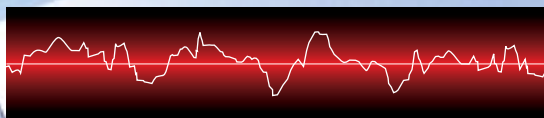
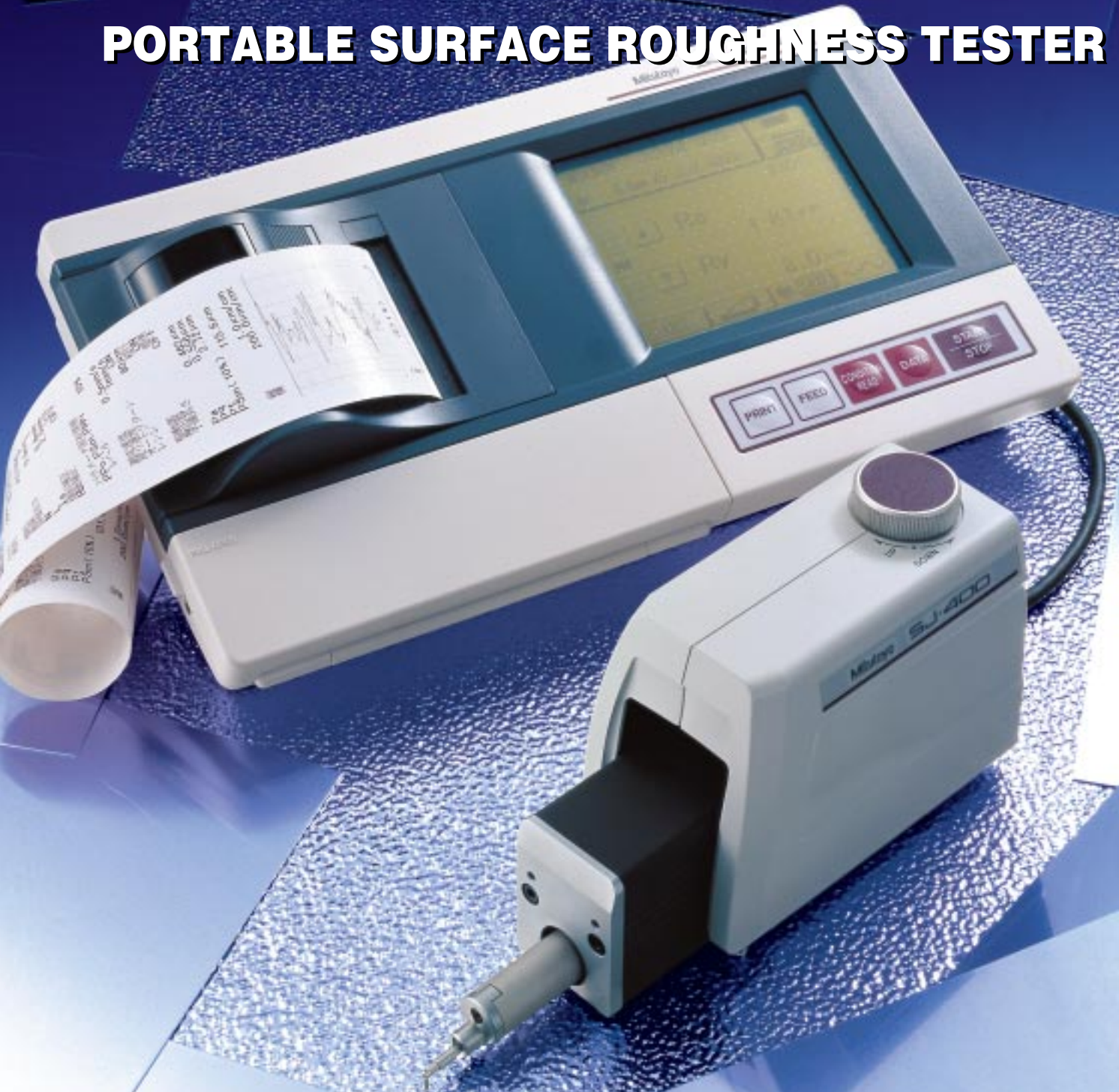


**Mitutoyo**

# Surftest SJ-400

## PORTABLE SURFACE ROUGHNESS TESTER



# Surftest SJ-400

**Revolutionary New Portable Surface Roughness Testers Make Their Debut!**

Now, long-awaited specifications and functions are at hand: compactness, skidless measurement, high-accuracy roughness detection, multi-function, and ease of operation.

1

## **Requirement** **High-accuracy measurements with a hand-held tester**

A wide-range, high-resolution detector and an straight drive unit provide superior high-accuracy measurement in its class.

### **<Detector>**

Measuring range: 800 $\mu$ m  
Resolution: 0.000125 $\mu$ m (at 8 $\mu$ m range)

### **<Drive unit>**

Straightness/traverse length  
SJ-401: 0.3 $\mu$ m/25mm  
SJ-402: 0.5 $\mu$ m/50mm



4

## **Requirement** **Measurement/evaluation of stepped features and straightness**

Ultra-fine steps, straightness and waviness can be measured by switching to the skidless measurement function. The ruler function enables simpler surface feature evaluation on the LCD monitor.

2

## **Requirement** **Roughness parameters that conform to international standards**

The SJ-400 series performs 36 kinds of roughness measurements that conform to the latest ISO, DIN, and ANSI standards as well as to JIS standards (1994/1982).



