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Mitutoyo Quality

Portable Surface Roughness Tester
Surftest SJ-210/310 Series

Form Measurement

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Portable Surface Roughness Tester

Surftest SJ-210/310 Series

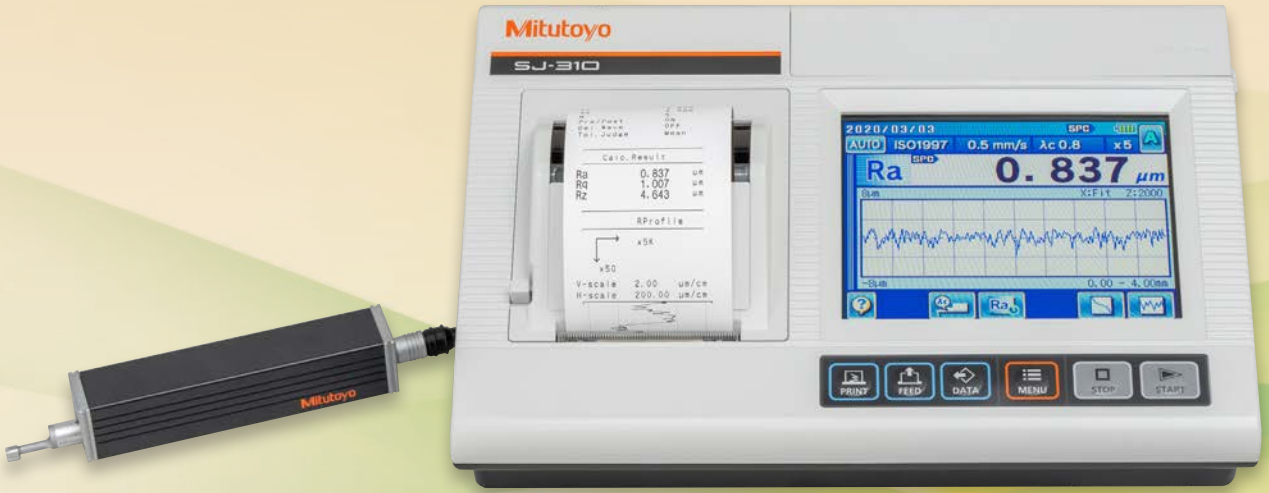
Surftest SJ-210 Series

The Surftest SJ-210 is a user-friendly surface roughness measurement instrument designed as a handheld tool that can be carried with you and used on-site.

Refer to page 4 to 7 for details.

Surftest SJ-310 Series

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



Refer to page 8 to 11 for details.

Enhanced power for making measurements on site

Charging is reduced approximately one quarter of the time compared with conventional models. The detector supports a variety of measurement orientations and can perform measurements up against a wall surface or while facing upward. When combined with optional accessories such as a height gage adapter, the detector can perform measurements in various orientations and settings.









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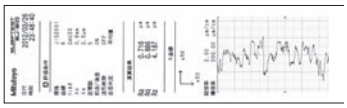
Surftest SJ-310 Series

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* provides intuitive and easy operation. The integrated high-speed printer offers the user the ability to perform the entire measuring and printing process with the push of a single button (START button). * Text display can also be selected.

High-speed 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

Sheet buttons

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

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.

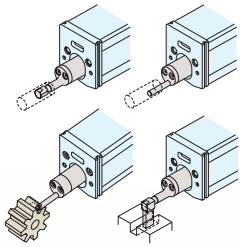
Highly functional detectors and drive units

Detector supplied as standard

One of two types may be selected:

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

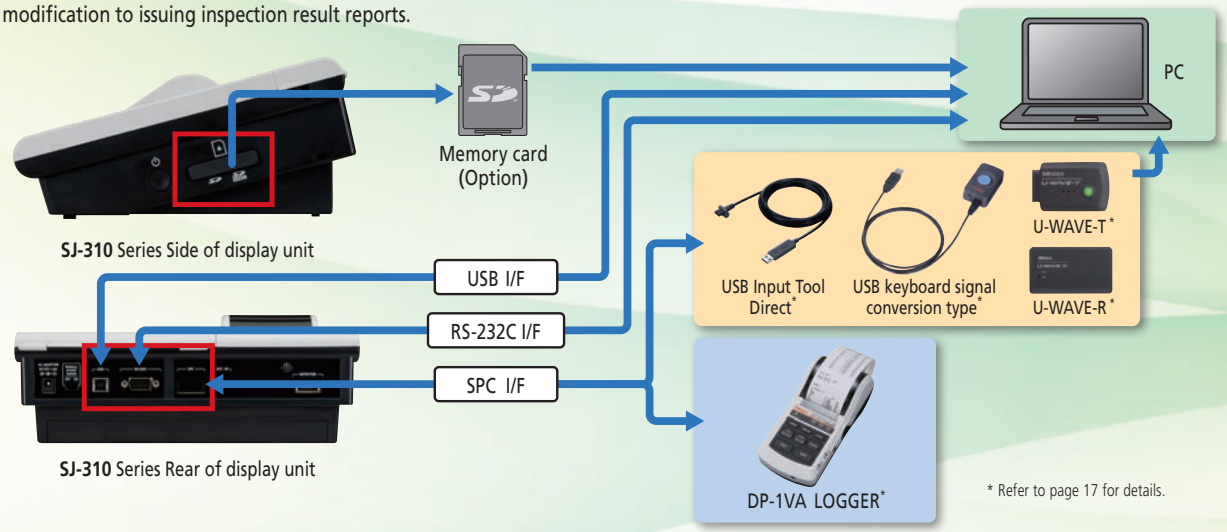
- **Standard drive unit**
  Popular standard drive unit

- **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

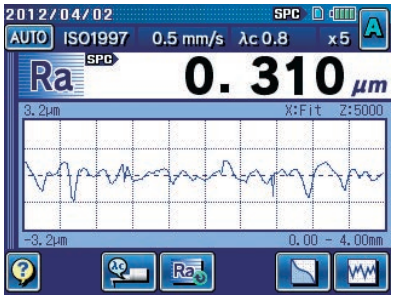
You can save parameter recalculations and measurement results in text format on a memory card and import into commercial spreadsheet software on a PC. You can also connect to a PC using the USB connector and use a dedicated software application to perform everything from measurement control and condition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



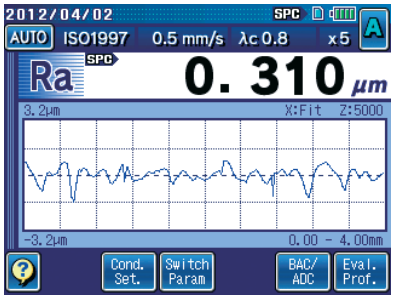
* Refer to page 17 for details.

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.



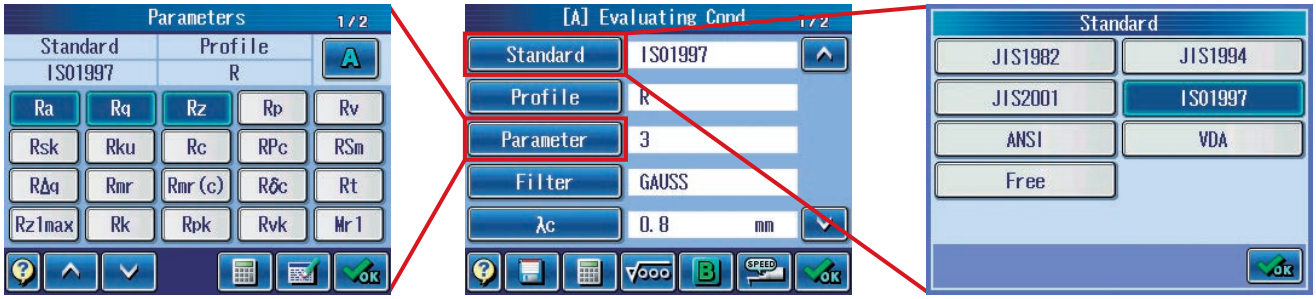
Icon



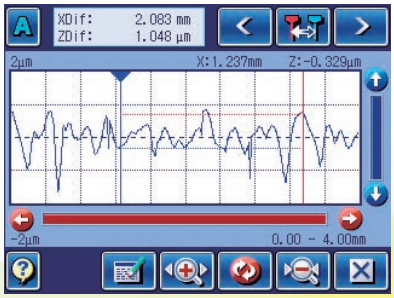
Text

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).

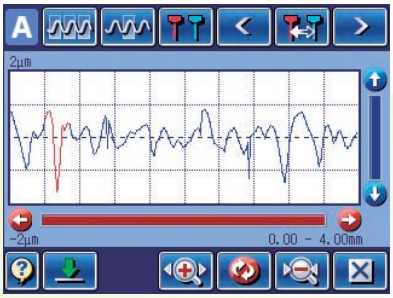


Zooming waveforms and analyzing coordinate differences



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.

