

SURFACE MEASUREMENT SURFTEST SJ-201/SJ-301

PRE 1211(3)



Portable Surface Testers

The smart solution for the workshop – the SJ-201.



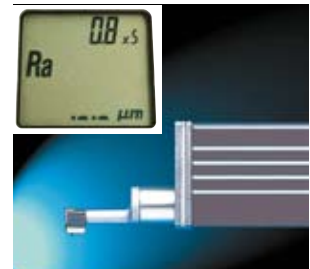
- Complies with GPS standardisation for surface quality
- Easy-to-read large character display
- Portable for easy use, wherever you need to measure
- Drive unit can be detached from the display unit for easy measurement even when features are difficult to access
- Wide measurement range of 350 μm (-200 μm to +150 μm)
- Parameters conform to ISO, DIN, ANSI, and JIS standards
- 19 analysis parameters are provided in total, including the frequently-used Ra, Rq, Rz, and Ry parameters
- Customise function allows unnecessary parameters to be deselected
- OK/NOK evaluation is available on every parameter
- Automatic dynamic calibration function
- Auto-sleep function can be activated or deactivated
- Ten measured values are retained in memory even after the power is turned off
- SPC data output (DIGIMATIC)
- RS-232C interface for data transfer to computer or other external devices
- 2-way power system (mains adapter / rechargeable built-in battery)
- Optional carrying case for safe transport supplied as standard
- Roughness standard supplied
- Measurement results can be printed out via the optional printer

Measures 19 roughness parameters according to ISO/DIN/ANSI/JIS

Ra, Rq, Ry, Rz, S, Sm, Pc, R3z, mr, Rt, Rp, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo

Measurement

When the START/STOP key is pressed in measuring mode, the probe begins to travel. When measurement is finished, the display changes from the measurement-in-progress display to the measurement-completed display to show the measured value of the chosen parameter. The evaluation length can be set either to a predefined standard length or to any arbitrary length within the measuring range.



Measurement-in-progress display



Measurement-completed display

Ra, Rq, Ry and Rz plus eleven further parameters

In addition to the standard parameters Ra, Rq, Ry and Rz, eleven other parameters can be evaluated after making the measurement. Pressing the PARAMETER key repeatedly until the desired parameter is displayed makes the parameter choice.

Parameter choice restriction and GO/NG evaluation

Parameter calculation and display of the results can be restricted to only those parameters that are actually required in normal use. This simplifies operation and parameter calculation. A measurement can also be judged GO or NO GO by setting upper and lower limits beforehand.



Calibration mode

When the CALIBRATION key is pressed in measuring mode, the system changes to calibration mode. The probe can now be calibrated with the roughness standard simply by pressing a key.

Applications



Keys for changing the operating setup

The upper cover of the display unit can be pushed back to operate the keys underneath.



Upside-down measurement



Measurement in the horizontal direction
Adapter for height gauge:
Code No. 12AAA222

SPC data output and communication

The SJ-201P offers functions for output of SPC data and communication with external devices via the RS-232C interface.



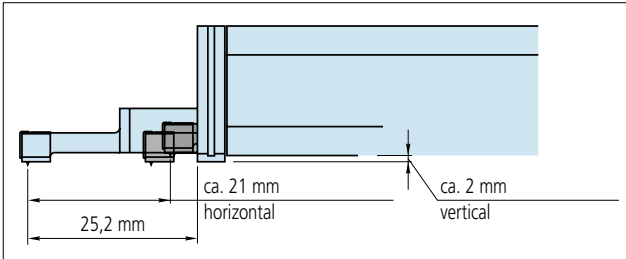
The drive unit is V-shaped underneath to ensure secure measurement even on cylindrical workpieces.



