# SURFTEST SJ-500/SV-2100


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

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

## Improved operability

### 7.5" colour TFT LCD

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

### Positioning by joystick and control knobs

Easy-to-operate joystick for fast traverse to the measurement position. 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.

### Auto levelling table (optional)

Automatically levels the surface to be tested for easy, strain-free setup.

## 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.

## Highly durable

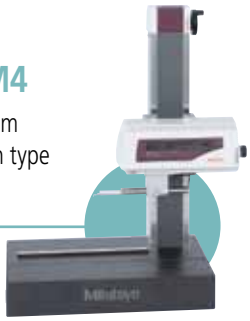
### Ceramic guideway

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

## Dedicated data processor

Advanced processing and easy operation


**SJ-500**
Traverse: 50mm
Compact, high-performance type



**SV-2100M4**
Traverse: 100mm
Manual column type

**SV-2100S4/H4/W4**
Traverse: 100mm
Power column type

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# Easy operation, high-accuracy analysis of surface roughness and fine contour

## High-visibility colour display panel

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

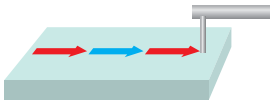
### Supports 16 languages

English, Chinese (simplified or traditional), Czech, Dutch, German, French, Hungarian, Italian, Japanese, Korean, Polish, Portuguese, Spanish, Swedish, Turkish.

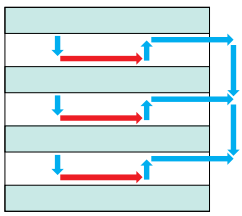
## Multiple trace programming function

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

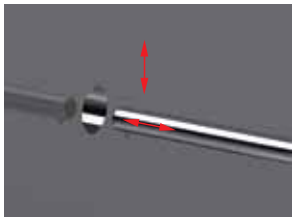


Example:
**SV-2100S4**
input screen

## Efficient positioning by joystick and adjustment knobs

Both a fast-traverse joystick (X-axis: 20mm/s for SJ-500, 40mm/s for SV-2100, Z2-axis: 20mm/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.

## Navigation function aids levelling

### Powerful support for levelling adjustments

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

### Example of 3-axis adjustable table

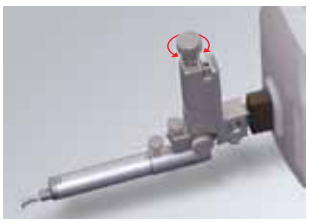

The user is guided through the levelling procedure to determine the amount of adjustment needed.

# **Surftest SJ-500** – a portable tester that offers high performance in desktop applications

High accuracy, high performance, user-friendly display and easy operation. Class-leading traverse straightness of 0.2 µm/50 mm. High-speed traverse at up to 20 mm/s under joystick control. Smooth positioning using the vertical adjustment knob.

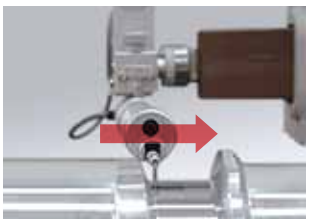

## Vertical adjustment knob

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 swivelling the detector through 90°.

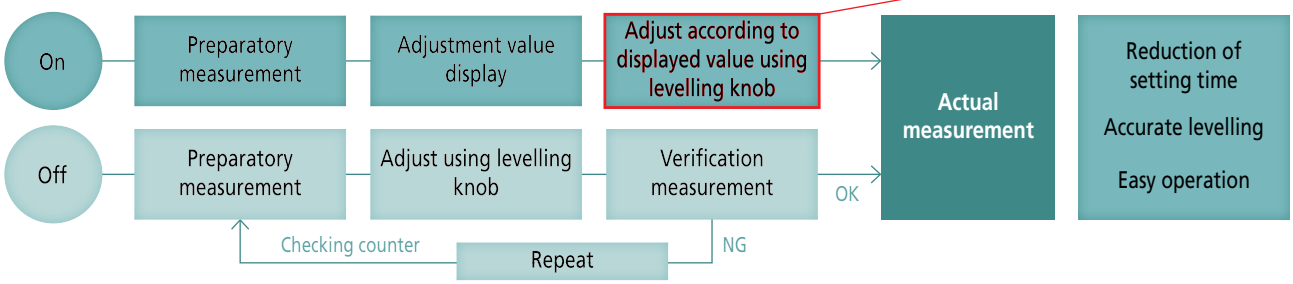


## Drive unit inclination adjustment mechanism

The Digital Adjustment Table (D.A.T.)* function is supplied as standard for efficient levelling of workpieces by up to ±1.5°.

