

# PORTABLE SURFACE ROUGHNESS TESTER SURFTEST SJ-201/301

Bulletin No. 1964



**Excellent, Portable Surface Roughness Testing  
with Enhanced Capabilities**

**Mitutoyo**



# Improved Product Lineup

A wide variety of system setups is possible with the detector + drive unit + display unit combination.

## Standard detector

Measuring force: 0.75mN  
Stylus profile: Tip radius: 2 $\mu$ m

Measuring force: 4mN  
Stylus profile: Tip radius: 5 $\mu$ m



## Drive units

### Standard drive unit

#### For SJ-201P/SJ-301

- Popular standard drive unit



### Transverse tracing drive unit

#### For SJ-201S/SJ-301S

- Best suited for measurement of narrow, shrouded workpiece features such as crankshaft bearings, etc.



### Retractable drive unit

#### For SJ-201R/SJ-301R

- The detector is in the retracted position at rest so it is immune from damage when inserted into a feature whose profile cannot easily be seen, such as a blind hole, etc.



## Display units

### Handheld compact unit

#### Display unit for SJ-201 series

- For SJ-201P/201S: Standard type
- For SJ-201R: With function to retract the detector when setting up



### Touch-panel operation unit with a built-in printer

#### SJ-301 series display unit

- For SJ-201P/201S: Standard type
- Common to SJ-301/301S/301R



# SurfTest SJ-301 Series

Unbeatable portable surface roughness tester created for ease-of-use and as a cost-effective solution to a wide variety of measuring needs



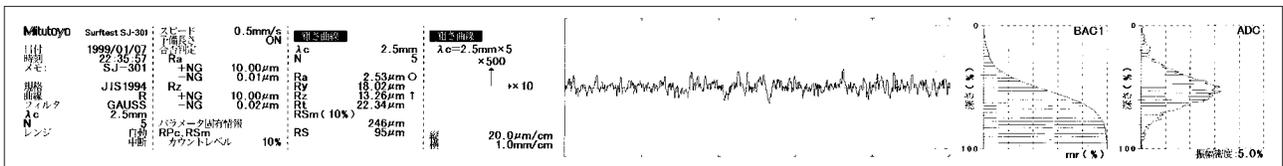
Simple operations performed with the large LCD touch-panel

- The Measure-Start button and others frequently used are shop-hardened and resistant to workshop contaminants.



Equipped with a large capacity battery that, when fully charged, allows approximately 600 measurements to be made

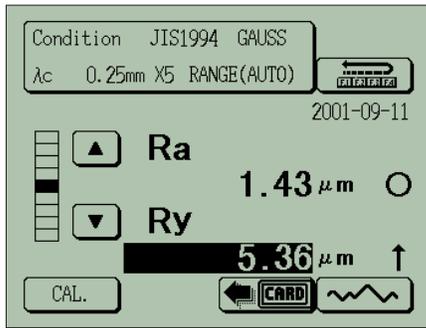
- A convenient carrying case is supplied as standard for protecting the instrument in the field.



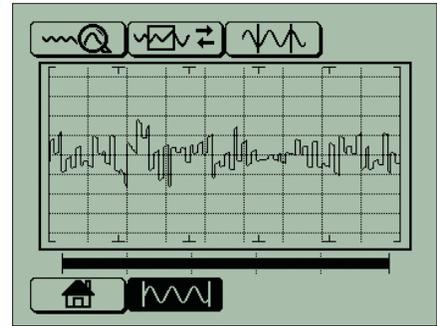
A high-resolution, high-speed printer is built in the main unit.

- Five sets of measurement set-ups can be saved in the unit and the optional memory card (compact flash memory) allows saving of set-ups and measurements.
- Measurement data also can be saved in the memory card in CSV format and then loaded onto a personal computer for data handling with spreadsheet software.

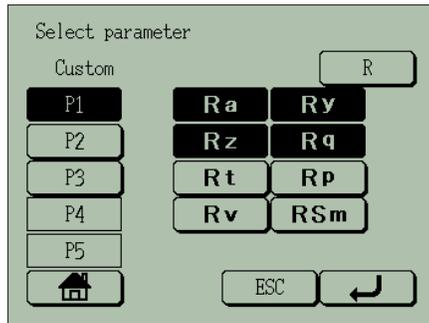
Result display screen shows the GO/NG judgment result.



