SURFTEST SJ-310 SERIES
PORTABLE SURFACE ROUGHNESS TESTER
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.

**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.

**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

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.
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.

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

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.

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.

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.

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.

Surface texture symbol entry
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.

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 ($\lambda_c$) and the number of sampling lengths ($N$) on the measurement screen. (Patent pending in Japan.)

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.

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).

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 ($\lambda_c$) and the number of sampling lengths ($N$) on the measurement screen. (Patent pending in Japan.)

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.

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).
## Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Standard drive unit type</th>
<th>Retractable drive unit type</th>
<th>Transverse tracing drive unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of detector</strong></td>
<td>SJ-310 (0.75mN type)</td>
<td>SJ-310 (0.75mN type)</td>
<td>SJ-310 (0.75mN type)</td>
</tr>
<tr>
<td><strong>Model No.</strong></td>
<td>SJ-310-01A</td>
<td>SJ-310-02A</td>
<td>SJ-310-01A</td>
</tr>
<tr>
<td><strong>Order No.</strong></td>
<td>SJ-310-01A</td>
<td>SJ-310-02A</td>
<td>SJ-310-01A</td>
</tr>
<tr>
<td><strong>Detector</strong></td>
<td>1A</td>
<td>2A</td>
<td>3A</td>
</tr>
<tr>
<td><strong>Measuring range</strong></td>
<td>14400 µinch / (7-5000 µinch to 48300 µinch)</td>
<td>14400 µinch / 8 µinch (360 µm / 0.02 µm)</td>
<td>4000 µinch / 2 µinch (100 µm / 0.006 µm)</td>
</tr>
<tr>
<td><strong>Measuring force / Stylus tip</strong></td>
<td>0.75mN / 4mN</td>
<td>0.75mN / 4mN</td>
<td>0.75mN / 4mN</td>
</tr>
<tr>
<td><strong>Cut-off length</strong></td>
<td>0.003 ~ 0.100</td>
<td>0.003 ~ 0.100</td>
<td>0.003 ~ 0.100</td>
</tr>
<tr>
<td><strong>Sampling length</strong></td>
<td>100 ~ 3200 µinch (2.5 ~ 8 mm)</td>
<td>100 ~ 3200 µinch (2.5 ~ 8 mm)</td>
<td>100 ~ 3200 µinch (2.5 ~ 8 mm)</td>
</tr>
<tr>
<td><strong>Number of sampling lengths</strong></td>
<td>Arbitrary</td>
<td>Arbitrary</td>
<td>Arbitrary</td>
</tr>
<tr>
<td><strong>Trace display</strong></td>
<td>The ten latest measurement results using the same parameter</td>
<td>The ten latest measurement results using the same parameter</td>
<td>The ten latest measurement results using the same parameter</td>
</tr>
<tr>
<td><strong>Profile display</strong></td>
<td>One parameter measurement result and the measured profile</td>
<td>One parameter measurement result and the measured profile</td>
<td>One parameter measurement result and the measured profile</td>
</tr>
<tr>
<td><strong>4-parameter display</strong></td>
<td>Four parameter measurement results</td>
<td>Four parameter measurement results</td>
<td>Four parameter measurement results</td>
</tr>
<tr>
<td><strong>1-parameter display</strong></td>
<td>One parameter measurement result</td>
<td>One parameter measurement result</td>
<td>One parameter measurement result</td>
</tr>
<tr>
<td><strong>External I/O</strong></td>
<td>USB 1.1, Digital output, RS-232C 1.1, External SW 1.1</td>
<td>USB 1.1, Digital output, RS-232C 1.1, External SW 1.1</td>
<td>USB 1.1, Digital output, RS-232C 1.1, External SW 1.1</td>
</tr>
<tr>
<td><strong>Customization</strong></td>
<td>Desired parameters can be selected for calculation and display</td>
<td>Desired parameters can be selected for calculation and display</td>
<td>Desired parameters can be selected for calculation and display</td>
</tr>
<tr>
<td><strong>GO/NG judgement</strong></td>
<td>Max rule / 16% rule / Average rule / Standard deviation (1σ, 2σ, 3σ)</td>
<td>Max rule / 16% rule / Average rule / Standard deviation (1σ, 2σ, 3σ)</td>
<td>Max rule / 16% rule / Average rule / Standard deviation (1σ, 2σ, 3σ)</td>
</tr>
<tr>
<td><strong>Storage of measurement condition</strong></td>
<td>Save the condition at power OFF</td>
<td>Save the condition at power OFF</td>
<td>Save the condition at power OFF</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Saves last inputted nominal value of specimen / Average calibration with multiple measurement (MAX 12 times) is available</td>
<td>Saves last inputted nominal value of specimen / Average calibration with multiple measurement (MAX 12 times) is available</td>
<td>Saves last inputted nominal value of specimen / Average calibration with multiple measurement (MAX 12 times) is available</td>
</tr>
<tr>
<td><strong>Power-saving</strong></td>
<td>Auto-sleep function (30-600sec) *7</td>
<td>Auto-sleep function (30-600sec) *7</td>
<td>Auto-sleep function (30-600sec) *7</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>Two-way power supply; battery (rechargeable Ni-MH battery) and AC adapter</td>
<td>Two-way power supply; battery (rechargeable Ni-MH battery) and AC adapter</td>
<td>Two-way power supply; battery (rechargeable Ni-MH battery) and AC adapter</td>
</tr>
<tr>
<td><strong>Size (WxDxH)</strong></td>
<td>Display unit 10.8 x 9.6 x 10.25 (275 x 109 x 198 mm)</td>
<td>Display unit 10.8 x 9.6 x 10.25 (275 x 109 x 198 mm)</td>
<td>Display unit 10.8 x 9.6 x 10.25 (275 x 109 x 198 mm)</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>About 1.8 Kg (Display unit + Drive unit + Standard detector)</td>
<td>About 1.8 Kg (Display unit + Drive unit + Standard detector)</td>
<td>About 1.8 Kg (Display unit + Drive unit + Standard detector)</td>
</tr>
</tbody>
</table>