Measurement in the vertical direction

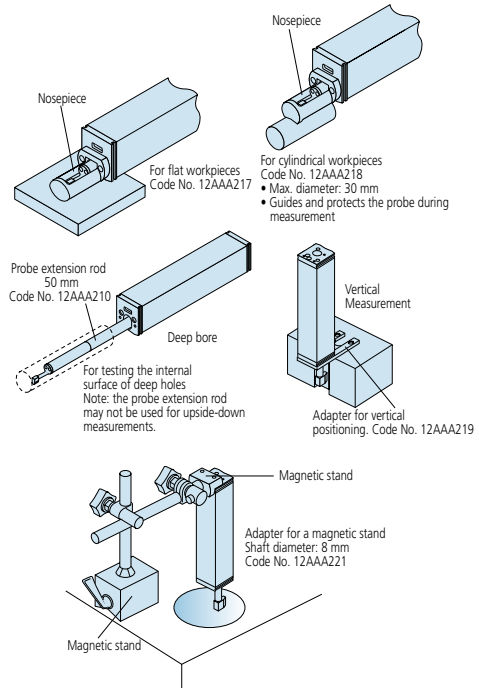


Supporting feet, pair
Adjustable height: 28 mm

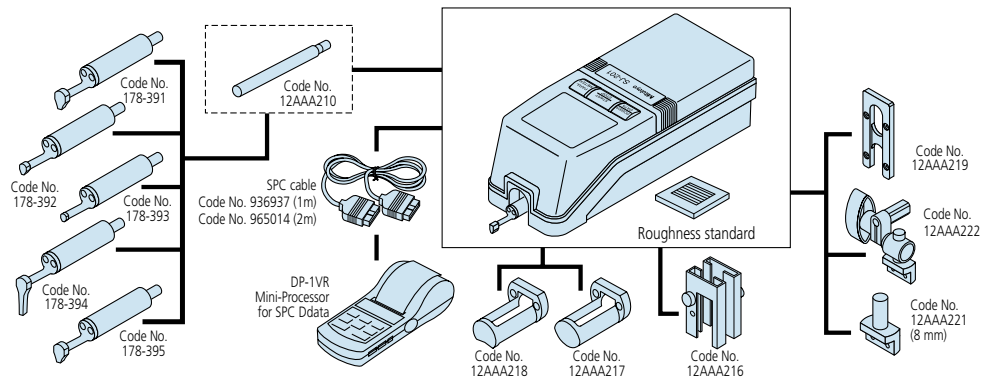


Probe retraction function

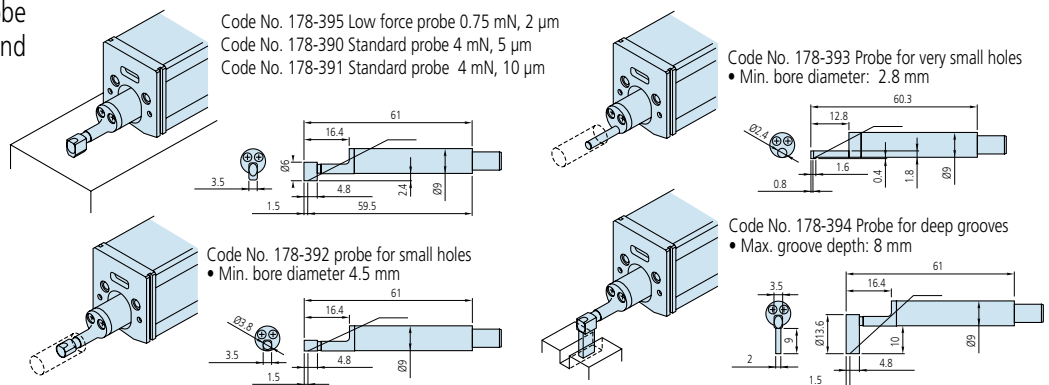
When the SJ-201P is transported, or will not be used for some time, the probe can be retracted to protect the tip.



The large choice of optional accessories enables use for many different measuring tasks.



Selecting the correct probe for workpiece material and shape.



Standard and optional accessories.

Standard accessories

Code No.	Standard accessories
178-395	Standard probe: 4 mN, 5 μ m, (200 inch) tip radius
12BAA303	Connection cable (1 m)
178-601	Roughness calibration standard (Ra μ m)
353134	Calibration plate
538612	Screwdriver
12BAA304	Carry case
99MBB079A	Operating instructions
99MBB081A	Quick Reference Guide
526688	Mains adapter

Optional accessories

Code No. 178-390	Probe, 4 mN, 5 μ m stylus tip radius
Code No. 178-391	Probe for soft materials, 4 mN, 10 μ m (400 inch) tip radius