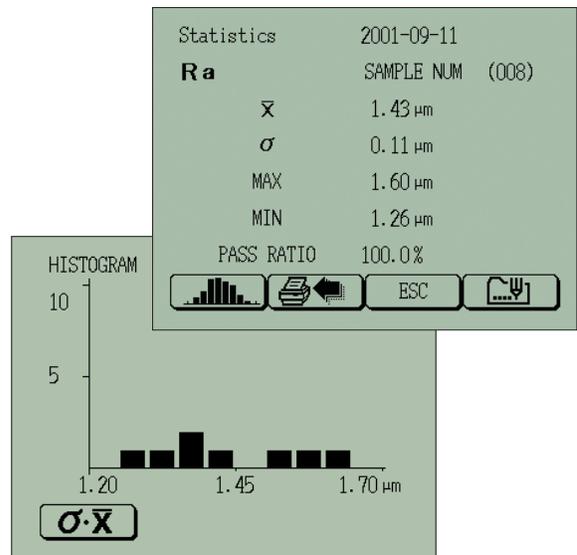
Recorded profile display capability allows surface texture measurements to be checked instantly, prior to print-out.



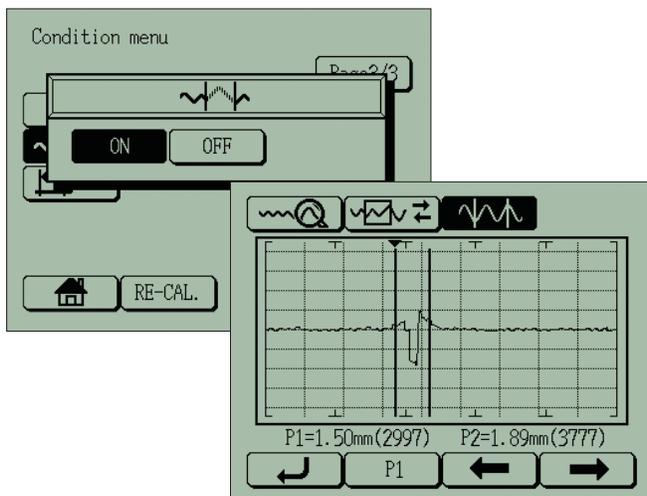
Evaluation parameters conform to internationally recognized surface roughness standards.



With a broad array of statistical processing functions, the instrument is ideally suited for histogram-based data management.



The data deletion function allows on-screen elimination of flaws that should be excluded from calculation prior to performing an evaluation.



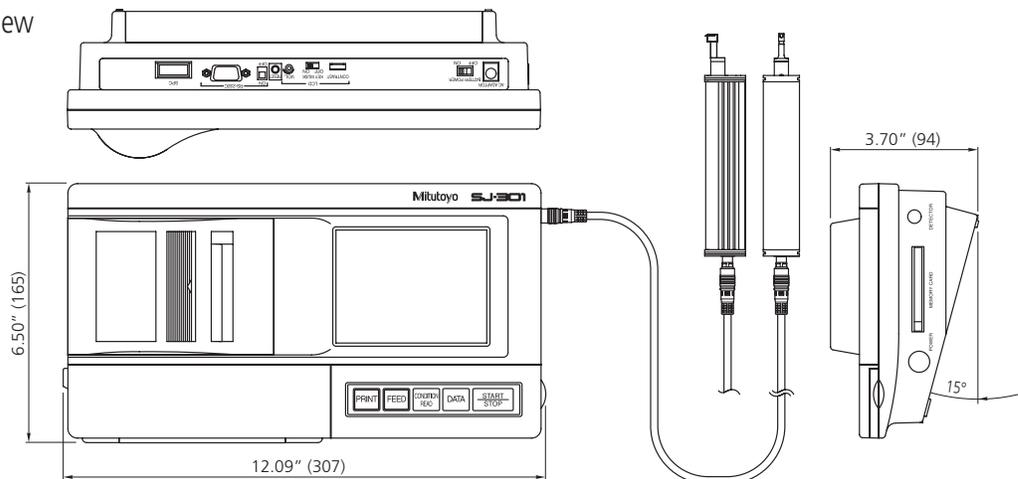
# Surftest SJ-301 Series

## External view

Unit: Inch (metric)

Drive unit type	Drive unit external view
Standard drive unit	
Retractable drive unit	
Transverse tracing drive unit	

- Display unit external view



# Specifications

Unit: Inch (metric)

