughness-analyzing programs have high operability and can exchange data with each other. SURFPAK®-SJ is the software for the portable model, SURFPAK®-SV is for use in the inspection room and SURFPAK®-PRO is designed for three-dimensional surface measuring machines. (Control method for the machine differs, depending on the model.)
- SURFPAK® Series software makes it easier to manage data from the manufacturing site to the laboratory because the same format can be used in surface roughness measurement as for storing and analyzing the measured data.
- Optionally, the FORMPAK®-SV program is available to evaluate surface contour.
- OS requirements: Windows®95/Windows®98/Windows®NT4.0

**SURFPAK®-PRO**
SV-3000▪3D

**SURFPAK®-SV**
SV-2000/SV-3000

**SURFPAK®-SJ**
SJ-201/301/401/402

**FORMPAK®-SV**
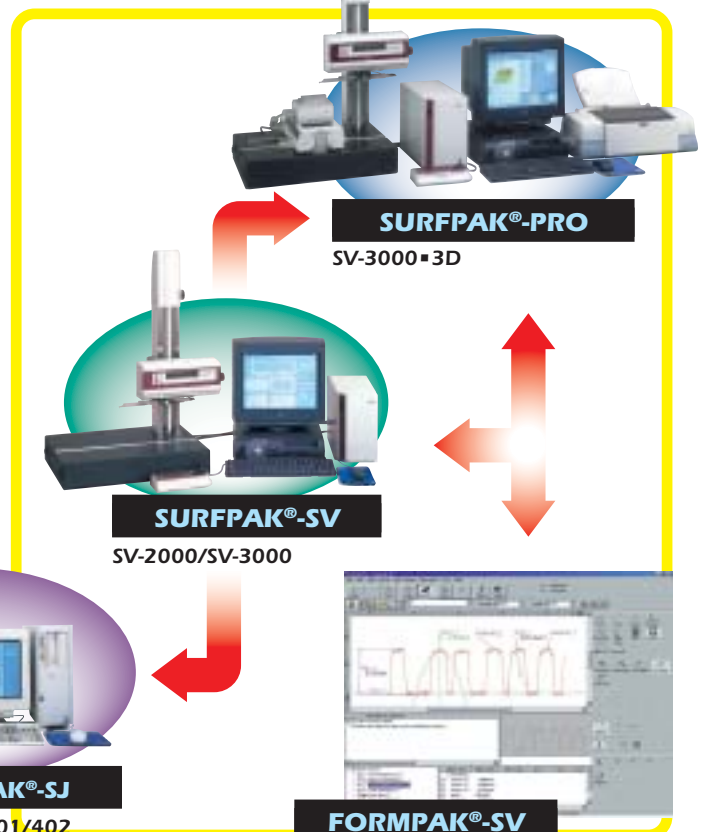
**Touch-Panel Controller**

# TCON

- **Easy & speedy operation with touch-panel control**
- **12-inch color LCD**
- **Large sized and easy-to-understand icons allow high-level analysis as well as SURFPAK-SV functionality.**

Measuring condition window

Z-axis indicator (stylus position)

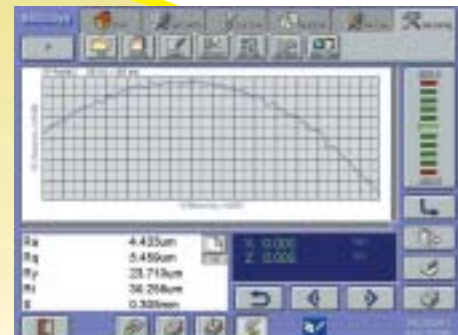Assessed profile window

Measurement result window

X and Y-axis counter

**Main window**

**Measuring condition setting window**

**Configuration setting window**

**Calibration and control window**
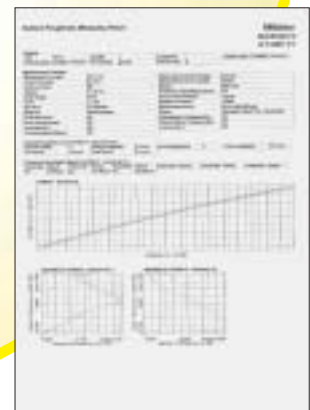
**Applied analysis window**

**Recalculation window**

**Printout**

# 3D

## Three-dimensional Surface Data Analysis

Non-contact sensor unit can be attached to SV-3000·3D
Order No. **178-067**
**178-067C**
**178-067A**
**178-067D**

SURFPAK®-PRO

3-D Auto-leveling Table

Note: The personal computer system and printer are optional.

# SV-3000·3D

- A multi-functional system provided with SURFPAK®-PRO, the software that measures, analyzes, and evaluates the roughness of workpiece surfaces three-dimensionally.
- From various graphics and three-dimensional surface roughness parameter analyses to volume and area measurements, a variety of surface contour evaluations can be performed freely. Selected topographic profiles can also be evaluated two-dimensionally.
- The three-dimensional auto-leveling table greatly reduces the workpiece set-up time.

## 3-D Auto-leveling Table (equipped as standard)

The 3-D auto-leveling table, which adjusts the level of the measured surface of the workpiece automatically, is a standard accessory. This relieves the operator from the time-consuming manual adjustment that a conventional machine would require, thus greatly improving work efficiency.

## SURFPAK®-PRO 3-D Analysis Functions

| | |
|---|---|
| Three-dimensional evaluation parameters | Sa, Sq, Ssk, Sku, S$\Delta$q, S$\lambda$, Sz, So, Sr, Sp, Sv, St, S3y, Spc, Svc, Spd, Svd, etc. |
| Filter functions | Moving average filter, Gaussian filter |
| Three-dimensional trend compensation | Plane compensation, sphere compensation, cylinder compensation, polyhedron compensation |
| Three-dimensional analysis functions | 3-D topography display, topographic profile analysis, BAC, ADC analysis, spectrum analysis, probability distribution analysis, local peak distribution analysis, parameter distribution analysis, slope enhancement |
| Topographic profile sampling function | A desired cross-section can be analyzed two-dimensionally. |

| | |
|---|---|
| Y-axis range | 100mm (4") |
| Y-axis traverse linearity | 0.2$\mu$m/100mm (8$\mu$inch/4") |
| Traverse speed | 5mm/s (.2"/s) max. |
| Resolution | 0.001mm (.00004") |
| Feeding accuracy | ±(2+2L/100)$\mu$m, L= Traversing length (mm) |
| Leveling range | ±2° (for each direction) |
| Max. workpiece weight | 10kg (22 lbs.) |

