

10

**Portable Surface
Roughness
Testers**

**Toolmakers'
Microscopes**

Hardness Testers



SJ-210 Series



SJ-310 Series

MeasurLink[®] ENABLED

Data Management Software by Mitutoyo

Measurement Data Network System

MeasurLink[®] is a measurement data management system based on databases (SQL Server). You can build a network to manage the measurement results and measuring instruments simply by combining the required functions.

MeasurLink[®] is a registered trademark of Mitutoyo Corporation in Japan and Mitutoyo America Corporation in the United States.



**Measuring Instruments Shipped with
Inspection Certificate**

Mitutoyo guarantees product quality as a leading precision measuring instrument manufacturer and ships measuring instruments with an inspection certificate that includes inspection data so that customers can use them with confidence.



**Toolmakers' Microscopes TM Series
TM-505B**



**Rebound Type Portable
Hardness Tester
HH-411**



**Durometers for Sponge,
Rubber and Plastics
HH-300**

INDEX

Portable Surface Roughness Testers

SURFTTEST SJ-210	10-3
SURFTTEST SJ-310	10-4
Optional Accessories for SURFTTEST SJ-210/310	10-5

Toolmakers' Microscopes

Toolmakers' Microscopes TM-505B/TM-1005B	10-7
---	------

Hardness Testers

Rebound Type Portable Hardness Tester HH-411	10-8
Durometers for Sponge, Rubber and Plastics HH-300	10-9

Portable Surface Roughness Tester Surftest SJ-210 SERIES 178

Enhancing your manufacturing with unparalleled performance

- Compact body to carry around or use on-site.
- It can be connected to a PC for greater convenience.
<Simplified communication program>
- Human error, such as failure to save data and unintended deletion, can be prevented.
- Reliable measurements by contact detection with a visual display of contact status.
- Stabilizer helps eliminate erroneous measurements.



Measuring by monitoring the waveform in real time.



Can be combined with height gage for easy positioning.

SPECIFICATIONS

Model	Standard drive unit		Retractable drive unit		Transverse tracing drive unit		
	SJ-210 (0.75 mN type)	SJ-210 (4 mN type)	SJ-210 (0.75 mN type)	SJ-210 (4 mN type)	SJ-210 (0.75 mN type)	SJ-210 (4 mN type)	
Code No.	mm	178-560-11	178-560-12	178-562-11	178-562-12	178-564-11	178-564-12
	inch/mm	178-561-11	178-561-12	178-563-11	178-563-12	178-565-11	178-565-12
X axis	16.0 mm				5.6 mm		
Measuring range	Range	360 μm (-200 μm to +160 μm)					
	Detector Range/Resolution	360 μm/0.02 μm, 100 μm/0.006 μm, 25 μm/0.002 μm					
Measuring force/Stylus tip shape	Depends on the code number: 0.75 mN/2 μmR 60° (when the code number ends with "-11") 4 mN/5 μmR 90° (when the code number ends with "-12")						
Applicable standards	JIS B 0601:2001, JIS B 0601:1994, JIS B 0601:1982, VDA, ISO:1997, ANSI						
Assessed profiles	Primary profile, Roughness profile, DF profile, Roughness motif profile						
Parameters	Ra, 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, Rpm, tp ^{*4} , Htp ^{*4} , R, Rx, AR, Possible Customize						
Analysis graphs	Bearing area curve, Amplitude distribution curve						
Filters	Gaussian, 2CR75, PC75						
Cut-off length	λc	0.08, 0.25, 0.8, 2.5 mm					
	λs ^{*5}	2.5, 8 μm					
Sampling length	0.08, 0.25, 0.8, 2.5 mm						
Number of sampling lengths	x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, arbitrary length (0.3 to 16.0 mm: 0.01 mm interval)				x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, arbitrary length (0.3 to 5.6 mm: 0.01 mm interval)		
Functions	GO/NG judgment ^{*6} By max value/16%/Standard deviation						

*1 Calculation is available only when selecting the VDA, ANSI, or JIS '82 standard.

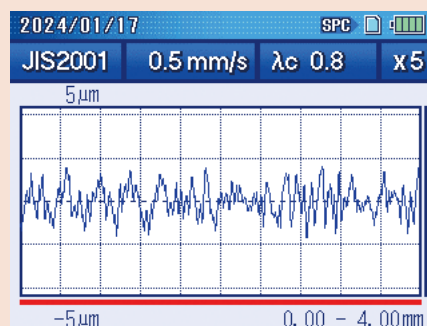
*2 Calculation is available only when selecting the ISO '97 standard.