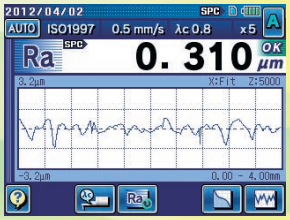
Deleting unnecessary data



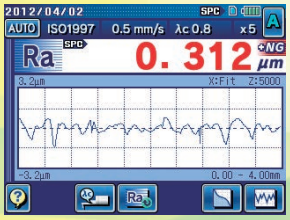
With the Surftest **SJ-310**, you can delete portions of measurement data. This feature allows you to make new calculations by deleting data that should not be included in parameter calculation, such as data on a scratch.

Displaying GO/NG judgment results

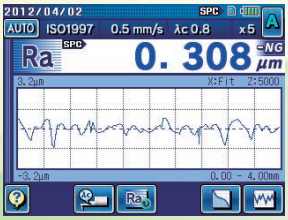
By specifying a tolerance in advance, you can display pass/fail results in color.



OK



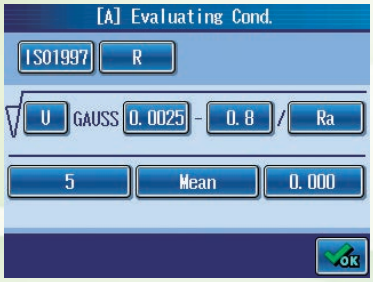
+NG



-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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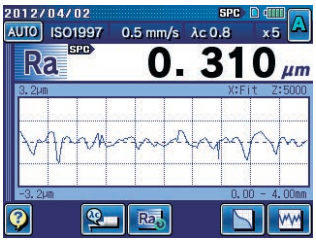
SJ-310 Series

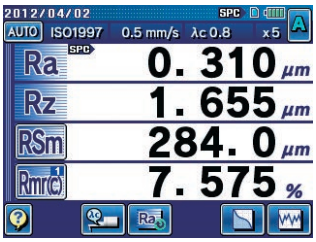
Measurement results can be displayed in several ways

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

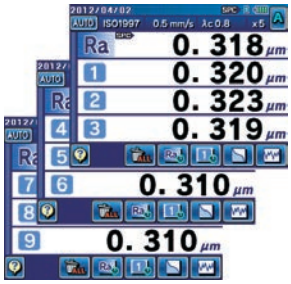
1-parameter display: one parameter measurement result



Profile display: one parameter measurement result and the measured profile



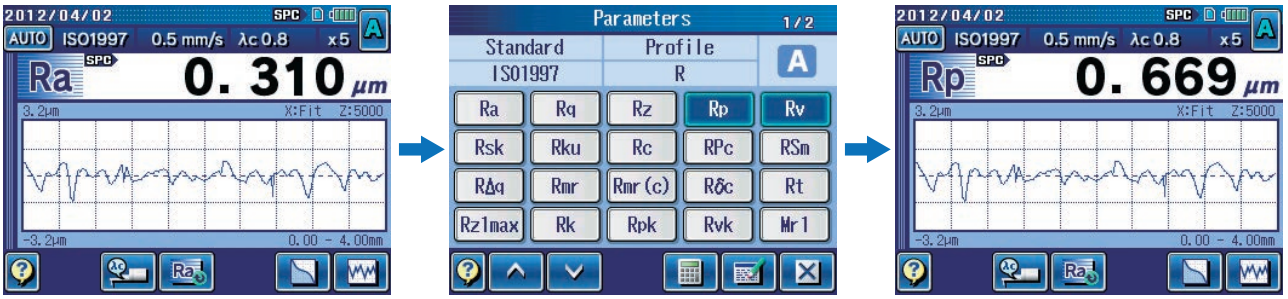
4-parameter display: multiple parameter measurement results



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

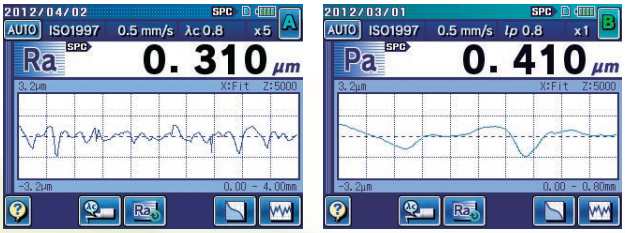
Recalculation function

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.