# Surface roughness-analyzing program
## SURFPAK®-PRO

- **SURFPAK®-PRO provides a variety of graphics methods and evaluation parameters for various surface roughness evaluations from the three-dimensional topography data.**
- **A topographic profile can be analyzed two-dimensionally, thus allowing evaluation of contours, in fine detail, and surface roughness at the same**
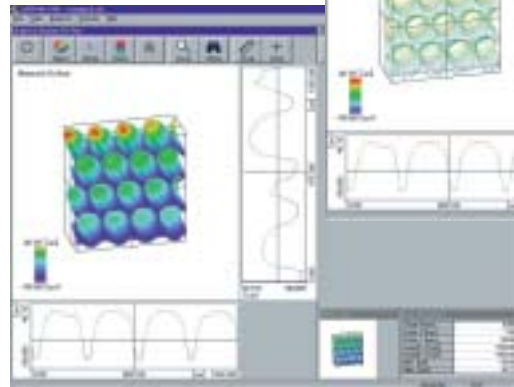
**Measurement result windows**
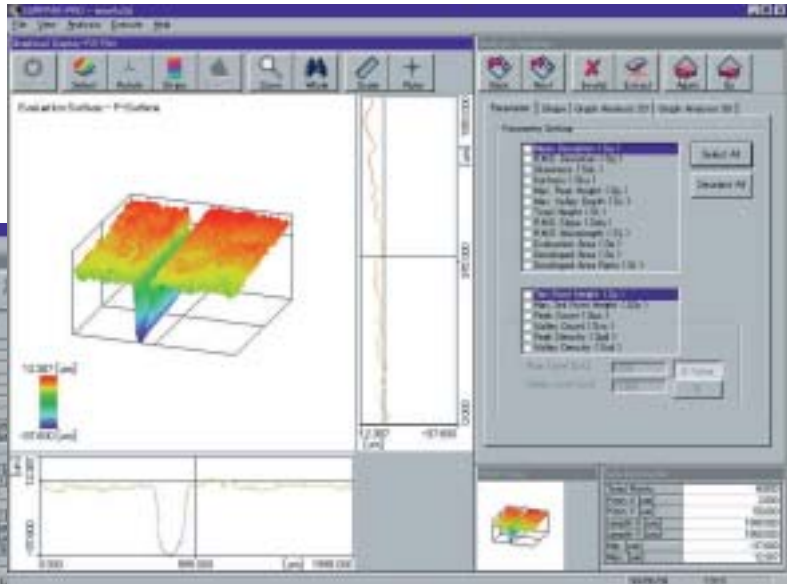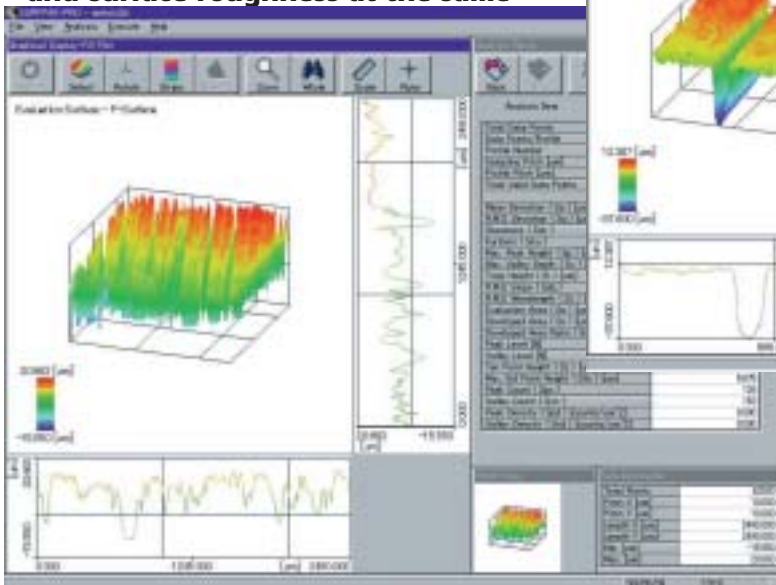


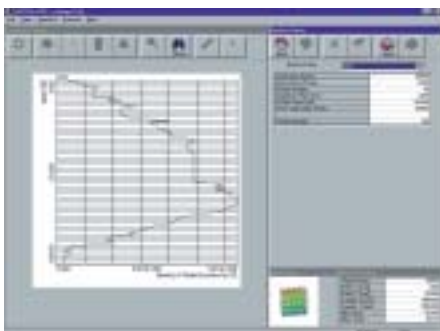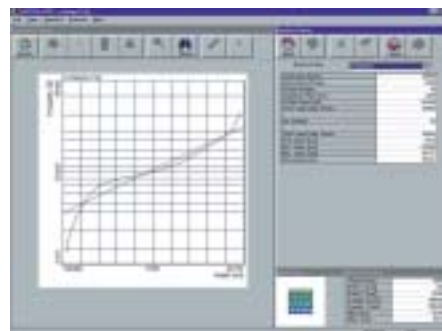**3-D topography (contour lines) display**
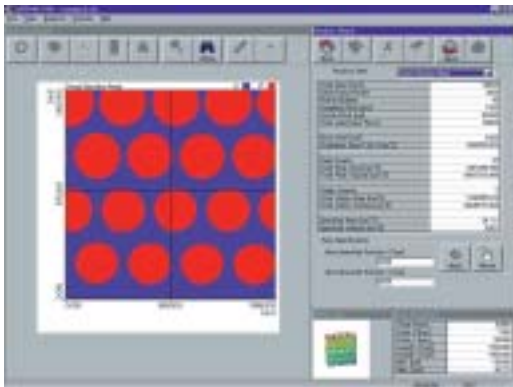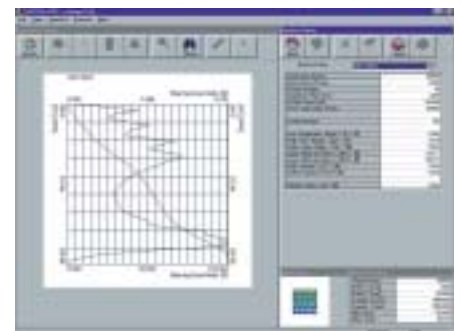




**Cross-section analysis display**

**3-D topography display**



**Peak-height distribution chart**



**Probability distribution chart**



**BAC (Bearing area curve) & ADC (Amplitude distribution chart)**

# SURFTEST SV-2000/3000 Series
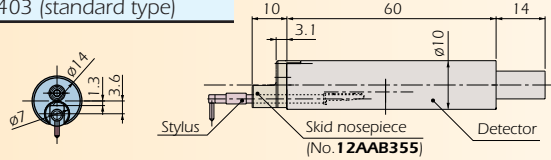# Measurement Applications


Using a small hole stylus

## Detector

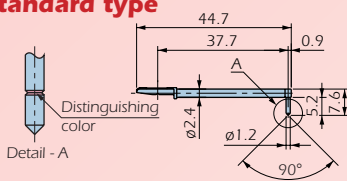| Order No. | Measuring force | Stylus |
|-----------|-----------------|--------|
| **178-396-2** | 0.75mN | 12AAC731 (standard type) |
| **178-397-2** | 4mN | 12AAB403 (standard type) |

