Portable Surface Roughness Tester
SURFTEST SJ-310 Series

Bulletin No. 2078

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.

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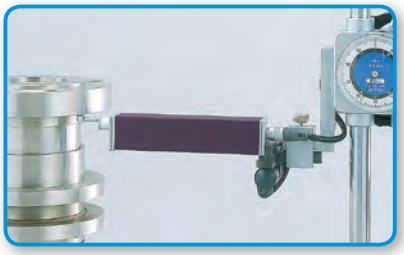
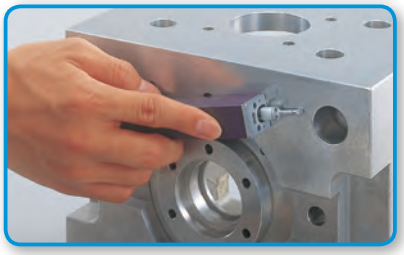
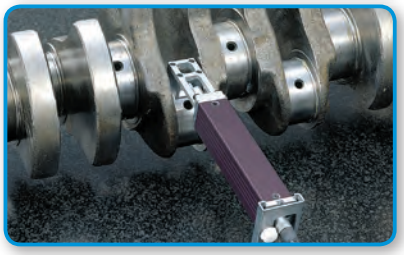
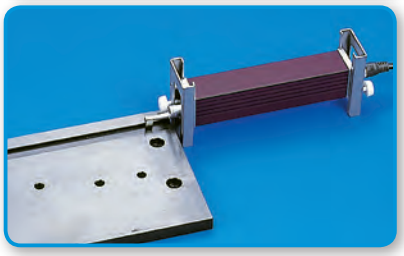
Enhanced power for making measurements on site

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.


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.

Printer

BAC and ADC curves can be printed in addition to calculation results (including pass/fail results) and assessed profiles. The printer offers an easy-to-understand layout and can also print horizontally to match the content displayed on the LCD. Furthermore, printing speed is approximately 50% faster than conventional models.

5.7-inch color graphic LCD with touch screen

Measurement Result
Measured profile
One-touch switching
BAC curve
ADC curve

Built-in battery

With drastically enhanced power compared to conventional models, the Surftest SJ-310 can make 1,500 continuous measurements on a full charge achieved in 4 hours.

Sheet buttons

Frequently used functions, such as the measurement start button, are provided as rugged sheet buttons with excellent durability.

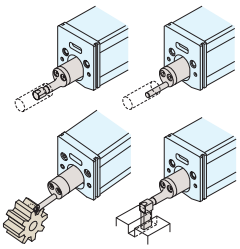
Highly functional detectors and drive units

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

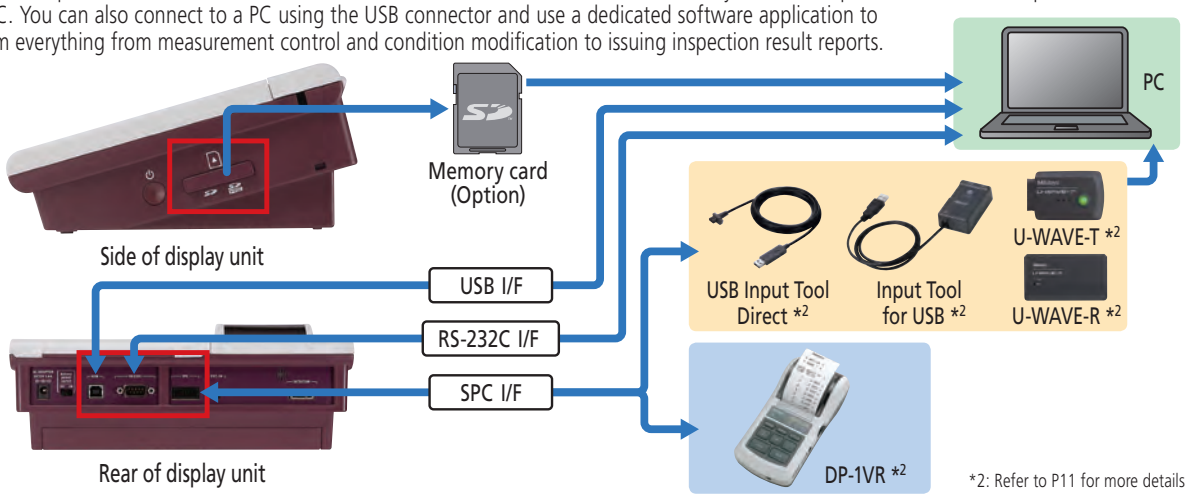
- **Standard drive unit**
  - Popular standard drive unit

