

Portable Surface Roughness Tester SURFTEST SJ-310 Series

Bulletin No. 2141



Mitutoyo

The Surftest SJ-310 is a compact, portable, easy-to-use surface roughness measurement instrument equipped with extensive measurement and analysis features.



Easy to use

Large color graphic LCD

The color touch-screen provides excellent readability and an intuitive display that is easy to negotiate. The LCD also includes a backlight for improved visibility in dark environments. The integrated printer allows you to print measurement results on the spot.

Highly functional

Internal memory

Up to 10 measurement conditions and one measured profile can be stored in the internal memory.

Optional memory card

The optional memory card can be used as an extended memory to store large quantities of measured profiles and conditions and adds the convenience of automatically saving data from the 10 most recent measurements (Trace 10).

Password protection

Access to each feature can be password-protected, which prevents unintended operations and allows protection of your settings.

Multilingual support

The display interface supports 16 languages, which can be freely switched.

Stylus alarm (patent pending in Japan, U.S.A., EU)

An alarm warns you when the cumulative measurement distance exceeds a preset limit.

Extensive analysis and display features

Complies with many industry standards

The Surftest SJ-310 complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO-1997, and ANSI.

Displays assessed profiles and graphical data

In addition to calculation results, the Surftest SJ-310 can display sectional calculation results and assessed profiles, load curves, and amplitude distribution curves.

Enhanced power for making measurements on site

Despite its reduced charging time — approximately 1/4 that required for conventional models, the Surftest SJ-310 is capable of making approximately 2.5 times the number of measurements when fully charged. The detector supports a variety of measurement orientations and can make measurements up against a wall surface or while facing upward. When combined with optional accessories such as a height gauge adapter, the detector can make measurements in various orientations and settings.

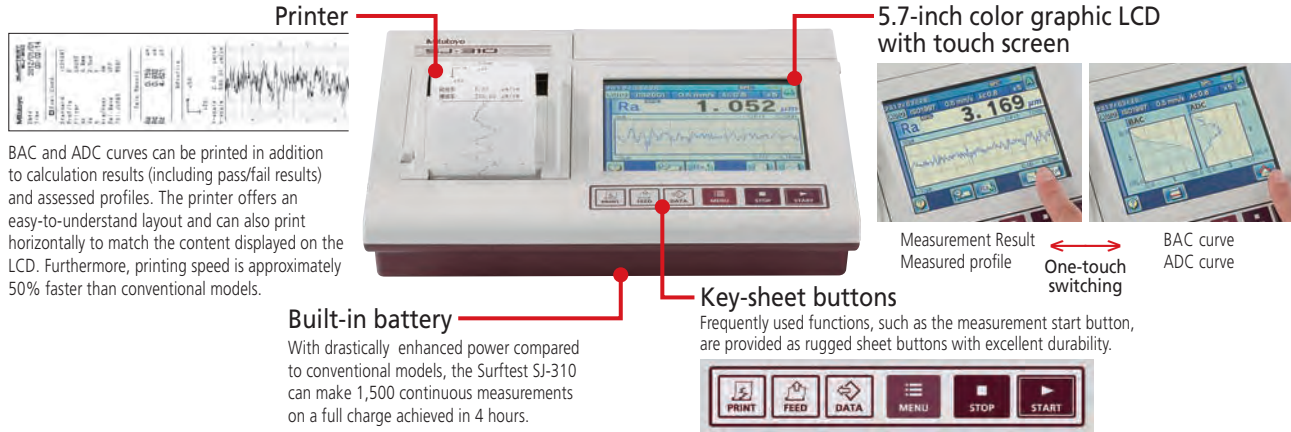


Mitutoyo

Surftest SJ-310

User friendly, high-functionality display unit with integrated high-speed printer

The large 5.7-inch color graphic touch-screen LCD provides excellent readability. Furthermore, selecting icons from the touch panel display*1 provides intuitive and easy operation. The integrated high-speed printer also allows the user to perform the entire process from making measurements to printing the results with the push of a single button (START button). *1 Text display can also be selected.



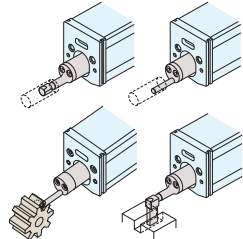
Highly functional detectors and drive units

Detector supplied as standard

One of two types may be selected:

- Measuring force: 0.75mN
Stylus form: Tip radius 2μm
Tip angle 60°
- Measuring force: 4mN
Stylus form: Tip radius 5μm
Tip angle 90°

A wide range of optional detectors is available, including detectors for small holes, extra small holes, gear tooth surfaces, and deep grooves.