*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 JIS '82 standard.

*6 Standard deviation only can be selected in ANSI. 16% rule cannot be selected in VDA.



Waveform display for checking scuffmarks and surface texture.

Portable Surface Roughness Tester Surftest SJ-310 SERIES 178

Advanced portable model with a built-in printer allows various kinds of measurement and analysis functions

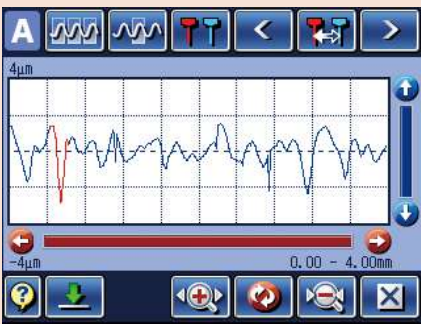
- Great visibility makes measurement easier. <Large 5.7-inch color graphic LCD touch panel>
- The high-speed printer can output measurement results anywhere, anytime.
- It can be connected to a PC for greater convenience. <Simplified communication program>
- The simultaneous two-profile assessment function enables advanced utilization of measurement data.
- The delete function can expand the range of data utilization.
- Up to three parameters and 300 statistical measurements are supported.



Easy to carry and has a built-in printer for on-site printing.



Easy-to-operate touch panel.



The delete function can expand the range of data utilization.



SPECIFICATIONS

Model	Standard drive unit		Retractable drive unit		Transverse tracing drive unit	
	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)
Code No.	mm 178-570-21	mm 178-570-22	mm 178-572-21	mm 178-572-22	mm 178-574-21	mm 178-574-22
	inch/mm 178-571-21	inch/mm 178-571-22	inch/mm 178-573-21	inch/mm 178-573-22	inch/mm 178-575-21	inch/mm 178-575-22
Measuring range	X axis	16.0 mm			5.6 mm	
	Range	360 μm (-200 μm to +160 μm)				
Detector	Range/Resolution	360 μm/0.02 μm, 100 μm/0.006 μm, 25 μm/0.002 μm				
	Measuring force/Stylus tip shape	Depends on the code number: 0.75 mN/2 μmR 60° (when the code number ends with "-21") 4 mN/5 μmR 90° (when the code number ends with "-22")				
Applicable standards	JIS B 0601:2001, JIS B 0601:1994, JIS B 0601:1982, VDA, ISO:1997, ANSI					
Assessed profiles	Primary profile, Roughness profile, DF profile, Roughness motif profile, Waviness motif profile					
Parameters	Ra, Ry, Rz, Rq, Rt, Rmax*1, Rp, Rv, R3z, Rsk, Rku, Rc, RPC, Rsm, Rz1max*2, S, HSC, Rz1S*3, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, λa, λq, lO, Rpm, tp*4, Htp*4, R, Rx, AR, VW, AW, Wx, Wte, Possible Customize					
Analysis graphs	Bearing area curve, Amplitude distribution curve					
Filters	Gaussian, 2CR75, PC75					
Cut-off length	λc	0.08, 0.25, 0.8, 2.5, 8 mm				
	λs*5	2.5, 8 μm				
Sampling length	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 (0.3 to 16.0 mm: 0.01 mm Interval)				x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, Arbitrary (0.3 to 5.6 mm: 0.01 mm Interval)	
	Functions	GO/NG judgment*6				Max rule/16% rule/Average rule/Standard deviation (1σ, 2σ, 3σ)

*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 JIS '82 standard.

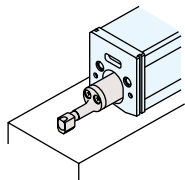
*6 Standard deviation only can be selected in ANSI. 16% rule cannot be selected in VDA.

Optional Accessories for Surftest SJ-210/310

Detector

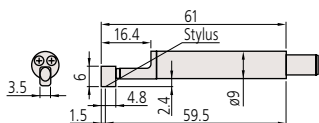
Unit: mm

• Standard detectors

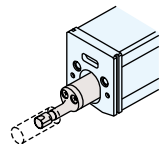


Code No.	Measuring force	Stylus profiles*	Remarks
178-296	0.75 mN	2 μmR/60°	Dedicated to the standard / retractable drive unit
178-390	4 mN	5 μmR/90°	
178-387	0.75 mN	2 μmR/60°	Dedicated to the transverse tracing drive unit
178-386	4 mN	5 μmR/90°	
178-391	4 mN	10 μmR/90°	Dedicated to the standard / retractable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