3

## **Requirement** **Measurement of cylinder surface roughness even with a compact type**

The skidless measurement and R-surface compensation functions make it possible to evaluate cylinder surface roughness.

5

## **Requirement** **Advanced data processing with an extended analyzing program**

The SJ-400 series allows data processing that is identical to that in the high-end class. These data analysis and report creation capabilities can be achieved with this system using the surface roughness analyzing program SURFPAK-SJ.

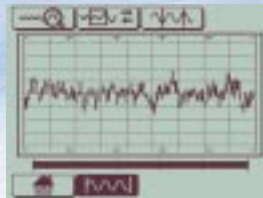
# Series

6

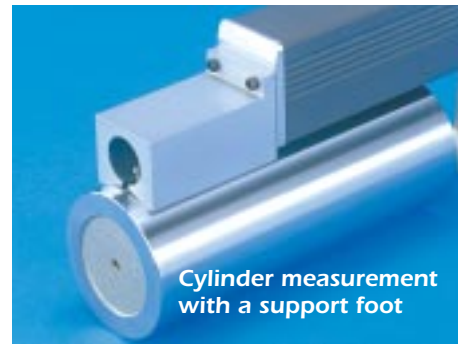
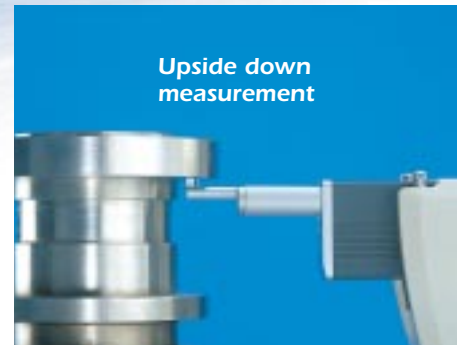
## Requirement

**Confirmation of a measurement results and an assessed profile without printout**

Using the integrated large touch-panel LCD monitor, measurement results and an assessed profile can be clearly displayed.



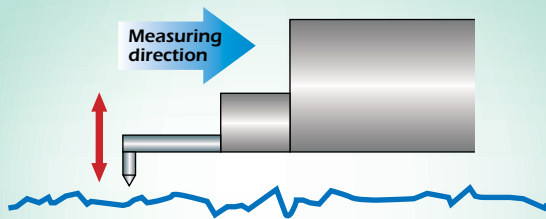
## Measurement Applications



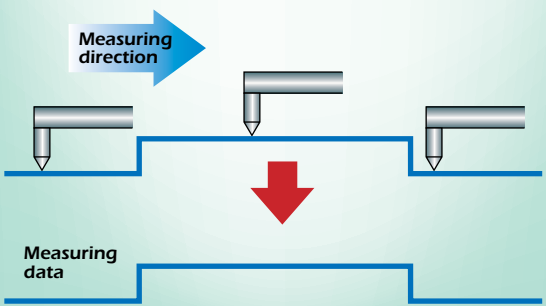
# The SJ-400 Series Performs Skidless Measurements

The SJ-400 series employs a detector with exchangeable nosepiece that is interchangeable between skidless measurement and skid measurement. It allows optional evaluation according to measurement conditions.

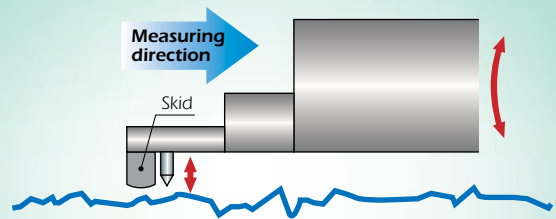
## Skidless measurement



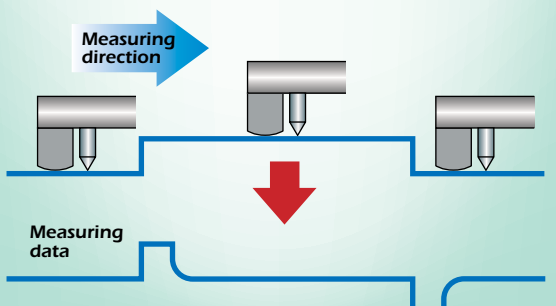
- In skidless measurement surface irregularities are detected with reference to the guide on the drive unit, it can measure waviness and finely stepped features in addition to surface roughness.
- The SJ-400 series supports a variety of surface feature measurements by replacing the stylus.



## Skid measurement



- In skid measurement surface irregularities are detected with reference to the skid that traces waviness on a measuring surface, it cannot measure waviness and stepped features exactly.
- This measurement facilitates the leveling of the detector/drive unit.



## Simplified surface feature evaluation

### with the ruler function

- This function determines the coordinate difference between two arbitrary points, such as a step height and a pitch interval.



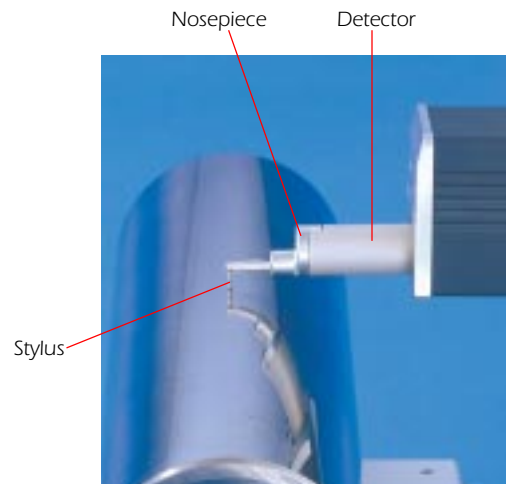
Ruler Analysis screen

Coordinate difference

Ruler key

## A variety of accessories

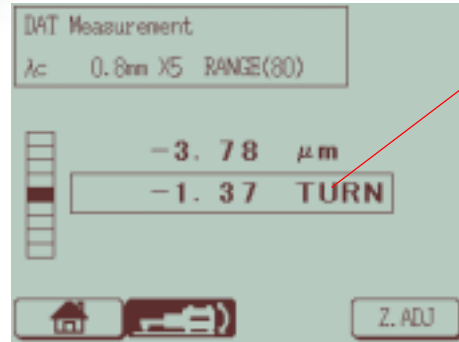
- A stylus and a nosepiece can be selected according to the measurement condition. (See page 9 – 11.)