Code No.	Standard accessories
178-392	Probe for small holes, \varnothing 4.5 mm (0.177")
178-393	Probe for very small holes, \varnothing 2.8 mm (0.110")
178-394	Probe for deep grooves
936937	SPC cable 1 m (39")
965014	SPC-cable 2 m (78")
12AAA208	RS-232C connector cable
12AAA216	Height adjustment feet
12AAA217	Nosepiece for flat workpieces
12AAA218	Nosepiece for cylindrical workpieces
12AAA219	Adapter for vertical positioning
12AAA221	Adapter for a magnetic stand with \varnothing 8 mm shaft
12AAA222	Metric height gauge adapter 9 x 9 mm
12AAA210	Probe extension rod, 50 mm (1.97")
178-033	Device for measuring cylindrical workpieces
178-034	Universal carrier
178-035	Device for measuring in tubes
178-420 D	Printer, with connecting cable
12AAC243	Printer paper, 20 rolls

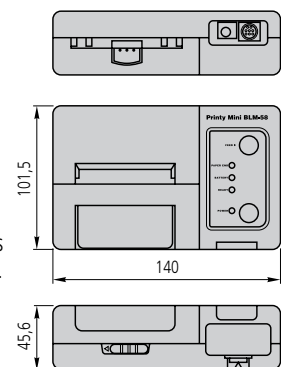
Optional accessories SJ-printer

Measurement data	Measuring set up, calculation result, profile, BAC diagram (selectable)
Print method	Thermal printer
Data transmission	Via RS-232C
Point density	8 dots/mm
Max. print speed	50 mm/s (2"/s)
Print/recording width	48 mm (1.89") / 58 mm
Paper roll diameter	\varnothing 30 mm
Dimensions (W x H x D)	140 x 45,6 x 101,5 mm
Mass	1,5 kg
Batteries	Built-in battery: 7.5 V Mains adapter: 8.5 VDC
Accessories	Mains adapter, battery pack, Connecting cable 20 rolls of printer paper Code No. 12AAC234



The compact SJ printer 178-420 prints measurement data quickly and clearly. Its handy format and built-in battery make it suitable for use practically anywhere.

Printer dimensions



Specifications SJ-201

Code No. 178-930D

Drive Unit		
Speed	Measuring: 0.25 mm/s, 0.5 mm/s (0.01"/s, 0.02"/s) Returning: 0.8 mm/s (0.03"/s)	
Measuring range (x-axis)	12,5 mm	
Mass	190 g	
Standard probe	Code No. 178-395	
Type	inductive	
Measuring range	350 µm (-200 µm to +150 µm)	
Stylus	Diamond cone	
Skid radius	40 mm	
Tip radius	2 µm	
Measuring force	0,75 mN	
Recorded profiles	Roughness profile (R), DIN 4776	
Roughness parameters	Ra, Ry, Rz, Rq, S, Sm, Pc, R3z, mr, Rt, Rp, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo (user-defined)	
Roughness standards	JIS, DIN, ISO, ANSI	
Evaluation length (L)	0,25 mm, 0,8 mm, 2,5 mm	
No. of sampling lengths	x1, x3, x5, xL*	
Digital filters	Gauss 2 CR, PC 75 (phase corrected), Gauss (PL 50)	
Cut-off-wavelengths	lc	0,25 mm, 0,8 mm, 2,5 mm
	ls	2,5 µm, 8 µm
Resolution/range	Automatic/depending on measuring range 0,4 µm / 350 µm 0,1 µm / 100 µm 0,05 µm / 50 µm 0,01 µm / 10 µm	
Display range	Ra, Rq	0,01 µm - 100 µm
	Rz, Ry, Rp, Rt	0,02 µm - 350 µm
	R3z, Rk, Rpk, Rvk	0,02 µm - 350 µm
	Pc	2,5 - 5000/cm
	mr	1 - 100 %
	Sm, S	2 - 4000 µm
	Mr1, Mr2	0 - 100 %
	A1, A2	0 - 1500
Vo	0,000 - 10,00 (mm ³ /cm ²)	
GO/NG evaluation	Upper and lower tolerance values can be set	
Power supply	Via mains adapter/built-in rechargeable batteries	
Rechargeable batteries	Charge duration: 12 hours (for 500 measurements)	
Auto-sleep function (auto switch-off)	After 30 seconds with no key presses	
Data output	Via RS-232C interface unit, SPC output	
Mass	290 g	