*Tip radius/Tip angles

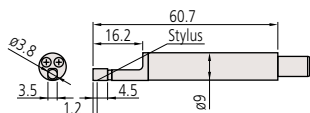


• Small hole detectors

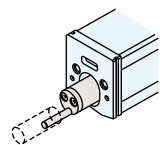


Code No.	Measuring force	Stylus profiles*	Remarks
178-383	0.75 mN	2 μmR/60°	Minimum measurable hole diameter: ø4.5 mm
178-392	4 mN	5 μmR/90°	

*Tip radius/Tip angles

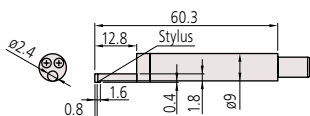


• Extra small hole detectors

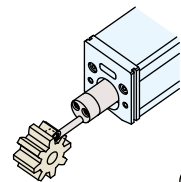


Code No.	Measuring force	Stylus profiles*	Remarks
178-384	0.75 mN	2 μmR/60°	Minimum measurable hole diameter: ø2.8 mm
178-393	4 mN	5 μmR/90°	

*Tip radius/Tip angles

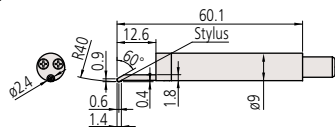


• Gear-tooth surface detectors

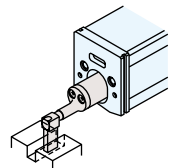


Code No.	Measuring force	Stylus profiles*
178-388	0.75 mN	2 μmR/60°
178-398	4 mN	5 μmR/60°

*Tip radius/Tip angles

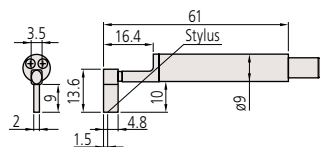


• Deep groove detectors



Code No.	Measuring force	Stylus profiles*	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 angles



Mounting example



Optional Accessories for Drive Units

• Nosepiece for flat surfaces



12AAA217

- SJ-310 standard accessory for standard/detector retracting type. (not for transverse tracing type)

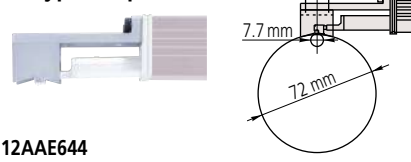
• Nosepiece for cylindrical surfaces



12AAA218

- SJ-310 standard accessory for standard/detector retracting type. (not for transverse tracing type)

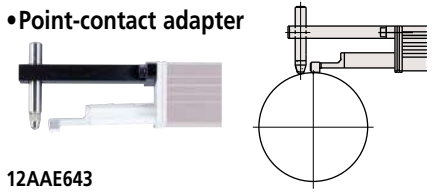
• V-type adapter



12AAE644

- SJ-210/SJ-310 Transverse tracing type standard accessory.
- Dedicated to the transverse tracing type.

• Point-contact adapter

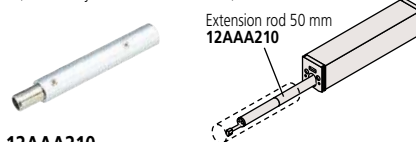


12AAE643

- SJ-210/SJ-310 Transverse tracing type standard accessory.
- Dedicated to the transverse tracing type.

• Extension rod (50 mm)

(Note: Only one rod can be used.)



12AAA210

- Not for transverse tracing type.
- Not applicable to upward measurement.

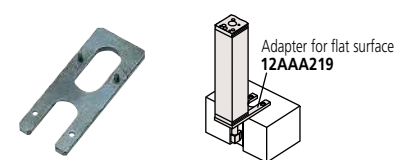
• Extension cable (1 m)

(Note: Only one rod can be used.)

12BAA303

- For the connection between the calculation display unit and drive unit.

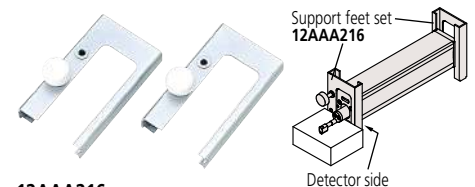
• Adapter for flat surface



12AAA219

- Not for transverse tracing type.

