

Surftest SJ-210/SJ-310

SERIES 178 — Portable Surface Roughness Tester



Surftest SJ-210



FEATURES

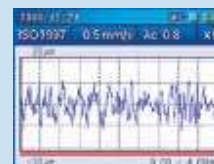
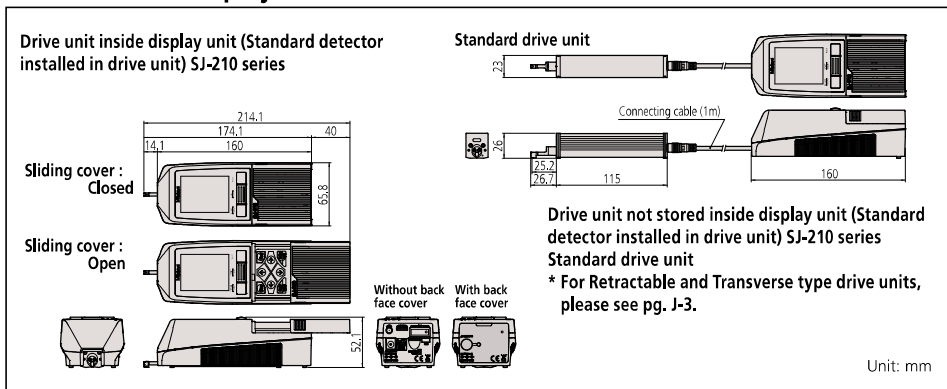
- The 2.4-inch color graphic LCD provides excellent readability and an intuitive display that is easy to use. The LCD also includes a backlight for improved visibility in dark environments.
- The Surftest SJ-210 can be easily operated using the buttons on the front of the unit and under the sliding cover.
- Up to 10 measurement conditions and one measured profile can be stored in the internal memory.
- An optional memory card can be used as an extended memory to store large quantities of measured profiles and conditions.

- Access to each feature can be password-protected, which prevents unintended operations and allows you to protect your settings.
- The display interface supports 16 languages, which can be freely switched.
- An alarm warns you when the cumulative measurement distance exceeds a preset limit.
- The Surftest SJ-210 complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO-1997, and ANSI.
- In addition to calculation results, the Surftest SJ-210 can display sectional calculation results and assessed profiles, load curves, and amplitude distribution curves.

SPECIFICATIONS/CONFIGURATION

Model No.	SJ-210					
Order No. (inch/mm)	178-561-01A	178-561-02A	178-563-01A	178-563-02A	178-565-01A	178-565-02A
Drive unit	Standard type (178-230-2)		Retractable type (178-235)		Transverse tracing type (178-233-2)	
Detector	0.75mN type (178-296)	4mN type (178-390)	0.75mN type (178-296)	4mN type (178-390)	0.75mN type (178-387)	4mN type (178-386)
Display unit	Compact type (178-253A)					
Detector: Tip angle	60°	90°	60°	90°	60°	90°
Stylus tip radius	2µm	5µm	2µm	5µm	2µm	5µm
Detector measuring force	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
Standard accessories	12BAA303 Connecting cable 178-602 Roughness specimen (Ra 3.00µm) 12BAK699 Carrying case 12BAK700 Calibration stage 12BAK820 Protective sheets for display AC Adapter Operation manual Quick reference manual Warranty					
	12BAA303 Connecting cable 178-606 Roughness specimen (Ra 1.00µm) 12AAE643 Point-contact adapter 12AAE644 V-type adapter 12BAK699 Carrying case 12BAK700 Calibration stage 12BAK820 Protective sheets for display AC Adapter, Operation manual Quick reference manual, Warranty					