*Patent pending (Japan, U.S., Germany)


**D.A.T. function** – powerful support for manual levelling

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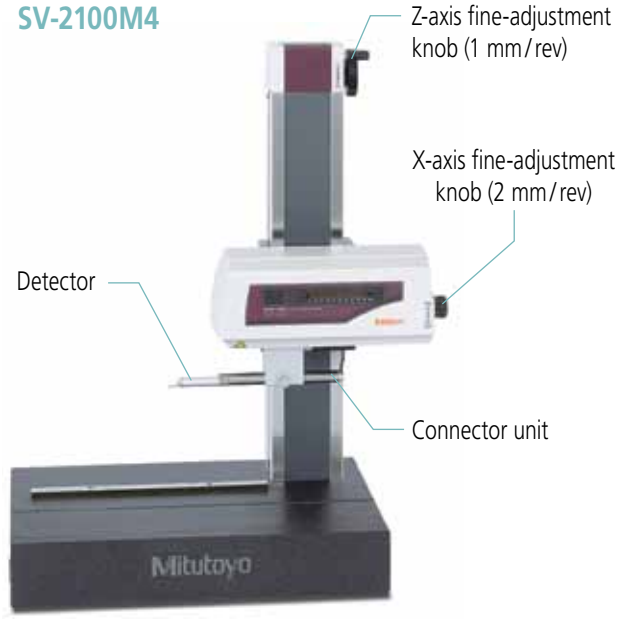
# **Surftest SV-2100** – a desktop tester that's easy to use for portable applications

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

**SV-2100M4**




**SV-2100S4**


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 µm/100 mm.

## Versatile operation

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

Measurement setup screen


## Emergency stop button

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

## Base sizes and vertical travel range on column

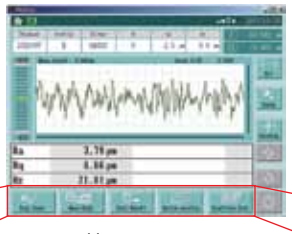
| Model No. | Vertical travel range | Vertical traverse method | Base size |
|---|---|---|---|
| **SV-2100S4** | 350 mm | Power and manual | 600 x 450 mm |
| **SV-2100H4** | 550 mm | | |
| **SV-2100W4** | | | 1000 x 450 mm |
| **SV-2100M4** | 350 mm | Manual only | 600 x 450 mm |

# Dedicated data processor

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


## Customizable menu screen

**The menu customization function allows display of frequently used menu icons.**



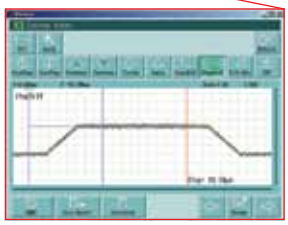
One-touch display of various screens

Home screen

Evaluation setup

Measurement setup

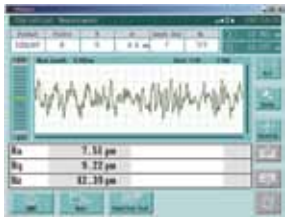
Calibration



Contour analysis

## Statistical processing

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



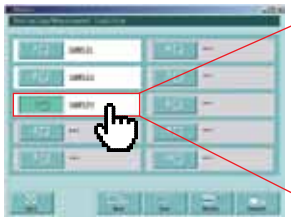
Statistical data input

Statistical results

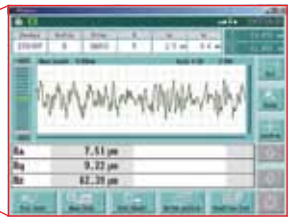
## Saving and recalling measurement setups

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

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# DATA PROCESSOR

## Analysis to international standards

Evaluates surface roughness using up to 43 parameters complying with international standards such as ISO 1997 and JIS 2001.

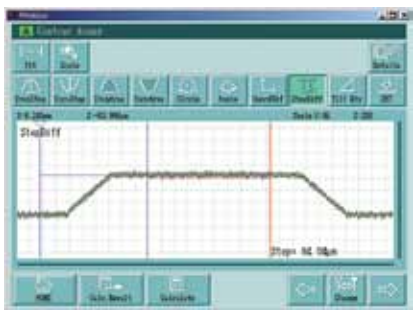
Bearing Area Curve (BAC), Amplitude Distribution Curve (ADC), and power spectrum (wavelength display) are readily available in graph form.

## A large variety of optional accessories

Options supporting measurement include an auto-levelling table, a 3-axis adjustment table, and a levelling 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.



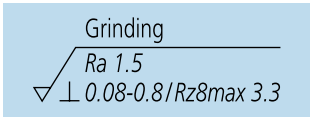
Select desired analysis icon and then specify the range.

## Easy, icon-based input of setup conditions*

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

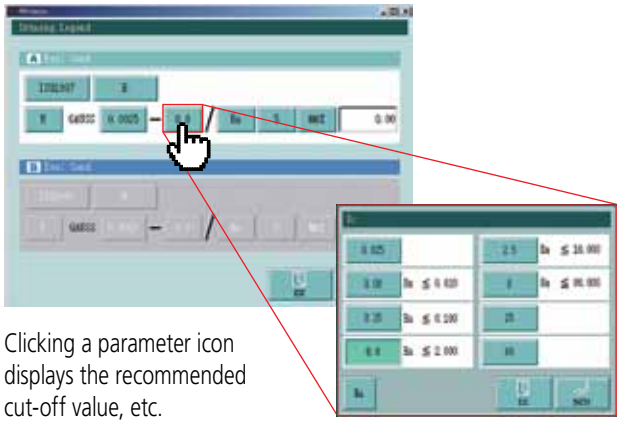
*Patent pending

Typical surface roughness symbol on drawing >




Typical result of icon-based setup >

U"X"0.08-0.8/Rz8max 3.3



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

## 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.

# **SJ-500P and SV-2100M4** – PC data processing types

Superior data processing, surface-roughness testers with PC data analysis for higher efficiency with FORMTRACEPAK software.