- **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.

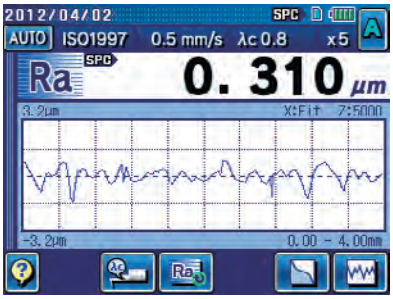


*2: Refer to P11 for more details

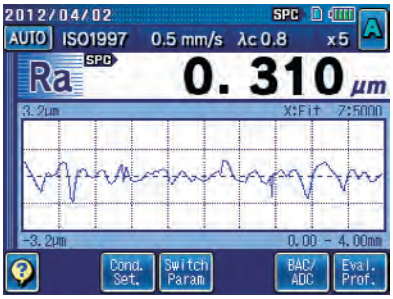
Measurement assistance and analysis features offering the ultimate in ease of use

Switches between icon and text display

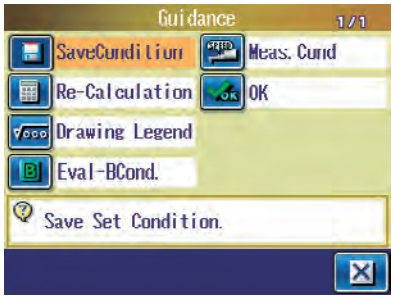
The display can be switched between icon and text, providing easy, user-friendly operation.
Additionally, the guidance feature provides detailed explanations of touch-screen buttons.



Icon

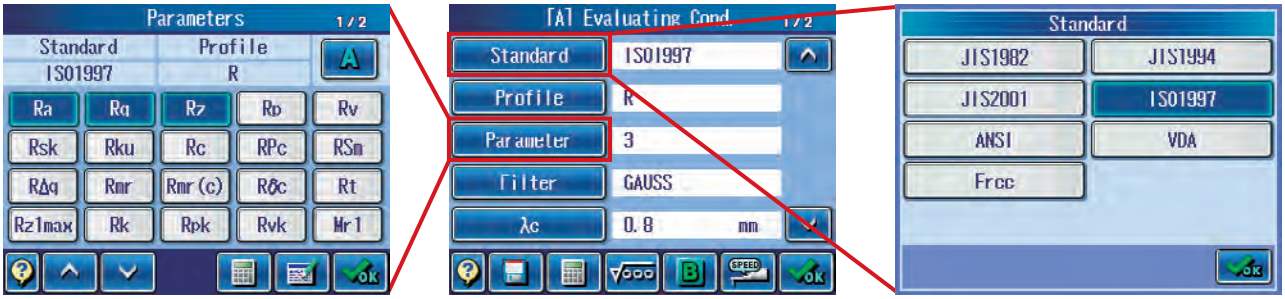


Text

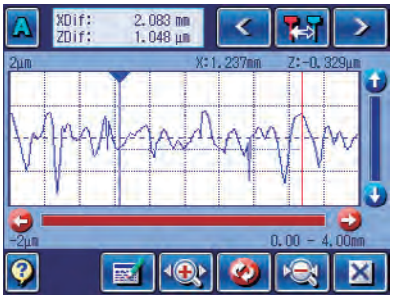


Easy specification of assessment conditions from a list

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

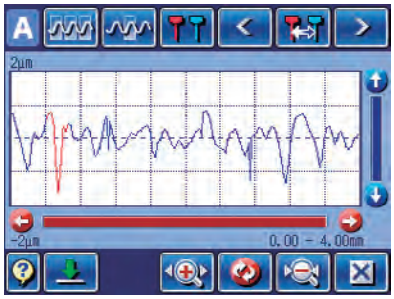


Zooming waveforms and analyzing coordinate differences



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.

