Portable Surface Roughness Tester
Surftest SJ-210/310 Series
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**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.
**Surftest SJ-210 Series**

**Color graphic LCD**
Intuitive display that’s clear, sharp, and legible.

**Battery**
The battery charges in one quarter of the time of previous Mitutoyo products.

**Large, 2.4-inch LCD**
The large LCD provides excellent readability.

**Backlight**
The backlight improves visibility in dark environments.

**Operation keys**
- The keys on the front of the unit and under the sliding cover are well-labeled and easy to use.
- The user-friendly screen layout and arrow keys provide intuitive operability.
- Displayed settings can be changed easily by using the left and right arrow keys.
- Infrequently used keys are hidden under the sliding cover to prevent unintended operations.

**Drive unit**
The drive unit can be separated from the display unit by using a cable, allowing more flexible measurement. The driver can be separated and reattached in one simple step.

**High-speed USB communication**
Data can be transferred to and from a computer via the high-speed USB interface.

**Applicable standards**
In addition to JIS and ISO, the Surftest SJ-210 also complies with ANSI and VDA standards.

**Memory card support**
The memory card slot lets you store large amounts of data onto a memory card.

**Multilingual support**
The display interface supports 16 languages.

There are many different kinds of drivers and detectors available. (Refer to page 6, 13, 14 for details.)
**Extensive display features that assist measurement**

- The highly visible 2.4-inch color graphic LCD with backlight lets you view the screen easily even in dark environments.

- Assessed profiles, load curves, and amplitude distribution curves can be displayed in addition to calculation results. Assessed profiles can also be zoomed up and down.

- The display mode can be easily switched between portrait and landscape.

- Calculation results are displayed in large characters.

- Pass/fail results are displayed in color.

- Assessed profiles, load curves, and amplitude distribution curves can be displayed in addition to calculation results. Assessed profiles can also be zoomed up and down.

**Advanced data storage capabilities**

- Up to 10 measurement conditions can be stored in the internal memory. Conditions can be quickly read according to the workpiece.

- An optional memory card can be used as an extended memory to store large quantities of measured profiles and conditions.

- A quick-charge, long-life battery is provided.

- Up to 10 measurement conditions can be stored in the internal memory. Conditions can be quickly read according to the workpiece.

- An optional memory card can be used as an extended memory to store large quantities of measured profiles and conditions.

- Many interface options:
  - A USB interface is equipped as standard.
  - The Surftest SJ-210 also provides an RS-232C output, Digimatic output, printer output, and foot switch input.

**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.

**Easy setting**

- 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 ($A_c$) and the number of sampling lengths ($N$) on the measurement screen.

**Setting parameters and recalculating results**

- The required parameters can be selected from the screen. The sub-menu also lets you specify detailed settings such as the tolerance. After completing measurement, the parameters can be changed and calculation can be executed again* using the new parameters.

  * May not be possible, depending on the measurement conditions.

**Storage capacity of memory card (optional)**

<table>
<thead>
<tr>
<th>Data type</th>
<th>Storage capacity of memory card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured profiles</td>
<td>10000</td>
</tr>
<tr>
<td>Calculation result</td>
<td>500</td>
</tr>
<tr>
<td>Measurement condition</td>
<td>500</td>
</tr>
<tr>
<td>Display images</td>
<td>500</td>
</tr>
</tbody>
</table>

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

- Access to features can be password-protected.

- A quick-charge, long-life battery is provided.
SJ-210 Series

A wide variation in system setup is possible with the detector + drive unit + display unit combination

Highly functional detectors and drive units

The driver can be separated from the display unit and reattached in one easy step.

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

Refer to page 14 for details of detector.

Detector supplied as standard

Selectable from the following two items.

- 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°

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).

Drive units (selectable)

Standard drive unit
- Popular standard drive unit

Transverse tracing drive unit
- Best suited for measurement of narrow, shrouded workpiece features such as crankshaft, 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 profile cannot be easily seen, such as a blind hole, etc.