Model No.	SJ-301		SJ-301R		SJ-301S		
	4mN type	0.75mN type	4mN type		0.75mN type		
	178-954-4A (inch/mm)	178-955-4A (inch/mm)	178-993-2A (inch/mm)		178-902-3A (inch/mm)		
Measuring range	X-axis	.5 inch (12.5mm)				.22 inch (5.6mm)	
	Z-axis	13780μinch (-7880μinch to +5900μinch) (350μm (-200μm to +150μm))					
Drive unit	Measuring speed	.01, .02 inch/s (0.25, 0.5mm/s)				.01 inch/s (0.25mm/s)	
	Measuring motion	Standard		Starts measuring from detector retracted state		Transverse tracing	
Detector	Conical-taper angle	90°	90°	90°		60°	
	Stylus tip radius	5μm	2μm	5μm		2μm	
	Measuring force	4mN	0.75mN	4mN		.75mN	
	Stylus tip material	Diamond					
	Skid radius of curvature	1.57 inch (40mm)					
	Skid force	400mN or less					
	Detecting method	Differential inductance					
Applicable standards	JIS'82, JIS'94, JIS'01, DIN, ISO, ANSI						
Assessed profiles	Primary profile (P), Roughness profile (R), DIN4776, MOTIF-R, MOTIF-W						
Parameters	Ra, Ry, Rz, Rt, Rp, Rq, Rv, Sm, S, Pc, R3z, mr (c), Rpk, Rvk, δc, Rk, Mr1, Mr2, Lo, Ppi, R, AR, Rx, A1, A2, Vo, HSC, mr, SK, Ku, Δa, Δq, Wte, Wx, W, AW (can be customized)						
Sampling length	.003, .01, .03, .1, .3 inch (0.08, 0.25, 0.8, 2.5, 8mm)						
Number of sampling lengths	x1, x3, x5, xL						
Arbitrary length	.01 to .49 inch (.01 inch interval) (0.3 ~ 12.5mm (0.1 mm increment))						
Cutoff filter	2CR / PC75 / Gaussian						
Cutoff length	λc	.003, .01, .03, .1, .3 inch (0.08, 0.25, 0.8, 2.5, 8mm)					
	λs	100μinch, 320μinch, 1000μinch (2.5, 8, 25μm)					
Printer	Built-in thermal printer						
Graphical printout	Bearing are curve (BAC1 BAC2), Amplitude distribution curve (ADC)						
Printing width	1.89" (48mm) (Paper width: 2.28" (58 mm))						
Recording magnification	Vertical magnification	x10, x20, x50, x100, x200, x500, x1K, x2K, x5K, x10K, x20K, x50K, x100K, AUTO					
	Horizontal magnification	x1, x2, x5, x10, x20, x50, x100, x200, x500, x1K, AUTO					
Function	Customization	Desired parameters can be selected for calculation and display.					
	Statistical processing	Maximum value, minimum value, mean value, standard deviation, pass rate, frequency distribution chart of each parameter					
	GO/NG judgment	Upper/lower limits setting: 3 parameters, GO/NG judgment rule: mean value, 16% rule, maximum value rule					
	Measurement conditions saving	Maximum 5 sets					
	Data saving	Save/retrieval of measurement conditions (up to 20 sets), evaluation data, sampling data, and statistical data with a memory card (option).					
	Calibration	Auto-calibration with the entry of numerical value.					
Power saving function	If the auto-power-off function ON: Power turns off if not operated for 5 minutes						
External input/output	RS-232C I/F, SPC output						
Power supply	Two-way power supply: battery (rechargeable Ni-H battery) and AC adapter.						
Battery	Charging time	15 hours maximum					
	Recharge cycles	Approximately 600 times (slightly varies with the usage and environmental conditions)					
External dimensions (WxDxH)	Display unit	12.09"x6.50"x3.70" (307x165x94mm)					
	Drive unit	4.53"x.91"x1.02" (115x23x26mm)					
Mass	Display unit	2.65 lbs. (1.2kg)					
	Drive unit	.44 lbs. (0.2kg)					
LCD dimensions	3.94"x2.76" (100x70mm), Touch-panel type						
Standard accessories		<b>12BAA686</b>	Connecting cable		<b>12BAA686</b>	Connecting cable	
		<b>178-602 (inch/mm)</b>	Roughness specimen (Ra3μm)		<b>178-606 (inch/mm)</b>	Roughness specimen (Ra1μm)	
		<b>357651</b>	AC adapter		<b>357651</b>	AC adapter	
		<b>12AAA217</b>	Flat surface nosepiece		<b>12AAE643</b>	Point-contact adapter	
		<b>12AAA218</b>	Cylinder nosepiece		<b>12AAE644</b>	V-type adapter	
		<b>12AAA216</b>	Supporting feet set		<b>353134</b>	Calibration stage	
		<b>12BAA689</b>	Touch-pen		<b>12BAA689</b>	Touch-pen	
		<b>12BAA690</b>	Protector sheet		<b>12BAA690</b>	Protector sheet	
		<b>541106</b>	Flat-blade screwdriver		<b>541106</b>	Flat-blade screwdriver	
		<b>270732</b>	Printer paper (5 rolls)		<b>270732</b>	Printer paper (5 rolls)	
	<b>12BAA781</b>	Carrying case		<b>12BAA781</b>	Carrying case		

