

Surface Roughness Measuring System SURFTEST SJ-500/SV-2100

Catalog No. E15006(5)



Surface roughness testers offer benchtop or portable operation and the choice of data analysis by PC or an easy-to-use dedicated processor

Mitutoyo

Dedicated data processor type Surftest SJ-500/SV-2100

Improved operability

7.5" Color TFT LCD

The dedicated data processor has a high-visibility 7.5" color TFT LCD. Icon display and touch panel operation provide user-friendly display and easy operation.

Positioning by joystick and manual control knobs on the processor

Easy-to-operate joystick. Fine positioning of stylus required for small-hole measurements can be easily performed using the manual fine-adjustment knobs.

Multiple trace function

A machine can be programmed to take up to three traces, one after the other.

Various types of analysis

Capable of fine-contour analysis

Supports 43 types of analysis parameters, complying with surface roughness standards such as ISO 1997 and JIS 2001. Also capable of various fine-contour analysis.

* Contour analyses: Area, circle, angle, coordinate difference, step, inclination

High-durability

Ceramic guideway

A ceramic guideway, inherently free from wear and deterioration with age, is employed to maintain the traversing straightness of the drive unit (X axis) indefinitely. Maintenance-free design, since anti-corrosion treatment is not required for ceramic.

Easy operation, high-accuracy analysis of surface roughness and fine contours!

High-visibility color display panel

A high-visibility 7.5" color TFT LCD, color icon display and touch-operated panel provide user-friendly, easy operation. Built-in thermal printer. Fine contour analysis provided as standard.



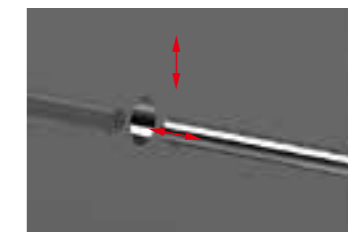
Supports 16 languages

Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Simplified Chinese, Traditional Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch

Efficient positioning by joystick and adjustment knobs

Both a fast-traverse joystick (X-axis: 20 mm/s for **SJ-500**, 40 mm/s for **SV-2100**, Z2-axis: 20 mm/s for **SV-2100S4/H4/W4**) and manual fine-adjustment knobs, essential for positioning in small hole measurement, are standard features.

Positioning in small hole measurement



Positioning in Y/Z-directions with column fine-adjustment knob (or detector elevation knob) and optional cross-travel table.



Positioning at the trace start point with X-axis fine-adjustment knob.

Multiple trace programming function

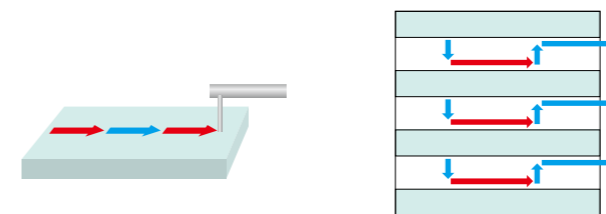
A machine can be programmed to take up to three consecutive traces by one-key operation, as shown in the figure below.

• SJ-500/SV-2100M4

Consecutive tracing in X-axis direction only

• SV-2100S4/H4/W4

X-axis tracing with programmed Z-axis shifts possible



→ Measurement
→ Traverse

Example: **SV-2100S4** input screen



Navigation function aids leveling

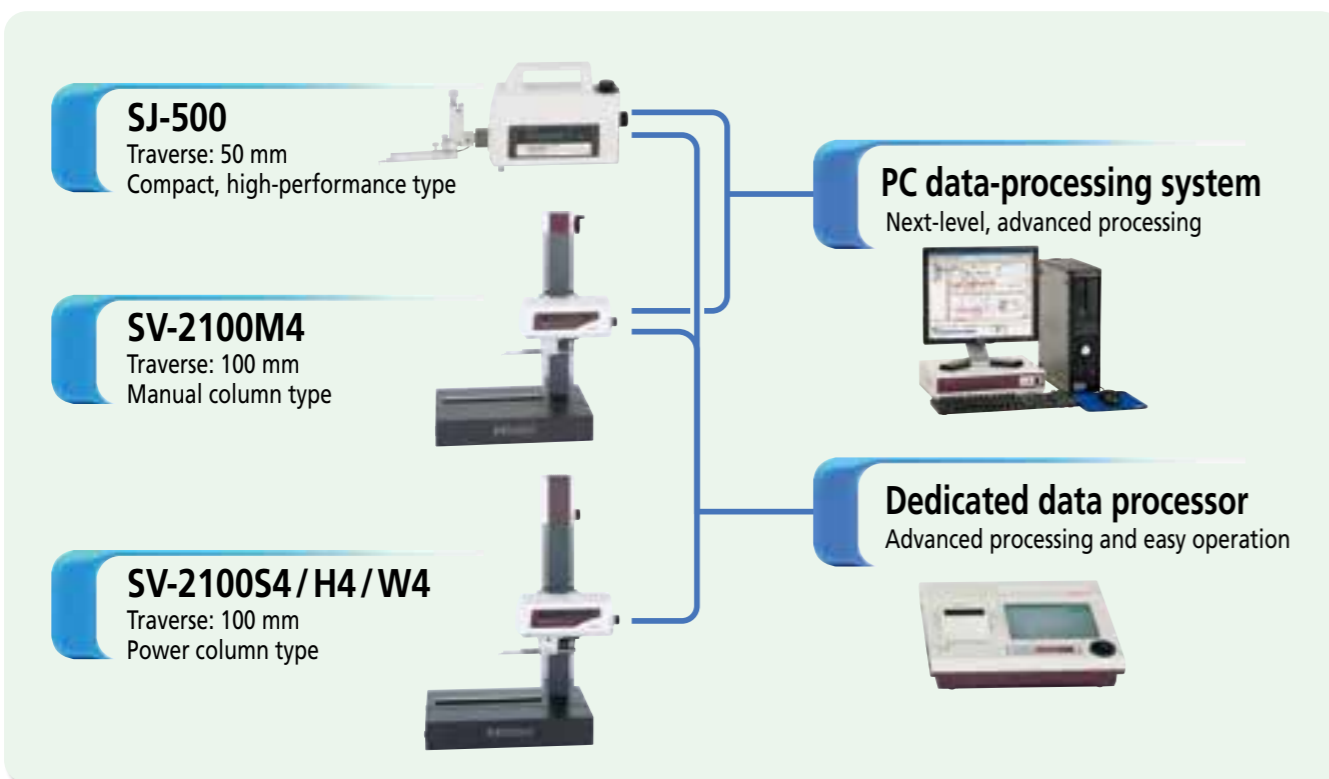
Powerful support for leveling adjustments