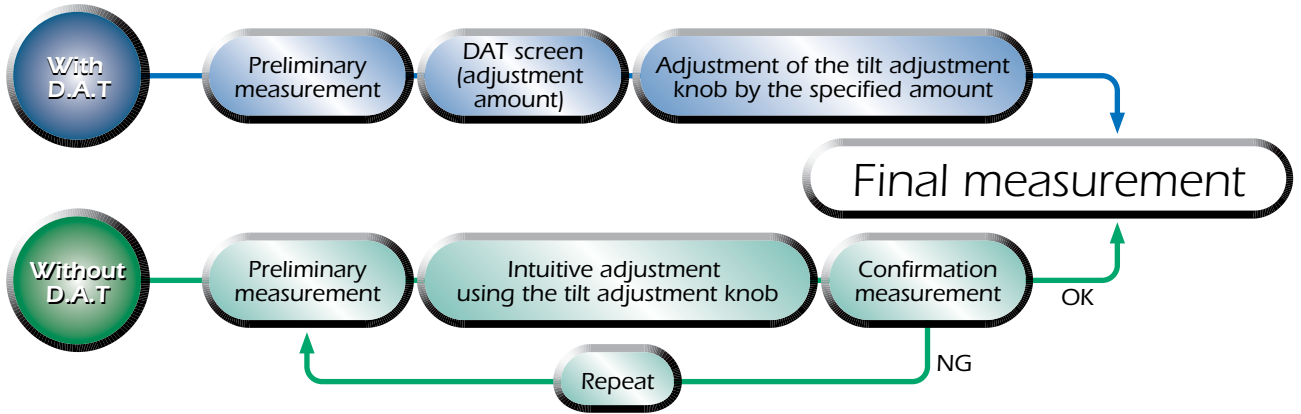
# Powerful Support for Leveling

The height-tilt adjustment unit comes as standard for powerful support of the leveling operation at skidless measurement. This unique and convenient function has achieved high-accuracy measurement with ease of operation.

## The D.A.T. Function

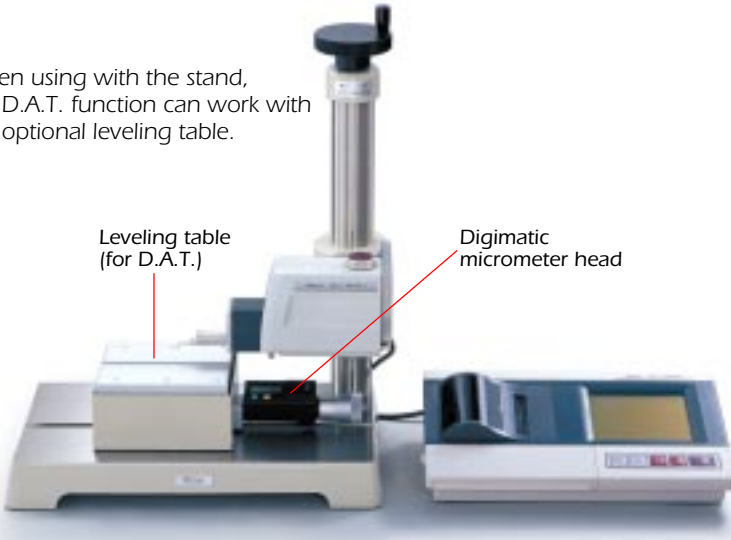


DAT screen showing the amount to be adjusted

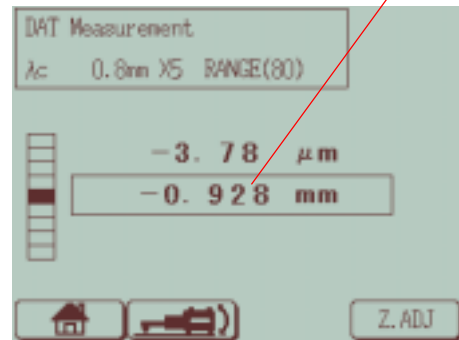


## The D.A.T. Function for the optional leveling table

When using with the stand, the D.A.T. function can work with the optional leveling table.



Move the micrometer head by this amount.



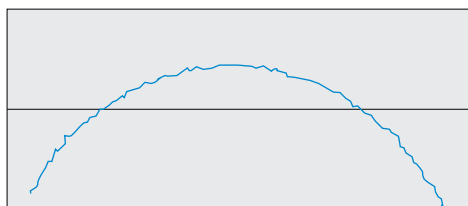
DAT screen showing the amount to be adjusted

# Full Equipped Measuring Functions Even in a Compact Tester

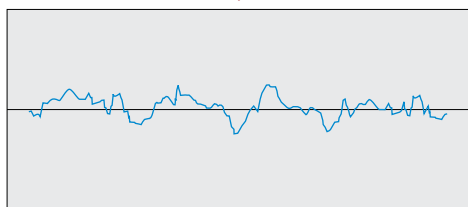
## Support for R-surface roughness

### measurement (skidless measurement)

Usually a workpiece with a spherical or cylindrical surface cannot be evaluated. By eliminating the round surface element with a filter, this function processes this R-surface data as if it was taken from a flat surface.