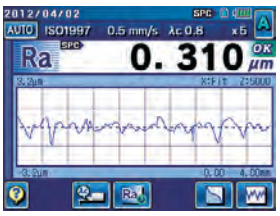
Deleting unnecessary data



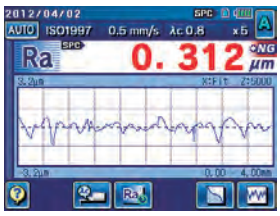
With the Surftest SJ-310, you can delete portions of measurement data. This feature allows you to make new calculations by deleting data that should not be included in parameter calculation, such as data on a scratch.

Displaying pass/fail results

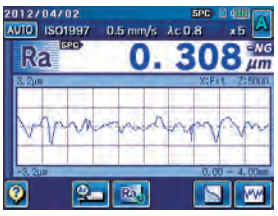
By specifying a tolerance in advance, you can display pass/fail results in color.



OK



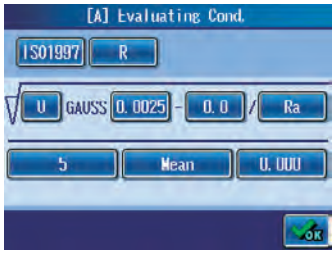
+NG



-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)



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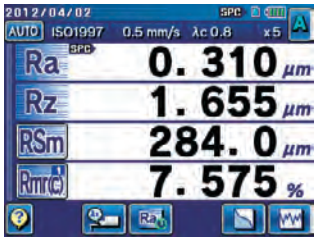
Measurement results can be displayed in several ways

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

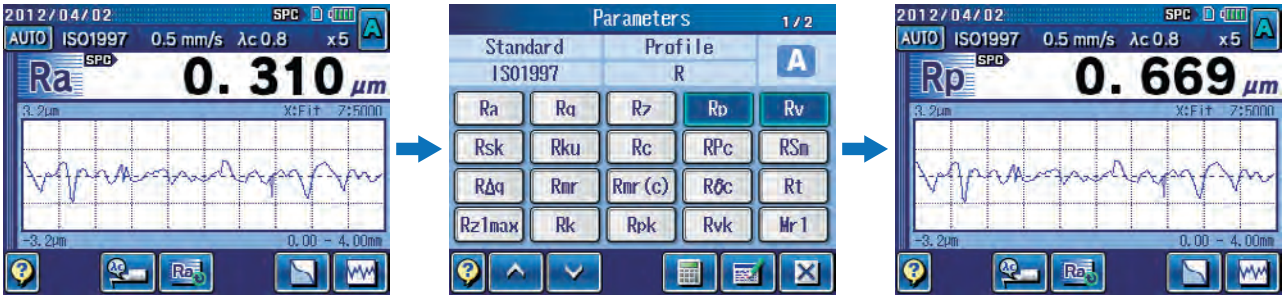


4-parameter display: four parameter measurement results

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

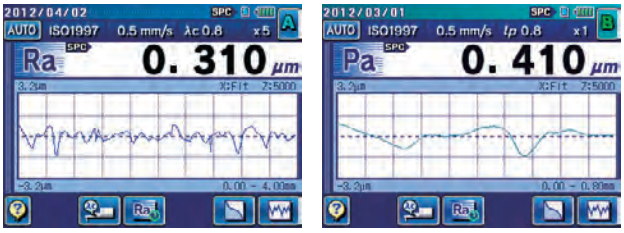
Recalculation function

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.

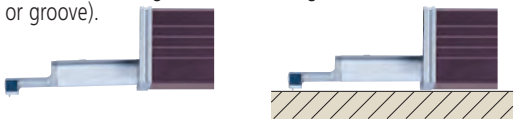


Stylus alarm function

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).