Stylus
Skid nosepiece (No.**12AAB355**)
Detector


Using a deep groove stylus

Unit: mm
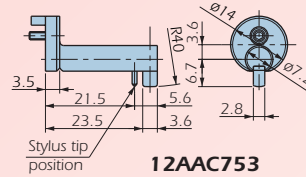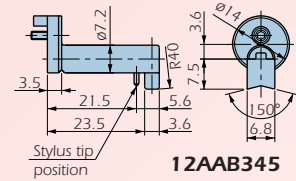
| Stylus | Applicable skid nosepiece |
|--------|---------------------------|
| **Standard type** <br> 44.7 / 37.7 / 0.9 <br> A / 5.2 / 7.6 / ø2.4 / ø1.2 / 90° <br> Distinguishing color / Detail - A <br> **12AAC731** (2μm)*¹ <br> **12AAB403** (5μm) <br> **12AAB415** (10μm) <br> ( ): Tip radius | ø14 / 3.6 / ø7.2 / R40 / 7.9 <br> 3.5 / 21.5 / 5.6 / 23.5 / 3.6 / 2.8 <br> Stylus tip position <br> **12AAC753** | ø14 / 3.6 / ø7.2 / R40 / 7.5 <br> 3.5 / 21.5 / 5.6 / 23.5 / 3.6 / 150° / 6.8 <br> Stylus tip position <br> **12AAB345** |
| **Small hole type** <br> 0.6 / 44.4 / 37.7 / 0.6 / 15 / 0.4 <br> ø2.4 / 2.4 / ø0.6 / 1.6 / 3.4 / 90° <br> ø1.2 / A / Detail - A (S=5/1) <br> Distinguishing color <br> **12AAC732** (2μm)*¹ <br> **12AAB404** (5μm) <br> **12AAB416** (10μm) <br> ( ): Tip radius | ø7.2 / 1.6 / 15.6 / R40 / ø14 / 3.6 / ø3 <br> 3.1 / 21.5 / 5.6 / 23.5 / 3.6 / 3.8 / 0.6 / R2 / 1.4 <br> Stylus tip position <br> **12AAC754** |
| **Extra small hole type** <br> 44.2 / 37.7 / 0.4 / 1.2 / 8.9 <br> ø2.4 / 2.5 / ø0.3 / 1.2 / 90° / ø0.6 / A <br> Distinguishing color / Detail - A (S=5/1) <br> **12AAC733** (2μm)*¹ <br> **12AAB405** (5μm) <br> **12AAB417** (10μm) <br> ( ): Tip radius | ø7.2 / 7 / R40 / ø14 / 3.6 <br> 3.1 / 21.5 / 2 / 22.3 / 1.2 / 3.8 / ø1.9 <br> Stylus tip position <br> **12AAB347** |
| **Extra small hole type** <br> 44.2 / 37.7 / 0.4 / 8.9 <br> ø2.4 / 2.5 / ø0.3 / 0.8 / 90° / ø0.6 / A / 0.8 <br> Distinguishing color / Detail - A (S=5/1) <br> **12AAC734** (2μm)*¹ <br> **12AAB406** (5μm) <br> **12AAB418** (10μm) <br> ( ): Tip radius | |
| **Deep hole type** <br> 94.7 / 87.7 / 0.9 / A / 5.2 / 7.6 / ø2.4 / Ø1.2 / 90° <br> Distinguishing color / Detail - A <br> **2 x stylus** <br> **12AAC740** (2μm) <br> **12AAB413** (5μm) <br> **12AAB425** (10μm) <br> ( ): Tip radius <br><br> 144.7 / 137.7 / 0.9 / A / 5.2 / 7.6 / ø2.4 / Ø1.2 / 90° <br> Distinguishing color / Detail - A <br> **3 x stylus** <br> **12AAC741** (2μm)*¹ <br> **12AAB414** (5μm) <br> **12AAB426** (10μm) <br> ( ): Tip radius | |
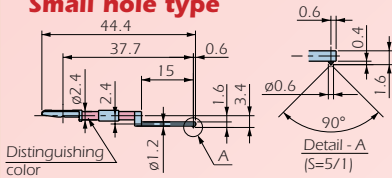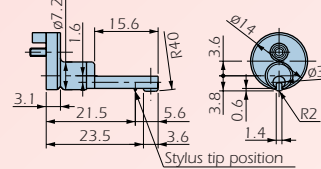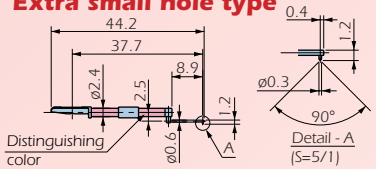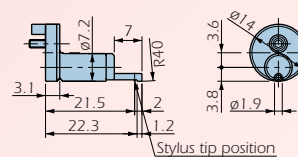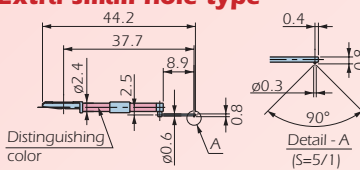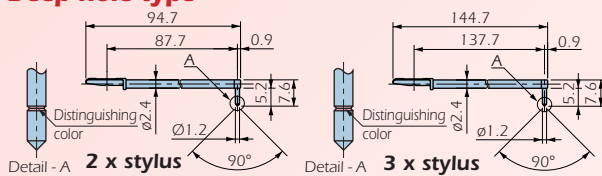
*¹ Tip angle is 60°

### Skidless nosepiece with stylus stopper

Used for measuring a workpiece having grooves the depth of which exceeds the measuring range of the detector. The stylus stopper prevents the stylus from falling into the grooves.


**12AAC867**

### Skidless nosepiece

ø14 / 3.6 / 1.3 / ø7 <br> 3.5 / 10 / 21.5 / 4 <br> Stylus tip position <br> **12AAB355**

| Stylus | Applicable skid nosepiece |
|---|---|

## Deep groove type*²

44.7
37.7
0.9
A
ø2.4
1.3
14.2
Distinguishing Color
ø1.2
Detail - A
90°

**12AAC735** (2μm)*¹
**12AAB409** (5μm)
**12AAB421** (10μm)
( ): Tip radius

ø7.2
3.6
4.5
ø14
R40
12.8
3.1
10
19.5
3.8
21.5
1.8
0.6
1.4
4.4
1.4
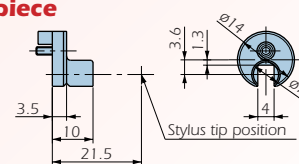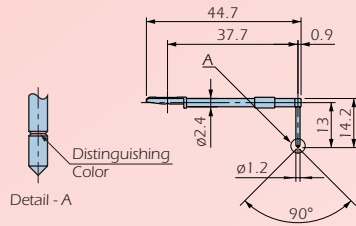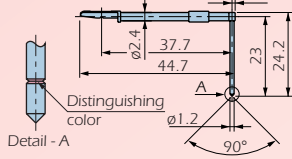9
R2
Stylus tip position
**12AAB349**

ø7.2
3.6
ø14
R40
13.4
3.1
10
21.5
5.6
23.5
3.6
R2
1.4
2.8
Stylus tip position
**12AAC755**

ø7.2
3.6
ø14
R40
13.4
5 (8.4)
3.1
10
19.5
3.8
ø1.5
21.5
1.8
2.5
9
Stylus tip position
**12AAB351**

ø7.2
R40
4.5
ø14
17.9
13.4
3.6
3.1
10
Stylus tip position
3
3
21.5
10
5
R2
1.4
5
9
11.6
**12AAB352**