Carrying case

A convenient carrying case is supplied as standard for protecting the instrument in the field.
## SJ-210 Series Specifications

### Specifications

<table>
<thead>
<tr>
<th>Type of detector</th>
<th>Standard drive unit type</th>
<th>Retractable drive unit type</th>
<th>Transverse tracing drive unit type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model No.</strong></td>
<td>SJ-210 (0.75 mN type)</td>
<td>SJ-210 (4 mN type)</td>
<td>SJ-210 (0.75 mN type)</td>
</tr>
<tr>
<td></td>
<td>SJ-210 (4 mN type)</td>
<td>SJ-210 (4 mN type)</td>
<td>SJ-210 (4 mN type)</td>
</tr>
<tr>
<td><strong>Measuring range</strong></td>
<td>X axis</td>
<td>X axis</td>
<td>X axis</td>
</tr>
<tr>
<td></td>
<td>63° (16.0mm)</td>
<td>14400 µm (-7900 µm to +6300 µm)</td>
<td>14400 µm (-200 µm to +160µm)</td>
</tr>
<tr>
<td></td>
<td>Z axis</td>
<td>14400 µm / .8 µm (360 µm / 0.02 µm)</td>
<td>4000 µm / 2 µm (100 µm / 0.006 µm)</td>
</tr>
<tr>
<td></td>
<td>Range/</td>
<td>1000 µm / .8µm (25 µm / 0.002 µm)</td>
<td></td>
</tr>
<tr>
<td><strong>Measuring speed</strong></td>
<td>When measuring: 0.01, 0.02, 0.03 µm (0.25mm, 0.5mm, 0.75mm)</td>
<td>When returning: 0.4 in/s (1mm/s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.75 µm / 2 µm 60°, 4 µm / 5 µm 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Skid force</strong></td>
<td>Less than 400 mN</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Applicable standards</strong></td>
<td>JIS '82/JIS '94/JIS '97/ISO '97/VDA</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Assessed profiles</strong></td>
<td>Primary profile, Roughness profile, DF profile, Roughness profile-Motif</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td>Ra, Rz, Ry, Rq, Rmax<em>1, Rp, Rpk, Rv, Rpm, tp</em>1, Htp*1, R, Rx, AR, Possible Customize</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Graph analysis</strong></td>
<td>Bearing area curve/Amplitude distribution curve</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Filters</strong></td>
<td>Gaussian, 2CR75, PC75</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cut off length</strong></td>
<td>A 0.003, 0.01, 0.03, 0.1° (0.008, 0.025, 0.08, 0.25mm)</td>
<td>x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary 0.01 ~ 63° (0.001° interval)</td>
<td>x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary 0.01 ~ 22° (0.001° interval)</td>
</tr>
<tr>
<td><strong>Sampling length</strong></td>
<td>0.003, 0.01, 0.03, 0.1° (0.008, 0.025, 0.08, 0.25mm)</td>
<td>100, 300µm (0.5, 1.5mm)</td>
<td>100, 300µm (0.5, 1.5mm)</td>
</tr>
<tr>
<td><strong>Number of sampling lengths (×n)</strong></td>
<td>x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary 0.01 ~ 63° (0.001° interval)</td>
<td>[0.3 ~ 16.0mm: 0.01mm interval]</td>
<td>x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary 0.01 ~ 22° (0.001° interval)</td>
</tr>
<tr>
<td><strong>LCD dimensions</strong></td>
<td>1.45 x 1.93&quot; (36.7 x 48.9 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Display languages</strong></td>
<td>Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurement result display</strong></td>
<td>Vertical display: 1-parameter display/3-parameter display/Trace display</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Printing function</strong></td>
<td>Measurement conditions/Calculation results/GO/NG judgement result/Calculation results for each sampling length/Assessed profile/Bearing area curve/Amplitude distribution curve/Environment setting information</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>External I/O</strong></td>
<td>USB I/F, Digimatic Output, Printer Output, RS-232C I/F, Foot SW I/F</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Customization</strong></td>
<td>Desired parameters can be selected for calculation and display</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GD/NG judgment</strong></td>
<td>By max value/16 %/Standard deviation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Storage of measurement condition</strong></td>
<td>Save the conditions at power OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>Memory card (Option): 500 measurement conditions, 10000 measured profiles, 500 display images</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Auto-calibration with the entry of numerical data</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>Internal memory: Measurement condition (10 sets)</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Average calibration with multiple measurement (Max 5 times) is available</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Auto-calibration with the entry of numerical data</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Average calibration with multiple measurement (Max 5 times) is available</td>
</tr>
<tr>
<td><strong>Power-saving function</strong></td>
<td>Auto-shutdown function (10-600 sec)</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Average calibration with multiple measurement (Max 5 times) is available</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Average calibration with multiple measurement (Max 5 times) is available</td>
</tr>
<tr>
<td><strong>Size (WxDxH)</strong></td>
<td>Display unit 2.05 x 2.6&quot; x 6.3&quot; (52.1 x 65.8 x 160mm) (sliding cover closed, detector not mounted)</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Average calibration with multiple measurement (Max 5 times) is available</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>About 1.1lbs (500g) (Display unit + Drive unit + Standard detector)</td>
<td>Text file (Measurement conditions/Measured profile/Assessed profile/Bearing area curve/Amplitude distribution curve)</td>
<td>Average calibration with multiple measurement (Max 5 times) is available</td>
</tr>
</tbody>
</table>