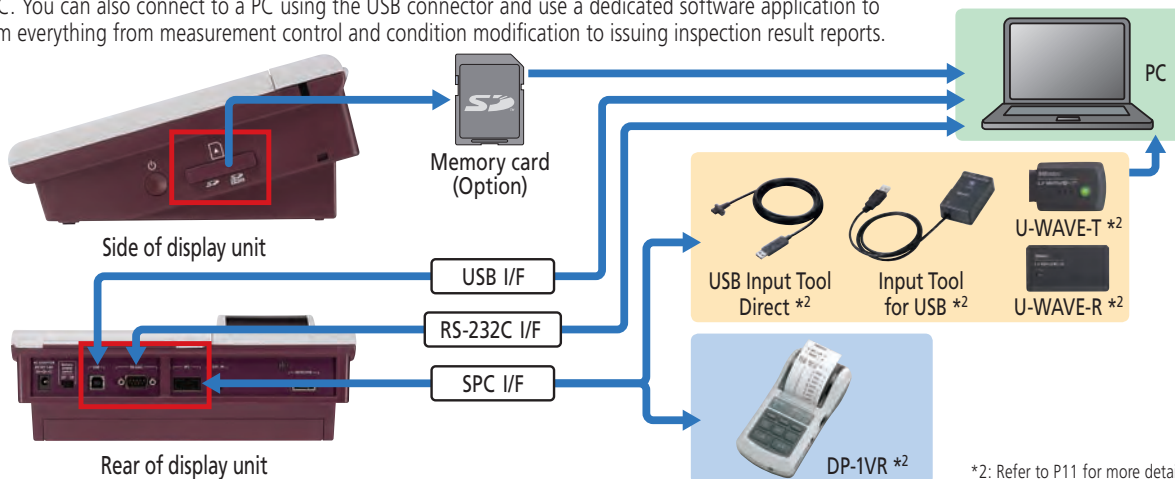
Drive units

- Standard drive unit
 - Popular standard drive unit
- Transverse tracing drive unit
 - Best suited for measurement of narrow, shrouded workpiece features such as crankshaft bearings, EDM parts, etc. (Patent Registered in Japan)
- Retractable drive unit
 - The detector is in the retracted position at rest so it is immune from damage when inserted into a feature whose shape cannot be easily seen, such as a blind hole, etc.



Links to a wide variety of external instruments

You can save parameter recalculations and measurement results in text format on a memory card and import into commercial spreadsheet software on a PC. You can also connect to a PC using the USB connector and use a dedicated software application to perform everything from measurement control and condition modification to issuing inspection result reports.

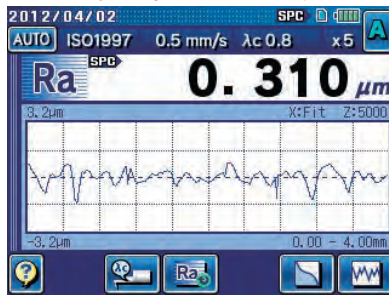


*2: Refer to P11 for more details

Measurement assistance and analysis features offering the ultimate in ease of use

Switches between icon and text display

The display can be switched between icon and text, providing easy, user-friendly operation. Additionally, the guidance feature provides detailed explanations of touch-screen buttons.



Icon

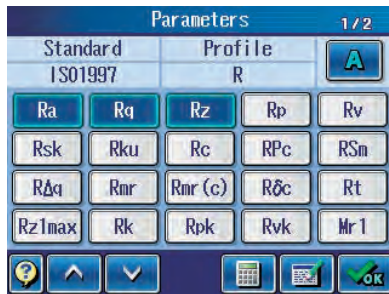


Text

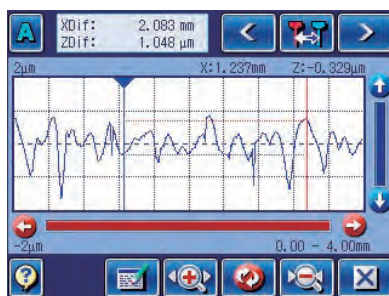


Easy specification of assessment conditions from a list

Setting assessment conditions is simple because you can select the desired condition from a displayed list (e.g., standard, parameter).

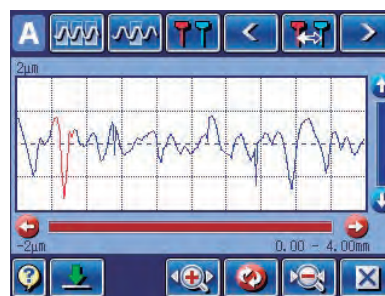


Zooming waveforms and analyzing coordinate differences



You can not only magnify or shrink waveforms, but also calculate the coordinate difference between two points using a ruler operation. You can quickly check the irregularity status without waiting for a printout.