## Optional accessories, consumables, and others for SJ-301

- Printer paper (5 rolls)
- Durable printer paper (5 rolls)
- Touch-panel protector sheet (10 sheets)
- Memory card \*1

No.**270732**  
 No.**12AAA876**  
 No.**12AAA896**  
 No.**12AAA841**

\*1: Compact flash (CF) card on the market is also available.

# Surftest SJ-201 Series

Light-weight, compact and simple to operate!



The display unit has IP53 protection level against dripping water and dust.



The built-in battery if fully charged allows approximately 500 measurements to be taken even on a site with no access to power. A convenient carrying case is supplied as standard for protecting the instrument in the field.

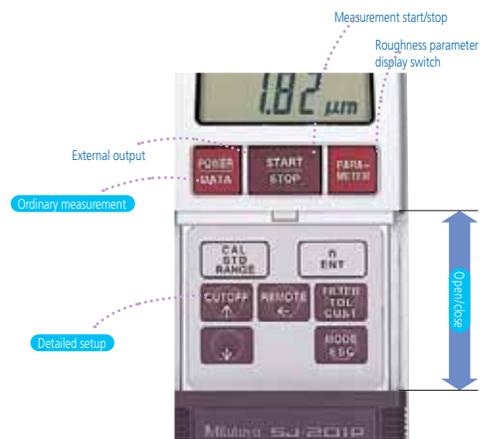
Up to 10 measurement results can be saved in the built-in memory.

**Mitutoyo**

Measurement results appear in large characters on the large LCD screen. Results can be confirmed at a glance.



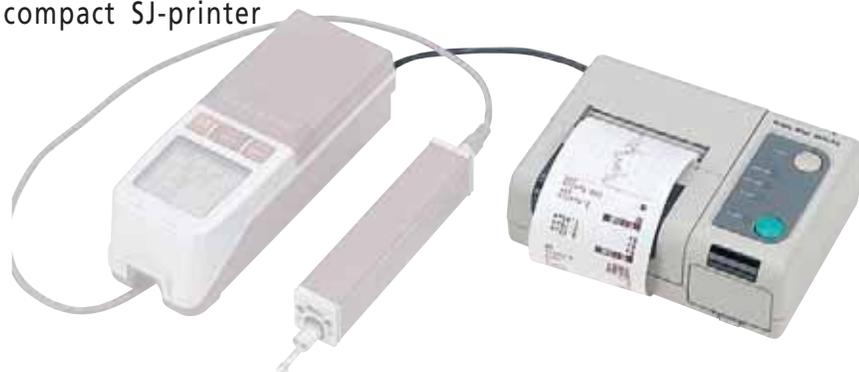
Detailed set-ups, such as change of standards and cutoff lengths, can be made by pressing the relevant buttons after sliding back the top cover.



The SPC connector for Digimatic output and the RS-232C output connector are provided on the rear panel of the display unit for data output to external devices.



Printout of recorded profiles is also possible if the tester is connected to the dedicated hand-held, built-in battery operated compact SJ-printer (optional).

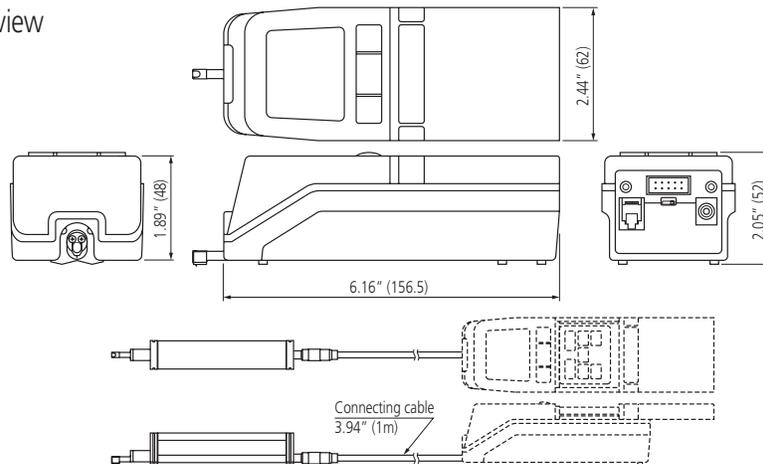


# Surftest SJ-201 Series

## External view

Unit: Inch (Metric)