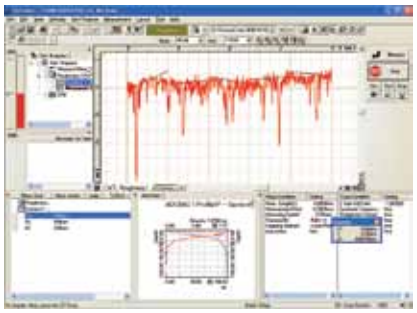
**SJ-500P** with PC

**SV-2100M4** with PC

(If a power column type with PC data-processing is desired, consider the SV-3100 series)

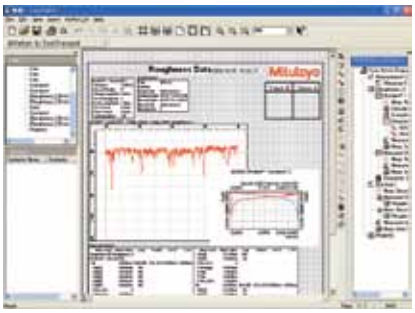

## FORMTRACEPAK: best-seller for surface roughness analysis

A best-seller dedicated software especially for surface roughness measurement and analysis capable of free print format settings for original inspection certificates.



Measurement and results display

Setup definition



Printing

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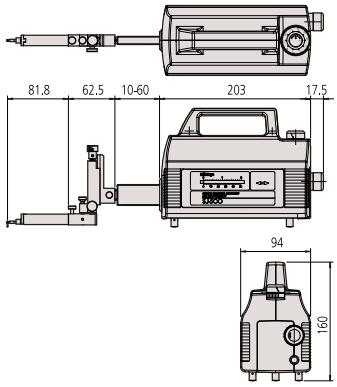
# Specifications

| Type of data processing | | | Dedicated data processor | | | | | PC system | |
|---|---|---|---|---|---|---|---|---|---|
| **Model** | | | **SJ-500** | **SV-2100M4** | **SV-2100S4** | **SV-2100H4** | **SV-2100W4** | **SJ-500P** | **SV-2100M4** |
| **Order No.** | with 0.75 mN detector | mm | **178-532-01** | **178-636-01** | **178-680-01** | **178-682-01** | **178-684-01** | **178-530-01** | **178-634-01** |
| | | inch | **178-533-01** | **178-637-01** | **178-681-01** | **178-683-01** | **178-685-01** | **178-531-01** | **178-635-01** |
| | with 4 mN detector | mm | **178-532-02** | **178-636-02** | **178-680-02** | **178-682-02** | **178-684-02** | **178-530-02** | **178-634-02** |
| | | inch | **178-533-02** | **178-637-02** | **178-681-02** | **178-683-02** | **178-685-02** | **178-531-02** | **178-635-02** |
| Travel range (operation) | X axis | | 50 mm (power drive/manual) | 100 mm (power drive/manual) | | | | 50 mm (power drive/manual) | 100 mm (power drive/manual) |
| | Z2 axis (column) | | — | 350 mm (manual) | 350 mm (power drive/manual) | | | — | 350 mm (manual) |
| Measuring range | X axis | | 50 mm | 100 mm | | | | 50 mm | 100 mm |
| | Z1 axis (detector unit) | | 800 µm/80 µm/8 µm | | | | | | |
| Resolution | X axis | | 0.05 µm | | | | | | |
| | Z1 axis (detector unit) | | 0.01 µm/800 µm range, 0.001 µm/80 µm range, 0.0001 µm/8 µm range | | | | | | |
| | Z2 axis (column) | | — | — | 1 µm | | | — | — |
| Power drive speed | X axis | | 0-20 mm/s (via joystick) | 0-40 mm/s (via joystick) | | | | 0-20 mm/s (via PC) | 0-40 mm/s (via PC) |
| | Z2 axis (column) | | — | — | 0-20 mm/s (via joystick) | | | — | — |
| Measuring speed | | | 0.02-5 mm/s | | | | | | |
| Traverse guideway straightness | | | 0.2 µm/50 mm | 0.15 µm/100 mm | | | | 0.2 µm/50 mm | 0.15 µm/100 mm |
| Stylus up/down operation | | | Arc movement | | | | | | |
| Stylus orientation | | | Downward | | | | | | |
| Detector | Measuring force | | 0.75 mN or 4 mN | | | | | | |
| | Stylus tip | | 0.75 mN detector: 60°, R2 µm or 4 mN detector: 90°, R5 µm | | | | | | |
| Applicable standards | | | JIS'82/JIS'94/JIS'01/ISO'97/ANSI/VDA | | | | | | |
| Assessed profiles | Dedicated data processor type | | P (primary profile), R (roughness profile), WC, envelope residual profile, roughness motif, waviness motif | | | | | | |