Deleting unnecessary data



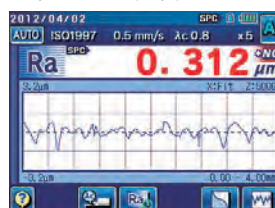
With the Surftest SJ-310, you can delete portions of measurement data. This feature allows you to make new calculations by deleting data that should not be included in parameter calculation, such as data on a scratch.

Displaying pass/fail results

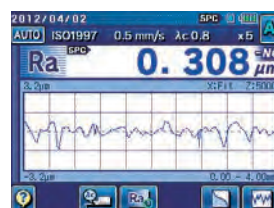
By specifying a tolerance in advance, you can display pass/fail results in color.



OK



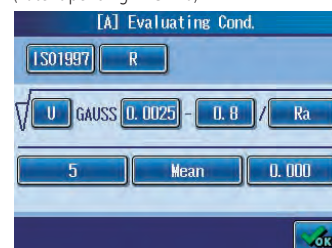
+NG



-NG

Surface texture symbol entry

You can enter assessment conditions using ISO/JIS surface texture symbols. (Patent registered in Japan, U.S.A., Germany, UK, France) (Patent pending in China)



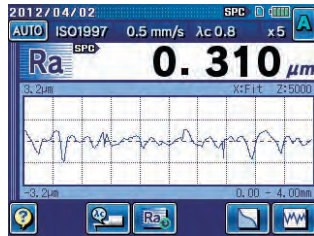
Mitutoyo

Measurement results can be displayed in several ways

Measurement results can be presented in the form of a 1-parameter, profile, 4-parameter or trace display.



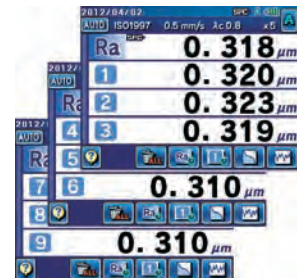
1-parameter display: one parameter measurement result



Profile display: one parameter measurement result and the measured profile



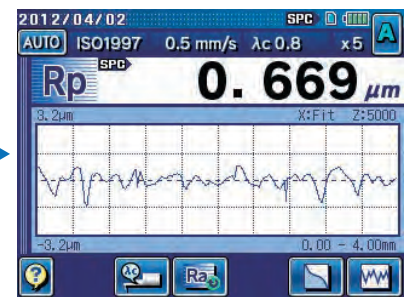
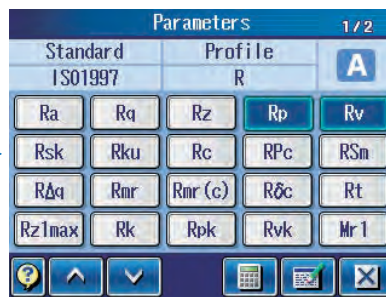
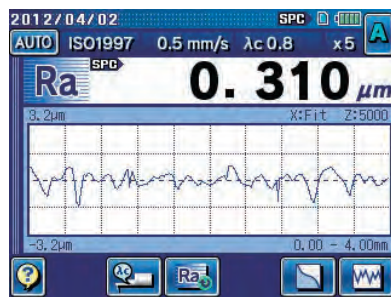
4-parameter display: four parameter measurement results



Trace display: the ten latest measurement results using the same parameter

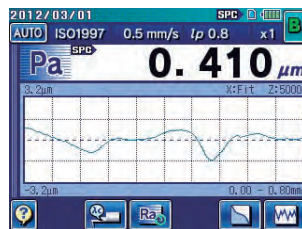
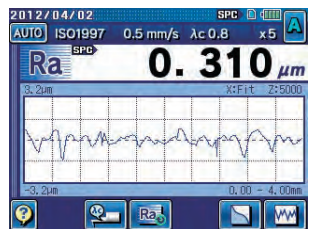
Recalculation function

After completing measurement, you can modify the assessment conditions (standard, profile, and parameter) and easily recalculate the results using the new condition.* *Not possible with all measurement conditions.



Dual assessment of a single measurement

Using the result of a single measurement, you can make calculations or analyze assessment profiles under two different assessment conditions (standard, profile, filter, etc.) without using the recalculation feature.



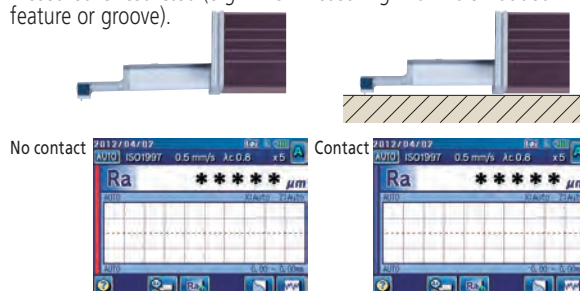
Stylus alarm function

Displayed settings can be easily changed by pressing the left and right arrow keys under the sliding cover. For example, these keys can be used to switch the cut-off value(λc) and the number of sampling lengths (N) on the measurement screen. (Patent pending in Japan.)