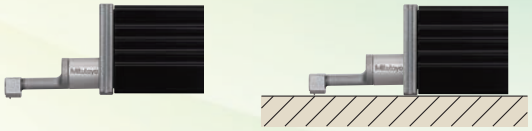


Stylus alarm function

An alarm warns you when the cumulative measurement distance exceeds a preset limit. This feature can be used to prevent problems that would be caused by worn out styli. Any value can be specified as the limit.

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).

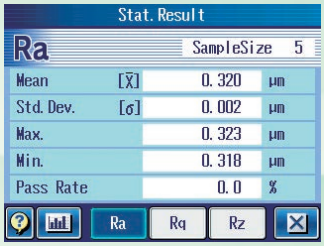


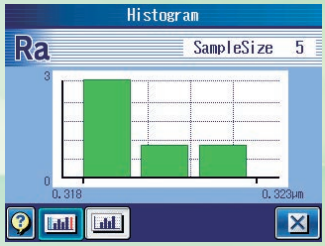
No contact

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.





SJ-310 Series Specifications

Specifications

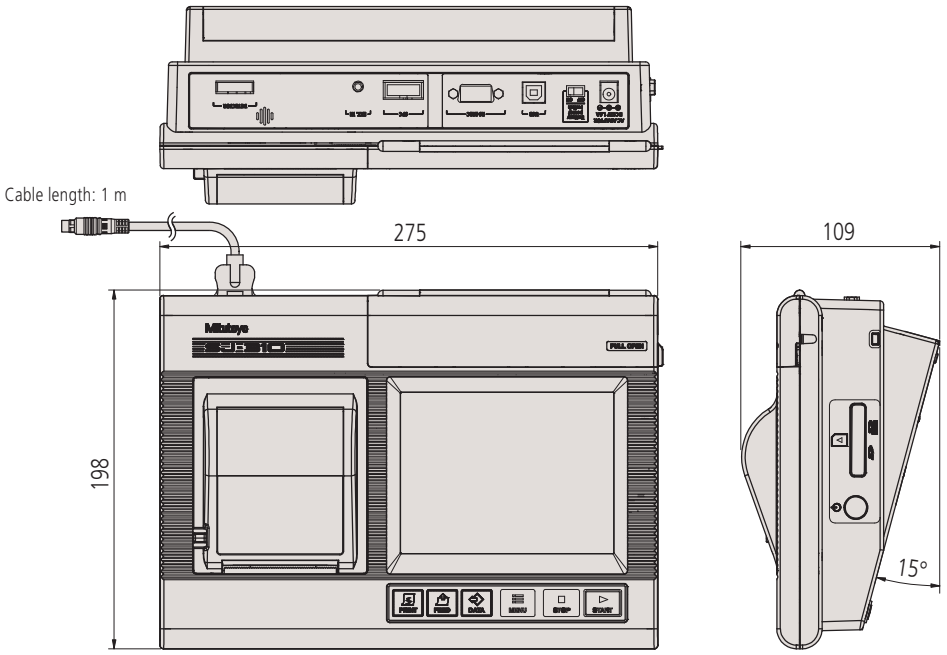
Type of detector			Standard drive unit type		Retractable drive unit type		Transverse tracing drive unit type	
Model No.			SJ-310 (0.75 mN type)	SJ-310 (4 mN type)	SJ-310 (0.75 mN type)	SJ-310 (4 mN type)	SJ-310 (0.75 mN type)	SJ-310 (4 mN type)
		inch/mm	**178-571-11A**	**178-571-12A**	**178-573-11A**	**178-573-12A**	**178-575-11A**	**178-575-12A**
Measuring range	X axis		.63" (16.0mm)				.22"(5.6 mm)	
	Detector	Range	14400 µin (-7900 µin to +6300 µin) [360 µm (-200 µm to +160 µm)]					
		Range/resolution	14400 µin / .8 µin (360 µm / 0.02 µm) 4000 µin / .2 µin (100 µm / 0.006 µm) 1000 µin / .08 µin (25 µm / 0.002 µm)					
Measuring speed			When measuring: 0.01, 0.02, 0.03 in/s (0.25mm/s, 0.5mm/s, 0.75mm/s), When returning: .04 in/s (1mm/s)					
Measuring force/Stylus tip			0.75 mN/2 µmR 60°, 4 mN/5 µmR 90°					
Skid force			400 mN or less					
Applicable standards			JIS '82/JIS '94/JIS '01/ISO '97/ANSI/VDA					
Assessed 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), RδC, 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			Bearing area curve/Amplitude distribution curve					
Filters			Gaussian, 2CR75, PC75					
Cut-off length		λc	.003, .01, .03, .1, .3" (0.08, 0.25, 0.8, 2.5, 8 mm)					
		λs[*5]	100, 320 µin (2.5, 8 µm)					
Sampling length			.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 0.01~.63" (.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/ Tolerance value/Assessed profile/Graphic curve/Bearing area curve/Amplitude distribution curve/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 function			Auto-sleep function (30-600 sec)[*7]					
Power supply			Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter Note 1: Charging time: about 4 hours (may vary due to ambient temperature) Note 2: Endurance: about 1500 measurements (differs slightly due to use conditions/environment)					
Size (W×D×H)		Display unit	10.8" x 4.3" x 7.8" (275 x 109 x 198 mm)					
		Drive unit	4.5"x 0.9" x 8.9" (115 x 23 x 26.7 mm)					
Mass			About 3.9 lbs. (1.8 kg) (Display unit + Drive unit + Standard detector)					
Standard accessories			**12AAW066** Connecting cable[*8] **178-601** Roughness reference specimen (Ra3 µm) **357651** AC adapter **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 Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty				**12AAW066** Connecting cable[*8] **178-606** Roughness reference specimen (Ra1 µm) **357651** AC adapter **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 Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty	