DIMENSIONS Display unit, Drive unit



Technical Data: SJ-210

X axis (drive unit)	Measuring range:	.70" (17.5mm)
		.22" (5.6mm) Transverse type
Measuring speed:	.01, .02, .03"/s (0.25, 0.5, 0.75mm/s)	.039"/s (1mm/s) (Returning))
Detector:	Range / Resolution:	Auto / depending on the measurement range
		14400 µin / .8 in (360 µm / 0.02 µm)
		4000 µin / .2 µin (100 µm / 0.006 µm)
		1000 µin / .08 µin (25 µm / 0.002 µm)
Measuring method:	skidded	
Measuring force:	4mN (0.75mN)	
Stylus tip:	Diamond, 90° / 5µmR (60° / 2µmR)	
Skid radius of curvature:	40mm	
Skid force:	less than 400mN	
Type:	Differential inductance	
Power supply:	Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter	
Charging time:	about 4 hours (may vary due to ambient temperature)	
Endurance:	about 1000 measurements (differs slightly due to use conditions/ environment)	
External I/O:	USB I/F, Digimatic Output, Printer Output, RS-232C I/F, Foot SW I/F	
Data storage:	Micro SD card w/ adapter (4GB) (option 12AAL069)	
Dimensions (WxDxH)	Display unit:	2.05x2.59x6.3" (52.1 x 65.8 x 160mm)
	Drive Unit:	4.5x.9x1" (115 x 23 x 26mm)
Mass:	Display unit + Drive unit + Standard detector	About 1.1lb (0.5kg)

Evaluation Capability: SJ-210

Applicable standards: JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA

Assessed profiles: Primary profile, Roughness profile, DF profile, Roughness profile-Motif

Evaluation parameters: Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Rsk, Rku, Rc, RPC, Rsm, Rz1max, S, HSC, Rz1S, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rpm, tp, Htp, R, Rx, AR, Possible Customize

Analysis graphs: Bearing area curve / Amplitude distribution curve

Digital filters: Gaussian, 2CR75, PC75

Cut off length: λc: .003, .01, .03, .1" (0.08, 0.25, 0.8, 2.5mm)
λs: .1, .3" (2.5, 8µm)

Sampling length: .003, .01, .03, .1" or arbitrary (0.08, 0.25, 0.8, 2.5mm) or arbitrary

Number of sampling lengths (x n): x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 16.0mm: 0.01mm interval)
x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 5.6mm: 0.01mm interval)*

* Only for Transverse tracing drive unit type

Function: SJ-210

Customization: Desired parameters can be selected for calculation and display.

Go/no-go judgment: By max value / 16% / Standard dev.

Storage of measurement condition: Save the conditions at power OFF

Storage: Internal memory: Measurement condition (10 sets), Measured profile (1set)

Memory card (Option): 500 measurement conditions, 10,000 measured profiles, 500 display images

Text file (Measurement conditions / Measured profile / Assessed profile / Bearing area curve / Amplitude distribution curve)

Calibration: Auto-calibration with the entry of numerical value / Average calibration with multiple measurement (Max.5 times) is available

Technical Data: SJ-310

X axis (drive unit)	
Measuring range:	.70" (17.5mm) .22" (5.6mm) Transverse type
Measuring speed:	.01, .02, .03"/s (0.25, 0.5, 0.75mm/s) .039"/s (1mm/s) Returning
Detector:	
Range / Resolution:	Auto / depending on the measurement range 14400 μ in / .8 in (360 μ m / 0.02 μ m) 4000 μ in / .2 μ in (100 μ m / 0.006 μ m) 1000 μ in / .08 μ in (25 μ m / 0.002 μ m)
Measuring method:	skidded
Measuring force:	4mN (0.75mN)
Stylus tip:	Diamond, 90° / 5 μ mR (60° / 2 μ mR)
Skid radius of curvature:	40mm
Skid force:	less than 400mN
Type:	Differential inductance
Power supply:	Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter
Battery	
Charging time:	4 hours maximum
Recharge cycles:	Approximately 1500 times (slightly varies with the usage and environmental conditions)
External I/O:	USB I/F, Digimatic Output, RS-232C I/F, External SW I/F
Data storage:	Micro SD card w/ adapter (4GB) (option 12AAA841)
Dimensions (WxDxH)	
Control unit:	10.8x4.29x7.8" (275 x 109 x 198mm)
Drive unit:	4.5x.9x1" (115 x 23 x 26mm)
Mass	
Display unit:	Approx. 3.7lb (1.7kg)
Drive unit:	.4lb (0.2kg)