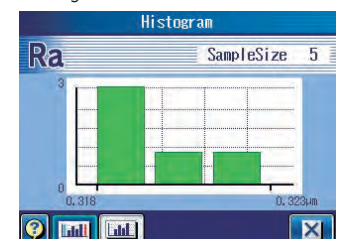
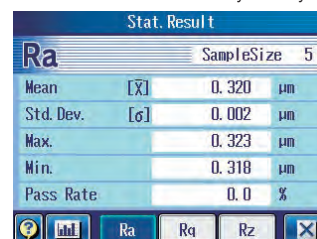
Positive stylus contact indication

Stylus contact with the workpiece is indicated by color coding in the display. This is helpful when visibility of the surface to be measured is restricted (e.g. when measuring within a shrouded feature or groove).



Extensive statistical processing features

You can make a maximum of 300 statistical measurements using up to three parameters to obtain averages, standard deviations, maximums, minimums, passing rates, and histograms (upper and lower limits can be displayed). This feature is ideal for day-to-day data management.



Specifications

Specifications

Type of detector			Standard drive unit type		Retractable drive unit type		Transverse tracing drive unit			
Model No.			SJ-310 (0.75mN type)	SJ-310 (4mN type)	SJ-310 (0.75mN type)	SJ-310 (4mN type)	SJ-310 (0.75mN type)	SJ-310 (4mN type)		
Order No.			inch/mm	178-571-01A	178-571-02A	178-573-01A	178-573-02A	178-575-01A	178-575-02A	
X axis			.7" (17.5 mm)					.22" (5.6 mm)		
Measuring range	Range		14400 μinch (-7900 μinch to +6300 μinch) [360 μm (-200 μm ~ +160 μm)]							
	Detector	Range/ resolution	14400 μinch / .8 μinch (360 μm / 0.02 μm)							
			4000 μinch / .2 μinch (100 μm / 0.006 μm)							
			1000 μinch / .08 μinch (25 μm / 0.002 μm)							
Measuring speed			In the measurement: .01inch/s (0.25mm/s), .02inch/s (0.5mm/s), .03inch/s (0.75mm/s), In the return: .04inch/s (1mm/s)							
Measuring force / Stylus tip			0.75mN type: 0.75mN / 2μmR 60°, 4mN type: 4mN / 5μmR 90°							
Skid force			400mN or less							
Standard			JIS'82 / JIS'94 / JIS'01 / ISO'97 / ANSI / VDA / FREE							
Measured profiles			Primary(P), Roughness(R), DF, R-Motif, W-Motif							
Parameters			Ra, Rc, Ry, Rz, Rq, Rt, Rmax* ¹ , Rp, Rv, R3z, Rsk, Rku, Rc, RPe, Rsm, Rz1max* ² , S, HSC, RzJIS* ³ , Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, λa, λq, Lo, Rpm, tp* ⁴ , Htp* ⁴ , R, Rx, AR, W, AW, Wx, Wte, Possible Customize							
Graph analysis			BAC and ADC curves							
Filter			Gaussian, 2CR75, PC75							
Cut-off length			λ _C λ _S * ⁵	.003, .01, .03, .1, .3" (0.08, 0.25, 0.8, 2.5, 8 mm)						
Sampling length			100, 320 μinch (2.5, 8 μm)							
			.003, .01, .03, .1, .3" (0.08, 0.25, 0.8, 2.5, 8 mm)							
Number of sampling lengths			x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary .0118 ~ .6299" (.0001" Interval) [(0.3 ~ 16.0mm: 0.01mm Interval)]					x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary .0118 ~ .22" (.0001" Interval) [(0.3 ~ 5.6mm: 0.01mm Interval)]		
LCD dimensions			4.64" x 3.47" (117.8 x 88.2 mm)							
Display languages			Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian Turkish, Swedish, Dutch							
Measurement result display			1-parameter display: one parameter measurement result 4-parameter display: four parameter measurement results Profile display: one parameter measurement result and the measured profile Trace display: The ten latest measurement results using the same parameter							
Printing function			Measurement conditions / Calculation results / GO / NG judgement result / Calculation results for each sampling length / Measurement curve / BAC / ADC / Environmental setting information							
External I/O			USB I/F, Digimatic output, RS-232C I/F, External SW I/F							
Functions	Customization		Desired parameters can be selected for calculation and display							
	GO/ NG judgement * ⁶		Max rule / 16% rule / Average rule / Standard deviation (1σ, 2σ, 3σ)							
	Storage of measurement condition		Save the condition at power OFF							
	Storage		Internal memory: Measurement condition (10 sets) Memory card (option): 500 measurement conditions, 1000 measuring data, 10000 text data, 500 statistic data, 500 image data, 1 backup of machine setting, the last ten traces (Trace 10)							
Calibration			Saves last inputted nominal value of specimen / Average calibration with multiple measurement (MAX.12 times) is available							
Power-saving			Auto-sleep function (30-600sec) * ⁷							
Power supply			Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter *Charging time: about 4 hours (may vary due to ambient temperature) *Endurance: about 1500 measurements (differs slightly due to use conditions / environment)							
Size (WxDxH)			Display unit Drive unit	10.8" x 4.3" x 7.8" (275 x 109 x 198 mm) 4.5" x 0.9" x 8.9" (115 x 23 x 26.7 mm)						
Mass			About 1.8kg (Display unit + Drive unit + Standard detector)							
Standard accessories			12AAM475 Connecting cable * ⁸ 12AAA217 Nosepiece for plane surface 12AAA218 Nosepiece for cylinder 12AAA216 Supporting leg 12BAK700 Calibration stage 12BAG834 Stylus pen 12BAL402 Protection sheet 270732 Printer paper (5 pieces) 12BAL400 Carrying case Roughness reference specimen (Ra3μm), AC adapter, Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty					12AAM475 Connecting cable * ⁸ 12AAE643 Point-contact adapter 12AAE644 V-type adapter 12BAK700 Calibration stage 12BAG834 Stylus pen 12BAL402 Protection sheet 270732 Printer paper (5 pieces) 12BAL400 Carrying case Roughness reference specimen (Ra1μm), AC adapter, Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty		

