Portable Surface Roughness Tester
SURFTEST SJ-210 Series

This is it! A small, lightweight, and extremely easy to use surface roughness measurement instrument that lets you view surface roughness waveforms right there on the color LCD screen.

- Registered design in Japan, China, and the European Union.
- Design registration pending in the United States of America.
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.

**Easy to use**

**2.4-inch color graphic LCD with backlight**
The color LCD provides excellent readability and an intuitive display that's easy to negotiate. The LCD also includes a backlight for improved visibility in dark environments.

**Simple key layout**
The Surftest SJ-210 can be operated easily using the keys on the front of the unit and under the sliding cover.

**Highly functional**

**Advanced data storage capabilities**
Up to 10 measurement conditions and one measured profile can be stored in the internal memory.

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

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

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

**Stylus alarm** (patent pending in Japan)
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-210 can display sectional calculation results and assessed profiles, load curves, and amplitude distribution curves.
The large LCD provides excellent readability.

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.
  (Patent pending in Japan.)
• 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.

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

Multilingual support
The display interface supports 16 languages.

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

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

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

There are many different kinds of drivers and detectors available.
Many features in a compact body

Extensive display features that assist measurement

- The highly visible 2.4-inch color graphic LCD with backlight lets you see 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 freely switched between portrait and landscape.

- Calculation results are displayed in large characters.

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. *See page 10 for details about the memory card.

Storage Capacity

<table>
<thead>
<tr>
<th>Data type</th>
<th>Internal memory</th>
<th>Memory Card (option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured profiles</td>
<td>1</td>
<td>10000</td>
</tr>
<tr>
<td>Calculation result</td>
<td>10</td>
<td>500</td>
</tr>
<tr>
<td>Measurement condition</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

- Pass/fail results are displayed in color.

- Any value can be specified as the cut-off value (λc) and the number of sampling lengths (N) on the measurement screen. (Patent pending in Japan)

Advanced features

- A USB interface is equipped as standard.
- The Surftest SJ-210 also provides an RS-232C output, Digiomatic output, printer output, and footswitch 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 stylus. Any value can be specified as the limit. (Patent pending in Japan)

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

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.
Battery-powered portability scores when making surface roughness measurements on the shop floor.
Capable of performing measurements in any orientation, including vertical and upside-down. Optional accessories, such as a height gage adapter, allow measurements to be performed efficiently in various situations and setups.

*Refer to pages 8 to 11 for details of the optional accessories available.

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.

[Images of detector in display unit and detached from display unit]

Detector supplied as standard

Selectable from the following two items.

- Measuring force: 0.75mN
  Stylus profile: Tip radius 2µm
  Tip angle 60°
- Measuring force: 4mN
  Stylus profile: 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, 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.

Optional detectors

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

*See page 8 for details about the Detectors.