Evaluation Capability: SJ-310

Applicable standards:	
JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA	
Assessed profiles:	
P (primary profile), R (roughness profile), DIN4776, roughness motif, waviness motif	
Evaluation parameters:	
Ra, Ry, Rz, Rt, Rp, Rq, Rv, Rsk, Rku, Rc, RSm, S, RPl, R3z, Rm(c), Rpk, Rvk, Rdc, Rk, Mr1, Mr2, Lo, Rppi, R, AR, Rx, A1, A2, Vo, HSC, Rmr, SK, Ku, Rda, Rda, Rlr, la, laq, Rpm, RzJIS (JIS'01), tp (ANSI), Htp (ANSI), Wte, Wx, W, AW, Rz1max (ISO), Rmax (VDA, ANSI, JIS'82), Possible Customize	
Analysis graphs:	
Bearing Area Curve (BAC), Amplitude Distribution Curve (ADC)	
Digital filter:	2CR, PC75, Gaussian
Cutoff length:	λ_c : .003, .01, .03, .1, .3" (0.08, 0.25, 0.8, 2.5, 8mm) λ_s : .1, .3" (2.5, 8 μ m)
Sampling length:	.003, .01, .03, .1, .3" or arbitrary (0.08, 0.25, 0.8, 2.5, 8mm) or arbitrary
Number of sampling lengths (x n):	
x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 16.0mm: 0.01mm interval)	
x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 5.6mm: 0.01mm interval)*	
* Only for Transverse tracing drive unit type	
Printer:	Thermal type
Printing width:	48mm (paper width: 58mm)
Recording magnification:	
Vertical magnification: 10X to 100,000X, Auto	
Horizontal magnification: 1X to 1,000X, Auto	

Function: SJ-310

Customization: Desired parameters can be selected for calculation and display.	
Statistical processing: Maximum value, minimum value, mean value, standard deviation, pass rate, histogram of each parameter	
Go/no-go judgment: maximum value rule, 16% rule, average value rule, standard deviation (1 σ , 2 σ , 3 σ)	
Storage: Internal memory: Measurement condition (10 sets)	
Memory card (Option): 500 measurement conditions, 10,000 measured profiles, 500 display images, Text file (Measurement conditions / Measured profile / Assessed profile / Bearing area curve / Amplitude distribution curve), 500 statistical data, etc.	
Calibration: Auto-calibration with the entry of numerical value / Average calibration with multiple measurement (Max.12 times) is available.	
Power-saving function: Auto-sleep-function, Auto light-off of Backlight by ECO mode.	

Surftest SJ-210/SJ-310

SERIES 178 — Portable Surface Roughness Tester



Surftest SJ-310

FEATURES

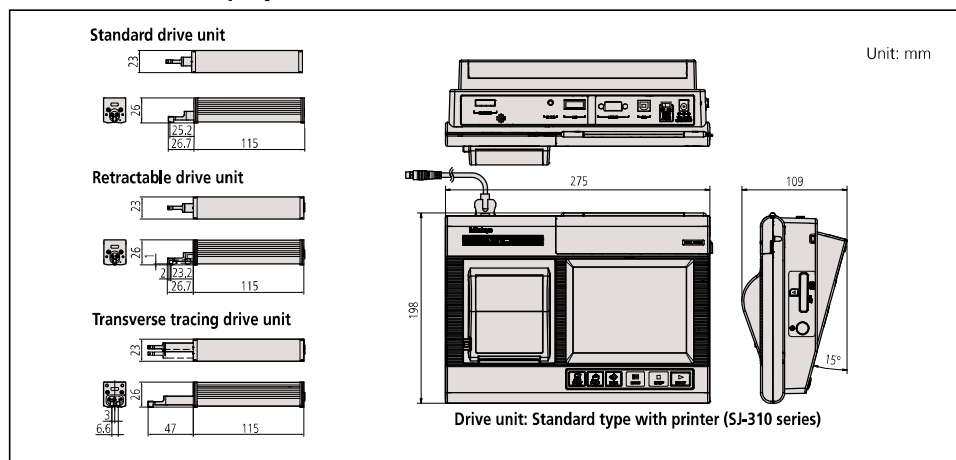
- The data processing unit offers large 5.7-inch color graphic LCD touch-panel for superior readability and operability. The LCD also includes a backlight for improved visibility in dark environments.
- The excellent user interface provides intuitive and easy-to-understand operability.

- Complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO- 1997, and ANSI.
- The Measure-Start and other frequently used buttons are strengthened to resist wear and the detrimental effects of workshop contaminants.
- Equipped with a large-capacity battery allowing approximately 1500 measurements when fully charged.
- Includes convenient carrying case for protection in the field.
- A high-speed printer is built into the main unit. Either landscape or portfolio mode can be selected according to the application. Paper saving mode is supported.
- The display interface supports 16 languages, which can be easily switched.
- 10 sets of measurement conditions can be saved in the measurement unit—an optional memory card can save measurement conditions and the measured profile.

SPECIFICATIONS/CONFIGURATION

Model No.	SJ-310					
Order No. (inch/mm)	178-571-01A	178-571-02A	178-573-01A	178-573-02A	178-575-01A	178-575-02A
Drive unit	Standard type (178-230-2)		Retractable type (178-235)		Transverse tracing type (178-233-2)	
Detector	0.75mN type (178-296)	4mN type (178-390)	0.75mN type (178-296)	4mN type (178-390)	0.75mN type (178-387)	4mN type (178-386)
Display unit	Standard type with printer					
Detector: Tip angle	60°	90°	60°	90°	60°	90°
Stylus tip radius	2 μ m	5 μ m	2 μ m	5 μ m	2 μ m	5 μ m
Detector measuring force	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
Standard accessories	12AAM475 Connecting cable 12AAA217 Nosepiece for plane surface 12AAA218 Nosepiece for cylinder 12AAA216 Supporting leg 12BAK700 Calibration stage 12BAG834 Stylus pen 12BAL402 Protection sheet 270732 Printer paper (5 pieces) 12BAL400 Carrying case 178-602 Roughness reference specimen (Ra3 μ m), AC adapter, Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty					
	12AAM475 Connecting cable 12AAE643 Point-contact adapter 12AAE644 V-type adapter 12BAK700 Calibration stage 12BAG834 Stylus pen 12BAL402 Protection sheet 270732 Printer paper (5 pieces) 12BAL400 Carrying case 178-606 Roughness reference specimen (Ra1 μ m), AC adapter, Philips screwdriver, Strap for stylus pen, Operation manual, Quick reference manual, Warranty					

DIMENSIONS Display unit, Drive unit

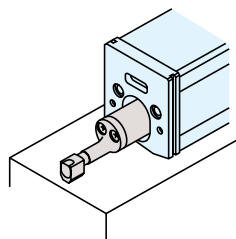


Drive unit: Standard type with printer (SJ-310 series)

Surftest SJ-210 / SJ-310

SERIES 178 — Optional Accessories

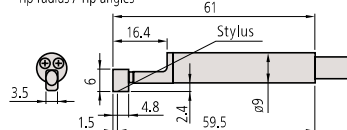
Detectors



Standard detectors

Order No.	Measuring force	Stylus profiles*	Remarks column
178-296	0.75mN	2µmR/60°	Dedicated to the standard/retractable drive unit
178-390	4 mN	5µmR/90°	
178-387	0.75mN	2µmR/60°	Dedicated to the transverse tracing drive unit
178-386	4 mN	5µmR/90°	
178-395	0.75mN	2µmR/90°	Dedicated to the standard/retractable drive unit
178-391	4 mN	10µmR/90°	