*1: Only for VDA/ANSI/JIS'82 standards.

*2: Only for JIS'97 standard.

*3: Only for JIS'01 standard.

*4: Only for ANSI standard.

*5: λs may not be switchable depending on a standard selected.

*6: Standard deviation only can be selected in ANSI.16% rule cannot be selected in VDA.

*7: Auto-sleep function is invalid when AC adapter is used.

*8: For connecting the calculation display unit and drive unit.



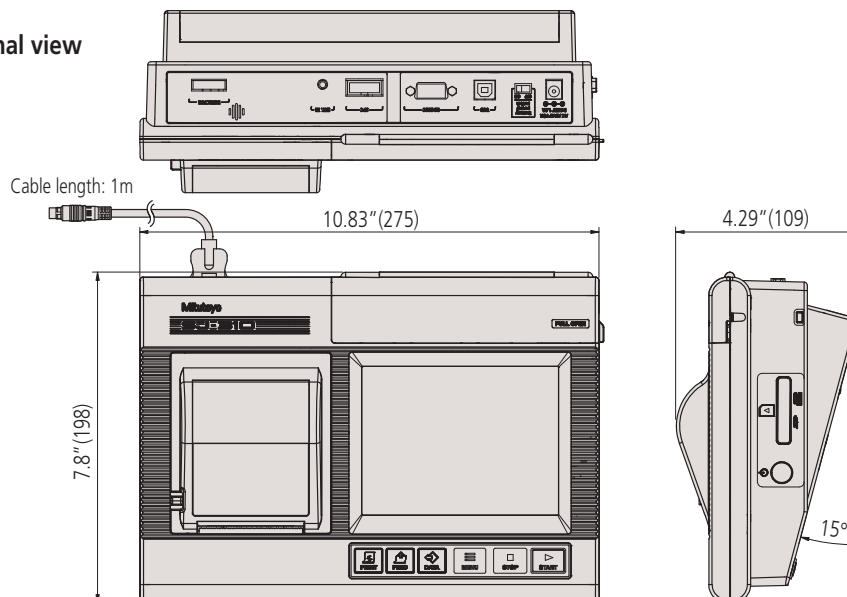
Dimensions: Display Unit and Drive Unit

Drive unit, Display unit

Unit: inch(mm)

Drive unit type	Drive unit external view
Standard drive unit	Dimensions: 0.91" (23.0) height, 1.02" (26.0) depth, 0.99" (25.2) and 1.05" (26.7) mounting bracket width, 4.53" (115.0) length.
Retractable drive unit	Dimensions: 0.91" (23.0) height, 1.02" (26.0) depth, 0.39" (1) retractable mechanism depth, 0.08" (2.0) and 0.91" (23.2) mounting bracket width, 1.05" (26.7) base width, 4.53" (115.0) length.
Transverse tracing drive unit	Dimensions: 0.91" (23.0) height, 1.02" (26.0) depth, 0.118" (3.0) and 0.26" (6.6) mounting bracket width, 1.8" (45.5) and 1.85" (47) base width, 4.53" (115.0) length.