## Extra deep groove type*²

0.9
ø2.4
37.7
44.7
23
24.2
A
Distinguishing color
ø1.2
Detail - A
90°

**12AAC736** (2μm)*¹
**12AAB408** (5μm)
**12AAB420** (10μm)
( ): Tip radius

ø7.2
R40
ø14
20
27
22.8
3.1
Stylus tip position
19.5
3.8
21.5
1.8
0.6
1.4
4.4
1.4
9
R2
**12AAB348**

## Extra deep groove type*²

37.7
ø2.4
ø2.4
45.2
5.2
31.8
33
A
Distinguishing color
ø1.2
Detail - A
90°
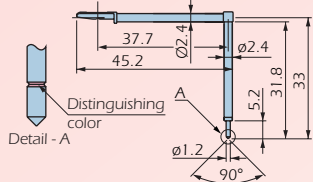
**12AAC737** (2μm)*¹
**12AAB407** (5μm)
**12AAB419** (10μm)
( ): Tip radius

## Gear face type

43.8
37.7
60°
6.4
7.6
ø2.4
A
ø1.2
60°
Distinguishing color
Detail - A
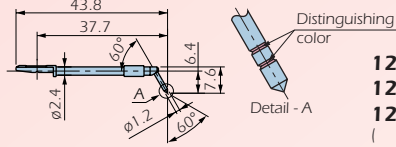
**12AAB339** (2μm)*¹
**12AAB410** (5μm)
**12AAB422** (10μm)
( ): Tip radius

ø7.2
R40
4.5
ø14
6.1
3.6
3.1
2.3
R2
0.6
21.5
0.5
1.4
4.4
1.4
19.7
2.3
Stylus tip position
**12AAB353**

## WE-curve type

44.7
37.7
0.9
ø2.4
5.2
7.6
Ball ø1.588
ø1.2
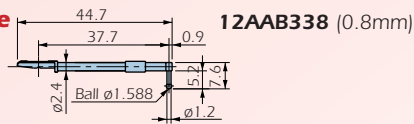
**12AAB338** (0.8mm)

## Knife edge type

44.7
37.7
0.9
A
7.6
ø2.4
ø1.2
Distinguishing color
Detail - A
90°
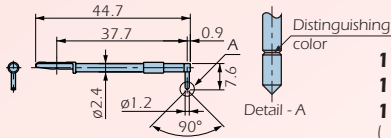
**12AAC738** (2μm)*¹
**12AAB411** (5μm)
**12AAB423** (10μm)
( ): Tip radius

ø7.2
R40
3.6
ø14
6.7
3.1
21.5
5.6
Flat
23.5
3.6
2.8
Stylus tip position
**12AAC756**

## Eccentric type*²

45.2
37.7
0.9
ø2.4
A
ø2.4
10
7.6
Distinguishing color
ø1.2
Detail - A
90°
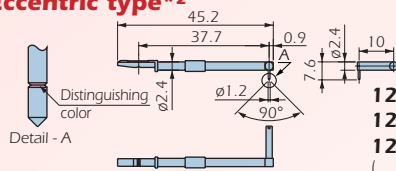
**12AAC739** (2μm)*¹
**12AAB412** (5μm)
**12AAB424** (10μm)
( ): Tip radius
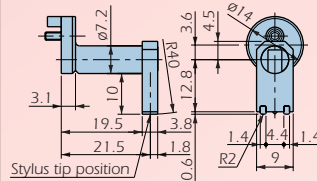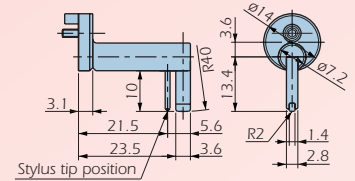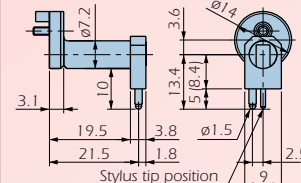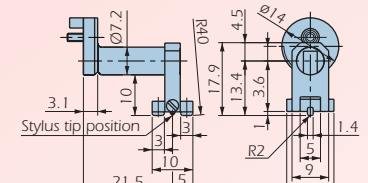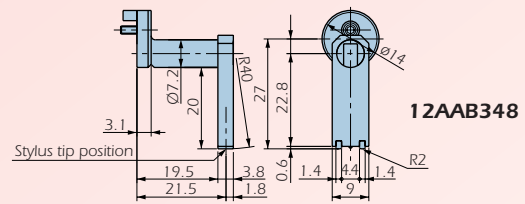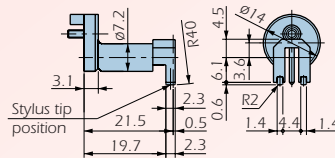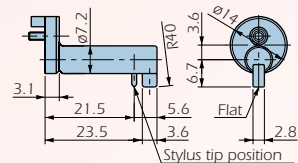
*¹ Tip angle is 60°      *² The measuring force is not guaranteed when using this stylus.

**12AAC763**

Detector right angle adapter (SV-3000 series only)
▪ Useable with standard stylus, gear face stylus, WE-curve stylus

## Motor-driven accessories

## Auto-leveling Table

- Leveling a workpiece for skidless measurement at high magnification requires skill and is time-consuming. Electrical correction for the inclination may involve errors depending on the method or the material of the workpiece, and on the radius of curvature of the stylus tip. The Auto-leveling Table solves these problems and allows exact workpiece leveling easily and quickly.
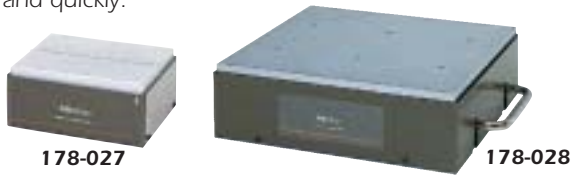
**178-027**

**178-028**

| Order No. | 178-027 | 178-028 |
|---|---|---|
| Table top | 130x100mm (5"x4") | 280x250mm (11"x10") |
| Leveling range | ±2° | |
| Max. table load | 7kg (15.4 lbs.) | 20kg (44 lbs.) |
| Dimensions (WxDxH) | 135x105x57mm (5.31"x4.13"x2.24") | 287x252x85mm (11.30"x9.92"x9.35") |

*Preliminary measurement*

*Measurement after auto-leveling*

## Traverse Table

- The Traverse Table is used for measuring workpieces whose dimensions exceed the traverse range of the Surftest Drive Unit. It moves the workpiece, and extends the tracing range up to 160mm (6.3").

**178-044** (metric)
**178-054** (inch/metric)

| Order No. | 178-044 | 178-054 |
|---|---|---|
| Traverse range | 160mm | 6.3" |
| Table top | 130x100mm | 5"x4" |
| Leveling range | ±1.5° | |
| Max. table load | 10kg (22 lbs.) | |
| Linearity | 0.5µm (19.6µin) | |
| Traverse speed | 0.05mm/s, 0.5mm/s, 2mm/s (.002"/s, .02"/s, .08"/s) for measuring 0.5mm/s, 4mm/s (.02"/s, .16"/s) for positioning | |
| Dimensions (WxDxH) | 535x185x117mm (21.16"x7.28"x4.61") | |

## Rolling Unit

- The Rolling Unit is used for measuring cylindrical and spherical workpieces that the Surftest SV-2000/3000 Series cannot otherwise measure. It rotates the workpiece mounted on it to measure the surface using the Surftest. Special nosepieces are used for measurement.