| | PC system type | | P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, E (envelope residual profile), roughness motif, waviness motif | | | | | | |
| Evaluation parameters | Dedicated data processor type | | Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Sm, S, Pc, mr (c), δc, mr, tp, Htp, Lo, lr, Ppi, HSC, Δa, Δq, Ku, Sk, Rpk, Rvk, Rk, Mr1, Mr2, A1, A2, Vo, λa, λq, R, AR, Rx, W, AW, Wx, Wte, (43 parameters), customization | | | | | | |
| | PC system type | | Pa, Pq, Psk, Pku, Pp, Pv, Pz, Pt, Pc, PSm, PΔq, Pmr (c), Pmr, Pδc, Ra, Rq, Rsk, Rku, Rp, Rv, Rz, Rt, Rc, RSm, RΔq, Rmr (c), Rmr, Rδc, Wa, Wq, Wsk, Wku, Wp, Wv, Wz, Wt, Wc, WSm, WΔq, Wmr (c), Wmr, Wδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rx, AR, R, Wx, AW, W, Wte, Ry, RyDIN, RzDIN, R3y, R3z, S, HSC, Lo, lr, Δa, λa, λq, Vo, Htp, NR, NCRX, CPM, SR, SAR, NW, SW, SAW | | | | | | |
| Analysis graphs | Dedicated data processor type | | ADC, BAC, power spectrum graph | | | | | | |
| | PC system type | | ADC, BAC graph, power spectrum graph, auto-correlation graph, Walsh power spectrum graph, Walsh auto-correlation graph, slope distribution graph, local peak distribution graph, parameter distribution graph | | | | | | |
| Curved surface compensation | Dedicated data processor type | | Parabolic compensation, hyperbolic compensation, elliptical compensation, circular compensation, conic compensation, inclination (entire, arbitrary) | | | | | | |
| | PC system type | | Parabolic compensation, hyperbolic compensation, elliptical compensation, circular compensation, conic compensation, inclination (entire, arbitrary), polynomial compensation | | | | | | |
| Contour analysis | Dedicated data processor type | | Area, circle, angle, coordinate difference, step, inclination | | | | | | |
| | PC system type (FORMTRACEPAK) | | Area, circle, angle, coordinate difference, step, inclination | | | | | | |
| Filters | Dedicated data processor type | | 2CR-75%, 2CRPC-75%, gaussian, robust-spline | | | | | | |
| | PC system type | | 2CR-75%, 2CR-50%, 2CRPC-75%, 2CRPC-50%, gaussian, robust-spline | | | | | | |
| Base size (W x D) | | | — | 600 x 450 mm | | | 1000 x 450 mm | — | 600 x 450 mm |
| Base material | | | — | Granite | | | | — | Granite |
| External dimensions (W x D x H) | Main unit (mm) | | 425 x 94 x 160 | 716 x 450 x 863 | 766 x 450 x 966 | 766 x 450 x 1166 | 1166 x 450 x 1176 | 425 x 94 x 160 | 716 x 450 x 863 |
| | Display unit (mm) | | 330 x 270 x 124 | | | | | — | — |
| | Electronic unit (mm) | | — | — | 372 x 245 x 71.8 | | | — | — |
| | PC I/F unit (mm) | | — | — | — | — | — | 350 x 263 x 86 | |
| Mass | Main unit | | 2.7 kg | 140 kg | | 150 kg | 220 kg | 2.7 kg | 140 kg |
| | Display unit | | 4.0 kg | | | | | — | — |
| | Electronic unit | | — | — | 3.0 kg | | | — | — |