Display unit external view

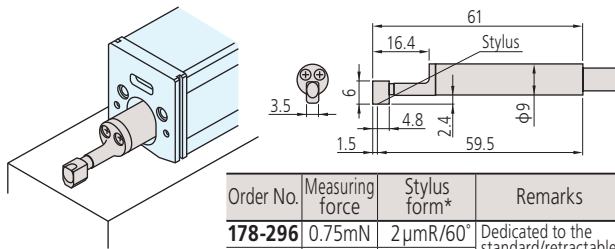


Dimensions: Detectors

Detectors

Unit: mm

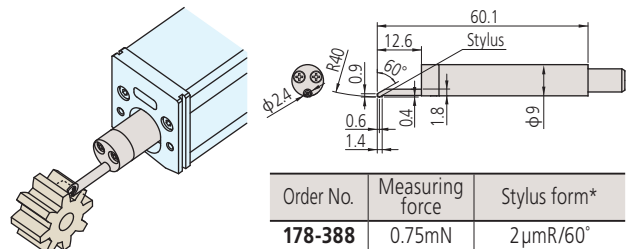
Standard detectors



Order No.	Measuring force	Stylus form*	Remarks
178-296	0.75mN	2 μ mR/60°	Dedicated to the standard/retractable drive unit
178-390	4 mN	5 μ mR/90°	
178-387	0.75mN	2 μ mR/60°	Dedicated to the transverse tracing drive unit
178-386	4 mN	5 μ mR/90°	
178-395	0.75mN	2 μ mR/90°	Dedicated to the standard/retractable drive unit
178-391	4 mN	10 μ mR/90°	

*Tip radius / Tip angle

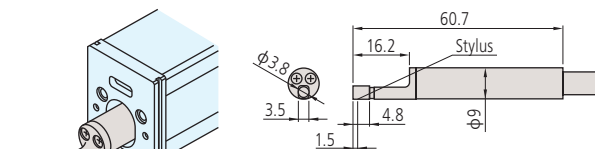
Gear-tooth surface detectors



Order No.	Measuring force	Stylus form*
178-388	0.75mN	2 μ mR/60°
178-398	4 mN	5 μ mR/60°

*Tip radius / Tip angle

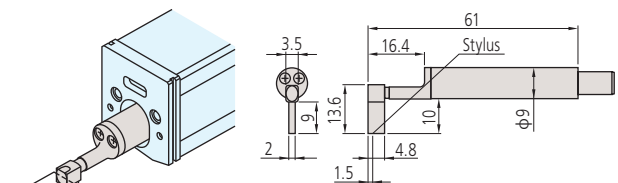
Small hole detectors



Order No.	Measuring force	Stylus form*	Remarks
178-383	0.75mN	2 μ mR/60°	Minimum measurable hole diameter: ϕ 4.5mm
178-392	4 mN	5 μ mR/90°	

*Tip radius / Tip angle

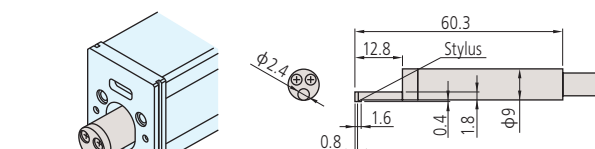
Deep groove detectors



Order No.	Measuring force	Stylus form*	Remarks
178-385	0.75mN	2 μ mR/60°	Not available for the transverse tracing drive unit
178-394	4 mN	5 μ mR/90°	

*Tip radius / Tip angle

Extra small hole detectors



Order No.	Measuring force	Stylus form*	Remarks
178-384	0.75mN	2 μ mR/60°	Minimum measurable hole diameter: ϕ 2.8mm
178-393	4 mN	5 μ mR/90°	

*Tip radius / Tip angle



Mitutoyo

1.888.610.7664



www.calcert.com

sales@calcert.com

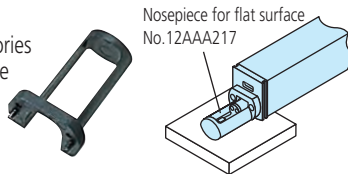
Dimensions: Display Unit and Drive Unit

Drive unit, Display unit

Nosepiece for flat surfaces

No.12AAA217

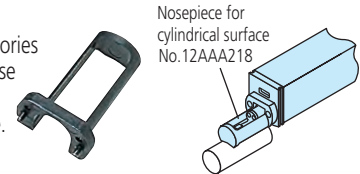
- SJ-310/310R standard accessories
- Not available for the transverse tracing drive unit.