- Display unit external view



Type of drive unit	Drive unit external view
Standard drive unit	
Retractable drive unit	
Transverse tracing drive unit	

## Specifications

Unit: Inch (Metric)

Model No.		SJ-201P	SJ-201R	SJ-201S	
		4mN type	4mN type	4mN type	
		<b>178-923-2A (inch/mm)</b>	<b>178-992A (inch/mm)</b>	<b>178-912-2A (inch/mm)</b>	
Measuring range	X-axis	.5 inch (12.5mm)		.22 inch (5.6mm)	
	Z-axis	13780µinch (-7880µinch to +5900µinch) (350µm (-200µm to +150µm))			
Drive unit	Measuring speed	.01, .02 inch/s (0.25, 0.5mm/s)		.01 inch/s (0.25mm/s)	
Detector	Measuring motion	Standard	Starts measuring from detector retracted state		
	Conical taper angle	90°	90°	90°	
	Stylus tip radius	5µm	5µm	5µm	
	Measuring force	4mN	4mN	4mN	
	Stylus tip material	Diamond			
	Skid radius of curvature	1.57 inch (40mm)			
	Skid force	400mN or less			
	Detecting method	Differential inductance			
Applicable standards		JIS'82, JIS'94, JIS'01, DIN, ISO, ANSI			
Assessed profiles		Primary profile (P), roughness profile (R), DIN4776 profile			
Evaluation parameters		Ra, Rq, Ry, Rz, Rk, Rt, Rp, R3z, S, Sm, Pc, mr (c), Rpk, Rvk, Mr1, Mr2, A1, A2, Vo (can be customized)	Ra, Ry, Rz, Rq, S, Sm, Pc, R3z, mr (c), Rt, Rp, Mr	Ra, Rq, Ry, Rz, Rt, Rp, R3z, S, Sm, Pc, mr (c), Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo (can be customized)	
Sampling length		.01, .03, .1 inch (0.25, 0.8, 2.5mm)			
Number of sampling lengths		x1, x3, x5, xL			
Arbitrary length		.01 to .49 inch (.01 inch interval) (0.3 ~ 12.5mm (0.1mm increment))			
Digital filter		2CR / PC75 / Gaussian			
Cutoff length	λc	.01, .03, .1 inch (0.25, 0.8, 2.5mm)			
	λs	100µinch, 320µinch (2.5, 8µm)			
Printer		Optional (Refer to page 14)			
Functions	Customization	Desired parameters can be selected for calculation and display.			
	Statistical processing	-			
	GO/NG judgment	Upper / lower limit setting: 2 parameters, GO/NG judgment rule: mean value *1			
	Measurement conditions saving	Saves the conditions at the power OFF			
	Data saving	A maximum of 10 measurement results can be saved.			
	Calibration	Auto-calibration with the entry of numerical value			
Power saving function		If the auto-power-off function is ON then power turns off if no operation for 30 seconds.			
External input/output		RS-232C I/F, SPC output, printer output			
Power supply		Two-way power supply: battery (rechargeable Ni-H battery) and AC adapter.			
Battery	Charging time	12 hours (16 hours maximum)			
	Recharge cycles	Approximately 500 times (slightly varies according to usage and environmental conditions)			
External dimensions (WxDxH)	Display unit	6.16"x2.44"x2.05" (156.5x62x52mm)			
	Drive unit	4.53"x.91"x1.02" (115x23x26mm)			
Mass	Display unit	.66 lbs. (0.3kg)			
	Drive unit	.44 lbs. (0.2kg)			
LCD dimensions		1.57"x1.38" (40x35mm), Large character display			
Standard accessories		<b>12BAA303</b>	Connecting cable	<b>12BAA303</b>	Connecting cable
		<b>178-602 (mm/inch)</b>	Roughness specimen (Ra3µm)	<b>178-606 (mm/inch)</b>	Roughness specimen (Ra1µm)
		<b>353134</b>	Calibration stage	<b>12AAE643</b>	Point-contact adapter
		<b>538612</b>	Phillips screwdriver	<b>12AAE644</b>	V-type adapter
		<b>12BAA304</b>	Carrying case	<b>353134</b>	Calibration stage
		<b>526688A</b>	AC adapter	<b>538612</b>	Phillips screwdriver
				<b>12BAA304</b>	Carrying case
			<b>526688A</b>	AC adapter	

\*1: Not compatible with the 16% rule and maximum value rule.