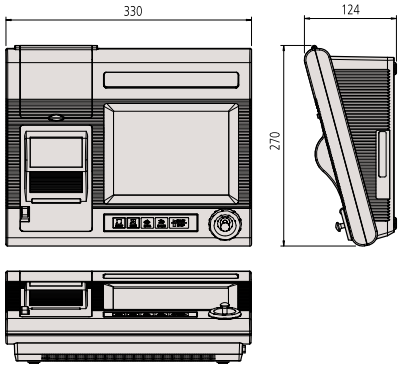



# Dimensions

## SJ-500

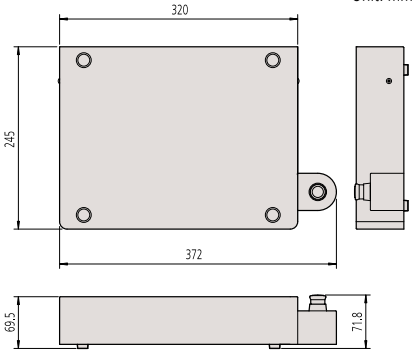



## Dedicated data processor

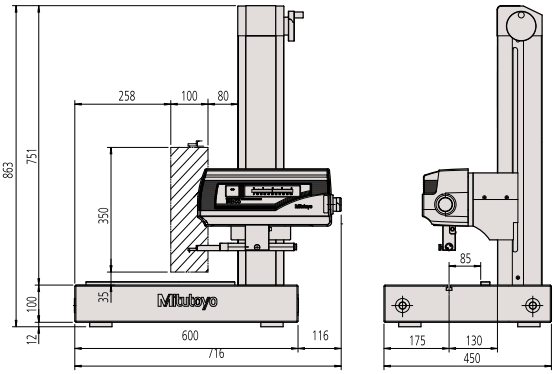



## Electronic unit

Unit: mm

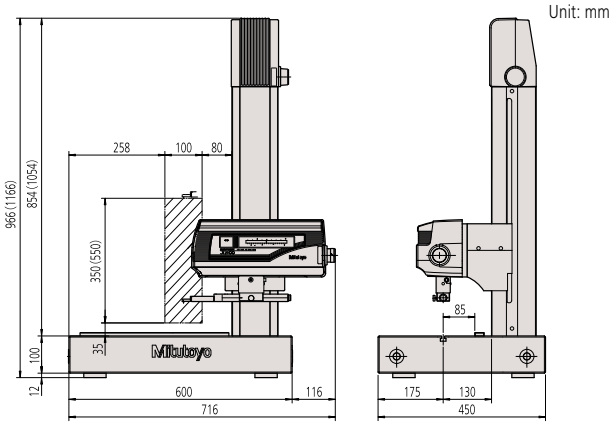



## SV-2100M4

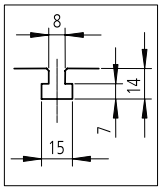



## SV-2100S4 / SV-2100H4

Unit: mm



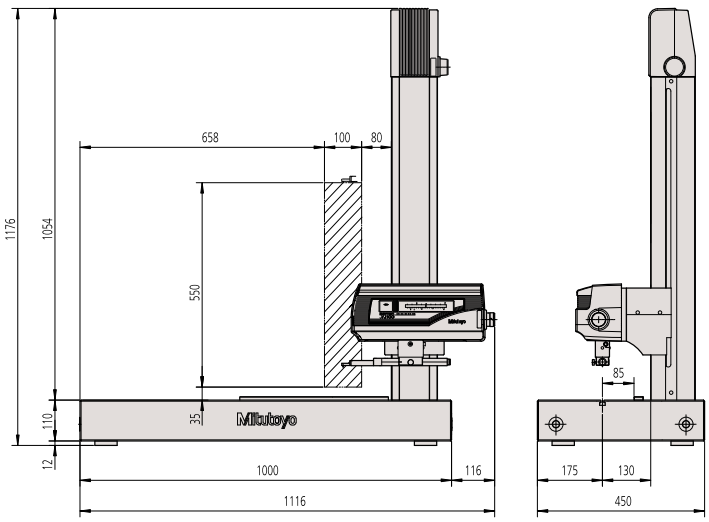

## SV-2100W4




T-groove dimensions
(common to all types)

Measuring range

Unit: mm

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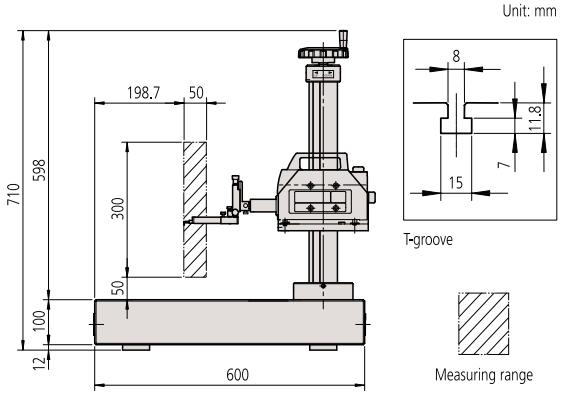
# Optional accessories

## Manual column stand

**178-085***

Suitable for desktop use in inspection rooms and such.

*Does not include measuring unit

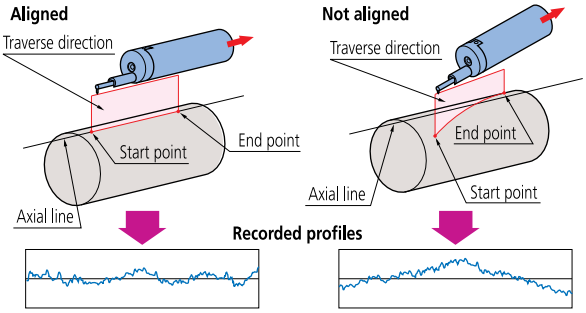



| | |
|---|---|
| Vertical adjustment range | 300 mm |
| Dimensions (W x D x H) | 600 x 450 x 710 mm |
| Mass | 110 kg |

## 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 levelled with this table.




| | |
|---|---|
| Inclination adjustment angle | ±1.5° |
| Swivelling angle | ±2° |
| Y-axis range | ±12.5 mm |
| Resolution of heads | 0.001 mm |
| Table dimensions | 130 x 100 mm |
| Maximum load | 15 kg |

## DAT levelling table

**178-048**

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

| | |
|---|---|
| Inclination adjustment angle | ±1.5° |
| Maximum load | 7 kg |
| Table dimensions | 130 x 100 mm |

## Micro-chuck

**211-031**

This chuck is suitable for clamping extra-small diameter workpieces (ø1 mm or less), which cannot be clamped with the centering chuck.

| | |
|---|---|
| Clamping range OD | 0-15 mm |
| Dimensions | ø118 x 48.5 mm |
| Mass | 0.6 kg |

## Quick chuck

**211-032**

This chuck is useful when measuring small workpieces. The knurled ring makes clamping very easy.

| | | |
|---|---|---|
| Retention range | Inner latch OD | 1-36 mm |
| | Inner latch ID | 14-70 mm |
| | Outer latch OD | 1-75 mm |
| Dimensions | | ø118 x 41 mm |
| Mass | | 1.2 kg |