Nosepiece for cylindrical surfaces

No.12AAA218

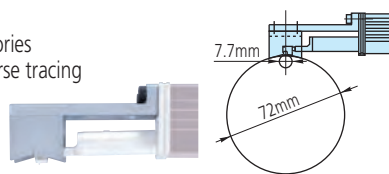
- SJ-310/310R standard accessories
- Not available for the transverse tracing drive unit.
- $\phi 30\text{mm}$ or smaller workpiece.



V-type adapter

No.12AAE644

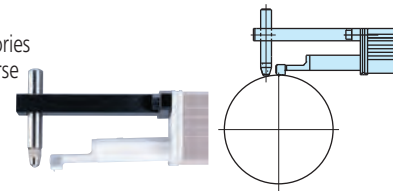
- SJ-310S standard accessories
- Dedicated to the transverse tracing drive unit.



Point-contact adapter

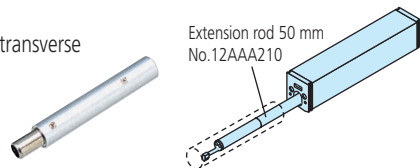
No.12AAE643

- SJ-310S standard accessories
- Dedicated to the transverse tracing drive unit.



Extension rod (50 mm)

- Not available for the transverse tracing drive unit.



Extension cable (1 m)

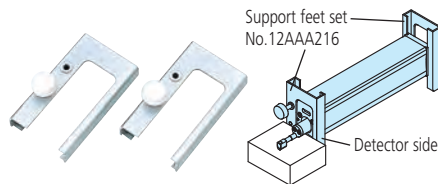
No.12BAA303

- For connecting calculation display unit and drive unit.

Support feet set

No.12AAA216

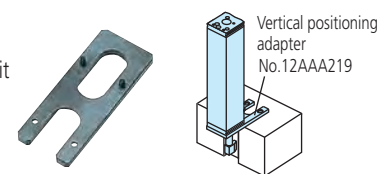
- SJ-310 standard accessory
- Not attachable to the detector side of the transverse tracing drive unit.



Vertical positioning adapter

No.12AAA219

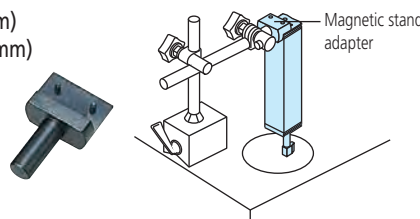
- Not available for the transverse tracing drive unit



Magnetic stand adapter

No.12AAA221($\phi 8\text{mm}$)

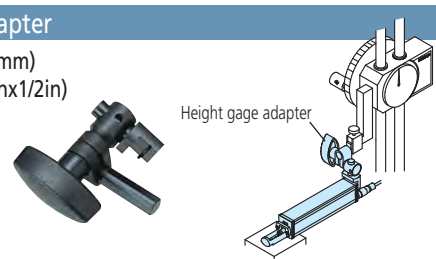
No.12AAA220($\phi 9.5\text{mm}$)



Height gage adapter

No.12AAA222(9x9mm)

No.12AAA233(1/4inx1/2in)



Setting attachments

(Note: 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.

V-type for measuring axially

No.178-033

The V-width is adjustable to the cylindrical workpiece diameter, facilitating axial measurement of a wide range workpiece sizes.

- Adjustable range: $\phi 5 \sim 150\text{ mm}$



Slider type

No.178-034

This attachment is ideal for measuring a flat area of a workpiece that has an indentation or step that makes it difficult to attach the drive unit. You can further improve the ease of use by using this attachment with the magnetic installation base (option: No. 12AAA910).



Inside diameter type

No.178-035

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

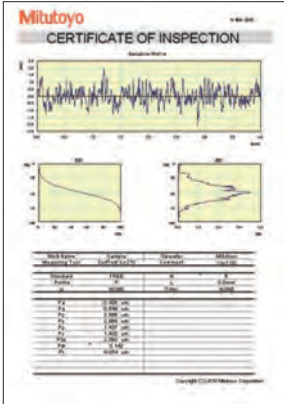
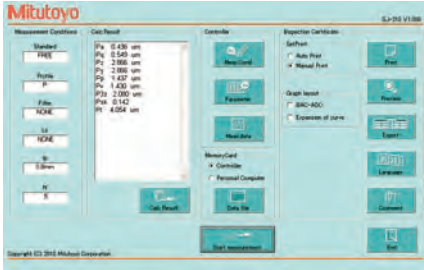
- Applicable diameter: $\phi 75 \sim \phi 95\text{ mm}$
- Accessible depth: $30 \sim 135\text{ mm}$



Op

Simplified communication program for SURFTEST SJ series

The Surftest SJ-310 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.



Required environment*:

- OS:
 - Windows XP-SP3
 - Windows Vista
 - Windows 7 (32/64 bit)
- Spreadsheet software:
 - Microsoft Excel 2002
 - Microsoft Excel 2003
 - Microsoft Excel 2007
 - Microsoft Excel 2010

*Windows OS and Microsoft Excel are products of Microsoft Corporation.