**178-036**

### Nosepieces included
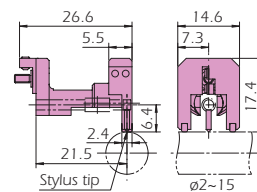
Cylinder (**12AAC871**)
Useable stylus: 12AAC731
(not included) 12AAB403
12AAB415
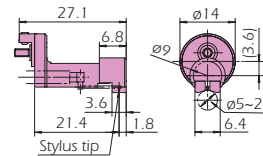
Sphere (**12AAC872**)
Useable stylus: 12AAC733
(not included) 12AAB405
12AAB417
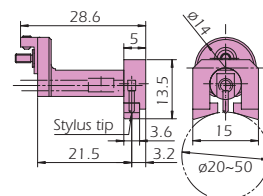
Sphere (**12AAC873**)
Useable stylus: 12AAC731
(not included) 12AAB403
12AAB415

| Order No. 178-036 | |
|---|---|
| Nosepieces Cylinder(**12AAC871**) | Diameter: 2 to 50mm (.08" to 1.97") Width: 20 to 100mm (.79" to 3.94") |
| Sphere (**12AAC872**) | Diameter: 5 to 20mm (.20" to .79") |
| Sphere (**12AAC873**) | Diameter: 20 to 50mm (.79" to 1.97") |
| Max. workpiece load | 2kg (4.4 lbs.) |
| Measuring speed | 0.1, 0.5, 1mm/s (.004", .02", .04"/s) |
| Rolling speed | 0.05mm/s to 2mm/s (.002"/s to .08"/s) |
| Cutoff value | λc, fl = 8mm (.3") or less |
| Dimensions (WxDxH) | 160x52x53mm (6.3"x2.1"x2.1") |

## Extension unit for SV-2000N2 and SV-3000M4

▪ The Extension Unit is required to connect up to two kinds of motor-driven options such as the Auto-leveling Table, Traverse Table or Rolling Unit with the Surftest SV-2000N2 and SV-3000M4.

**998054☐**
☐ Suffix: **A** for 120V, **D** for 220V, **E** for 240V or non for 100V

## Add-on Unit for SV-2000N2/S2 and SV-3000M4

▪ The Add-on Unit is required to connect two or more kinds of motor-driven options, such as the Auto-leveling Table, Traverse Table or Rolling Unit with the Surftest SV-2000N2/ S2 and SV-3000M4.

The Extension Unit (998054) is required for connecting to SV-2000N2/3000M4.

**998055**

## 3-axis Adjustment Table

This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be leveled with this table.

**178-047**
**3-axis Adjustment Table**
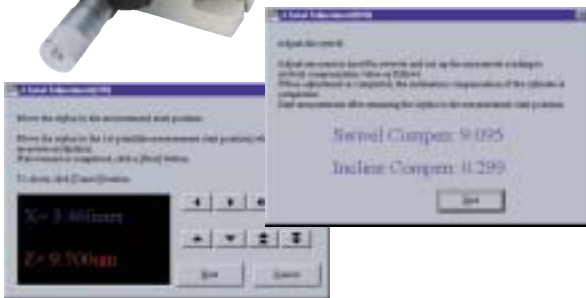
| Order No. | 178-047 |
|---|---|
| Table top | 130x100mm (5"x4") |
| Table loading | 15kg (33 lbs.) maximum |
| Workpiece diameter | 1mm to 160mm (.04" to 6.3") |
| Leveling range | ±1.5° |
| Swivel range | ±2° |
| Y-axis adjustment | ±12.5mm (±.5") |
| Height | 152.5mm (6") |
| Mass | 9kg (19.8 lbs.) |
| Remarks | V-block (**998291**) is provided. |

**Aligned**

Traverse direction
Start point
End point
Axial line

**Not aligned**

Traverse direction
End point
Axial line
Start point

**Recorded profiles**
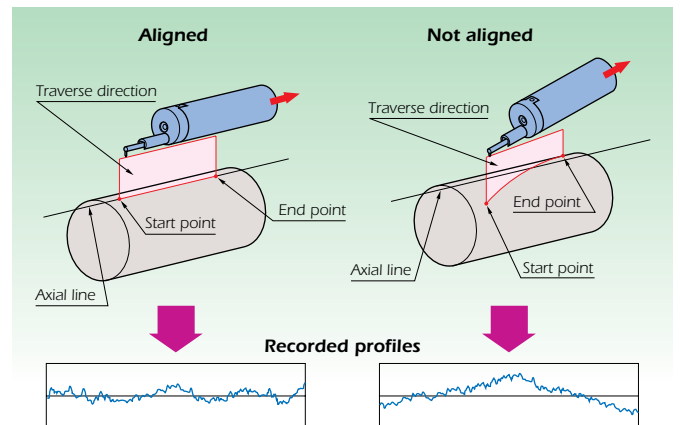
# OPTIONAL ACCESSORIES

## Step gage

### Metric 4-step gage
- Step: 1μm, 2μm, 5μm, 10μm

**178-610**

### Step gage
- Steps: 2μm (79μinch), 10μm (394μinch)

**178-611** (mm)
**178-612** (inch/mm)
for SV-2000N2/S2000S2/3000M4

## Vise

### Precision vise
- Max. workpiece size: 36mm (1.42")
- Can be mounted on a leveling table.

**178-019**

## Leveling tables

### Leveling table
- Table top: 130x100mm (5"x4")
- Leveling range: ±1.5°
- Height: 40mm (1.57")

**178-016**

### XY leveling table with swivel
- Table top: 130x100mm (5"x4")
- Leveling range: ±1.5°
- XY travel: ±12.5mm (.5")
- Height: 83mm (3.27")

**178-043-1** (metric)
**178-053-1** (inch)
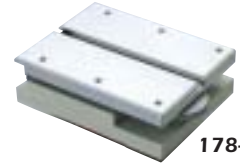
## Workbenches

### Adjustable workbench
- Dimensions (WxDxH): 1000x500x660mm (40"x20"x26")

**218-007**

### Auxiliary desk
- Dimensions (WxDxH): 400x500x660mm (16"x20"x26")

**218-008**

### Adjustable workbench
- Dimensions (WxDxH): 1200x750x670mm (48"x30"x27")

**166-215**

### Auxiliary desk
- Dimensions (WxDxH): 550x500x700mm (22"x20"x28")

**218-010**

## V-block

### V-block
- Workpiece diameter: 1mm to 160mm (.04" to 6.3")
- Can be mounted on a leveling table.

**998291**

### V-block with clamp
- Maximum workpiece diameter: 25mm (1")
- 2 blocks in a set.

**181-902** (metric)
**181-901** (inch)

### Digimatic XY leveling table with swivel
- Table top: 130x100mm (5"x4")
- Leveling range: ±1.5°
- XY travel: ±12.5mm (.5")
- Height: 83mm (3.27")
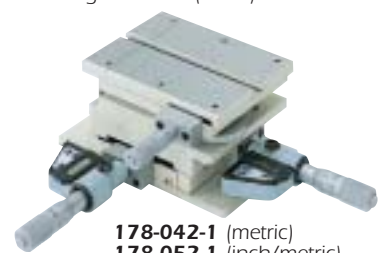
**178-042-1** (metric)
**178-052-1** (inch/metric)