When using an optional 3-axis adjustment table or leveling table, a navigation screen is available to help the operator level the surface to be tested.

Example of 3-axis adjustable table



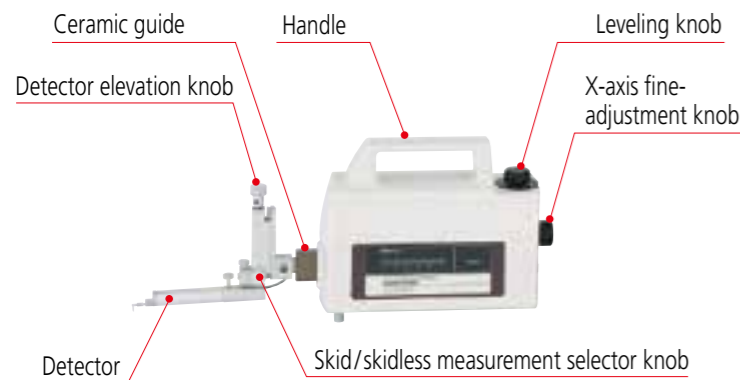
The user is guided through the leveling procedure to determine the amount of adjustment needed.



A portable tester also boasting high performance in desktop applications

Surftest SJ-500

High accuracy, high performance, user-friendly display and easy operation



Class-leading traverse straightness: 0.2 $\mu\text{m}/50\text{ mm}$
 High-speed traverse at up to 20 mm/s under joystick control
 Smooth positioning using the vertical adjustment knob

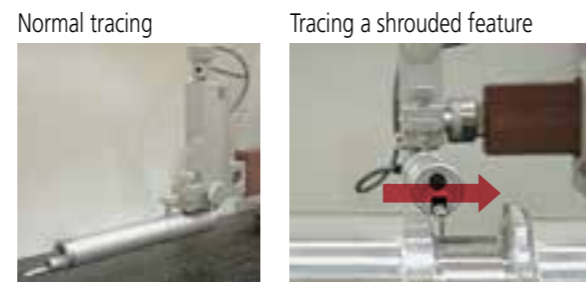
Vertical adjustment knob

Essential for positioning the stylus close to the workpiece!



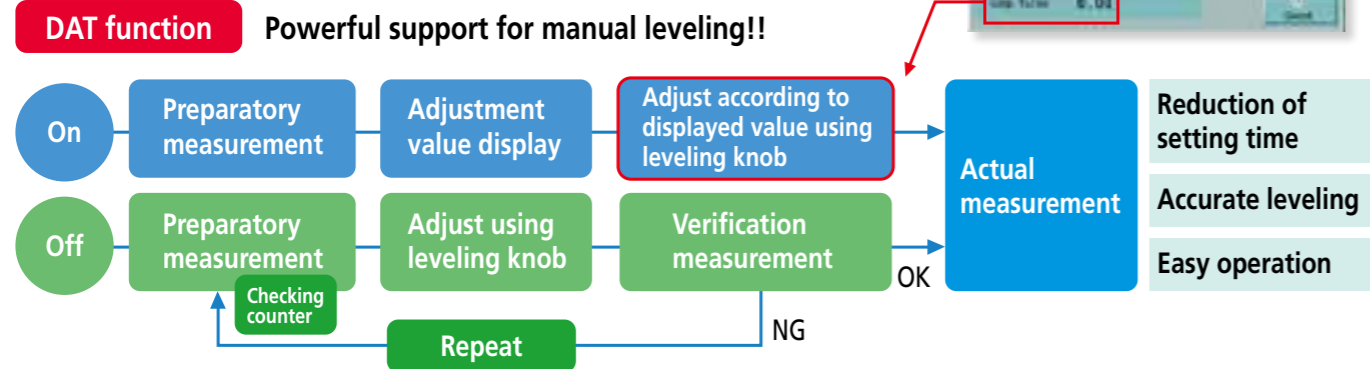
Support for testing problematic features

Supports measurement in the axial direction for shrouded features, such as found on crankshafts, by simply swiveling the detector through 90 degrees.