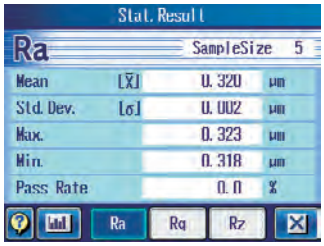


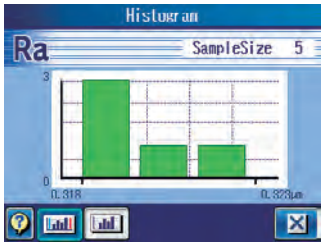
No contact

Contact

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**
Measuring range	X axis		16.0 mm (.63inch)				5.6 mm (.22inch)	
	Detector	Range	360 µm (-200 µm ~ +160 µm) [14400 µinch (-7900 µinch to +6300 µinch)]					
		Range/ resolution	360 µm / 0.02 µm (14400 µinch / .8 µinch) 100 µm / 0.006 µm (4000 µinch / .2 µinch) 25 µm / 0.002 µm (1000 µinch / .08 µinch)					
Measuring speed			In the measurement: 0.25 mm/s (.01inch/s), 0.5 mm/s (.02inch/s), 0.75 mm/s (.03inch/s), In the return: 1 mm/s (.04inch/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					
Measured profiles			Primary, Roughness, DF, R-Motif, W-Motif					
Parameters			Ra, Rc, Ry, Rz, Rq, Rt, Rmax*1, Rp, Rv, R3z, Rsk, Rku, Rc, RPc, Rsm, Rz1max*2, S, HSC, RzJIS*3, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), R c, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, λa, λq, L0, 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		λc	0.08, 0.25, 0.8, 2.5, 8 mm (.003, .01, .03, .1, .3 inch)					
		λs *5	2.5, 8 µm (100, 320 µinch)					
Sampling length			0.08, 0.25, 0.8, 2.5, 8 mm (.003, .01, .03, .1, .3 inch)					
Number of sampling lengths			×1, ×2, ×3, ×4, ×5, ×6, ×7, ×8, ×9, ×10, Arbitrary (0.3 ~ 16.0mm: 0.01mm Interval)				×1, ×2, ×3, ×4, ×5, ×6, ×7, ×8, ×9, ×10, Arbitrary (0.3 ~ 5.6mm: 0.01mm Interval)	
LCD dimensions			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, 10000 measuring data, 10000 text data, 500 statistic data, 1 backup of machine setting, the last ten traces (Trace 10)					
	Calibration		Auto-calibration with the entry of numerical value / 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 (W×D×H)		Display unit	275 x 109 x 198 mm					
		Drive unit	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 (Ra 3µm), 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 (Ra 1µm), 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.