Measured profile



Assessed profile

## Statistical processing function

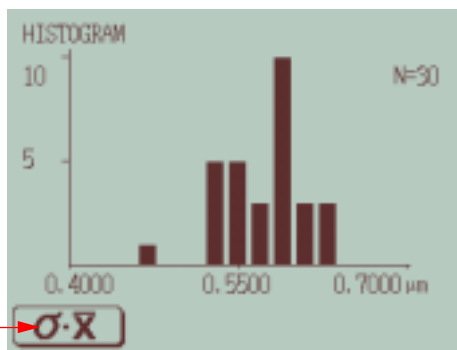
This function performs statistical processing of multiple measurements for one roughness parameter. It is possible to display and print histograms in addition to statistical results (mean, standard deviation, maximum value/minimum value, and acceptance ratio).

Statistics	2000-02-16
Ra	SAMPLE NUM (030)
$\bar{x}$	0.575 $\mu\text{m}$
$\sigma$	0.094 $\mu\text{m}$
MAX	0.631 $\mu\text{m}$
MIN	0.477 $\mu\text{m}$
PASS RATIO	100.0%

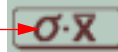
Statistical



Switchable

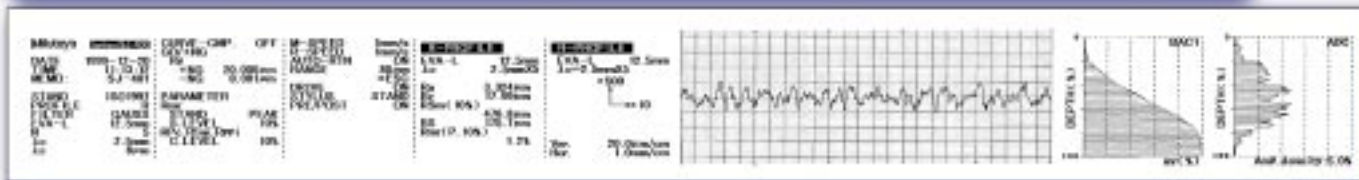
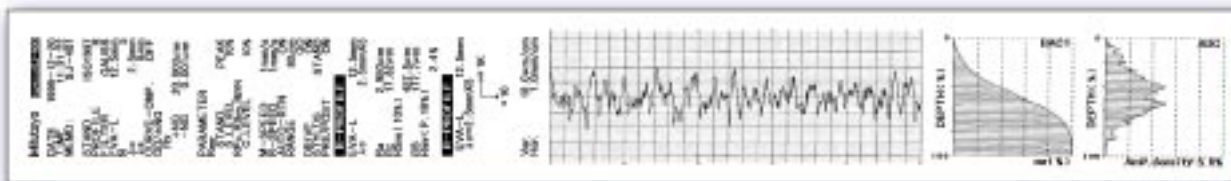


Histograms



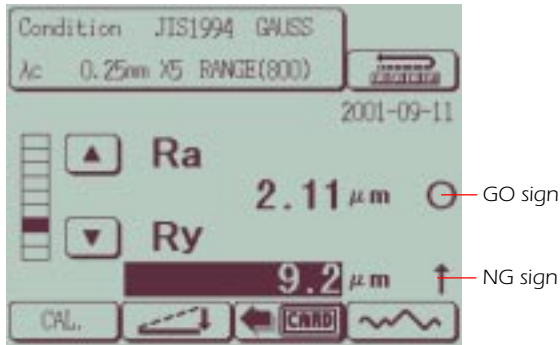
## Built-in thermal printer

A high-quality, high-speed thermal printer prints out measured results. It can also print a BAC curve or an ADC curve as well as calculated result and assessed profile. These results and profiles can be printed out in landscape format, just as they appear on the LCD. They are presented in an easy-to-understand form.



## GO/NG judgment function

According to the upper/lower tolerance limits set the GO/NG judgment sign is displayed and the calculation result is highlighted (max. for 3 roughness parameters).



Calculation Result screen with GO / NG judgment result

## Real sampling function

This function samples a displacement of the stylus for the specified time without traversing the detector. It has a wide range of uses such as a simplified vibration meter or a displacement gage incorporated in another system.

## Recalculation function

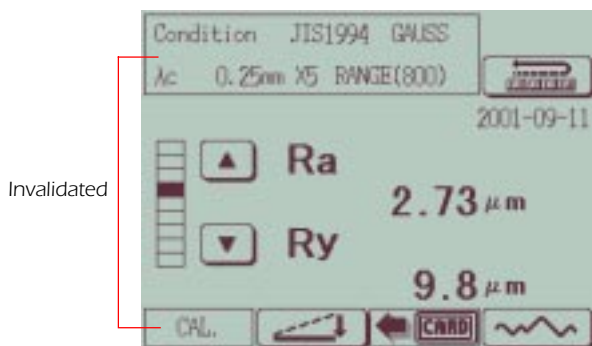
It is possible to recalculate already measured data for other evaluation by changing the current standard, assessed profile and roughness parameters.

## Arbitrary length measurement function

This function allows a sampling length to be arbitrarily set in 0.1mm increments (SJ-401: 0.1mm to 25mm, SJ-402: 0.1mm to 50mm). It also allows the SJ-400 series to make both narrow and wide range measurements.