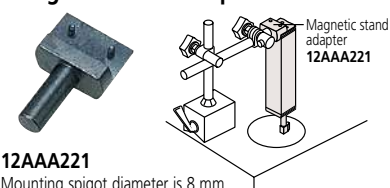
• Support feet set



12AAA216

- SJ-310 standard accessory for standard/detector retracting type. (not for transverse tracing type)
- Adjustment range is 28 mm from bottom face.

• Magnetic stand adapter



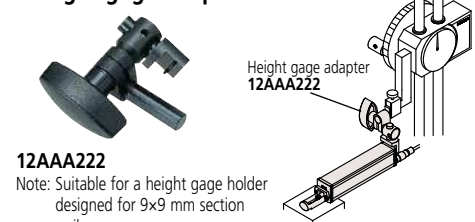
12AAA221

Mounting spigot diameter is 8 mm.

12AAA220

Mounting spigot diameter is 9.5 mm.

• Height gage adapter



12AAA222

Note: Suitable for a height gage holder designed for 9x9 mm section scribers.

TM SERIES 176 — Toolmakers' Microscopes

- Compact universal toolmakers' microscope that can be installed on any site.
- The newly designed LED light ensures clear observation. It also provides excellent color reproduction.
- Attaching an optional circular LED light expands the range of observation.
- **TM-505B** achieves a maximum measuring height of 115 mm despite the compact size.
- Digimatic micrometer head (**164-163**, **164-164**, optional) makes measurement easy and precise.



TM-505B

Note: Micrometer heads are optional.

SPECIFICATIONS

Model	TM-505B	TM-1005B	
Code No.	176-818-11	176-819-11	
Optical tube	Monocular type (Vertical tilt angle: 30°)		
Observation image	Erect		
Eyepiece protractor	Resolution (graduation): 1°, Rotation angle: 360°, Resolution (angle): 6', Adjustable zero point		
Eyepiece	Standard accessory: 15X (field number: 13), Options: 10X, 20X		
Objective	Standard accessory: 2X, Optional: 5X, 10X		
Microscope head	Maximum height of workpiece	115 mm	
	Focusing method	Manual (Coarse feed)	
Illumination unit	Transmitted illumination	Stepless brightness adjustment, White LED light source with green filter	
	Reflected illumination	Oblique single-source type, Stepless brightness adjustment, White LED light source	
Cross-travel stage	Measuring range	50×50 mm	100×50 mm (An optional 50 mm gauge block is required to cover full range. A CERA block is recommended.)
	Table size	152×152 mm	240×152 mm
	Usable area of the stage glass	96×96 mm	154×96 mm
	Maximum stage glass loading	5 kg	
Linear measurement method	Micrometer head*		
Resolution	Depends on the micrometer head specifications* 164-163 (mm): 0.001 mm or 164-164 (inch/mm): 0.00005 in/0.001 mm		
Micrometer head travel range	164-163 (mm): 50 mm or 164-164 (inch/mm): 2 in/50 mm		
Power source	AC 100 to 240 V 50/60 Hz Maximum power consumption: 4.2 W		
Mass	14 kg	15 kg	

* Micrometer heads are optional for **TM-505B** and **TM-1005B**.

Angle Index (Standard Accessory)



HARDMATIC HH-411 SERIES 810 — Rebound Type Portable Hardness Tester

- Excellent operability that performs hardness tests with the touch of a key and a compact body allows users to measure hardness in the field. This instrument is best suited for on-site hardness tests such as large molds, railroad track, and welded spots in structures.



SPECIFICATIONS

Code No.	810-299-21	810-298-21
Model	HH-411	
Hardness display range	Leeb hardness: 1 to 999 HL	
Display range* ¹ (This display range varies depending on the conversion table used.)	Vickers hardness: 43 to 950 HV Brinell hardness: 20 to 896 HB Rockwell hardness (C scale): 19.3 to 68.2 HRC Rockwell hardness (B scale): 13.5 to 101.7 HRB	Shore hardness: 30.1 to 99.5 HS (ASTM) 13.2 to 98.6 HS (JIS) Tensile strength: 499 to 1999 MPa
Shore hardness (HS) conversion	VHS (JIS B7731)	HSD
Detector	Impact hammer with integrated detector and carbide-ball tip (D type)	
Display	7-segment LCD	
Specimen requirements	Test points: At least 5 mm from specimen edges and at intervals of at least 3 mm Min. thickness: 5 mm; mass: 5 kg or more (However, specimens with a mass between 0.1 and 5 kg can be tested if fixed to a strong support.)	
Power source	Alkaline AA battery (2 pcs.)* ² or optional AC adapter (battery life: 70 hours)	
External dimensions/Mass	Detector: ø28×175 mm in length, 120 g Display (W×D×H): 70×35×110 mm, 200 g	

*1 For **HH-411**, display values are guaranteed based on Leeb hardness. Converted values are for reference only.