# Optional accessories

## Drive unit, Display unit

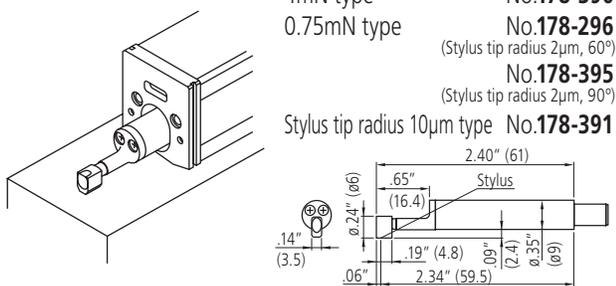
Drive unit	Display unit	Model No.
Standard drive unit Order No. <b>178-230-2</b>	Standard display unit Order No. <b>178-248-2A</b>	<b>SJ-201P</b>
Transverse tracing Order No. <b>178-234-2</b>		<b>SJ-201S</b>
Detector retracting type Order No. <b>178-235</b>	Dedicated display unit for the detector retracting type Order No. <b>178-251A</b>	<b>SJ-201R</b>

Drive unit	Display unit	Model No.
Standard drive unit Order No. <b>178-230-2</b>	Order No. <b>178-241-3A</b>	<b>SJ-301</b>
Transverse tracing Order No. <b>178-234-2</b>		<b>SJ-301S</b>
Detector retracting type Order No. <b>178-235</b>		<b>SJ-301R</b>

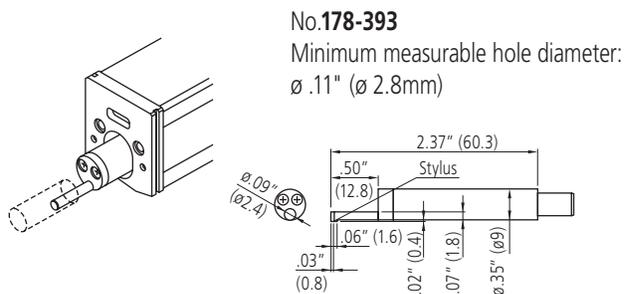
## Detector

Unit: Inch (Metric)

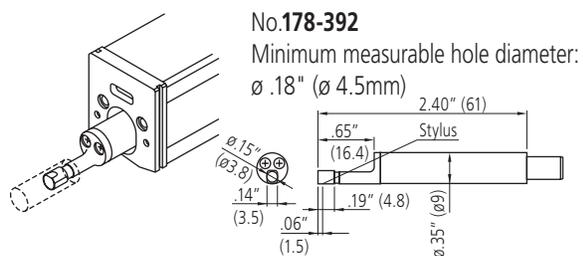
### Standard detector



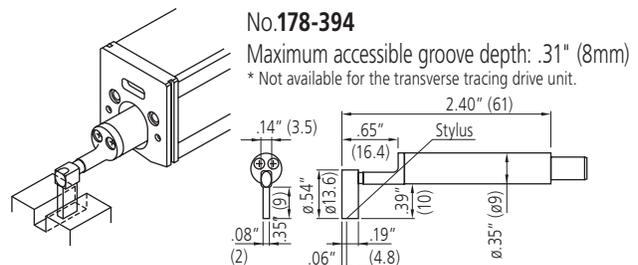
### Extra-small hole detector



### Small hole detector



### Deep groove detector



# Optional accessories Drive unit accessories

## Drive unit, Display unit

### Nosepiece for flat surfaces

No.12AAA217

- \* SJ-301 standard accessories
- \* Not available for the transverse tracing drive unit.



### Nosepiece for cylindrical surfaces

No.12AAA218

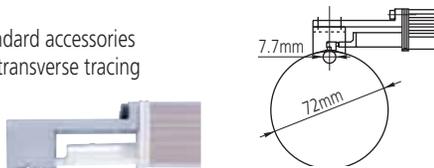
- \* SJ-301 standard accessories
- \* Not available for the transverse tracing drive unit.