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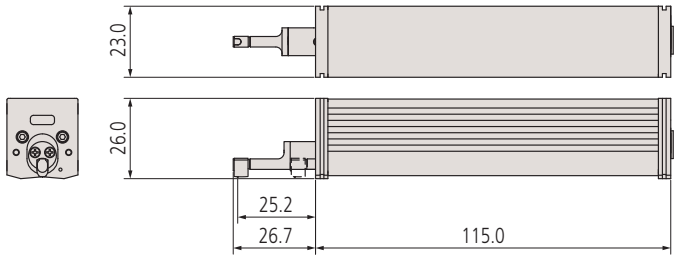
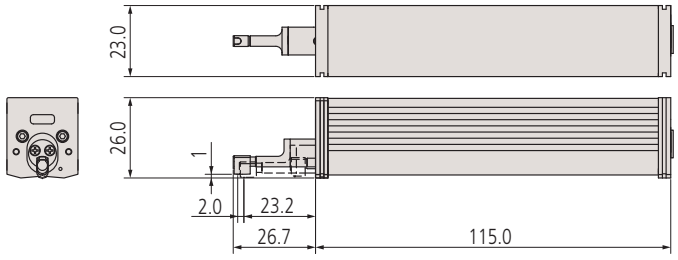
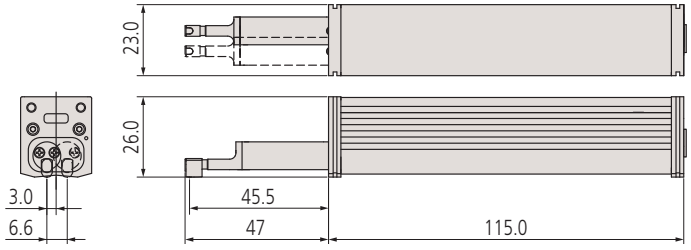
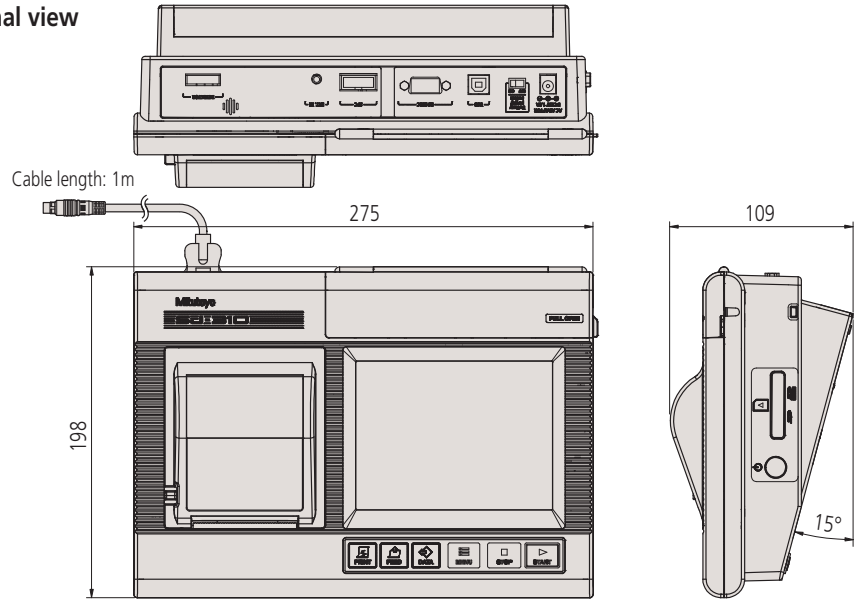
Dimensions: Display Unit and Drive Unit