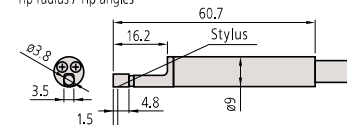
* Tip radius / Tip angles



Small hole detectors

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

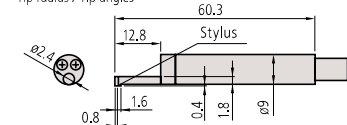
* Tip radius / Tip angles



Extra small hole detectors

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

* Tip radius / Tip angles

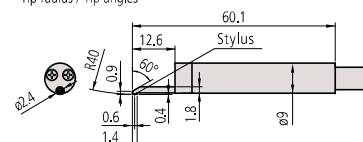


Unit: mm

Gear-tooth surface detectors

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

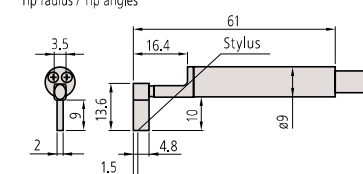
* Tip radius / Tip angles



Deep groove detectors

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

* Tip radius / Tip angles



SJ-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 (WxDxH: 93x125x70mm) and can run on an internal battery.

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



178-421A

DP-1VA

It is possible to process Digimatic data output from the Surftest SJ series with the DP-1VA. This compact, hand-held device can provide printouts of measurement data and various statistical analyses results such as histograms, D-charts, and Xbar-R control charts. With optional output cables, DP-1VA is also capable of RS-232C output of measurement data to a PC (cable **09EAA084**) and go/no-go condition output (cable **965516**).



264-505A

Connecting cable: **936937** 40" (1m)
Connecting cable: **965014** 80" (2m)
AC adapter: **06AEG180JA**
Printer paper: **09EAA082**

*Not compatible with older SJ-201 models.



Example of the connection with SJ-210

Durable Printer paper (25m, 5 rolls/set): **12AAA876**
Printer paper (5 packs): **270732**
RS-232C cable: **12AAL067**



Free Communication Software

SJ-Tools

This program can be downloaded for FREE from the Mitutoyo website. <http://www.mitutoyo.com>

Output software based on Microsoft-Excel* for controlling the devices and reproducing and storing the measurement data.

* Microsoft-Excel is not included in the scope of supply. Complete with exclusive accessories.

- Measurement device control
- Definition of measurement variables
- Graphic representation of the profile
- Storage of measurement records
- Documentation of measurement results
- Connecting cable

Optional cables (Required for software communication)

12AAL068: USB PC connecting cable(USB cable) for SJ-210

12AAD510: USB PC connecting cable(USB cable) for SJ-310/410

12AAL067: RS-232C cable for SJ-210

12AAA882: RS-232C cable for SJ-310/410

12AAH490: USB PC connecting cable for SJ-500/SV-2100

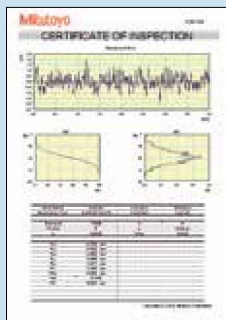


SJ-Tools input mask for Surftest SJ series

Required environment*:

- OS:
Windows XP-SP3
Windows Vista
Windows 7/8/10
- Spreadsheet software:
Microsoft Excel 2000/2002/
2003/2007/2010/2013/2016

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



SJ-Tools output record from MS-Excel

Optional Accessories

12AAL272: SJ-210 Replacement Battery Pack

12AAN046: SJ-310 Replacement Battery Pack

12BAK820: SJ-210 Display Protection Sheet (1pc.)

12AAL066: SJ-210 Display Protection Sheet (5pcs.)

12BAL402: SJ-310 Display Protection Sheet (1pc.)

12AAN040: SJ-310 Display Protection Sheet (10pcs.)