# Optional accessories

## Auto-levelling table

**178-081** (for SJ-500/SV-2100M4)
**178-083** (for SV-2100S4/H4/W4)
This stage performs fully automatic levelling as measurement starts, freeing the user from this tedious operation. Fully automatic levelling can be done quickly by anyone, easily and reliably.

| | |
|---|---|
| Inclination adjustment angle | ±2° |
| Maximum load | 7 kg |
| Table dimensions | 130 x 100 mm |
| Mass | 3.5 kg |

## Levelling table

**178-043-1** (with analogue heads)
**178-042-1** (with digital heads)

178-043-1

178-042-1

| Order No. | 178-043-1 | 178-042-1 |
|---|---|---|
| Table dimensions | 130 x 100 mm | |
| Maximum load | 15 kg | |
| Inclination adjustment | ±1.5° | |
| Swivelling angle | ±3° | |
| X/Y-axis travel range | ±12.5 mm | |
| Resolution | 0.01 mm | 0.001 mm |
| Dimensions | 220 x 189 x 83 mm | 262 x 233 x 83 mm |
| Mass | 6 kg | 6.3 kg |

## Rotary vice

**218-003**
Two-slide jaw type.

| | |
|---|---|
| Maximum workpiece diameter | ø60 m |
| Minimum reading | 1° |

## Cross-travel table

**218-001**
Useful for fine adjustment of workpiece position in X and Y.

| | |
|---|---|
| Table dimensions | 280 x 180 mm |
| XY travel | 100 x 50 mm |

## V-block

**998921**
Can be mounted on a levelling table.

| | |
|---|---|
| Workpiece diameter | 1-160 mm |

## Roughness specimen

**178-601**
Standard accessory.

| | |
|---|---|
| Display | Ra = approx. 3 µm |
| Material | Ni (TiN surface coating) |

## Roughness specimen

**178-604**
A dual-purpose specimen incorporating a surface of a suitable roughness (Ra = 0.4 µm) for checking the condition of styli.

| | |
|---|---|
| Display | Ra = approx. 0.4 and 3 µm |
| Material | Chromium-plated steel |

## Reference step specimen

**178-611**
**178-612**
For calibrating detector sensitivity.


| | |
|---|---|
| Nominal value of step | 2 µm (79 µin), 10 µm (394 µin) |

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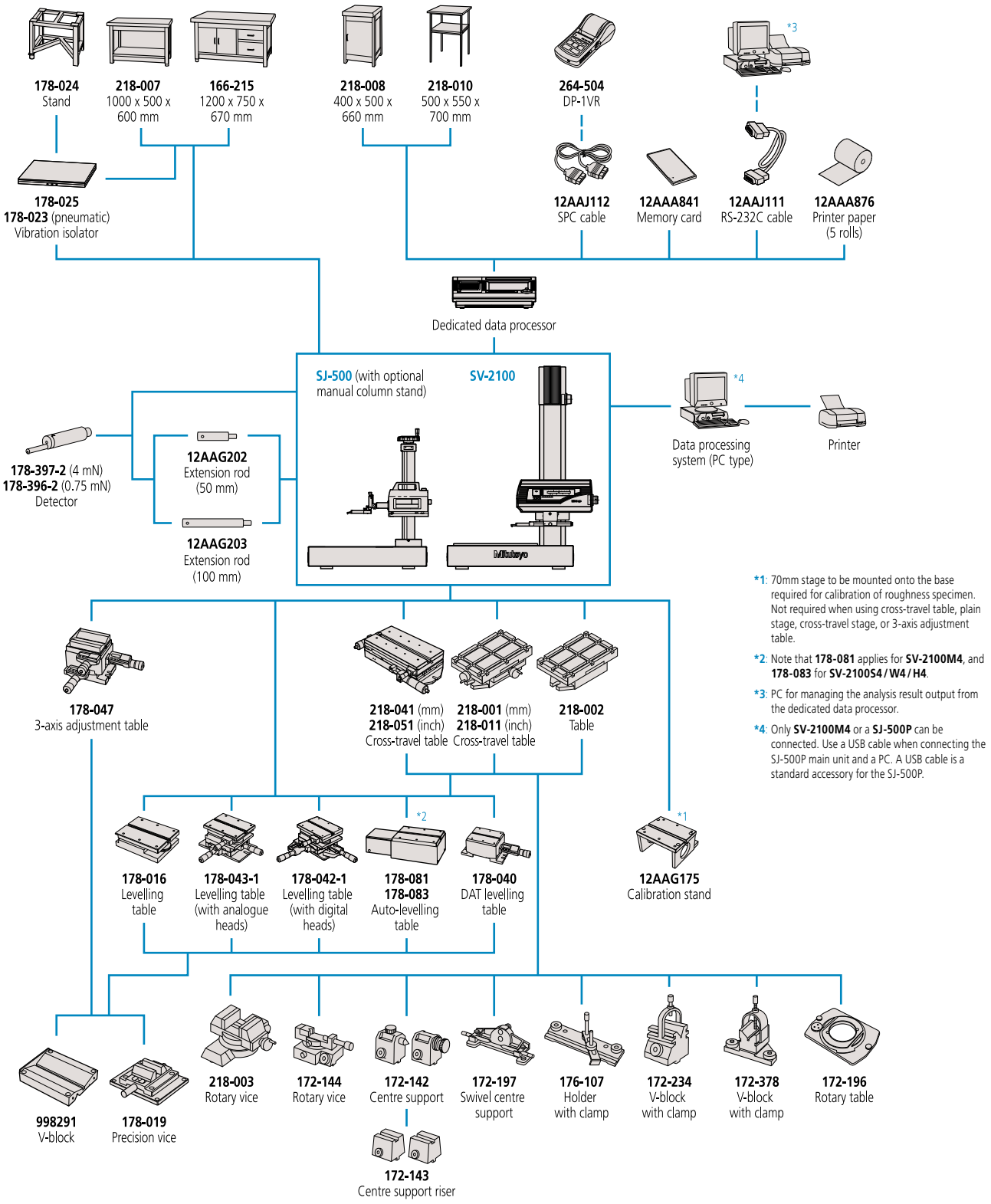
# Accessories