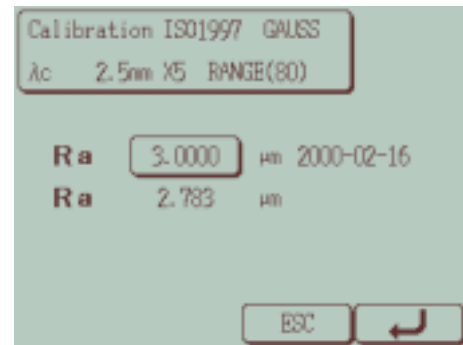
## Key masking function

This function invalidates the key operation on the touch panel. Since only the sheet key operation is valid, there is no chance for error in data, including calibration conditions and measurement conditions.



## Auto-Calibration function

The SJ-400 series is equipped with the Ra calibration and step calibration methods for detector calibration (gain adjustment). In both calibration methods only the reference value described in the precision specimen needs to be entered. No other operation such as volume control is required.



Calibration screen

## Saving/calling the measured data and conditions

It is possible to save the measurement conditions and measured data in the control unit or memory card (optional) and to recall the data from both.

Batch printout of the measured data after performing on-site measurement and saving the data will raise measurement efficiency.

### Saving capacity

Measurement conditions	Control unit: 5 conditions Memory card: 20 conditions
Measured data	Memory card: 50 or more pieces of data

## Customize function

This function selects only the necessary parameters for calculation/display from a variety of roughness parameters. It is also possible to add parameters later for recalculation.

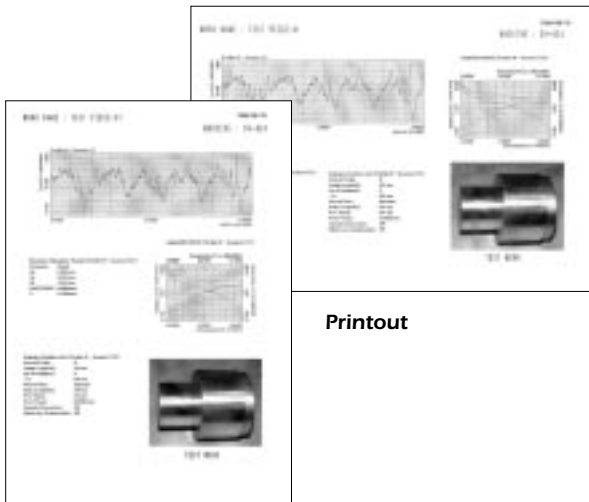
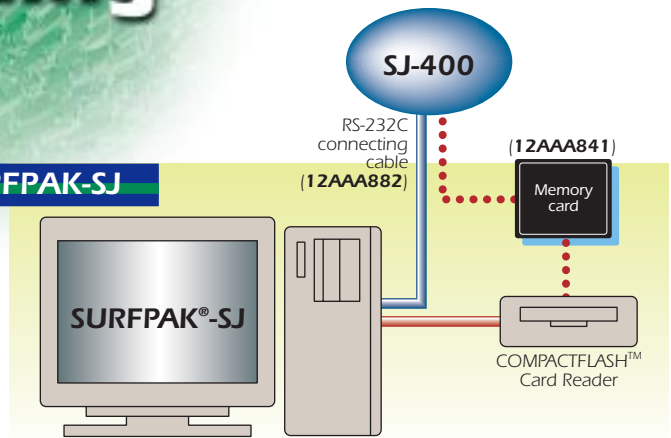


Customized screen

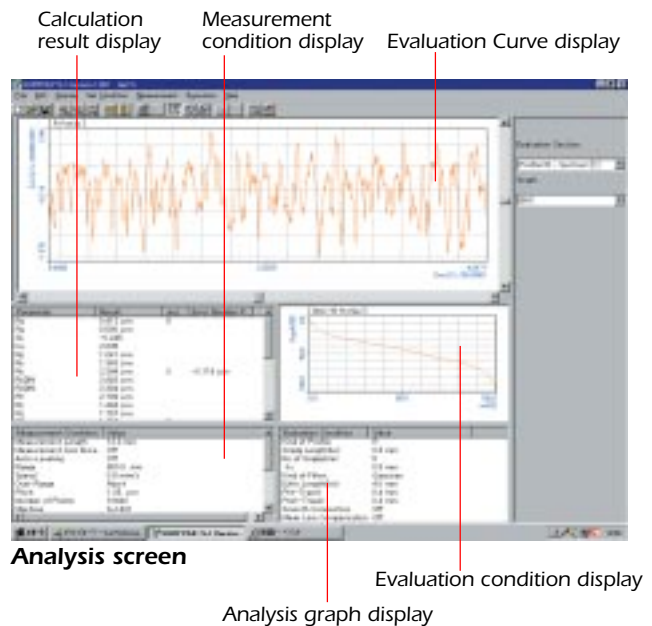
# Various Evaluations in Conjunction with the Analyzing Program

## Surface roughness analyzing program SURFPAK-SJ

In conjunction with SURFPAK-SJ, the SJ-400 series has the same excellent operability and advanced analysis performance that is achieved by a high-end desk top tester. The SURFPAK-SJ increases the number of roughness parameters and analysis graphs, and also allows the elimination of unnecessary data and the evaluation of surface features including step and pitch. In addition to surface roughness capabilities, the SJ-400 series can make a total evaluation of a complete set of surface features. This small system can be used as a high-end desktop evaluation system.