Drive unit, Display unit

Unit: mm

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

Display unit external view

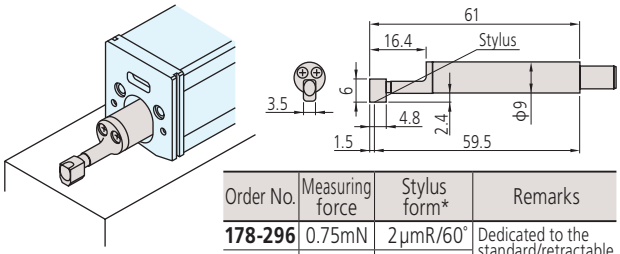


Dimensions: Detectors

Detectors

Unit: mm

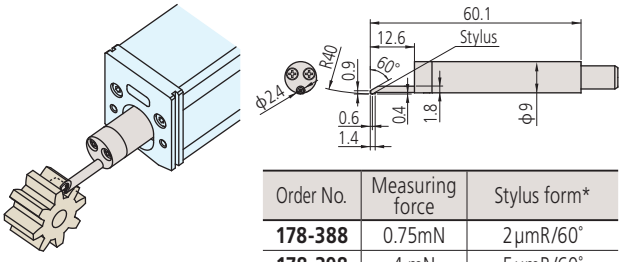
Standard detectors



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

*Tip radius / Tip angle

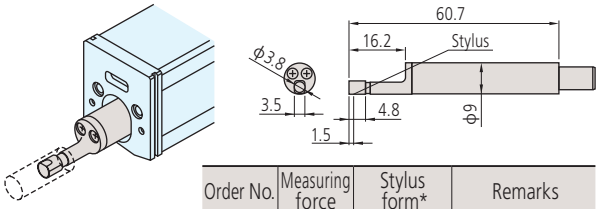
Gear-tooth surface detectors



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

*Tip radius / Tip angle

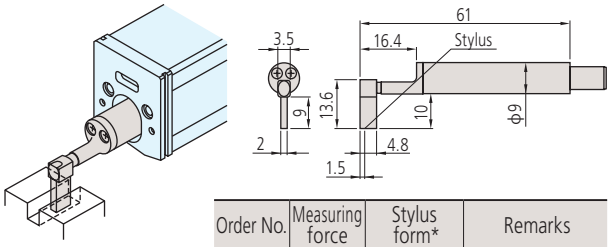
Small hole detectors



Order No.	Measuring force	Stylus form*	Remarks
178-383	0.75mN	2μmR/60°	Minimum measurable hole diameter:ø4.5mm
178-392	4 mN	5μmR/90°	

*Tip radius / Tip angle

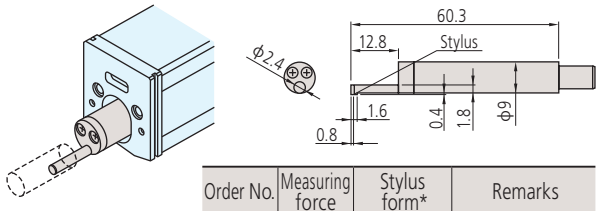
Deep groove detectors



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

*Tip radius / Tip angle

Extra small hole detectors



Order No.	Measuring force	Stylus form*	Remarks
178-384	0.75mN	2μmR/60°	Minimum measurable hole diameter: ø2.8mm
178-393	4 mN	5μmR/90°	

*Tip radius / Tip angle

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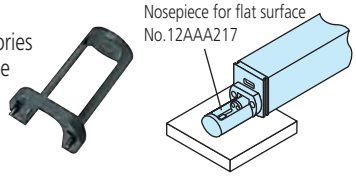
Dimensions: Display Unit and Drive Unit

Drive unit, Display unit

Nosepiece for flat surfaces

No.12AAA217
- SJ-310/310R standard accessories
- Not available for the transverse tracing drive unit.

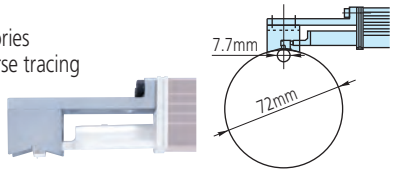


Nosepiece for cylindrical surfaces

No.12AAA218
- SJ-310/310R standard accessories
- Not available for the transverse tracing drive unit.
- ø30mm or smaller workpiece.

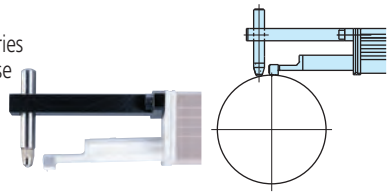
V-type adapter

No.12AAE644
- SJ-310S standard accessories
- Dedicated to the transverse tracing drive unit.



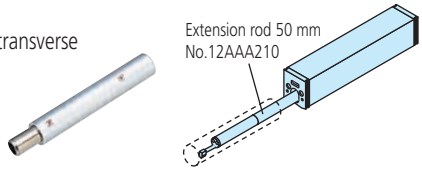
Point-contact adapter

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.

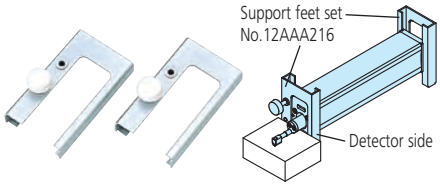


Extension cable (1 m)

No.12BAA303
- For connecting calculation display unit and drive unit.

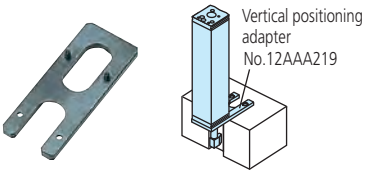
Support feet set

No.12AAA216
- SJ-310 standard accessory
- Not attachable to the detector side of the transverse tracing drive unit.