## System configuration including optional accessories




*1: 70mm 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: Note that **178-081** applies for **SV-2100M4**, and **178-083** for **SV-2100S4 / W4 / H4**.

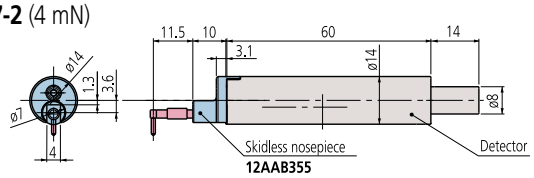
*3: PC for managing the analysis result output from the dedicated data processor.

*4: Only **SV-2100M4** or a **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 for the SJ-500P.

# Optional styli

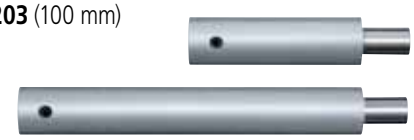
## Detectors

**178-396-2** (0.75 mN)
**178-397-2** (4 mN)




## Extension rods

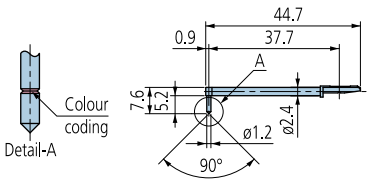
**12AAG202** (50 mm)
**12AAG203** (100 mm)



## Styli

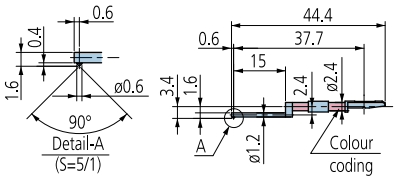
### Standard stylus

**12AAE882** (1 µm)*
**12AAE924** (1 µm)**
**12AAC731** (2 µm)*
**12AAB403** (5 µm)**
**12AAB415** (10 µm)**
**12AAE883** (250 µm)



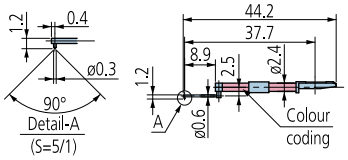

### For small hole

**12AAC732** (2 µm)*
**12AAB404** (5 µm)**
**12AAB416** (10 µm)**



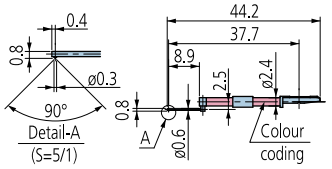

### For very small hole

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



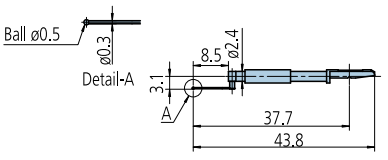

### For extra small hole

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



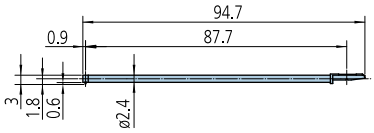

### For ultra small hole

**12AAJ662** (0.25 mm)



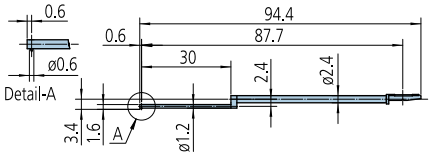

### Double-length for deep hole

**12AAE898** (2 µm)*
**12AAE914** (5 µm)**



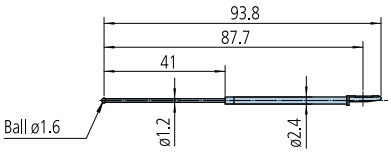

### For small hole / double-length for deep hole

**12AAE892** (2 µm)*
**12AAE908** (5 µm)**



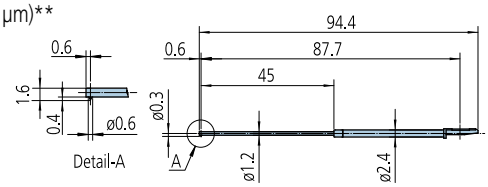

### For very small hole

**12AAE884** (0.8 mm)




### For small slotted hole

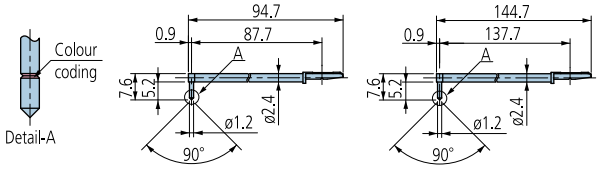
**12AAE938** (2 µm)*
**12AAE940** (5 µm)**