### Standard accessories

1. 12BAA303 Connecting cable
2. 178-601 Roughness specimen Ra (3 µm)
3. 12BAA344 Carrying case
4. 12BAA700 Calibration stage
5. Protective sheets for display, AC Adapter, Operation manual, Quick reference manual, Warranty

### Notes

1. Calculation is available only when selecting the VDA, ANSI, or JIS ’82 standard.
2. Calculation is available only when selecting the ISO '97 standard.
3. Calculation is available only when selecting the JIS ’01 standard.
4. Calculation is available only when selecting the ANSI standard.
5. Not available when selecting the ISO ’82 standard.
7. Standard deviation only can be selected in ANSI. 16 % rule cannot be selected in VDA.
8. Auto-shutdown function is invalid when AC adaptor is used.
9. For connecting the calculation display unit and drive unit.

Note: To denote your AC line voltage add the following suffixes (e.g. 178-560-11A):
   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)
**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](image)

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.

![Measurement Result](image)

**Highly functional detectors and drive units**

Detector supplied as standard

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

![Detector](image)

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°

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.

![Drive units](image)

**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.

![Links](image)

*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.

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.

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. 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.

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.

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).

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

<table>
<thead>
<tr>
<th>Type of detector</th>
<th>Standard drive unit type</th>
<th>Retractable drive unit type</th>
<th>Transverse tracing drive unit type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>SJ-310 (0.75 mN type)</td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (0.75 mN type)</td>
</tr>
<tr>
<td></td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (0.75 mN type)</td>
<td>SJ-310 (4 mN type)</td>
</tr>
<tr>
<td></td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (0.75 mN type)</td>
<td>SJ-310 (4 mN type)</td>
</tr>
<tr>
<td></td>
<td>SJ-310 (0.75 mN type)</td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (0.75 mN type)</td>
</tr>
<tr>
<td></td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (0.75 mN type)</td>
<td>SJ-310 (4 mN type)</td>
</tr>
<tr>
<td>Parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ra, Rc, Ry, Rz, Rq, Rt, Rmax*1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rp, Rv, R3z, Rs, Rsk, Rk, Rs, Rsk, Rmin*2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rsk, Rku, Rc, RPc, Rsm, Rz1max*2</td>
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<tr>
<td>S, HSC, RzJIS*3</td>
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</tr>
<tr>
<td>Rppi, R</td>
<td></td>
<td></td>
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<tr>
<td>Assessed profiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary, Roughness, DF, R-Motif, W-Motif</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable standards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JIS '82/JIS '94/JIS '01/ISO '97/ANSI/VDA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skid force</td>
<td>400 mN or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring force/Stylus tip</td>
<td>0.75 mN/2 µmR 60°, 4 mN/5 µmR 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring speed</td>
<td>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)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range/resolution</td>
<td>0.003, 0.01, 0.03, 0.1, 0.3 in (0.08, 0.25, 0.8, 2.5, 8 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of sampling lengths</td>
<td>x1, x2, x3, x4, x5, x6, x7, x8, x9, x10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arbitrary 0.01~63° (.0001*interval)</td>
<td>[0.3~16.0mm: 0.01mm interval]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD dimensions</td>
<td>4.64* x 3.47* (117.8 x 88.2 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display languages</td>
<td>Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement result display</td>
<td>1-parameter display: one parameter measurement result</td>
<td>4-parameter display: four parameter measurement results</td>
<td>Profile display: one parameter measurement result and the measured profile</td>
</tr>
<tr>
<td>Filters</td>
<td>Gausian, 2CR75, PC75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut-off length</td>
<td>.003, .01, .03, .1, .3 in (0.08, 0.25, 0.8, 2.5, 8 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampling length</td>
<td>.003, .01, .03, .1, .3 in (0.08, 0.25, 0.8, 2.5, 8 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External I/O</td>
<td>USB I/F, Digimatic output, RS-232C I/F, External SW I/F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customization</td>
<td>Desired parameters can be selected for calculation and display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GD NG judgement*4</td>
<td>Max rule/16% rule/Average rule/Standard deviation (1σ, 2σ, 3σ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage of measurement condition</td>
<td>Save the condition at power OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>Memory card (option): 500 measurement conditions, 10000 text data, 500 statistic data, 1 backup of machine setting, the last ten traces (Trace 10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibration</td>
<td>Auto-calibration with the entry of numerical values/Average calibration with multiple measurement (MAX 12 times) is available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power-saving function</td>
<td>Auto-save function (30-600 sec)*7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter</td>
<td>Note 1: Charging time: about 4 hours (may vary due to ambient temperature)</td>
<td>Note 2: Endurance: about 1500 measurements (differs slightly due to use conditions/environment)</td>
</tr>
<tr>
<td>Size (WxDxH)</td>
<td>Display unit 10.8&quot; x 4.3&quot; x 7.8&quot; (275 × 109 × 198 mm)</td>
<td>Drive unit 4.5&quot; x 0.9&quot; x 8.9&quot; (117 × 23 × 226.7 mm)</td>
<td>Mass About 3.9 lbs. (1.8 kg) (Display unit + Drive unit + Standard detector)</td>
</tr>
</tbody>
</table>