## Accessories for SV-2000N2

### Cylinder attachment
- Diameter: 50 to 625mm (2" to 25")

**997843**

### Column stand
- Dimensions (WxDxH): 600x350x730mm (24"x14"x29")
- Vertical travel: 330mm (13")

**178-006**

### Column stand
- Dimensions (WxDxH): 370x200x540mm (15"x8"x21")
- Vertical travel: 200mm (7.8")

**178-008**

### Vibration isolator
- Dimensions (WxDxH): 750x550x59mm (40"x20"x2.3")
- Stand is optional (**178-024**).

**178-023**

# Fine contour analyzing software
# FORMPAK®-SV

- **Evaluates contours on the workpiece surface that cannot be measured by surface roughness parameters.**
- **Performs various analyses/evaluations including contour evaluation of step, pitch and area calculations.**

Data display window

Operation guide window

Operation procedure window

Command icons

Measurement result window



## Various Contour Evaluation Commands

- By combining contour elements such as point, line, circle, and coordinates, various evaluations can be performed, including the length measurement of step and pitch, the area calculation, etc.

## Data Processing Function

- Allows assessed profile filtration, deletion of data, data cut-off, and combination of data from multiple measurements.

## Data Compensation Function

- Circular error compensation function: Compensates circular movement error of the stylus to reduce distortion, thus obtaining the most accurate contour data possible.
- Stylus-tip diameter compensation: Offsets the measured data for the stylus-tip diameter.

## Report Generation Function

- Just like the SURFPAK® Series software, FORMPAK®-SV allows measurement results to be freely laid out and printed out as report. This program also supports the optional color printer.



Surftest SV-2000/3000

## SURFPAK®-SV

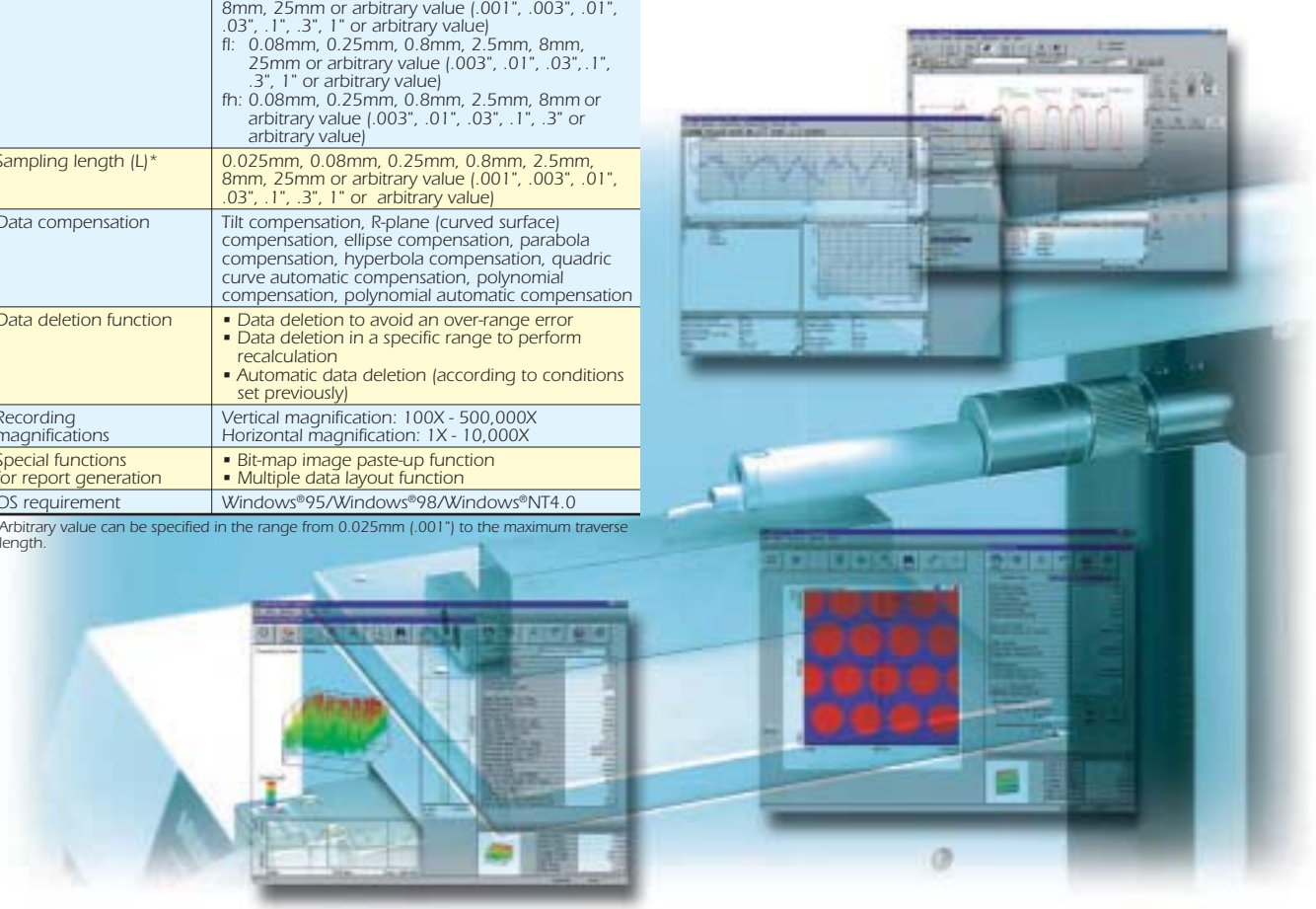| | | |
|---|---|---|
| International standards supported | ISO 4287: 1997, ANSI/ASME B46.1-1995, to be JIS B0601 1994 | |
| Assessed profiles | P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, E (envelope residual profile), R-motif (roughness motif), W-motif (waviness motif) | |
| Evaluation parameters | P, R, WC, WCA, WE, WEA, DIN 4776, E | Ra, Rq, Rz, Rz (JIS), Ry, Ry (DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, R3z, R3zi, R3y, S, Pc (Ppi), Sm, HSC, mr, δc, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δa, Δq, λa, λq, Sk, Ku, Lo, Lr, A1, A2 |
| | R-motif | Rx, R, AR, SR, SAR, NR, NCRX, CPM |
| | W-motif | Wte, Wx, W, AW, SW, SAW, NW |
| Analysis graphs | ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart | |
| Digital filter | 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian-50% (phase corrected) | |
| Cutoff length* | λc: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value (.001", .003", .01", .03", .1", .3", 1" or arbitrary value)<br>fl: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value (.003", .01", .03", .1", .3", 1" or arbitrary value)<br>fh: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm or arbitrary value (.003", .01", .03", .1", .3" or arbitrary value) | |
| Sampling length (L)* | 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value (.001", .003", .01", .03", .1", .3", 1" or arbitrary value) | |
| Data compensation | Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, quadric curve automatic compensation, polynomial compensation, polynomial automatic compensation | |
| Data deletion function | ▪ Data deletion to avoid an over-range error<br>▪ Data deletion in a specific range to perform recalculation<br>▪ Automatic data deletion (according to conditions set previously) | |
| Recording magnifications | Vertical magnification: 100X - 500,000X<br>Horizontal magnification: 1X - 10,000X | |
| Special functions for report generation | ▪ Bit-map image paste-up function<br>▪ Multiple data layout function | |
| OS requirement | Windows®95/Windows®98/Windows®NT4.0 | |

* Arbitrary value can be specified in the range from 0.025mm (.001") to the maximum traverse length.