Carrying case

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

<table>
<thead>
<tr>
<th>Model No.</th>
<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>SJ-210</td>
<td></td>
<td>SJ-210 (0.75mN type)</td>
<td>SJ-210 (0.75mN type)</td>
<td>SJ-210 (0.75mN type)</td>
</tr>
<tr>
<td>SJ-210</td>
<td></td>
<td>SJ-210 (4mN type)</td>
<td>SJ-210 (4mN type)</td>
<td>SJ-210 (4mN type)</td>
</tr>
<tr>
<td>SJ-210</td>
<td></td>
<td>SJ-210 (0.75mN type)</td>
<td>SJ-210 (0.75mN type)</td>
<td>SJ-210 (0.75mN type)</td>
</tr>
<tr>
<td>SJ-210</td>
<td></td>
<td>SJ-210 (4mN type)</td>
<td>SJ-210 (4mN type)</td>
<td>SJ-210 (4mN type)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order No.</th>
<th>mm</th>
<th>inch/mm</th>
<th>mm</th>
<th>inch/mm</th>
<th>mm</th>
<th>inch/mm</th>
<th>mm</th>
<th>inch/mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ-210</td>
<td>178-560-02</td>
<td>178-560-02</td>
<td>178-562-02</td>
<td>178-562-02</td>
<td>178-564-02</td>
<td>178-564-02</td>
<td>178-566-02</td>
<td>178-566-02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>X axis (Detector)</th>
<th>Range</th>
<th>X axis (Detector)</th>
<th>Range / Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17.5mm</td>
<td>360µm (-200µm to +160µm)</td>
<td>17.5mm</td>
<td>360µm / 0.02µm, 100µm / 0.006µm, 25µm / 0.002µm</td>
</tr>
<tr>
<td></td>
<td>5.6mm</td>
<td>0.75mN type: 0.75mN / 2µmR 60°</td>
<td>0.75mN type: 0.75mN / 2µmR 60°</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring speed</th>
<th>Measuring: 0.25mm/s, 0.5mm/s, 0.75mm/s Returning: 1mm/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skid force</td>
<td>Less than 400mN</td>
</tr>
<tr>
<td>Applicable standards</td>
<td>JIS ’82 / JIS ‘94 / JIS ‘01 / ISO ‘97 / ANSI / VDA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessed profiles</th>
<th>Primary profile / Roughness profile / DF profile / Roughness profile-Motif</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation parameters</td>
<td>Ra, Rc, Ry, Rz, Rq, Rmax, Rp, Rmr, Rku, Rlr, Rmr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analysis graphs</th>
<th>Bearing area curve / Amplitude distribution curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters</td>
<td>Gaussian, 2CR75, PC75</td>
</tr>
<tr>
<td>Cut off length</td>
<td>&lt;A&lt; 0.08, 0.25, 0.8, 2.5mm</td>
</tr>
<tr>
<td>Sampling length</td>
<td>&lt;A&lt; 2.5, 8µm</td>
</tr>
<tr>
<td>Number of Sampling lengths (&lt;n)</td>
<td>&lt;A&lt; ×1, ×2, ×3, ×4, ×5, ×6, ×7, ×8, ×9, ×10, arbitrary length (0.3 to 16.0mm: 0.01mm interval)</td>
</tr>
<tr>
<td>Number of Sampling lengths (&lt;n)</td>
<td>&lt;A&lt; ×1, ×2, ×3, ×4, ×5, ×6, ×7, ×8, ×9, ×10, arbitrary length (0.3 to 5.6mm: 0.01mm interval)</td>
</tr>
<tr>
<td>LCD dimensions</td>
<td>367.1 × 48.9 mm</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>
</tr>
<tr>
<td>Calculation result display</td>
<td>Vertical display: 1 parameter / 3 parameter / trace to measurements</td>
</tr>
<tr>
<td>Printing function</td>
<td>Horizontal display: 1 parameter / 4 parameter / trace to measurements (Horizontal display is invertable)</td>
</tr>
<tr>
<td>External I/O</td>
<td>USB 1/F, Digtamatic Output, Printer Output, RS-232C 1/F, Foot SW 1/F</td>
</tr>
<tr>
<td>GO/NG judgment</td>
<td>Desired parameters can be selected for calculation and display</td>
</tr>
<tr>
<td>Storage of measurement condition</td>
<td>By max value / 16% / Standard deviation</td>
</tr>
<tr>
<td>Calibration</td>
<td>Auto-calibration with the entry of numerical value / Average calculation with multiple measurement (Max.5 times) is available</td>
</tr>
<tr>
<td>Power-saving function</td>
<td>Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter</td>
</tr>
<tr>
<td>Size (W×D×H) Display unit</td>
<td>52.1 × 65.8 × 160mm</td>
</tr>
<tr>
<td>Drive unit</td>
<td>115 × 23 × 26mm</td>
</tr>
<tr>
<td>Mass</td>
<td>About 500g (Display unit + Drive unit + Standard detector)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard accessories</th>
<th>12BAA303 Connecting cable *4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ-210</td>
<td>178-601 Roughness specimen</td>
</tr>
<tr>
<td>SJ-210</td>
<td>12BAAK699 Carrying case</td>
</tr>
<tr>
<td>SJ-210</td>
<td>12BAK700 Calibration stage</td>
</tr>
<tr>
<td>SJ-210</td>
<td>Protective sheets for display</td>
</tr>
<tr>
<td>SJ-210</td>
<td>AC Adapter</td>
</tr>
<tr>
<td>SJ-210</td>
<td>Operation manual</td>
</tr>
<tr>
<td>SJ-210</td>
<td>Quick reference manual</td>
</tr>
<tr>
<td>SJ-210</td>
<td>Warranty</td>
</tr>
</tbody>
</table>

*1: Order the SJ-210 printer (No.178-421, optional accessory) separately. See page 10 for details about the SJ-210 printer.
*2: Standard deviation only can be selected in ANSI. 16% rule cannot be selected in VDA.
*3: Auto-sleep function is invalid when AC adaptor is used.
*4: For connecting the calculation display unit and drive unit.