Drive unit inclination adjustment mechanism

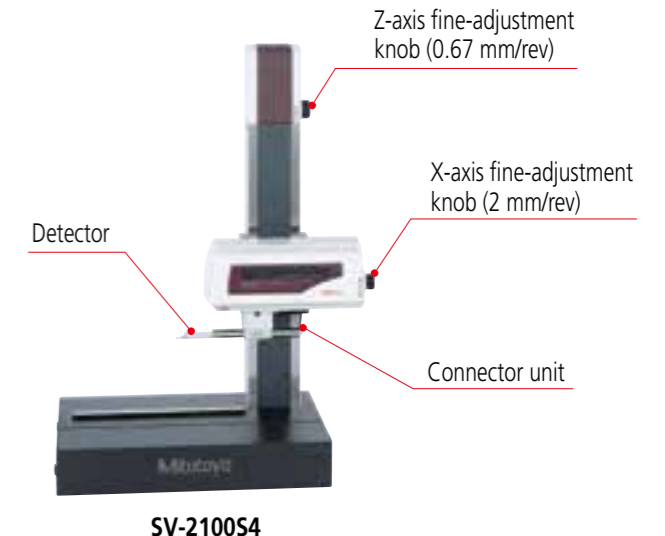
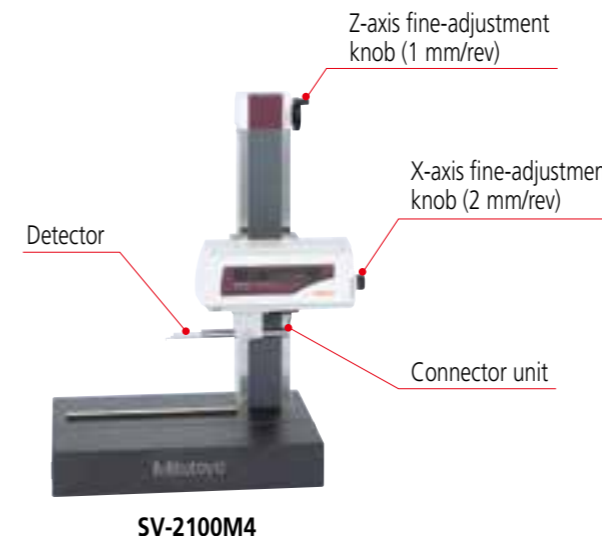
Digital Adjustment Tilting (DAT) function is supplied as standard for efficient leveling of workpieces: $\pm 1.5^\circ$



A desktop tester that's easy to use for portable applications

Surftest SV-2100

By setting the origin point at start-up, the Absolute scale system allows accurate positioning for repeated or multiple measurements.



High-speed traverse at up to 40 mm/s (X-axis) under joystick control
 Smooth positioning, using the Z-axis fine-adjustment knobs
 Stable, high-accuracy measurement with a traverse straightness of 0.15 $\mu\text{m}/100\text{ mm}$

1. Capable of a series of automatic measurements, plus auto leveling (optional) and stylus retraction. Accurate positioning for repeated or multiple measurements possible.



Measurement setup screen

2. SV-2100S4/H4/W4 models are equipped with an emergency stop button.



3. Base sizes and vertical travel range on column

Model No.	Vertical travel range	Vertical traverse method	Base size
SV-2100S4	350 mm	Power and manual	600x450 mm
SV-2100H4	550 mm		
SV-2100W4	550 mm	Manual only	1000x450 mm
SV-2100M4	350 mm		

Dedicated data processor

MiCAT

Mitutoyo Intelligent Computer Aided Technology

the standard in world metrology software
FORM

Data processing unit

- Data saving (internal memory)
- High-speed printing
- Expansion slot for external memory (CF card)
- Display supports 16 languages
- Key panel



- High-visibility 7.5" color LCD
- Touch panel with color icon display
- Joystick

Customizable menu screen

The menu customization function allows display of frequently used menu icons



One-touch display of various screens

Home screen



Evaluation setup screen



Measurement setup screen



Calibration screen



Contour analysis screen

Statistical processing

Statistical data processing possible (up to 300 data samples)
Statistical processing items: MAX., MIN., average, standard deviation, histogram, probability of acceptance.



Statistical data input

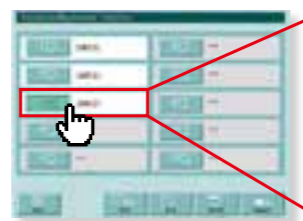


Statistical results

Saving and recalling measurement setups

Up to 10 measurement setups can be saved to and recalled from internal memory.

One-touch recall of stored setups



Click the desired measurement setup file



Measurement screen opens

Analysis to international standards

Evaluates surface roughness using up to 43 parameters complying with international standards such as ISO 1997 and JIS 2001. Bearing Area Curve (BAC), Amplitude Distribution Curve (ADC), and power spectrum (wavelength display) are readily available in graph form.

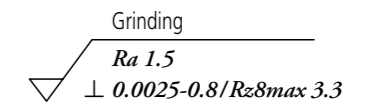


Easy, icon-based input of setup conditions

Note: Patent registered in Japan, U.S.A., China, Germany, U.K., and France.

Setups are aided by icons representing ISO/JIS roughness standard parameters with appropriate values selected from recommended lists.

Typical surface roughness symbol on drawing



Typical result of icon-based setup

U"X"0.0025—0.8/Rz8max 3.3



Clicking a parameter icon displays the recommended cut-off value, etc.

A large variety of optional accessories

Options supporting measurement including an auto leveling table, a 3-axis adjustment table, and a leveling table. Furthermore, these can be easily operated via a navigation function. (Supported accessories differ depending on the model.)



Fine-contour analysis

Various contour analyses (area, circle, angle, coordinate difference, step, inclination) are supplied as standard.



Select desired analysis icon and then specify the range.

Built-in thermal printer

Measurement data is printed by the high-definition, high-speed thermal printer. In addition to calculation results and evaluation results, BAC, ADC and other curves can also be printed.



Simplified communication program for SURFTEST SJ-500/SV-2100

The SurfTest **SJ-500/SV-2100** Series has a USB interface, enabling data to be transferred to a spreadsheet or other software. We also provide a program that lets you create inspection record tables using a Microsoft Excel* macro.

This program can be downloaded free of charge from the Mitutoyo website.

<https://www.mitutoyo.co.jp>

- OS: Windows XP-SP3, Windows Vista, Windows 7, Windows 8, Windows 10
- Spreadsheet software: Microsoft Excel 2000, Microsoft Excel 2002, Microsoft Excel 2003, Microsoft Excel 2007, Microsoft Excel 2010, Microsoft Excel 2013, Microsoft Excel 2016

* Windows OS and Microsoft Excel are products of Microsoft Corporation.
The optional USB cable is also required.
USB cable for **SJ-500/SV-2100** Series **12AAH490**

PC data processing type Surftest SJ-500P/SV-2100M4

A superior data processing tester with PC data analysis for higher efficiency.