*1 Only for VDA/ANSI/JIS '82 standards. *2 Only for ISO '97 standard. *3 Only for JIS '01 standard. *4 Only for ANSI standard. *5 Not available for JIS '82 standard.
*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.
Note: To denote your AC line voltage add the following suffixes (e.g. **178-570-11A**). A for 120 V, C for 100 V, D for 230 V, E for 230 V (for UK), DC for 220 V (for China), K for 220 V (for Korea)

SJ-310 Series Display unit

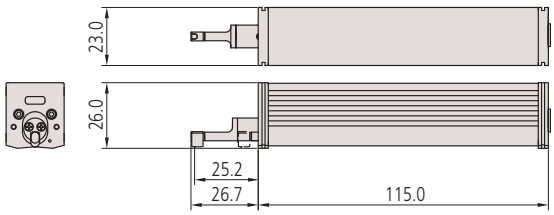
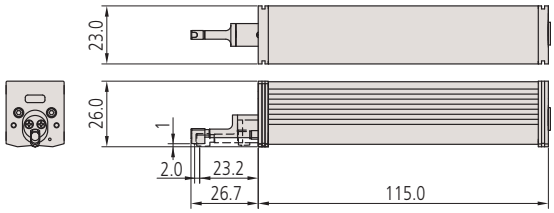
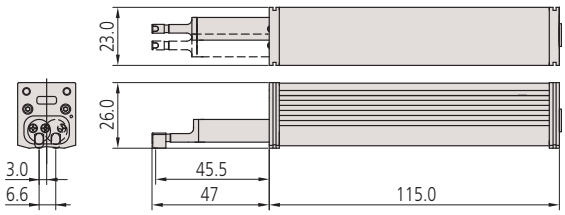
Unit: mm

25.4mm = 1"



Drive unit

Unit: mm

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

25.4mm = 1"

* External dimension for the models with standard detector conforms to each drive unit.

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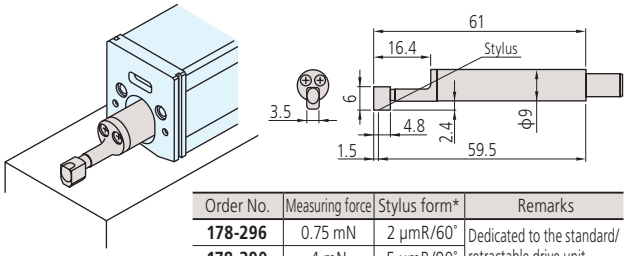
Dimensions

Detectors

Unit: mm

25.4mm = 1"