## SURFPAK®-PRO
## (3-D Data Analysis Program
## for SV-3000▪3D)

| | |
|---|---|
| Three-dimensional evaluation parameters | Sa, Sq, Ssk, Sku, SΔq, Sλ, Sz, So, Sr, Sp, Sv, St, S3y, Spc, Svc, Spd, Svd, etc. |
| Three-dimensional filter function | Moving average filter, Gaussian filter |
| Three-dimensional trend compensation functions | Plane compensation, sphere compensation, cylinder compensation, polyhedron compensation |
| Three-dimensional analysis functions | 3-D topography display, topographic profile analysis, BAC, ADC, power spectrum chart, probability distribution chart, local peak distribution chart, parameter distribution chart, slope enhancement |
| Topographic profile sampling function | A desired cross-section which is included in a three-dimensional topography data can be analyzed two-dimensionally. |
| Two-dimensional data analysis capabilities | Include the same evaluation parameters, analysis graphs, and functions as SURFPAK®-SV |

## Dimensions

**SV-2000N2**

82 (3.23")
140 (5.51")
263 (10.35")
315 (12.4")
332 (13.07")
40 (15.75")

**SV-2000S2**

905 (33")
300 (11.81")
156 (6.14")
116 (4.57")
78 (3.07")
315 (12.4")
613 (24.33")
450 (17.72")
147 (5.79")
245 (9.65)
332 (13.07")
40 (15.75")

**SV-3000M4**

711 (27.99")
315 (12.4")
710 (27.95")
450 (17.72")
332 (13.07")
40 (15.75")

**SV-3000S4/S8**

905 (35.63")
380 (14.96")
300 (11.81")
116 (4.57")
78 (3.07")
S4: 710 (27.95")
S8: 760 (29.92")
450 (17.72")
180 (7.09")
245 (9.65)

**SV-3000H4/H8**

1105 (43.5")
380 (14.96")
300 (11.81")
116 (4.57")
78 (3.07")
H4: 710 (27.95")
H8: 760 (29.92")
450 (17.72")
180 (7.09")
245 (9.65)

**SV-3000W4/W8**

1111 (43.74")
380 (14.96")
300 (11.81")
116 (4.57")
78 (3.07")
W4: 1100 (43.3")
W8: 1150 (45.28")
450 (17.72")
180 (7.09")
245 (9.65)

**SV-3000▪3D**

S4: 905 (35.63")/H4: 1105 (43.5")
380 (14.96")
300 (11.81")
100 (3.94")
78 (3.07")
610 (24")
710 (27.95")
450 (17.72")
180 (7.09")
225 (8.86")

Note: An adjustable connector (**998047**) is required when using the Drive Unit separated from the power column.

# Surface Roughness Testing System
# Surftest SV-2000/3000

| Model No. | | SV-2000N2 | | SV-2000S2 | | SV-3000M4 | | SV-3000S4 | | SV-3000H4 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Type** | | mm | inch/mm | mm | inch/mm | mm | inch/mm | mm | inch/mm | mm | inch/mm |
| **Order No.** (Each order number suffix denotes the AC power cable type equipped.) Measuring force of detector: **0.75mN** | 100V AC | **178-660** | — | **178-661** | — | **178-662** | — | **178-663** | **178-673** | **178-664** | **178-674** |
| | 110V AC | **178-660C** | — | **178-661C** | — | **178-662C** | — | **178-663C** | — | **178-664C** | — |
| | 120V AC | **178-660A** | **178-670A** | **178-661A** | **178-671A** | **178-662A** | **178-672A** | **178-663A** | **178-673A** | **178-664A** | **178-674A** |
| | 220V AC | **178-660D** | **178-670D** | **178-661D** | **178-671D** | **178-662D** | **178-672D** | **178-663D** | **178-673D** | **178-664D** | **178-674D** |
| | 240V AC | **178-660E** | **178-670E** | **178-661E** | **178-671E** | **178-662E** | **178-672E** | **178-663E** | **178-673E** | **178-664E** | **178-674E** |
| **Order No.** (Each order number suffix denotes the AC power cable type equipped.) Measuring force of detector: **4mN** | 100V AC | **178-640** | — | **178-641** | — | **178-642** | — | **178-643** | **178-653** | **178-644** | **178-654** |
| | 110V AC | **178-640C** | — | **178-641C** | — | **178-642C** | — | **178-643C** | — | **178-644C** | — |
| | 120V AC | **178-640A** | **178-650A** | **178-641A** | **178-651A** | **178-642A** | **178-652A** | **178-643A** | **178-653A** | **178-644A** | **178-654A** |
| | 220V AC | **178-640D** | **178-650D** | **178-641D** | **178-651D** | **178-642D** | **178-652D** | **178-643D** | **178-653D** | **178-644D** | **178-654D** |
| | 240V AC | **178-640E** | **178-650E** | **178-641E** | **178-651E** | **178-642E** | **178-652E** | **178-643E** | **178-653E** | **178-644E** | **178-654E** |
| Traverse range | | 50mm (2") | | | | 100mm (4") | | | | | |
| Linearity of traverse | | 0.3µm/50mm (12µinch/2") | | | | 0.3µm/100mm (12µinch/4") | | 0.05+1.5L/1000µm [(2+1.5L)µinch] L=Measuring length | | | |
| Vertical travel | | — | | 300mm (11.8") Power column (or manual) | | 300mm (11.8") Manual column | | 300mm (11.8") Power column | | 500mm (19.7") Power column | |
| Base — Size (WxD) | | — | | 610x450mm (24"x17.7") | | 610x450mm (24"x17.7") | | 610x450mm (24"x17.7") | | | |
| Stylus speed — Measuring | | 0.1mm/s (.004"/s), 0.2mm/s (.008"/s), 0.5mm/s(.02"/s), 1mm/s (.04"/s), 2mm/s (.08"/s) | | 0.02mm/s (.0008"/s), 0.05mm/s (.002"/s), 0.1mm/s (.004"/s), 0.2mm/s (.008"/s), 0.5mm/s (.02"/s), 1mm/s (.04"/s), 2mm/s (.08"/s) | | 0.05mm/s (.002"/s), 0.1mm/s (.004"/s), 0.2mm/s (.008"/s), 0.5mm/s (.02"/s), 1mm/s (.04"/s), 2mm/s (.08"/s) | | | | | |
| Stylus speed — Positioning | | 0.5mm/s (.02"/s), 2mm/s (.08"/s), Manual feed available | | Can be adjusted with joystick 0.1mm/s to 5mm/s (.004"/s to .2"/s), Manual feed available | | 0.5mm/s (.02"/s), 2mm/s (.08"/s), Manual feed available | | | | | |
| Measuring range | | | | | | | | | | | |
| Standard detector (**178-396-2**) (**178-397-2**) — Detecting method | | | | | | | | | | | |
| Stylus | | | | | | | | | | | |
| Skid | | | | | | | | | | | |
| Data analysis software | | | | | | | | SURFPAK®-SV (CD-ROM provided) | | | |
| Operating temperature | | | | | | | | | | | |
| Power supply | | | | | | | | | | | |
| Dimensions (WxDxH) of main unit | | 263x82x140mm (10.35"x3.2"x5.5") | | 618x450x905mm (24.33"x17.72"x33") | | 760x450x711mm (29.92"x17.72"x27.99") | | 710x450x905mm (27.95"x17.72"x36.63") | | 710x450x1105mm (27.95"x17.72"x43.5") | |
| Mass of main unit | | 2.8kg (6.16 lbs.) | | 130kg (286 lbs.) | | 140kg (308 lbs.) | | 140kg (308 lbs.) | | 150kg (330 lbs.) | |
| Standard accessories  * Not included with SV-2000N2  ** Not included with SV-2000N2 or SV-3000M4 | | Standard detector (**178-396-2** (Measuring force: 0.75mN), **178-397-2** (Measuring force: 4mN)), standard nosepiece (**12AAC753**), roughness specimen (**178-601** (mm) or **178-602** (inch/mm)), machine cover (**355130**)*, carrying bolts**, lubricant**, key wrenches, screwdriver, AC adapter, power cord, User's manual | | | | | | | | | | |