Note 1: If a power column type with PC data-processing is required, consider the **FORMTRACER Avant S3000 Series** (Refer to the Brochure <E15030> for specifications.)

Note 2: Printer is optional.



FORMTRACEPAK: Best-seller for surface roughness and contour analysis

• Surface Roughness analysis function

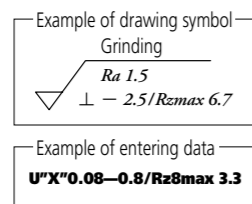
FORMTRACEPAK can perform surface roughness analyses that conform to various standards such as ISO, JIS, ANSI, and VDA. For comparing the measurement values with the tolerance limits, you can use the 16% rule or the maximum value rule.

Furthermore, since FORMTRACEPAK comes with parameter calculation functions as well as a rich set of graphic analysis functions, it can be widely utilized for everything from routine quality control to R&D applications. It also includes many other functions, such as the function for eliminating (compensating) shapes, such as slopes and R-surface, and a data deletion function.



• Simple input using drawing symbols

You can easily set up cumbersome measurement conditions by simply entering data according to the drawing symbols of the ISO/JIS roughness standard.

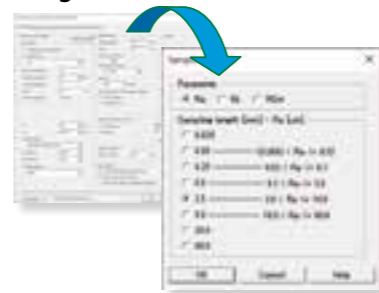


• Microscopic contour analysis function

This function can calculate steps and surface areas from the roughness data. Furthermore, as with the contour analysis function, a rich set of calculation commands that combine various elements, such as points, lines, and circles, to calculate angles, pitches, and distances are provided as standard features.

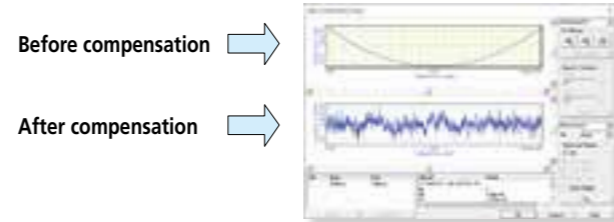
• Reference length dialog box

When setting up the reference length in a measurement condition, you can display the standard values defined by the ISO/JIS standards by selecting the applicable standard.



• Analysis condition modification with a preview function

You can easily modify various types of analysis conditions such as the standard to be used, curve type, and filter. Furthermore, before eliminating (compensating) shapes such as slopes, R-surfaces, and parabolas, the preview function allows you to check the impact on the spot.