178-601: Precision Reference Specimen (Ra 3.00 µm)

178-602: Precision Reference Specimen

(Ra 119 µin / 3.00 µm)

178-603: Precision Reference Specimen – 2 values (GAR)

178-604: Precision Reference Specimen – 2 Values (MIT)

178-606: Precision Reference Specimen for Transverse Drive

(Ra 39.5 µin / 1.0 µm)

178-029: Manual Column Stand, must use adapter

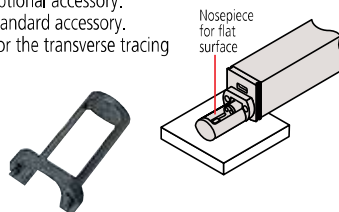
12AAA221 to mount SJ drive unit.

Nosepiece, Adapter

Nosepiece for flat surfaces

12AAA217

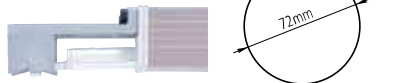
- SJ-210/210R optional accessory.
- SJ-310/310R standard accessory.
- Not available for the transverse tracing drive unit.



V-type adapter

12AAE644

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

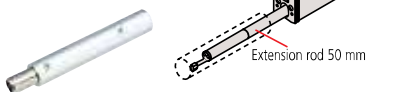


Extension rod (50mm)

12AAA210

- Not available for the transverse tracing drive unit.

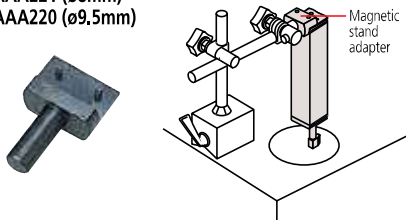
(Note: Only one rod can be used.)



Magnetic stand adapter

12AAA221 (ø8mm)

12AAA220 (ø9.5mm)



Extension cable (1m)

12BAA303

- Only one cable can be used.

Setting attachments

* Not available for the transverse tracing drive unit

Improves measurement efficiency by allowing the setup of workpieces of the same type and the positioning of hard-to-access features of a workpiece.

No. 178-033

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: ø 5 - 150mm

No. 178-034

Setting attachment: Magnetic slider type



Best suited for measurement of the flat surface of a workpiece that has partial indentations and steps and that is hard to set the drive unit. Combination use with the magnet type specimen holder (Option No. 12AAA910) further improves the ease of operation.

No. 178-035

Setting attachment: Inside diameter type



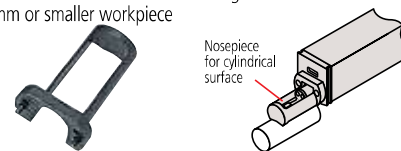
Greatly facilitates measurement of internal wall surfaces of, for example, cylinder-block bores.

- Applicable diameter: ø75 - ø95mm
- Accessible depth: 30 - 135mm

Nosepiece for cylindrical surfaces

12AAA218

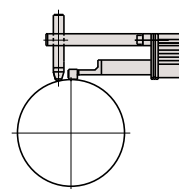
- SJ-210/210R optional accessory.
- SJ-310/310R standard accessory.
- Not available for the transverse tracing drive unit.
- ø30mm or smaller workpiece



Point-contact adapter

12AAE643

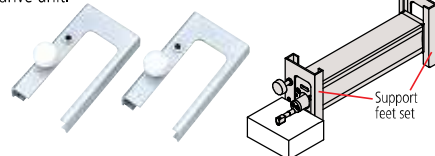
- SJ-210/SJ-310 Transverse tracing type standard accessory.
- Dedicated to the transverse tracing drive unit.



Support feet set

12AAA216

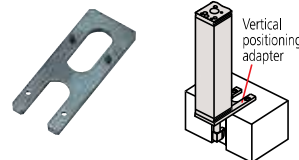
- SJ-210/210R optional accessory.
- SJ-310/310R standard accessory.
- Not available for the detector side of the transverse tracing drive unit.



Vertical positioning adapter

12AAA219

- Not available for the transverse tracing drive unit.



Height gage adapter

12AAA222 (9mm x 9mm)

12AAA233 (1/4" x 1/2")