| SV-3000W4 | | SV-3000S8 | | SV-3000H8 | | SV-3000W8 | | SV-3000S4▪3D | | SV-3000H4▪3D | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | inch/mm | mm | inch/mm | mm | inch/mm | mm | inch/mm | mm | inch/mm | mm | inch/mm |
| 178-665 | 178-675 | 178-666 | 178-676 | 178-667 | 178-677 | 178-668 | 178-678 | 178-721 | 178-731 | 178-723 | 178-733 |
| 178-665C | — | 178-666C | — | 178-667C | — | 178-668C | — | 178-721C | — | 178-723C | — |
| 178-665A | 178-675A | 178-666A | 178-676A | 178-667A | 178-677A | 178-668A | 178-678A | 178-721A | 178-731A | 178-723A | 178-733A |
| 178-665D | 178-675D | 178-666D | 178-676D | 178-667D | 178-677D | 178-668D | 178-678D | 178-721D | 178-731D | 178-723D | 178-733D |
| 178-665E | 178-675E | 178-666E | 178-676E | 178-667E | 178-677E | 178-668E | 178-678E | 178-721E | 178-731E | 178-723E | 178-733E |
| 178-645 | 178-655 | 178-646 | 178-656 | 178-647 | 178-657 | 178-648 | 178-658 | 178-722 | 178-732 | 178-724 | 178-734 |
| 178-645C | — | 178-646C | — | 178-647C | — | 178-648C | — | 178-722C | — | 178-724C | — |
| 178-645A | 178-655A | 178-646A | 178-656A | 178-647A | 178-657A | 178-648A | 178-658A | 178-722A | 178-732A | 178-724A | 178-734A |
| 178-645D | 178-655D | 178-646D | 178-656D | 178-647D | 178-657D | 178-648D | 178-658D | 178-722D | 178-732D | 178-724D | 178-734D |
| 178-645E | 178-655E | 178-646E | 178-656E | 178-647E | 178-657E | 178-648E | 178-658E | 178-722E | 178-732E | 178-724E | 178-734E |
| | | 200mm (8") | | | | | | 100mm (4") | | | |
| | | 0.5µm/200mm (20µinch/8") | | | | | | 0.05+1.5L/1000µm [(2+1.5L)µinch] L=Measuring length | | | |
| | | 300mm (11.8") Power column | | 500mm (19.7") Power column | | | | 125mm (4.9") Power column | | | |
| 1010x450mm (39.8"x17.7") | | 610x450mm (24"x17.7") | | | | 1010x450mm (39.8"x17.7") | | 610x450mm (24"x17.7") | | | |
| 0.02mm/s (.0008"/s), 0.05mm/s (.002"/s), 0.1mm/s (.004"/s), 0.2mm/s (.008"/s), 0.5mm/s (.02"/s), 1mm/s (.04"/s), 2mm/s (.08"/s) | | | | | | | | | | | |
| Can be adjusted with joystick 0.1mm/s to 5mm/s (.004"/s to .2"/s), Manual feed available | | | | | | | | | | | |
| 800µm [Resolution: 0.01µm] (32000µinch [Resolution: .4µinch])<br>80µm [Resolution: 0.001µm] (3200µinch [Resolution: .04µinch])<br>8µm [Resolution: 0.0001µm] (320µinch [Resolution: .004µinch]) | | | | | | | | | | | |
| Differential inductance method | | | | | | | | | | | |
| Measuring force 0.75mN: Diamond, 60° cone, Tip radius: 2µm (79µinch)<br>Measuring force 4mN: Diamond, 90° cone, Tip radius: 5µm (200µinch) | | | | | | | | | | | |
| Carbide, Radius of curvature: 40mm (1.6") | | | | | | | | | | | |
| | | | | | | | | **SURFPAK®-PRO** (CD-ROM provided) | | | |
| 15°C to 25°C | | | | | | | | | | | |
| 100V AC - 240V AC, 50/60Hz | | | | | | | | | | | |
| 1100x450x1111mm (43.3"x17.72"x43.74") | | 760x450x905mm (29.92"x17.72"x35.63") | | 760x450x1105mm (29.92"x17.72"x43.5") | | 1150x450x1111mm (45.28"x17.72"x43.74") | | 710x450x905mm (27.95"x17.72"x35.6") | | 710x450x1105mm (27.95"x17.72"x43.5") | |
| 155kg (341 lbs.) | | 145kg (319 lbs.) | | 155kg (341 lbs.) | | 160kg (352 lbs.) | | 140kg (308 lbs.) | | 150kg (330 lbs.) | |
| Standard detector (**178-396-2** (Measuring force: 0.75mN), **178-397-2** (Measuring force: 4mN)), standard nosepiece (**12AAC753**), roughness specimen (**178-601** (mm) or **178-602** (inch/mm)), machine cover (**355130** for SV-3000S4/S8) or **355270** for SV-3000H4/W4/H8/W8), key wrenches, screwdrivers, carrying bolts, lubricant, power cord, User's manual | | | | | | | | | | | |