Specifications

Type of data processing	Dedicated data processor					PC system		
Model No.	SJ-500	SV-2100M4	SV-2100S4	SV-2100H4	SV-2100W4	SJ-500P	SV-2100M4	
Order No.*	with 0.75 mN detector	178-532-01	178-636-01	178-680-01	178-682-01	178-684-01	178-534-11	178-638-11
	inch/mm	178-533-01	178-637-01	178-681-01	178-683-01	178-685-01	178-534-13	178-638-13
	with 4 mN detector	178-532-02	178-636-02	178-680-02	178-682-02	178-684-02	—	—
inch/mm	178-533-02	178-637-02	178-681-02	178-683-02	178-685-02	—	—	
Measuring range	X axis	50 mm (2 in)	100 mm (4 in)			50 mm (2 in)	100 mm (4 in)	
	Z axis (detector)	800 μm, 80 μm, 8 μm (32000 μin, 3200 μin, 320 μin)						
Detector	Detection method	Differential inductance						
	Resolution	0.01 μm (800 μm range), 0.001 μm (80 μm range), 0.0001 μm (8 μm range) (0.4 μin <32000 μin range>, 0.04 μin <3200 μin range>, 0.004 μin <320 μin range>)						
	Stylus tip shape (Angle/Radius) Measuring force	60°/2 μm, 0.75 mN 90°/5 μm, 4 mN						
Drive unit (X axis)	Measuring speed	0.02 - 5 mm/s						
	Drive speed	0 - 20 mm/s or manual	0 - 40 mm/s or manual			0 - 20 mm/s or manual	0 - 40 mm/s or manual	
	Straightness	0.2 μm/50 mm ^{*1}	0.15 μm/100 mm			0.2 μm/50 mm ^{*1}	0.15 μm/100 mm	
Drive unit (Z axis)	Resolution	0.05 μm (1.97 μin)						
	Travel	—	350 mm (H4, W4: 550 mm)			—	350 mm	
	Drive speed	— ^{*2}	Manual	0 - 20 mm/s or manual			— ^{*2}	Manual
Resolution	—	1 μm (39.4 μin)			—	—		
Applicable standards	JIS1982/JIS1994/JIS2001/ISO1997/ANSI/VDA							
Parameter	Pa, Pq, Pz, Pp, Pv, Pt, Psk, Pku, Pc, PSm, PΔq, Pmr, Pmr(c), Pδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rmax, Rz, Pmax, PzJIS, Ra, Rq, Rz, Rp, Rv, Rt, Rsk, Rku, Rc, RSm, RΔq, Rmr, Rmr(c), Rδc, Ry, R3z, RPC, Pc, Sm, S, HSC, Rmax, RzJIS, Rppi, RΔa, Rλa, Rλq, Rlo, Rlr, tp, Htp, Vo, Wa, Wq, Wz, Wp, Wv, Wt, Wsk, Wku, Wc, WSm, WΔq, Wmr, Wmr(c), Wδc, Wy, W3z, WPC, Wmax, WΔa, Wλa, Wλq, Wlo, Wlr, R, Rx, AR, W, Wx, AW, Wte					Pa, Pq, Psk, Pku, Pp, Pv, Pz, Pt, Pc, PSm, PΔq, Pmr(c), Pmr, Pδc, Ppq, Pvq, Pmq, Ppc, PzJIS, PPI, Ra, Rq, Rsk, Rku, Rp, Rv, Rz, Rt, Rc, RSm, RΔq, Rmr(c), Rmr, Rδc, Rpq, Rvq, Rmq, Rmax, RzJIS, Wa, Wq, Wsk, Wku, Wp, Wv, Wz, Wt, Wc, WSm, WΔq, Wmr(c), Wmr, Wδc, Wst, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rx, AR, R, Wx, AW, W, Wte, Ry, RyDIN, RzDIN, R3y, R3z, S, HSC, Lo, Ir, Δa, λa, λq, Vo, Htp, NR, NCRX, CPM, SR, SAR, NW, SW, SAW		
Filtered profile	Primary profile, Roughness profile, Waviness profile, DF profile, Roughness motif profile, Waviness motif profile					Primary profile, Roughness profile, Waviness profile, Filtered waviness profile, Band waviness profile, Rolling circle waviness profile, Rolling circle center line waviness profile, envelope residual profile, DIN4776 profile, Roughness motif profile, Waviness motif profile		
Analysis graph	ADC, BAC, power spectrum graph							
Data compensation functions	Inclination (Entire, Arbitrary), Circular compensation, Elliptical compensation, Parabolic compensation, Hyperbolic compensation, Conic compensation, Stylus circular-arc compensation					Inclination (Entire/start/end/Arbitrary), R-surface correction, Elliptical compensation, Parabolic compensation, Hyperbolic compensation, Conic compensation, Polynomial correction		
Filter	Gaussian, 2CR75, PC75, Robust-Spline							
Cutoff value	λs: 0.25/0.8/2.5/8/25/80/250 μm/None λc: 0.025/0.08/0.25/0.8/2.5/8/25/80 mm ⁻³ λf: 0.08/0.25/0.8/2.5/8/25/80 mm/None					λs: 0.0008/0.0025/0.008/0.025/0.08/0.25/0.8 λc: 0.025/0.08/0.25/0.8/2.5/8/25/Arbitrary λf: 0.08/0.25/0.8/2.5/8/25/Arbitrary		
Sampling length	0.025/0.08/0.25/0.8/2.5/8/25/80 mm ⁻³							
Number of intervals	1 - 20					- 700 (max.)		
Arbitrary length	0.02 - 50 mm (0.01 mm interval)	0.02 - 100 mm (0.01 mm interval)			0.025 - 50 mm (0.001 mm interval)	0.025 - 100 mm (0.001 mm interval)		
Display language	16 languages (Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Chinese (traditional/simplified), Czech, Polish, Hungarian, Turkish, Swedish, Dutch)					18 languages (Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Chinese (traditional/simplified), Czech, Polish, Hungarian, Turkish, Swedish, Dutch, Russian, Thai)		
External dimensions (WxDxH)	Main unit	425x94x160 mm	716x450x863 mm	S4: 766x450x966 mm H4: 766x450x1166 mm W4: 1166x450x1176 mm		425x94x160 mm	716x450x863 mm	
	Display unit	330x270x124 mm						
	Electronic unit	—						
PC I/F unit	350x263x86 mm							
Mass	Main unit	2.7 kg	140 kg	S4: 140 kg H4: 150 kg W4: 220 kg		2.7 kg	140 kg	
	Display unit	— ^{*4}						
	Electronic unit	—						
PC I/F unit	3.0 kg							
							3.8 kg	