Printout



Analysis screen

Analysis graph display

## SURFPAK-SJ Specifications

Industrial standards met	ISO 4287:1997, ANSI / ASME B46.1-1995, JIS B0601 1994, etc.
Assessed profiles	P (primary profile), R (roughness profile), WC, WCA, WE WEA DIN4776 profile, E (envelope residual profile), R - motif (roughness motif (waviness motif))
Evaluation Parameters	P, R, WC, WCA, WE, WEA, DIN4776, E R - motif W - motif
	Ra, Rq, Rz, Rz(JIS), Ry, Ry (DIN), Rc, Rpi, Rp, Rpmax Rvi, Rv, Rvmax, Rti, Rt, R3zi, R3z, 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
	Rx, R AR, SR, SAR, NR, NCRX, CPM
	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) fl: 0.25mm, 0.8mm, 2.5mm, 8mm or arbitrary value (.01", .03" or arbitrary value) fn: 0.25mm, 0.8mm, 2.5mm, 8mm or arbitrary value (.01", .03" or arbitrary value)
Sampling length [L]*	0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm or arbitrary value (.001", .003", .01", .1", .3", 1" or arbitrary value)
Data compensation	Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, Conic automatic compensation, polynomial compensation, polynomial automatic compensation
Data deletion function	<ul style="list-style-type: none"> <li>Data deletion to avoid an over-range error</li> <li>Data deletion in a specific range to perform recalculation</li> <li>Automatic data deletion (according to conditions set previously)</li> </ul>
Recording magnifications	Vertical: 100X - 500,000X Horizontal: 1X - 10,000X
Special functions for report generation	<ul style="list-style-type: none"> <li>Bit-map image paste-up function</li> <li>Multiple data layout function</li> </ul>
OS requirement	Windows®95 / Windows®98 / Windows®NT4.0

\* Arbitrary value can be specified in the following range: from 0.3mm (.012") to the maximum traverse length.

# Optional Accessories

## Stand, Tables

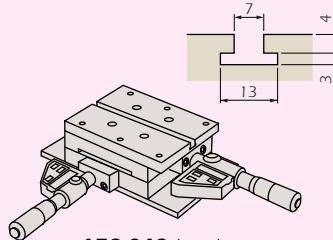
### XY leveling tables



**178-042-1** (mm)  
**178-052-1** (inch/mm)



**178-043-1** (mm)  
**178-053-1** (inch/mm)



**178-049** (mm)  
**178-059** (inch/mm)

Order No.	178-042-1, 178-052-1	178-043-1, 178-053-1	178-049, 178-059
Table size	130 x 100mm/5.12" x 3.94"		
Maximum loading weight	15Kg		
Inclination angle	±1.5°		—
Horizontal rotating angle	±3°		—
X, Y axis displacement	±12.5mm/.49"	±12.5mm/.49"	±12.5mm/.49"
Min. reading of the micrometer head	0.001mm/.00005"*	0.001mm/.001"*	0.001mm/.00005"*
Dimension	262 x 233 x 83mm	220 x 189 x 83mm	262 x 233 x 55mm
Mass	6.3kg	6kg	5kg

\* Digital display

## Measuring data output

### Input tool

Data input device for spreadsheet software.



**264-005**

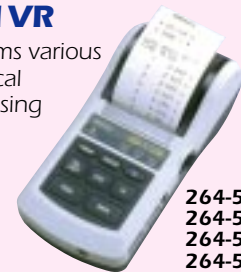
### SPC connecting cables

Connects a control unit with DP-1VR.

1m: **936937**  
2m: **965014**

### DP-1VR

Performs various statistical processing



**264-503** (100V)  
**264-503A** (120V)  
**264-503D** (220V)  
**264-503E**  
(240/220V)

## Others

### Memory card

Saves/Retrieves the measuring conditions (up to 20), measured data, and statistical data.

Memory: 8MB **12AAA841**



### Reference step specimen

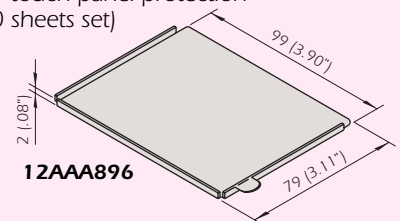
Used to calibrate detector sensitivity.  
Step nominal value: 2µm/10µm



**178-611** (mm)  
**178-612** (inch/mm)

### LCD protective sheet

For touch panel protection (10 sheets set)



**12AAA896**

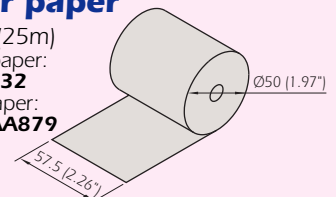
### Printer paper

Five rolls (25m)  
Standard paper:

**270732**

Durable paper:

**12AAA879**



## Precision vise

- Can be used with the XY leveling table.