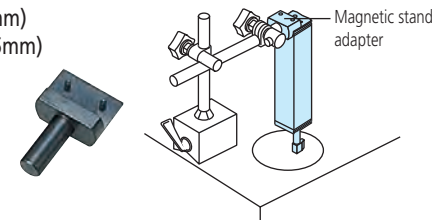
Vertical positioning adapter

No.12AAA219
- Not available for the transverse tracing drive unit



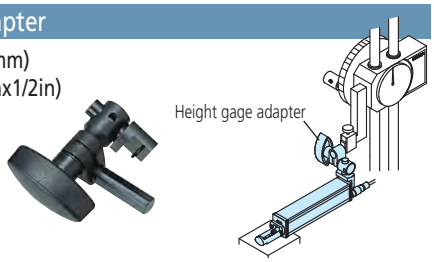
Magnetic stand adapter

No.12AAA221(ø8mm)
No.12AAA220(ø9.5mm)



Height gage adapter

No.12AAA222(9x9mm)
No.12AAA233(1/4inx1/2in)



Setting attachments

(Note: Not available for the transverse tracing drive unit)

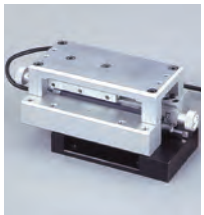
Enhances measurement efficiency by facilitating the measurement setup of multiple workpieces of the same type and of the hard-to-access sections of a workpiece.

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: ø 5 ~ 150 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**).



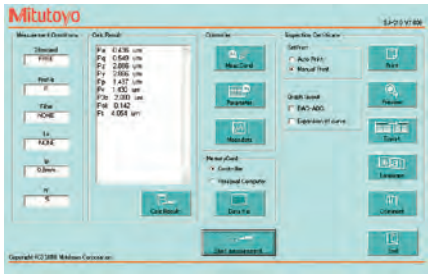
Inside diameter type

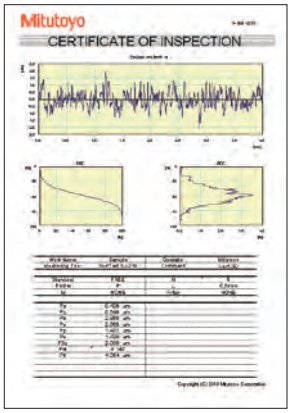
No.178-035
Greatly facilitates measurement of internal wall surfaces of, for example, a cylinder block.
- Applicable diameter: ø 75 ~ ø 95 mm
- Accessible depth: 30 ~ 135 mm

Optional Accessories: For External Output

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
- Spreadsheet software:
  Microsoft Excel 2002
  Microsoft Excel 2003
  Microsoft Excel 2007
  Microsoft Excel 2010

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

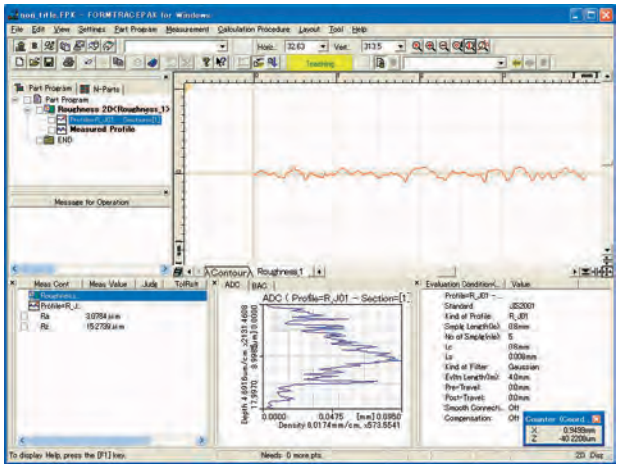
Required environment*:

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

This program can be downloaded free of charge from the Mitutoyo website.
http://www.mitutoyo.co.jp

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

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

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