*1 When using the simplified stand (optional): 0.4 μm/50 mm

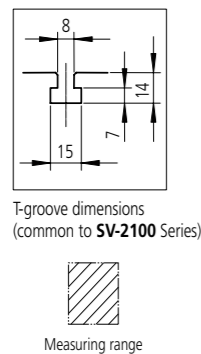
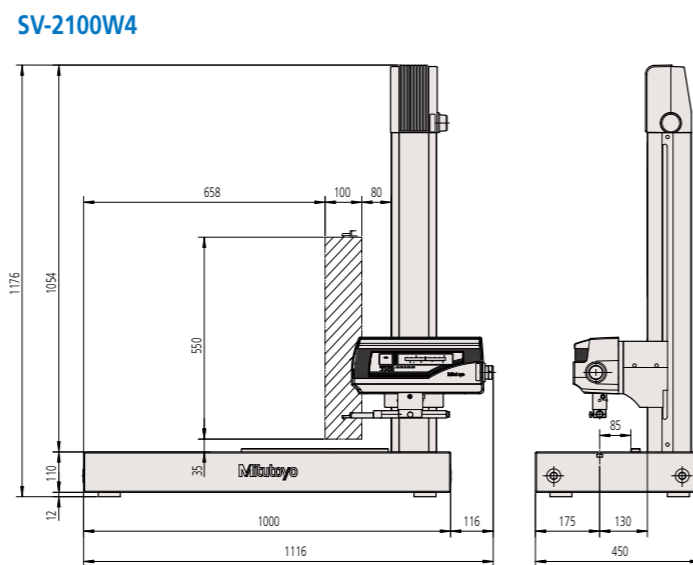
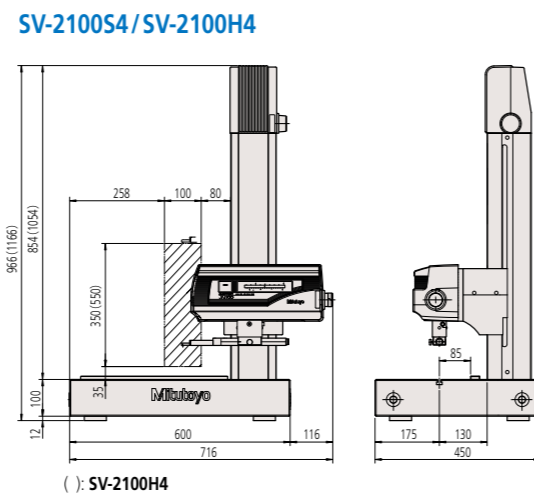
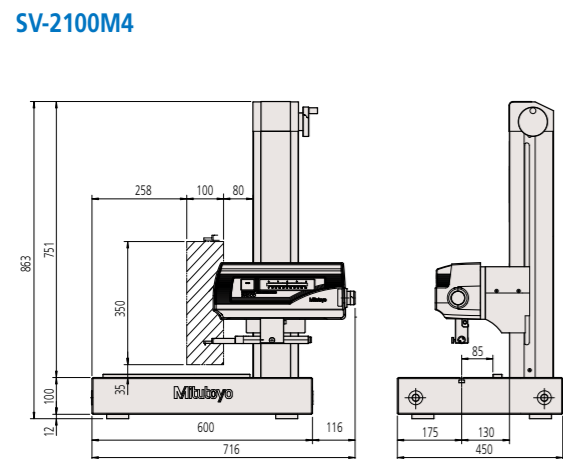
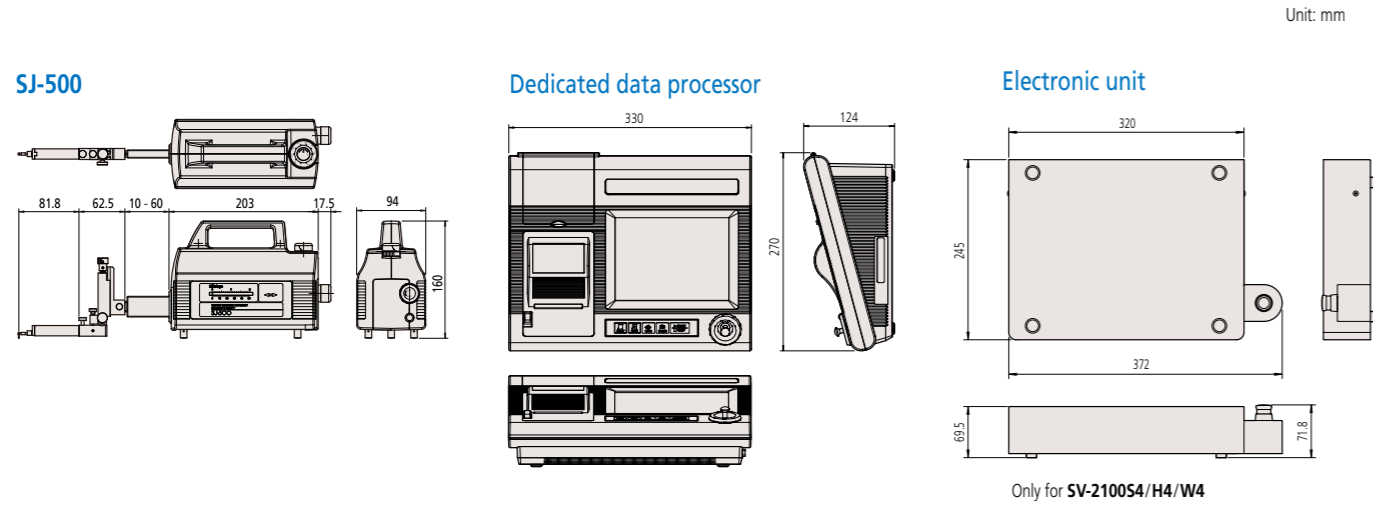
When using the manual column stand (optional): 0.3 μm/50 mm

*2 The simplified stand or manual column stand is available as an optional accessory. (Refer to page 11 for details.)

*3 80 mm only for the SV-2100 Series.

*4 Varies depending on the PC system.

External Dimensions



Optional Accessories

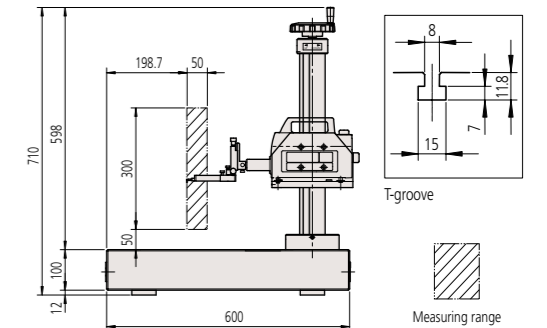
Manual column stand: 178-085 (for SJ-500)

Suitable for desktop use in inspection rooms, etc.

178-085 Except for measuring unit
Vertical adjustment range: 300 mm
Dimension (WxDxH): 600x450x710 mm
Mass: 110 kg



Dimensions of SJ-500 with manual column stand Unit: mm



Note: While the appearance of the natural stone stand varies according to the source, the high stability for which this material is known can always be relied upon.

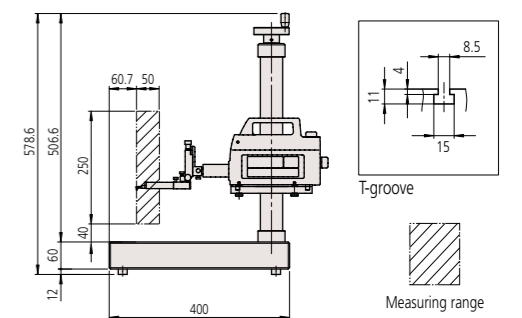
Simple column stand: 178-089 (for SJ-500)

A portable simple column stand.

178-089 Except for measuring unit
Vertical adjustment range: 250 mm
Dimension (WxDxH): 400x250x578.6 mm
Mass: 20 kg



Dimension of SJ-500 with simple column stand Unit: mm



Note: While the appearance of the natural stone stand varies according to the source, the high stability for which this material is known can always be relied upon.