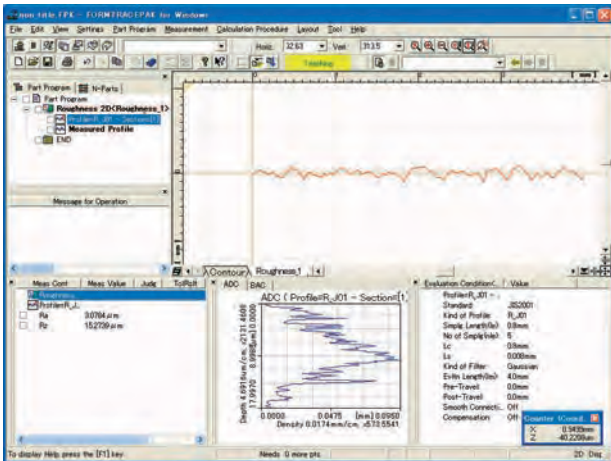
Required environment*:

- USB cable for SJ-310 series
No. 12AAD510

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

Contour / Roughness analysis software FORMTRACEPAK

More advanced analysis can be performed by loading SJ-310 series measurement data to software program FORMTRACEPAK via a memory card (option) for processing back at base.



Mitutoyo



www.calcert.com

sales@calcert.com

1.888.610.7664

Optional Accessories: For External Equipment

Digimatic mini processor DP-1VR

By connecting this printer to the Surftest SJ-310's digimatic output, you can print calculation results, perform a variety of statistical analyses, draw a histogram or D chart, and also perform complicated operations for X-R control charts.



No.264-504-5A

SJ-310→DP-1VR Connecting cable
1m: **No.936937**
2m: **No.965014**

Calculation results input unit INPUT TOOL

This unit allows you to load Surftest SJ-310 calculation results (SPC output) into commercial spreadsheet software on a PC via a USB connector. You can essentially use a one-touch operation to enter the calculation results (values) into the cells in the spreadsheet software.



USB Input Tool Direct
USB-ITN-D
No.06ADV380D



USB keyboard signal conversion type*
IT-012U
No.264-012-10

*Requires the optional Surftest SJ-310 connection cable.

1m: **No.936937**
2m: **No.965014**

Footswitch

A footswitch is used to trigger measurement. This tool is very useful in cases where you need to measure the same workpiece multiple times using jigs and other fixtures.

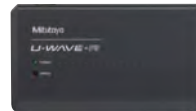


No.12AAJ088

Measurement Data Wireless Communication System U-WAVE

This unit allows you to remotely load Surftest SJ-310 calculation results (SPC output) into commercial spreadsheet software on a PC.

You can essentially use a one-touch operation to enter the calculation results (values) into the cells in the spreadsheet software.



U-WAVE-R
(Connects to the PC)
No.02AZD810D



U-WAVE-T *
(Connects to the SJ-310)
No.02AZD880D

*Requires the optional Surftest SJ-310 connection cable.

No.02AZD790D

Optional accessories and consumables for SJ-310

- | | |
|---|--------------------|
| •Printer paper (5 rolls) | No.270732 |
| •Durable printer paper (5 rolls) | No.12AAA876 |
| •Touch-screen protector sheet (10 sheets) | No.12AAN040 |
| •Memory card (2GB) * | No.12AAL069 |
| •Connecting cable (for RS-232C) | No.12AAA882 |

*micro SD card (with a conversion adapter to SD card)



- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Test Equipment and Seismometers
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

Mitutoyo America Corporation

M³ Solution Centers

Note: All information regarding our products, and in particular the illustrations, drawings, dimensional and performance data contained in this printed matter as well as other technical data are to be regarded as approximate average values. We therefore reserve the right to make changes to the corresponding designs. The stated standards, similar technical regulations, descriptions and illustrations of the products were valid at the time of printing. In addition, the latest applicable version of our General Trading Conditions will apply. Only quotations submitted by ourselves may be regarded as definitive.

Mitutoyo products are subject to US Export Administration Regulations (EAR). Re-export or relocation of our products may require prior approval by an appropriate governing authority.

Trademarks and Registrations

Designations used by companies to distinguish their products are often claimed as trademarks. In all instances where Mitutoyo America Corporation is aware of a claim, the product names appear in initial capital or all capital letters. The appropriate companies should be contacted for more complete trademark and registration information.

© 2014 Mitutoyo America Corporation, Aurora IL

2.5M 0214-02 Printed in USA, March 2014

Mitutoyo
Precision is our Profession

1.888.610.7664

 www.calcort.com

sales@calcort.com