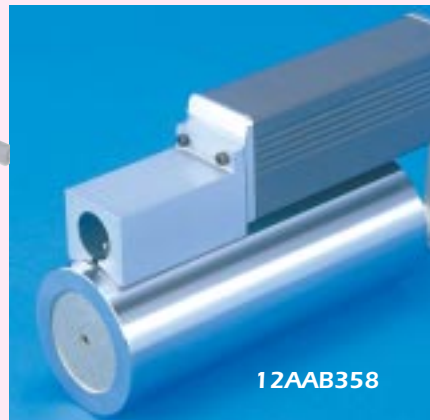


**178-019**

Order No.	178-019
Mounting method	Two-sliding-jaw
Clamp opening	36mm/1.42"
Clamp width	44mm/1.73"
Clamp depth	16mm/.63"
Height	38mm/1.50"

## Cylinder attachment

Used to attach on a cylinder  
Diameter: ø15mm up to 60mm



**12AAB358**

## Manual column stand

Column travel: 200mm  
Dimensions: 370x200x740mm  
Mass: 13kg



**178-009**

## Leveling table

- Can be used with the XY leveling table.
- Table swivels: ±1.5°  
Table size: 130x100mm  
Max. Loading weight: 15kg

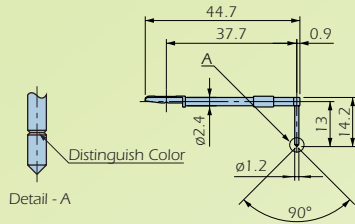


**178-048** (mm)  
**178-058** (inch/mm)



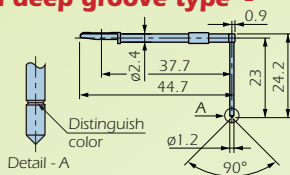
**Stylus**

**Deep groove type\*2**



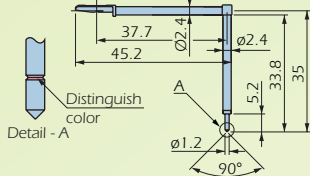
- 12AAC735** (2μm)\*1
- 12AAB409** (5μm)
- 12AAB421** (10μm)
- ( ): Tip radius

**Extra deep groove type\*2**



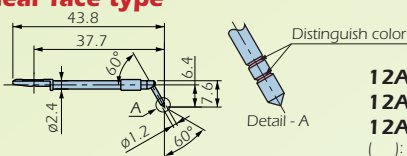
- 12AAC736** (2μm)\*1
- 12AAB408** (5μm)
- 12AAB420** (10μm)
- ( ): Tip radius

**Extra deep groove type\*2**



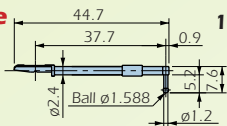
- 12AAC737** (2μm)\*1
- 12AAB407** (5μm)
- 12AAB419** (10μm)
- ( ): Tip radius

**Gear face type**



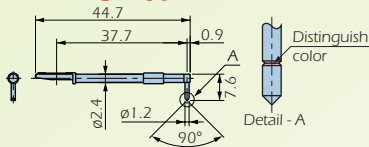
- 12AAB339** (2μm)\*1
- 12AAB410** (5μm)
- 12AAB422** (10μm)
- ( ): Tip radius

**WE-curve type**



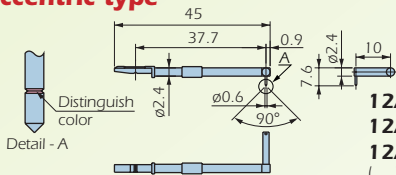
- 12AAB338**

**Knife edge type**



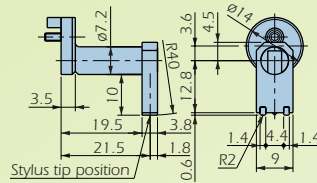
- 12AAC738** (2μm)\*1
- 12AAB411** (5μm)
- 12AAB423** (10μm)
- ( ): Tip radius

**Eccentric type\*2**

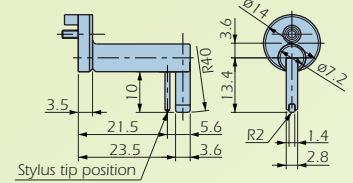


- 12AAC739** (2μm)\*1
- 12AAB412** (5μm)
- 12AAB424** (10μm)
- ( ): Tip radius

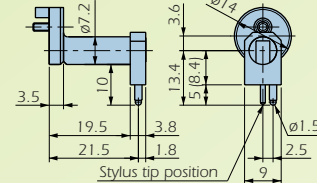
**Applicable skid nosepiece**



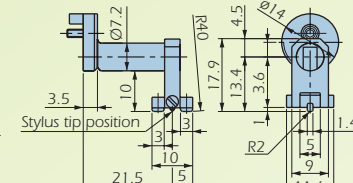
**12AAB349**



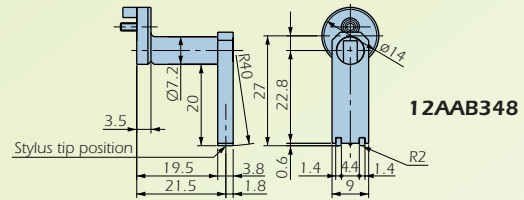
**12AAB350**



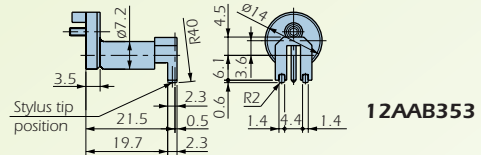
**12AAB351**



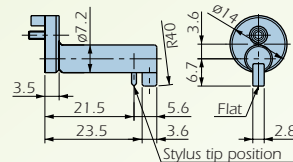
**12AAB352**



**12AAB348**



**12AAB353**



**12AAB354**

\*1 Tip angle is 60° \*2 At using this stylus, measuring force of the detector does not guarantee.