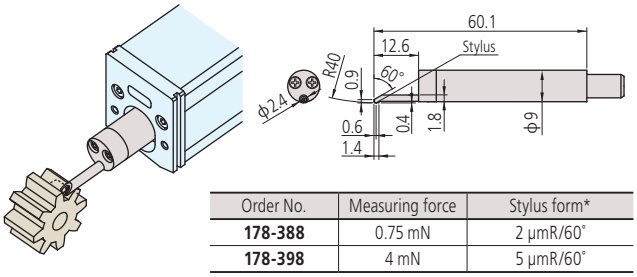
Standard detectors



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

* Tip radius/Tip angle

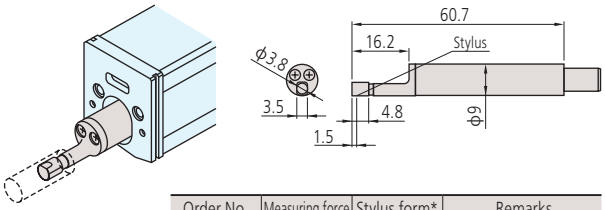
Gear-tooth surface detectors



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

* Tip radius/Tip angle

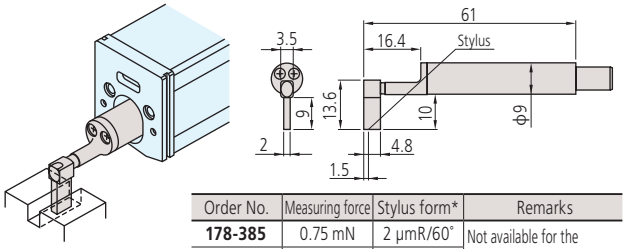
Small hole detectors



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

* Tip radius/Tip angle

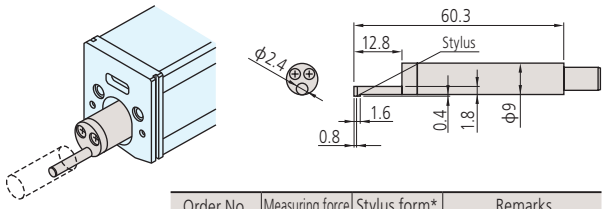
Deep groove detectors



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

* Tip radius/Tip angle

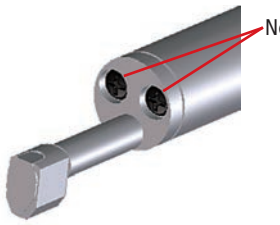
Extra small hole detectors



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

* Tip radius/Tip angle

- How to identify the stylus tip radius



Nose mounting screw (2 pcs.)
Black : 2 µm
White : 5 µm
Yellow: 10 µm

- Custom-made for special order

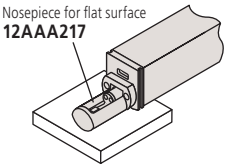
Any specified detector other than above listed can be custom-made for special order.
Please consult your local Mitutoyo sales office.

Optional accessories for SJ-210/310 Series

Drive unit accessories

Nosepiece for flat surfaces

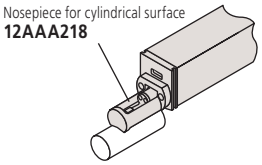
12AAA217



Note 1: Standard accessory for the standard/ retractable drive unit of the **SJ-310** Series
Note 2: Not available for the transverse tracing drive unit.

Nosepiece for cylindrical surfaces

12AAA218

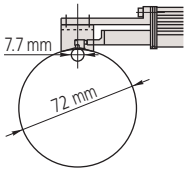


Note 1: Standard accessory for the standard/ retractable drive unit of the **SJ-310** Series
Note 2: Not available for the transverse tracing drive unit.

V-type adapter

12AAE644

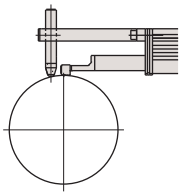
Note 1: Transverse tracing type standard accessory.
Note 2: Dedicated to the transverse tracing drive unit.



Point-contact adapter

12AAE643

Note 1: Transverse tracing type standard accessory.
Note 2: Dedicated to the transverse tracing drive unit.

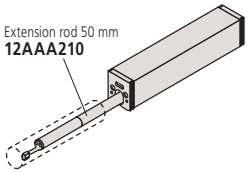


Extension rod (50 mm)

Note: Only one rod can be used.

12AAA210

Note: Not available for the transverse tracing drive unit.



Extension cable (1 m)

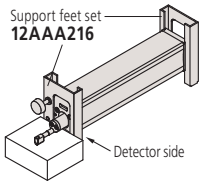
Note: Only one rod can be used.

12BAA303

Note: For connecting calculation display unit and drive unit.

Support feet set

12AAA216

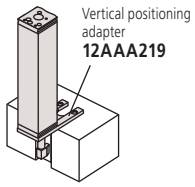


Note 1: Standard accessory for the standard/ retractable drive unit of the **SJ-310** Series
Note 2: Not attachable to the detector side of the transverse tracing drive unit.