### Standard accessories

- 12AAW066 Connecting cable*1
- 178-601 Roughness reference specimen (Ra3 µm)
- 357651 AC adapter
- 12AA2A17 Nosoipe for plane surface
- 12AA2A18 Nosoipe for cylinder
- 12AA2A16 Supporting leg
- 12BAK700 Calibration stage
- 12BAG834 Stylus pen
- 27032 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-save 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).
Dimensions

SJ-210 Series Display unit

- Drive unit stored inside display unit (Standard detector installed in drive unit)

- Drive unit not stored inside display unit (Standard detector installed in drive unit)

- Standard drive unit

Connecting cable (1 m)
### Drive unit

**Unit:** mm

<table>
<thead>
<tr>
<th>Drive unit type</th>
<th>Drive unit external view*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard drive unit</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>115.0</td>
</tr>
<tr>
<td><strong>Retractable drive unit</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23.2</td>
</tr>
<tr>
<td></td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>115.0</td>
</tr>
<tr>
<td><strong>Transverse tracing drive unit</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>115.0</td>
</tr>
</tbody>
</table>

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

#### 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>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Dedicated to the standard/retractable drive unit</td>
</tr>
<tr>
<td>178-390</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
<td></td>
</tr>
<tr>
<td>178-387</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Dedicated to the transverse tracing drive unit</td>
</tr>
<tr>
<td>178-386</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
<td></td>
</tr>
<tr>
<td>178-391</td>
<td>4 mN</td>
<td>10 µmR/90˚</td>
<td>Dedicated to the standard/retractable drive unit</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>0.75 mN</td>
<td>2 µmR/60˚</td>
</tr>
<tr>
<td>178-398</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
</tr>
</tbody>
</table>

* Tip radius/Tip angle

#### 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>178-383</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Minimum measurable hole diameter: ø4.5 mm</td>
</tr>
<tr>
<td>178-392</td>
<td>4 mN</td>
<td>5 µmR/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>178-385</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Not available for the transverse tracing drive unit</td>
</tr>
<tr>
<td>178-394</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
<td></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>178-384</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Minimum measurable hole diameter: ø2.8 mm</td>
</tr>
<tr>
<td>178-393</td>
<td>4 mN</td>
<td>5 µmR/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>178-388</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td></td>
</tr>
<tr>
<td>178-398</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
<td></td>
</tr>
</tbody>
</table>

* 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)
12AAA210

Note: Only one rod can be used.

#### Extension cable (1 m)
12BAA303

Note: Only one rod can be used.

#### 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.

#### Magnetic stand adapter
12AAA221
(Mounting spigot diameter is 8 mm)

12AAA220
(Mounting spigot diameter is 9.5 mm)

#### Vertical positioning adapter
12AAA219

Note: Not available for the transverse tracing drive unit.

#### Height gage adapter
12AAA222 (9 x 9 mm)
12AAA233 (1/4 x 1/2 " )

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.
Optional accessories for SJ-210/310 Series

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.

**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: \( \Phi 5 - \Phi 150 \) mm

![V type attachment]

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.

![Slider type attachment]

178-034

**Setting attachment: Inside diameter type**

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

- Applicable diameter: \( \Phi 75 - \Phi 95 \) mm
- Accessible depth: 30 - 135 mm

![Inside diameter attachment]

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
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.

**Calculation results input unit**  
INPUT TOOL

**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.

**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.

**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.

**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.

**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.
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)

This program can be downloaded free of charge from the Mitutoyo website. http://www.mitutoyo.com/about/contactingmac/surftestsimplecommunicationprogram/

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.

  ![Example of the output by the printer](image)

  *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

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

### 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
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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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www.mitutoyo.com

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