### For deep hole (double-length and triple-length)

**12AAC740** (2 µm)*
**12AAB413** (5 µm)**
**12AAB425** (10 µm)**

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




() tip radius, * 60° tip angle, ** 90° tip angle

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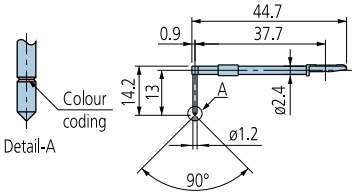
## Styli

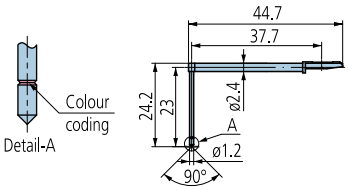
### For deep goove (10 mm)

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



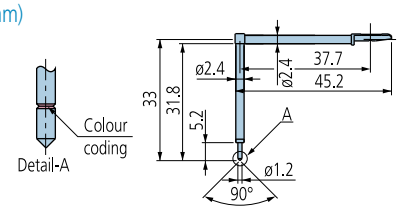

### For deep groove (20 mm)

**12AAC736** (2 µm)*
**12AAB408** (5 µm)**
**12AAB420** (10 µm)**



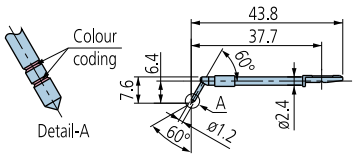

### For deep groove (30 mm)

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



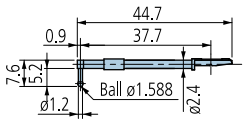

### For gear tooth

**12AAB737** (2 µm)*
**12AAB410** (5 µm)**
**12AAB422** (10 µm)**



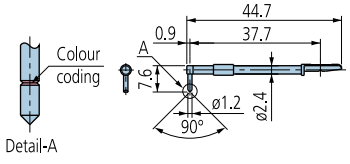

### For rolling circle waviness surface

**12AAB338** (ø1.588)



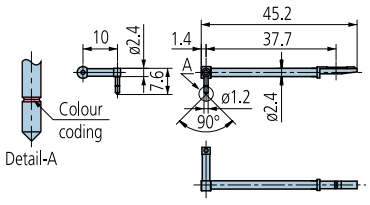

### For knife-edge detector

**12AAC738** (2 µm)*
**12AAB411** (5 µm)**
**12AAB423** (10 µm)**



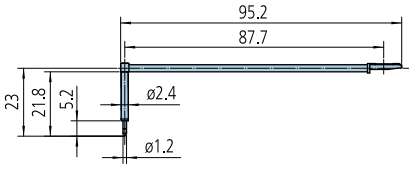

### For eccentric arm

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



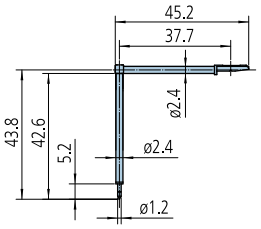

### For deep groove (20 mm) / double-length for deep hole

**12AAE893** (2 µm)*
**12AAE909** (5 µm)**



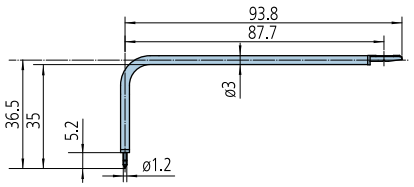

### For deep groove (40 mm)

**12AAE895** (2 µm)*
**12AAE911** (5 µm)**



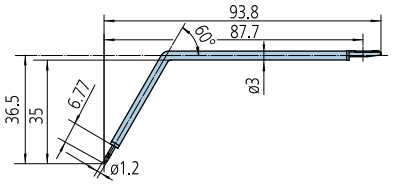

### For deep groove (30 mm) / double-length for deep hole

**12AAE894** (2 µm)*
**12AAE910** (5 µm)**



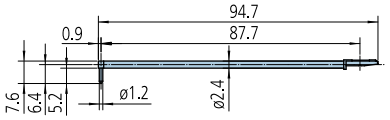

### For gear tooth / double-length for deep hole

**12AAE896** (2 µm)*
**12AAE912** (5 µm)**



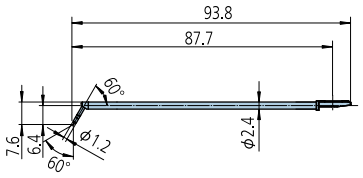

### For rolling circle waviness / double-length for deep hole

**12AAE886** (250 µm)



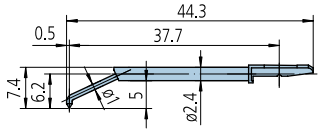

### For corner hole / double-length for deep hole

**12AAM601** (2 µm)
**12AAM603** (5 µm)




### For bottom surface

**12AAE899** (2 µm)*
**12AAE915** (5 µm)**




() tip radius, * 60° tip angle, ** 90° tip angle

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- Coordinate Measuring Machines
- Vision Measuring Systems
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- Small Tool Instruments and Data Management

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