Vertical positioning adapter

12AAA219

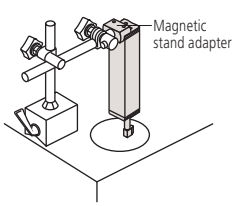
Note: Not available for the transverse tracing drive unit.



Magnetic stand adapter

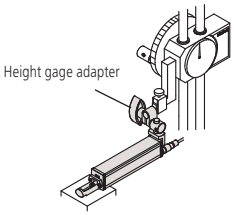
12AAA221
(Mounting spigot diameter is 8 mm)

12AAA220
(Mounting spigot diameter is 9.5 mm)



Height gage adapter

12AAA222 (9 x 9mm)
12AAA233 (1/4 x 1/2")



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Optional accessories for SJ-210/310 Series

Setting attachments

Note: Not available for the transverse tracing drive unit

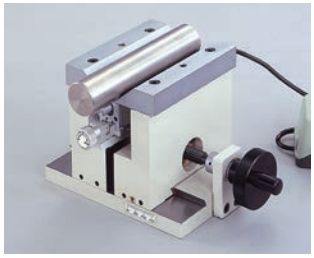
Enhances measurement efficiency by facilitating the measurement setup of multiple workpieces of the same type and of the hard-to-access sections of a workpiece.

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

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

- Adjustable range: ø5 - ø150 mm

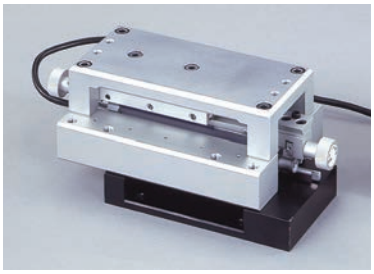
178-033



Setting attachment: Slider type

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.

178-034



Setting attachment: Inside diameter type

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

- Applicable diameter: ø75 - ø95 mm
- Accessible depth: 30 - 135 mm

178-035

- Custom-made for special order

Any specified attachment other than above listed can be custom-made for special order.
Please consult your local Mitutoyo sales office.
Example: measurements for crankshaft, cylinder-block bores

Calculation results input unit INPUT TOOL

This unit allows you to load Surftest **SJ-210/310** Series 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
06AFM380D

USB Input Tool
USB keyboard signal conversion type*
IT-016U
264-016-10

* Requires the optional connection cable.
1 m: **936937**
2 m: **965014**

Digimatic mini processor DP-1VA LOGGER

By connecting this printer to the Surftest **SJ-210/310** Series' digimatic output, you can print* calculation results, perform a variety of statistical analysis, draw a histogram or D chart, and also perform complicated operations for X-R control charts.

* The symbol 'µm' is not printable, but measurement results can still be printed out without setting the measurement unit.

264-505A

- **SJ-210/310** Series → **DP-1VA LOGGER** Connecting cable
  1 m: **936937**
  2 m: **965014**

Roughness specimen W

Display: Ra = Approx. 3 µm,
Approx. 0.4 µm

178-604

Note: Ra = Approx. 0.4 µm can only be used for stylus tip checking.

Measurement Data Wireless Communication System U-WAVE

This unit allows you to remotely load Surftest **SJ-210/310** Series 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)
02AZD810D

U-WAVE-T*
(Connects to the SJ-210/310 Series)
02AZD880G

* Requires the optional connection cable.
02AZD790D

Example of the connection with **SJ-210**

Foot switch

A foot switch 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.

12AAJ088

Memory card (2GB / 8GB)

12AAW452 / 64PMI244

Note 1: micro SD card (with a conversion adapter to SD card)
Note 2: Not all memory cards can be recognized. Please use the optional SD memory card.

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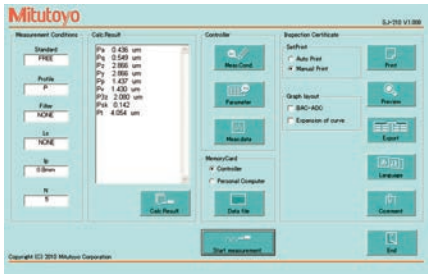
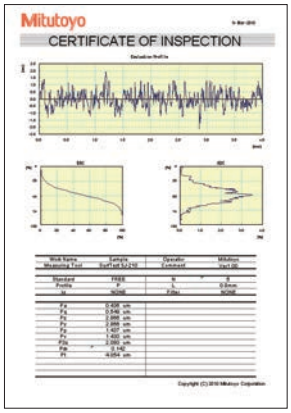
Optional accessories for SJ-210/310 Series

Simplified communication program for SURFTEST SJ-210/310 Series

The Surftest **SJ-210/310** Series has a USB interface, enabling setting up measurement conditions and starting the measurement via PC.
We also provide a program that allows you to create inspection record tables using a Microsoft Excel* macro.