DAT leveling table: 178-048

This table can be used by itself or in conjunction with other leveling tables.



Inclination adjustment angle	±1.5°
Maximum load	15 kg
Table dimensions	130x100 mm

XY leveling tables 178-043-1 / 178-042-1



178-043-1



178-042-1

Order No.	178-043-1 (mm) 178-053-1 (in) *with analog heads	178-042-1 (mm) 178-052-1 (in) *with digital heads	178-049 (mm) 178-058 (in/mm) *with digital heads
Table dimensions	130x100 mm		
Maximum load	15 kg		
Inclination adjustment angle	±1.5°		—
Swiveling angle	±3°		—
X/Y-axis travel range	±12.5 mm		
Resolution	0.01 mm	0.001 mm	
Dimensions (WxDxH)	220x189x83 mm	262x233x83 mm	262x233x55 mm
Mass	6 kg	6.3 kg	5 kg

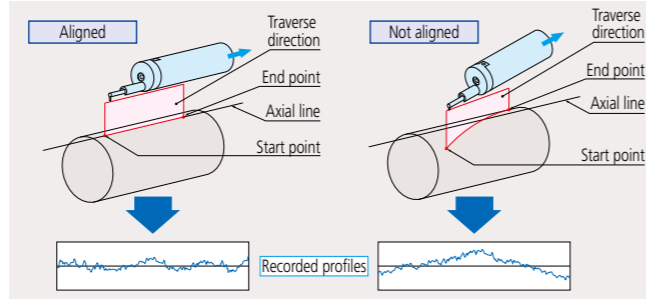
Optional Accessories

3-axis adjustment table: 178-047

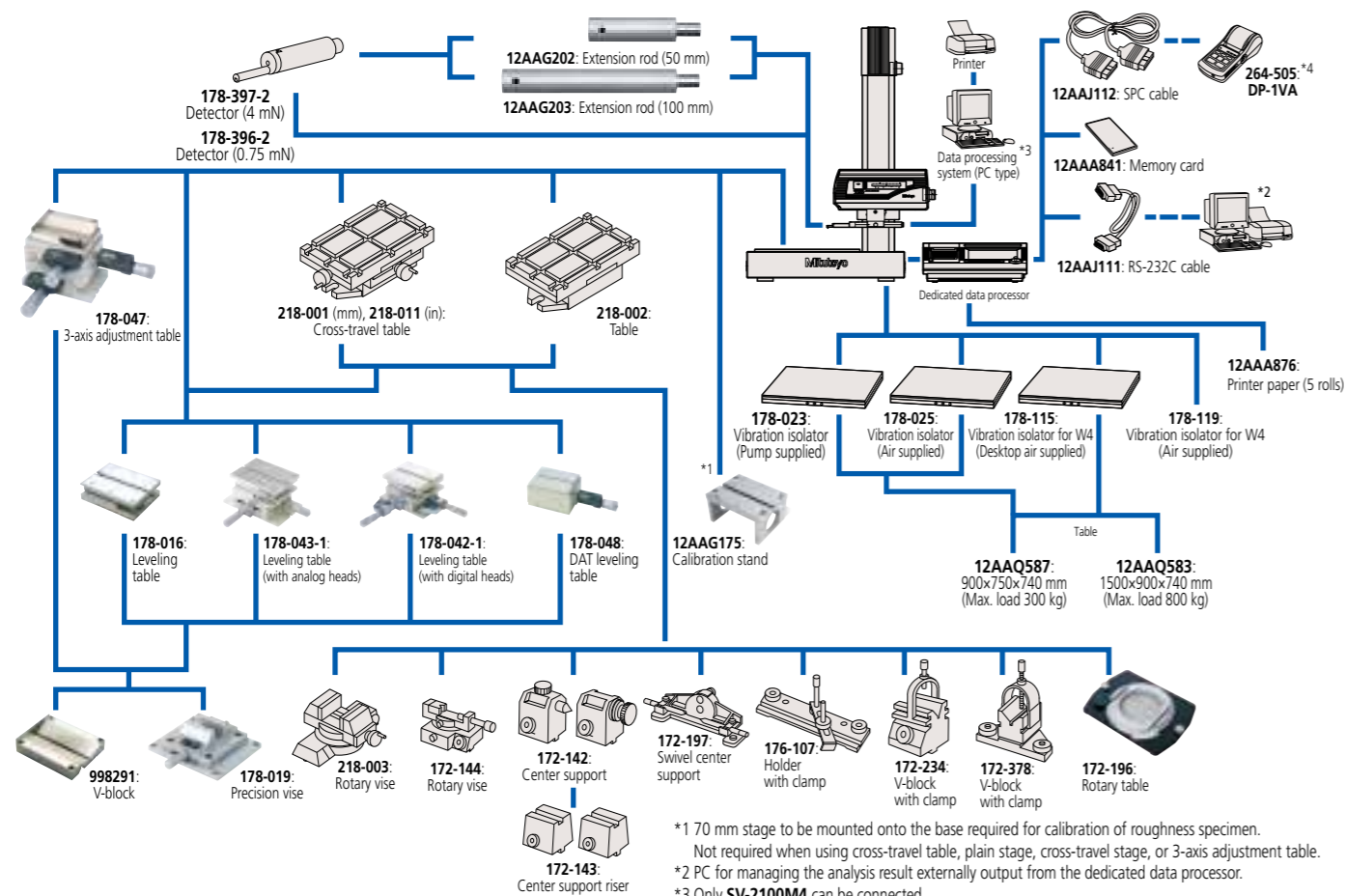
This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be leveled with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



Inclination adjustment angle	±1.5°
Swiveling angle	±2°
Y-axis range	±12.5 mm
Resolution of heads	0.001 mm
Table dimensions	130x100 mm
Maximum load	15 kg