### V-type adapter

No.12AAE644

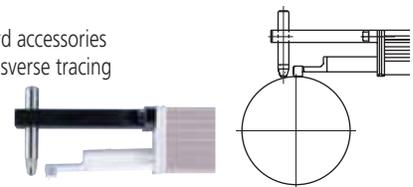
- \* SJ-201S/301S standard accessories
- \* Dedicated to the transverse tracing drive unit.



### Point-contact adapter

No.12AAE643

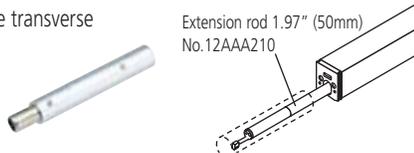
- \* SJ-201S/301S standard accessories
- \* Dedicated to the transverse tracing drive unit.



### Extension rod 1.97" (50mm) (Note: Extension is possible with only a single rod.)

No.12AAA210

- \* Not available for the transverse tracing drive unit.



### Extension cable 39.40" (1m) (Note: Extension is possible with only a single cable.)

No.12BAA303

### Support feet set

No.12AAA216

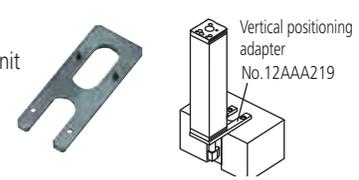
- \* SJ-301 standard accessory
- \* Not attachable to the detector side of the transverse tracing drive unit.



### Vertical positioning adapter

No.12AAA219

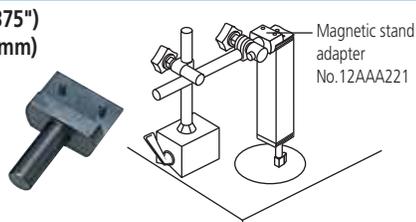
- \* Not available for the transverse tracing drive unit



### Magnetic stand adapter

No.12AAA220 (ø.375")

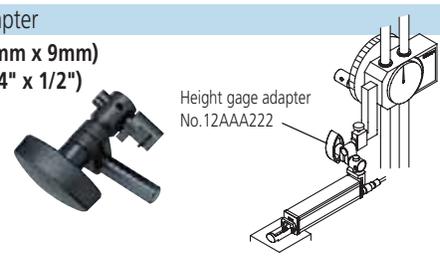
No.12AAA221 (ø8mm)



### Height gauge adapter

No.12AAA222 (9mm x 9mm)

No.12AAA233 (1/4" x 1/2")



## Setting attachments

\* Not available for the transverse tracing drive unit

Enhances measurement efficiency by facilitating the measurement setup of multiple workpieces of the same type and of the hard-to-access sections of a workpiece.

### Setting attachment: V type for measuring in the cylinder axis direction

No.178-033

The V-width is adjustable to the cylinder diameter facilitating axial measurement of a wide range of cylinder diameters.

- Adjustable range: ø.20"~ø5.91" (ø5~ø150mm)



### Setting attachment: Magnetic slider type

No.178-034

The magnet attached to the frame bottom surface allows taking hands-free measurement on the wall.



### Setting attachment: Inside diameter type

No.178-035

Greatly facilitates measurement of internal wall surfaces of, for example, a cylinder block.

- Applicable diameter: ø2.95"~ø3.74" (ø75~ø95mm)
- Accessible depth: 1.18"~5.31" (30~135mm)



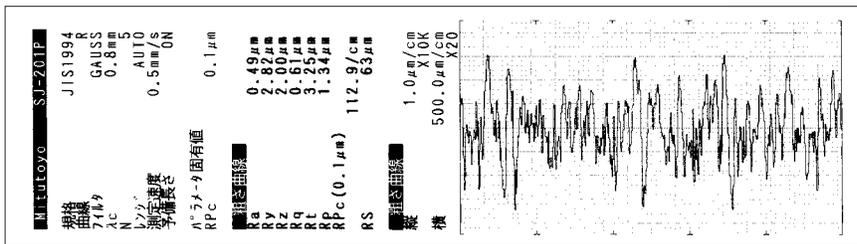
# Optional Accessories: Printers

## SJ-Printer

(Optional accessory dedicated to SJ-201 series)

Printing recorded profiles is possible if the tester is connected to the dedicated hand-held, built-in battery operated compact SJ-printer (optional).