To denote your AC line voltage add the following suffixes (e.g. 178-560-01A):
A for 120V, C for 100V, D for 230V, E for 230V(for UK), DC for 220V(for China), K for 220V(for Korea)
Dimensions: Display Unit and Drive Unit

Display unit, Drive 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

- Retractable drive unit

- Transverse tracing drive unit
### Detectors

#### Standard detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus profiles</th>
<th>Remarks column</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 angles

#### Small hole detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus profiles</th>
<th>Remarks column</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-383</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Minimum measurable hole diameter: φ4.5mm</td>
</tr>
<tr>
<td>178-392</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
<td></td>
</tr>
</tbody>
</table>

*Tip radius / Tip angles

#### Deep groove detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus profiles</th>
<th>Remarks column</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 angles

#### Extra small hole detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus profiles</th>
<th>Remarks column</th>
</tr>
</thead>
<tbody>
<tr>
<td>178-384</td>
<td>0.75 mN</td>
<td>2 µmR/60˚</td>
<td>Minimum measurable hole diameter: φ2.8mm</td>
</tr>
<tr>
<td>178-393</td>
<td>4 mN</td>
<td>5 µmR/90˚</td>
<td></td>
</tr>
</tbody>
</table>

*Tip radius / Tip angles

### Gear-tooth surface detectors

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Measuring force</th>
<th>Stylus profiles</th>
<th>Remarks column</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 angles

**Dimensions: Detectors**
Optional Accessories: For Drive Unit

### Drive unit accessories

**Nosepiece for flat surface**

No.12AAA217
* Not available for the transverse tracing drive unit.

**Nosepiece for cylindrical surface**

No.12AAA218
* Not available for the transverse tracing drive unit.

**V-type adapter**

No.12AAE644
* Transverse tracing drive unit type standard accessories.
* Dedicated to the transverse tracing drive unit.

**Extension rod (50mm)** (Note: Extension is possible with only a single rod.)

No.12AA210
* Not available for the transverse tracing drive unit.

**Point-contact adapter**

No.12AAE643
* Transverse tracing drive unit type standard accessories.
* Dedicated to the transverse tracing drive unit.

**Extension cable (1m)** (Note: Extension is possible with only a single cable.)

No.12BA203
* For connecting between calculation display unit and drive unit.

**Support feet set**

No.12AAA216
* Not attachable to the detector side of the transverse tracing drive unit.

**Magnetic stand adapter**

No.12AAA221 (ø 8 mm)
No.12AAA220 (ø 9.5 mm)

**Vertical positioning adapter**

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

**Height gage adapter**

No.12AAA222 (9 × 9 mm)
No.12AAA233 (1/4 in × 1/2 in)

### 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**

No.178-033
The V-width is adjustable to the cylinder diameter facilitating axial measurement of a wide range of cylinder diameters.
* Adjustable range:
  - ø 5 ~ 150 mm

**Setting attachment: Magnetic slider type**

No.178-034
The magnet attached to the frame bottom surface allows taking hands-free measurement on the wall.

**Setting attachment: Inside diameter type**

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

* Not available for the transverse tracing drive unit.

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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.
Optional Accessories: For External Equipment

Printer for SJ-210

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

Unit configuration:
1. Printer main unit
2. Printer connecting cable
3. Printing paper 6-pack
4. Battery pack 1piece
5. Exclusive use AC adaptor (with AC power cord) 1piece

Example of the connection with SJ-210

Digimatic mini processor DP-1VR

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

No.264-504
To denote your AC line voltage add the following suffixes (e.g.264-504-S). 5A for 120V, 5D for 230V (for UK), 5C for 220V (for China), 5K for 220V (for Korea), 5F for 230V (for Oceania)

SJ-210 → DP-1VR Connecting cable
1m: No.936937
2m: No.965014

Memory card

A memory card for saving 500 measurement conditions, 1000 measured profiles, 500 display images, text file (measurement conditions, measured profiles, assessed profiles, BAC, ADC)

*Not all memory cards can be recognized. Please use the memory card recommended by Mitutoyo.

Example of the output by the printer

Printer for SJ-210 supplies
Printing paper (5-pack) No.12AAA876
Optional Accessories: For External Output

Simplified communication program for SURFTEST SJ series

The Surftest SJ-210 has a USB interface, enabling data to be transferred to spreadsheet or other software. We also provide a program that lets you create inspection record tables using a Microsoft Excel* macro.

Required environment*:
- OS: Windows 2000 SP4
- Windows XP
- Windows Vista
- Windows 7
- Spreadsheet software: Microsoft Excel 2000
- Microsoft Excel 2002
- Microsoft Excel 2007

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

The optional USB cable is also required.
- USB cable for SJ-210 series (2m)
  No.12AAL068

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

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

Input Tool: Calculation results input unit

Surftest SJ-210 calculation results can be loaded directly into commercial spreadsheet software via this unit simply by connecting it to the USB connector on a computer or a PS/2 type keyboard connector. (See Catalog No.E4250-264 for details.)

USB keyboard signal conversion model
IT-012U No.264-012-10
PS/2 keyboard signal conversion model
IT-005D No.264-005

Protective sheets for the display

Protective sheet for the color LCD (5 sets)
No.12AAL066
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Form Measurement
Optical Measuring
Sensor Systems
Test Equipment and Seismometers
Digital Scale and DRO Systems
Small Tool Instruments and Data Management

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