System configuration including optional accessories (for SV-2100M4/S4/H4/W4)

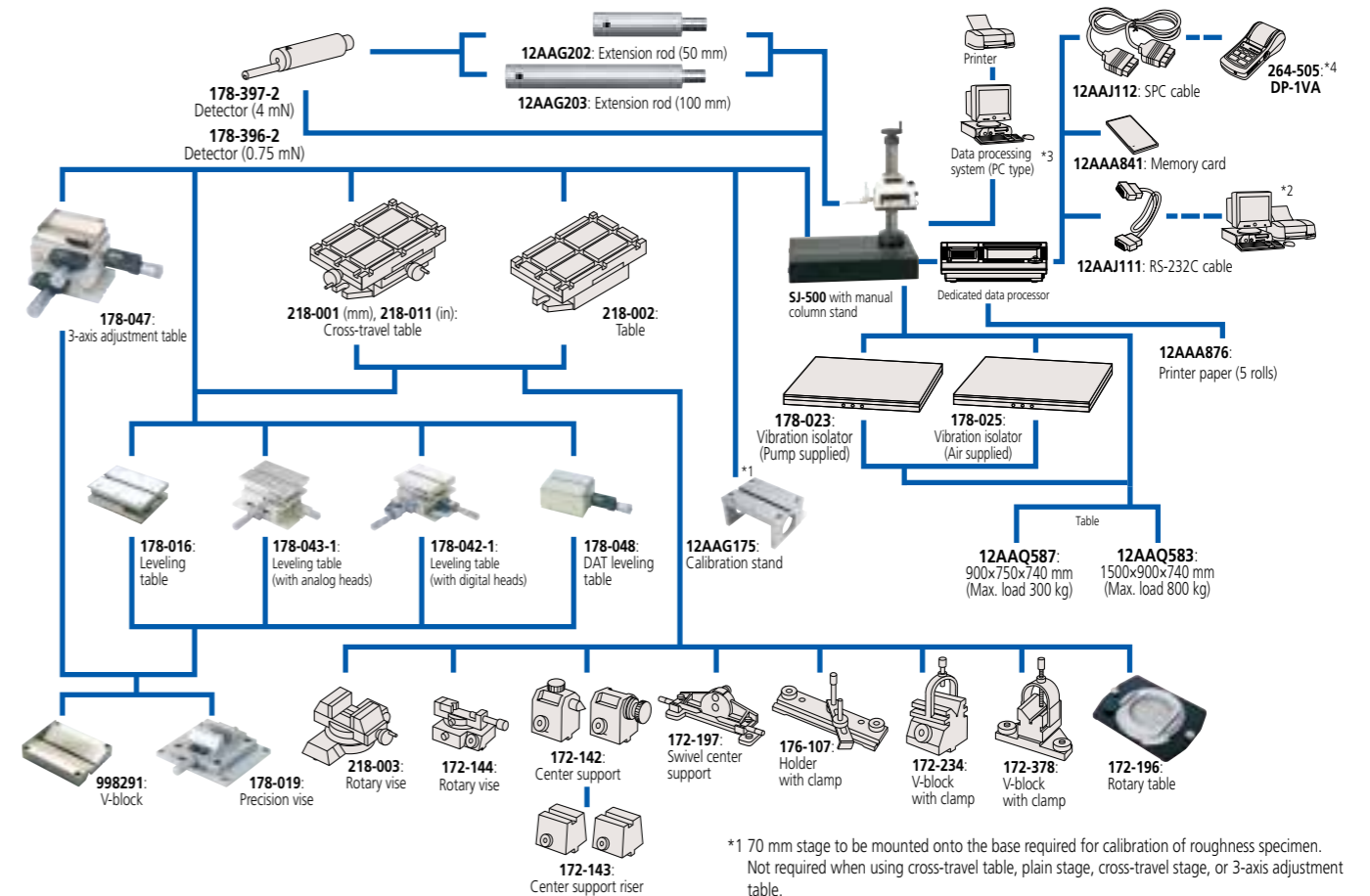


*1 70 mm stage to be mounted onto the base required for calibration of roughness specimen. Not required when using cross-travel table, plain stage, cross-travel stage, or 3-axis adjustment table.
 *2 PC for managing the analysis result externally output from the dedicated data processor.
 *3 Only SV-2100M4 can be connected.
 *4 Since print of unit does not support 'µm', use DP-1VA without print set of unit.



Optional Accessories

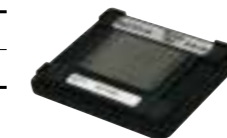
System configuration including optional accessories (for SJ-500 with optional manual column stand)



*1 70 mm stage to be mounted onto the base required for calibration of roughness specimen. Not required when using cross-travel table, plain stage, cross-travel stage, or 3-axis adjustment table.
 *2 PC for managing the analysis result externally output from the dedicated data processor.
 *3 Only SJ-500P can be connected. Use a USB cable when connecting the SJ-500P main unit and a PC. A USB cable is a standard accessory of the SJ-500P.
 *4 Since print of unit does not support 'µm', use DP-1VA without print set of unit.

Roughness specimen (standard accessory): 178-601

Display	Ra=about 3 µm
Material	Ni (Cr surface coating)



Roughness specimen: 178-604

Display	Ra=about 3 µm, about 0.4 µm
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Note: Ra=Approx. 0.4 µm should only be used for stylus tip checking.



Reference step specimen: 178-611 (mm), 178-612 (in)

For sensitivity calibration of detector

Nominal value of step	2 µm (79 µin), 10 µm (394 µin)
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- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Test Equipment
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management



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Mitutoyo Corporation
 20-1, Sakado 1-Chome,
 Takatsu-ku, Kawasaki-shi,
 Kanagawa 213-8533, Japan
 T +81 (0) 44 813-8230
 F +81 (0) 44 813-8231
<https://www.mitutoyo.co.jp>