# Specifications

Order No.*	SJ-401	178-946-2 (mm)	178-947-2 (inch/mm)	178-956-2 (mm)	178-957-2 (inch/mm)
	SJ-402	178-940-2 (mm)	178-945-2 (inch/mm)	178-958-2 (mm)	178-959-2 (inch/mm)
Measuring method	Skidless/Skid measurement				
Measuring range	Z-axis	800µm, 80µm, 8µm (3200µin, 3200µin, 320µin) (Up to 2,400µm with an option stylus)			
	X-axis	SJ-401: 25mm (1") SJ-402: 50mm (2")			
Drive method	Straightness	SJ-401: 0.3µm/25mm (12µin/1") SJ-402: 0.5µm/50mm (20µin/2")			
	Measuring speed	0.05, 0.1, 0.5, 1.0mm/s (.002", .004", .02", .04"/s)			
	Return speed	0.5, 1.0, 2.0 mm/s (.02", .04", .08"/s)			
Height-Tilt adjustment unit	Tilt adjustment range	±1.5°			
	Height adjustment amount	10mm/.39"			
Assessed profile	Primary profile (P), Roughness profile (R), Filtered waviness profile (W), DIN4776, MOTIF (R, W)				
Evaluation parameter	Ra, Ry, Rz, Rq, Pc, R3z, mr, Rt, Rp, Rv, Sm, S, δc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Lo, Ppi, R, AR, Rx, Δa, Δq, Ku, HSC, mrd, Sk, W, AW, Wte, Wx, Vo				
Analysis graph	Bearing Area Curve (BAC), Amplitude Distribution Curve (ADC)				
Number of sampling length	X1, X3, X5, XL* (*=arbitrary length)				
Arbitrary length	SJ-401: 0.1 to 25mm (0.1mm increments) [.01" to 2" (.01" increments)] SJ-402: 0.1 to 50mm (0.1mm increments) [.04" to 2" (.01" increments)]				
Sampling length (L)	0.08, 0.25, 0.8, 2.5, 8mm (.003", .01", .03", .1", .3")				
Printing width	48mm (1.89")/paper width: 58mm (2.28")				
Recording magnification	Vertical magnification	10 to 100K magnification, Auto			
	Horizontal magnification	1 to 1K magnification, Auto			
Detector	Detection method	Differential inductance method			
	Minimum resolution	0.000125µm (8µm range)/.005µm (320µin range)			
	Stylus tip	Corn 90°, Radius 5µm, Diamond		Corn 60°, Radius 2µm, Diamond	
	Measuring force	4mN		0.75mN	
	Radius of skid curvature	40mm/1.57"			
	Skid force	Less than 400mN			
Function	Customize	Display/Roughness parameter selectable			
	Data compensation	R-surface, Tilt compensation			
	Ruler function	Displays the coordinate difference of any two points			
	D.A.T. function	Helps to adjust the leveling during the skidless measurement			
	Displacement detection mode	Input the stylus displacement while the drive unit is stopped			
	Statistical processing	Maximum value, Minimum value, Mean value, Standard deviation (s), Pass ratio, Histogram			
	Tolerance judgment	Upper and lower limit values for three parameters can be specified			
	Measuring Condition storage	Five sets of measuring conditions (control unit)			
Printer	Thermal printer				
Cut-off length	0.08, 0.25, 0.8, 2.5, 8mm (.003", .01", .03", .1", .3")				
Digital filter	2CR, PC75 (phase corrected), Gauss				
Calibration	Ra, Step (Automatic calibration entering the value of roughness specimen)				
Power supply	Via AC adapter, built-in rechargeable battery (Ni-H)				
Battery	Charging time	15 hours			
	Number of measurement	600 maximum without printing			
Power consumption	43W (max.)				
Dimension	Control unit	307x165x94mm (12.09"x6.50"x3.7")			
	Height-Tilt adjustment unit	131x63x99mm (5.16"x2.48"x3.90")			
	Drive unit	SJ-401: 128x36x47mm (5.04"x1.42"x1.85")		SJ-402: 155x36x47mm (6.08"x1.41"x1.84")	
Roughness standard	JIS (JIS B0601-1994-1982), DIN, ISO, ANSI				
LCD size	Touch panel				
Data output	RS-232C input/output, SPC output				
External control	Connection to the data processing system (option)				
Mass	Control unit	1.2kg (2.64lbs.)			
	Height-Tilt adjustment unit	0.4kg (1.88lbs.)			
	Drive unit	SJ-401: 0.6kg (1.32lbs.)		SJ-402: 0.64kg (1.41lbs.)	
Standard accessories	AC adapter, Carrying case, Printing paper, Touch pen, Protect sheet, Skidless nosepiece, User's manual, one-sheet manual, tools				

\* To denote your AC line voltage add the following suffixes (e.g. **178-946-2A**): **A** for 120V, **C** for 110V, **D** for 220V, **E** for 240V, **No suffix** is required for 100V.

**Mitutoyo**  
PRECISION IS OUR PROFESSION

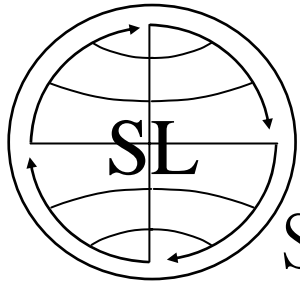


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Carrying case is a standard accessory

Specifications are subject to change without notice.



# 星隆貿易股份有限公司

## SINGLUNGTRADINGCO.,LTD

成立日期 1957年9月20日  
實收資本額 新台幣6仟萬元  
員工人數 70人(2006年7月止)

### 台灣總代理

主要產品 Mitutoyo 日本三豐精密測定儀器  
Sumitomo 日本住友電工捨棄切削工具  
Shinko 日本神鋼電磁離合器  
日本 LEUTOR 電動工

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