*2 Alkaline AA batteries are not included as standard. Please use commercially available batteries.

HARDMATIC HH-300 SERIES 811 — Durometers for Sponge, Rubber and Plastics

- These are available in two types: a compact type that can fit in the palm of your hand, and a long type with a slim, easy-to-hold stem. Both are available with an analog or digital indicator.

Compact type



811-330-10 HH-330
811-336-10 HH-336
811-338-10 HH-338

Long type



811-332-10 HH-332
811-334-10 HH-334

SPECIFICATIONS

Code No.	811-330-10	811-332-10	811-334-10
Model	HH-330	HH-332	HH-334
Type	Compact	Long	
Display specification	Digital		
Measurement target	Soft rubber, sponge, felt, hard film, fabric	General rubber, soft plastic	Hard rubber, hard plastic, ebonite
Category in standards	Type E	Type A	Type D
Needle shape	Shaft diameter	ø1.25 mm	
	Tip shape	Circular truncated cone	Cone
	Tip angle	35°	30°
	Tip diameter	ø0.79 mm	—
	Tip curvature	—	0.1 mm
Power source	SR44 battery (1 pc.), 938882 included as standard (for operational checks)		
External dimensions (WxDxH)	59x40x147 mm	59x41x190 mm	
Mass	290 g	310 g	

Code No.	811-336-10	811-336-11	811-338-10	811-338-11
Model	HH-336	HH-336-01	HH-338	HH-338-01
Type	Compact			
Display specification	Digital			
Measurement target	General rubber, soft plastic		Hard rubber, hard plastic, ebonite	
Category in standards	Type A		Type D	
Needle shape	Shaft diameter	ø1.25 mm		
	Tip shape	Circular truncated cone		Cone
	Tip angle	35°		30°
	Tip diameter	ø0.79 mm		—
	Tip curvature	—		0.1 mm
Power source	SR44 battery (1 pc.), 938882 included as standard (for operational checks)			
External dimensions (WxDxH)	59x40x147 mm			
Mass	290 g			

Optional Accessories for Dual-purpose Stand CTS Series

Code No.	811-019	811-012	811-013
Model	CTS-101	CTS-102	CTS-103
Applicable models	HH-332	HH-334/338/338-01	HH-336/336-01

- Hardness measurements by a durometer are performed by simply holding the instrument against the surface of a specimen and reading the indicated value.
- This type of hardness tester is most widely used for hardness testing of sponge, rubber, plastics and other soft materials.

Compact type



811-329-10 HH-329
811-335-10 HH-335
811-337-10 HH-337

Long type



811-331-10 HH-331
811-333-10 HH-333

SPECIFICATIONS

Code No.	811-329-10	811-331-10	811-333-10
Model	HH-329	HH-331	HH-333
Type	Compact	Long	
Display specification	Analog		
Measurement target	Soft rubber, sponge, felt, hard film, fabric	General rubber, soft plastic	Hard rubber, hard plastic, ebonite
Category in standards	Type E	Type A	Type D
Needle shape	Shaft diameter	ø1.25 mm	
	Tip shape	Circular truncated cone	Cone
	Tip angle	35°	30°
	Tip diameter	ø0.79 mm	—
	Tip curvature	—	0.1 mm
External dimensions (WxDxH)	68x34x146 mm	68x35x188 mm	
Mass	300 g	320 g	

Code No.	811-335-10	811-335-11	811-337-10	811-337-11
Model	HH-335	HH-335-01	HH-337	HH-337-01
Type	Compact			
Display specification	Analog			
Measurement target	General rubber, soft plastic		Hard rubber, hard plastic, ebonite	
Category in standards	Type A		Type D	
Needle shape	Shaft diameter	ø1.25 mm		
	Tip shape	Circular truncated cone	Cone	
	Tip angle	35°	30°	
	Tip diameter	ø0.79 mm	—	
	Tip curvature	—	0.1 mm	
External dimensions (WxDxH)	68x34x146 mm			
Mass	300 g			

Optional Accessories for Dual-purpose Stand CTS Series

Code No.	811-019	811-012	811-013
Model	CTS-101	CTS-102	CTS-103
Applicable models	HH-331	HH-333/337/337-01	HH-335/335-01