### Standard accessories

- 12AAM75: Connecting cable *8
- 12AA217: Nozzle for plane surface
- 12AA218: Nozzle for cylinder
- 12AA216: Supporting leg
- 12AA700: Calibration stage
- 12BAG34: Stylus pen
- 12BAL402: Protection sheet
- 270952: Printer paper (5 pieces)
- 12BAL400: Carrying case
- 178-602: Roughness reference specimen (Ra 119µin/2µm)
- 357651: AC Adapter
- 02AA010: Power Cord set (UL/CSA)

*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: *λ: 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

<table>
<thead>
<tr>
<th>Drive unit type</th>
<th>Drive unit external view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard drive unit</td>
<td><img src="image" alt="Drive unit external view" /></td>
</tr>
<tr>
<td>Retractable drive unit</td>
<td><img src="image" alt="Drive unit external view" /></td>
</tr>
<tr>
<td>Transverse tracing drive unit</td>
<td><img src="image" alt="Drive unit external view" /></td>
</tr>
</tbody>
</table>

### Display unit external view

- **Cable length:** 1m
- **Dimensions:**
  - 10.83” (275)
  - 0.8” (20.3)
  - 1.8” (45.5)
  - 4.29” (109)
  - 7.81” (198)
  - 15°

Unit: inch (mm)
## Dimensions: Detectors

### Standard detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus form*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-296</td>
<td>0.75mN</td>
<td>2µmR/60°</td>
<td>Dedicated to the standard/retractable drive unit</td>
</tr>
<tr>
<td>178-390</td>
<td>4 mN</td>
<td>5µmR/90°</td>
<td></td>
</tr>
<tr>
<td>178-387</td>
<td>0.75mN</td>
<td>2µmR/60°</td>
<td>Dedicated to the transverse tracing drive unit</td>
</tr>
<tr>
<td>178-386</td>
<td>4 mN</td>
<td>5µmR/90°</td>
<td></td>
</tr>
<tr>
<td>178-395</td>
<td>0.75mN</td>
<td>2µmR/90°</td>
<td>Dedicated to the standard/retractable drive unit</td>
</tr>
<tr>
<td>178-391</td>
<td>4 mN</td>
<td>10µmR/90°</td>
<td></td>
</tr>
</tbody>
</table>

*Tip radius / Tip angle

### Small hole detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus form*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-383</td>
<td>0.75mN</td>
<td>2µmR/60°</td>
<td>Minimum measurable hole diameter ø4.5mm</td>
</tr>
<tr>
<td>178-392</td>
<td>4 mN</td>
<td>5µmR/90°</td>
<td></td>
</tr>
</tbody>
</table>

*Tip radius / Tip angle

### Extra small hole detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus form*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-384</td>
<td>0.75mN</td>
<td>2µmR/60°</td>
<td>Minimum measurable hole diameter ø2.8mm</td>
</tr>
<tr>
<td>178-393</td>
<td>4 mN</td>
<td>5µmR/90°</td>
<td></td>
</tr>
</tbody>
</table>

*Tip radius / Tip angle

### Gear-tooth surface detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus form*</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-388</td>
<td>0.75mN</td>
<td>2µmR/60°</td>
</tr>
<tr>
<td>178-389</td>
<td>4 mN</td>
<td>5µmR/90°</td>
</tr>
</tbody>
</table>

*Tip radius / Tip angle

### Deep groove detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus form*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-385</td>
<td>0.75mN</td>
<td>2µmR/60°</td>
<td>Not available for the transverse tracing drive unit</td>
</tr>
<tr>
<td>178-394</td>
<td>4 mN</td>
<td>5µmR/90°</td>
<td></td>
</tr>
</tbody>
</table>

*Tip radius / Tip angle
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)**
No.12AAA210
- Not available for the transverse tracing drive unit.

**Extension cable (1 m)**
No.12BAE303
- 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.

**Magnetic stand adapter**
No.12AAA217 (ø8mm)
No.12AAA220 (ø9.5mm)

**Vertical positioning adapter**
No.12AAA219
- Not available for the transverse tracing drive unit.

**Height gauge adapter**
No.12AAA222 (9x9mm)
No.12AAA233 (1/4inx1/2in)

**Setting attachments**

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: Ø5 – 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: Ø75 – Ø95 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.

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

**Required environment***:

- **OS**:
  - Windows XP-SP3
  - Windows Vista
  - Windows 7/8/10

- **Spreadsheet software**:

This program can be downloaded free of charge from the Mitutoyo website. [http://www.mitutoyo.com](http://www.mitutoyo.com)

**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.
Optional Accessories: For External Equipment

**Digimatic mini processor DP-1VA**
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.264-505A

SJ-310→DP-1VA 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.06AFM380D

USB keyboard signal conversion type*
IT-012U
No.264-016-10
*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.02AZD880G
*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.12AAAA76
- Touch-screen protector sheet (10 sheets) No.12AAN040
- Memory card (2GB) * No.12AAL069
- Connecting cable (for RS-232C) No.12AAA882

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