Required environment*:

- OS: Windows 7
  Windows 8
  Windows 10
- Spreadsheet software:
  Microsoft Excel 2010
  Microsoft Excel 2013
  Microsoft Excel 2016

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

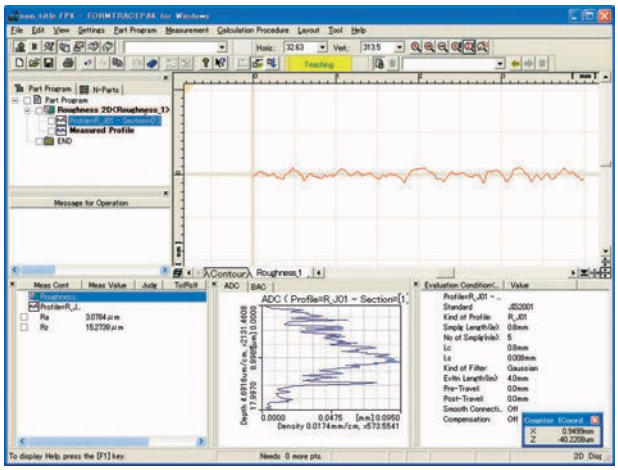
The optional USB cable is also required.

- USB cable for **SJ-210** Series (2 m)
  12AAL068
- USB cable for **SJ-310** Series
  12AAD510

Note: USB Communication cable (commercial item: Equivalent to A and mini-B type for device-host A)

Contour/Roughness analysis software FORMTRACEPAK-AP

More advanced analysis can be performed by loading **SJ-210/310** Series measurement data to software program **FORMTRACEPAK-AP** via a memory card (option) for processing back at base.



Refer to the **FORMTRACEPAK**
Bulletin No. 2010(2) for more details.

Optional Accessories

For SJ-210 Series

- Printer for **SJ-210**

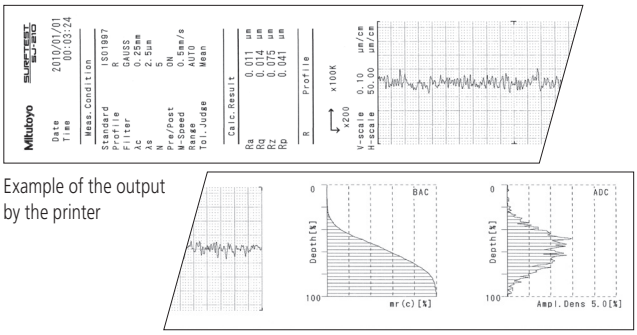
Assessed profiles, calculation results and curves can be printed out by connecting the **SJ-210**-dedicated printer, which is palm sized (W×D×H: 93×125×70 mm) and can run on an internal battery.

- Power supply can be selected. (AC adapter or battery pack)
- Printable items: Measurement conditions, calculation results, assessed profile, bearing area curve (BAC), amplitude distribution curve (ADC), and environment settings.

178-421A

Unit configuration:

1) Printer main unit 1 unit
2) Printer connecting cable (For the connection to the **SJ-210**)
3) Printing paper 6 rolls
4) Battery pack 1 piece
5) Exclusive use AC adaptor (with AC power cord) 1 piece



Example of the output by the printer

- Optional accessories and consumables for **SJ-210**

Protective sheet for the color LCD (5-sheet set)	**12AAL066**
Connecting cable (for **SJ-210** Series)	**12AAL067**

Printer supplies:

Printing paper standard type (5 rolls)	**270732**
Durable printer paper (5 rolls)	**12AAA876**

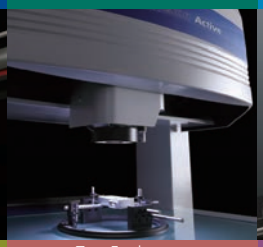
For SJ-310 Series

- Optional accessories and consumables for **SJ-310**

Printer paper standard type (5 rolls)	**270732**
Durable printer paper (5 rolls)	**12AAA876**
Touch-screen protector sheet (10 sheets)	**12AAN040**
Connecting cable (for **SJ-310** Series)	**12AAA882**

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

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

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