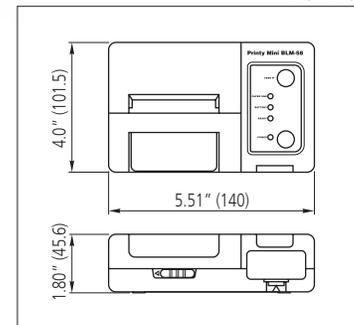
- Can be operated with two-way power supply (AC adapter/battery pack)
- Printing items: Measurement conditions, calculation results, surface profiles, bearing area curve (BAC)
- SJ Printer (with connection cable and 20 rolls of printer paper)  
No. **178-420A**
- Printer paper (dedicated to this printer): 20 rolls  
No. **12AAC243**



Sample of print format

- External view

Unit: Inch (Metric)



## DP-1VR

Powerful data management capabilities make it possible to process the Digimatic data output from the SurfTest SJ series for measurement data printout, various statistical analyses for plotting a histogram and D-chart, and calculation of  $\bar{X}$ -R control charts. Also, it is equipped with the RS-232C GO/NG judgment output for connection to a personal computer.

- Digimatic mini-processor DP-1VR  
No. **264-504-5A\***
- \*A Digimatic Connecting Cable is required to use DP-1VR
- Digimatic connecting cable  
Cable length 39.40" (1m): No. **936937**  
Cable length 78.80" (2m): No. **965014**



# Optional Software: SURFPAK-SJ

## Surface roughness analysis program SURFPAK-SJ

An upgraded data analysis system can be built by connecting the Surfptest SJ series to a personal computer.

- Capable of diversified analyses of surface textures, including calculations of varieties of parameters and graphical data analyses.
- Equipped with a flexible report generating function that allows freely laying out the recorded profiles and the calculation results in the report.

An RS-232C cable is also required.

- SJ-201 series RS-232C cable No. **12AAA208**
- SJ-301 series RS-232C cable \*1 No. **12AAA882**

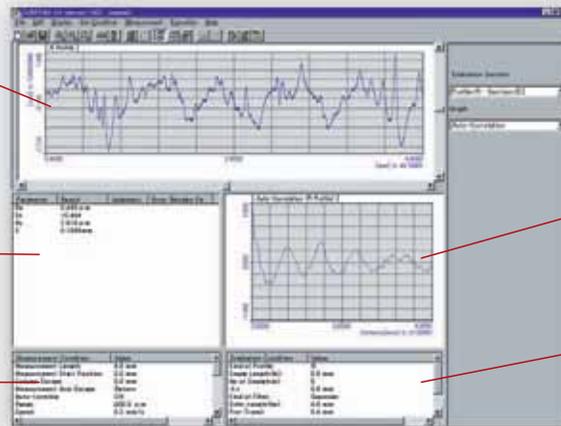
\*1: Equivalent to RS-232C straight cable with D-sub 9-pin female connector.



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

Measurement result window:  
Provides a great variety of parameters conforming to most of the world's standards.

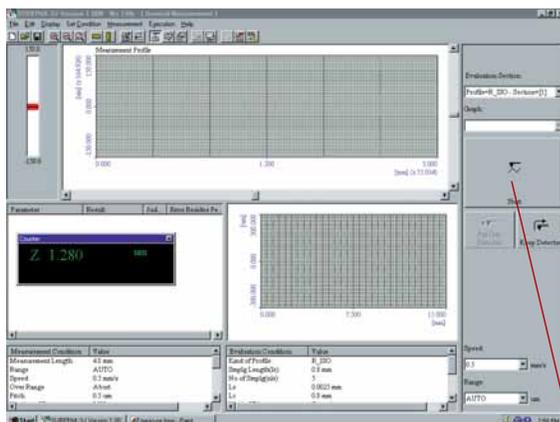
Measuring condition setting window



Analysis graph window:  
Various analysis graphs can be created.

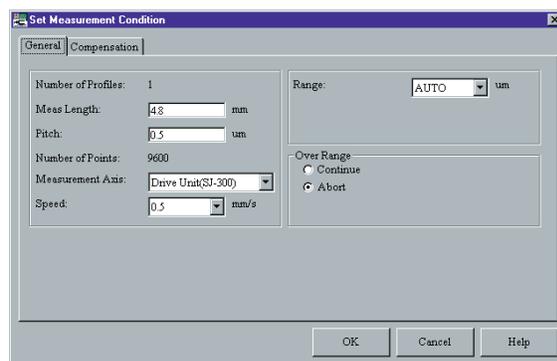
Evaluation conditions window:  
For various recalculations of the measured data.

### Operation window



Machine operation icons for SJ-201/301/401

### Measuring conditions setting window





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- Form Measurement
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