* The evaluation length can be selected as desired within the range 0.3 to 12.5 mm (0.012" to 0.49")

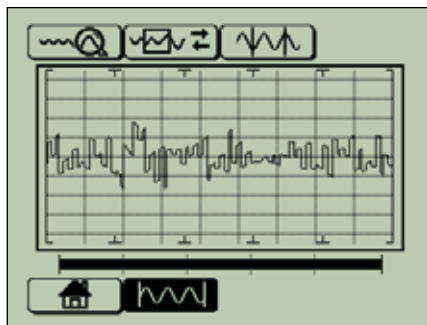
Portable surface tester SJ-301 with LCD touch-panel and integrated printer



- Graphical representation of surface profiles
- User-friendly touch panel
- Integrated printer and battery operation
- JIS/DIN/ISO/ANSI compatible, 36 evaluation parameters and 3 analysis graphs
- Probe with 350 μm measuring range
- Includes a statistical function
- Compatible with PC-based Surfpak SJ software
- Automatic sleep function can be activated or deactivated
- Measurement values and calculated graphs can be easily read on the generously sized LCD display, and the thermal printer outputs the results rapidly in clearly legible form
- Large, dustproof keys for selecting measuring functions and a touch panel (with stylus) for setting the measuring conditions make operating the instrument fast and easy
- Measurement data can be output to an external PC. Various surface analysis evaluations can be carried out with the Surfpak-SJ software
- Once a measurement has been made, any area of the profile that is not required (e.g. across a groove) can be deleted and the parameters recalculated.

Storage of measuring setup and measurement data

- The SJ-301 can store up to 5 different setups. Individual setups can be selected for individual workpieces.
- Setups stored in the SJ-301 can be called up and selected at the touch of a button.
- When an optional memory card is used up to 20 setups, measurement and statistical data records can be stored.
- The measurement data can be stored on site and printed out or processed later.



Profile representation on the LCD display

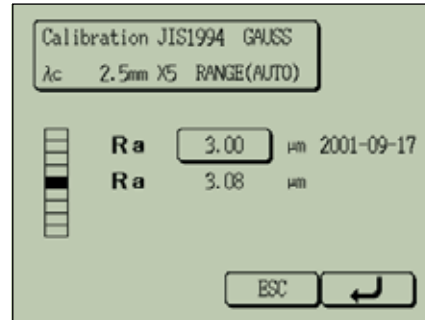
- Measurement results and associated profiles are read from the LCD display.
- The display resolution may be increased (or reduced) to emphasise detail.

Statistics	2001-09-11
Ra	SAMPLE NUM (008)
X	1.43 μm
σ	0.11 μm
MAX	1.60 μm
MTN	1.26 μm
PASS RATIO	100.0%

Special features

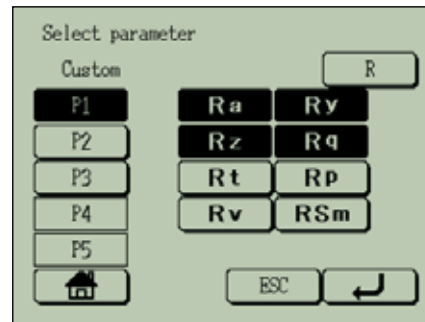
Auto-calibration

- For calibration, simply enter the value specified on the supplied calibration standard and then carry out the measurement.
- No further setting using any tool (e.g. electrical amplification) is required.



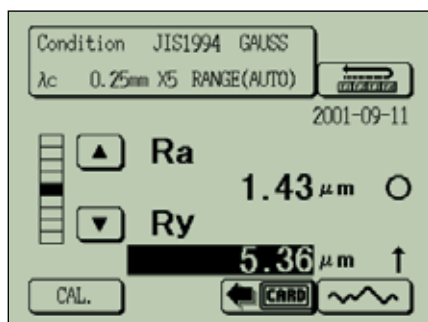
Individual function selection

- The user has an extensive choice of surface measurement parameters to use.



Selection of language for display/printout

- Available display/printout languages are English, French, German, Italian, Japanese and Spanish.



GO/NG evaluation

- Tolerance values for surface parameters can be set to aid production measurements.
- A symbol is displayed with the measurement results to show pass or fail.

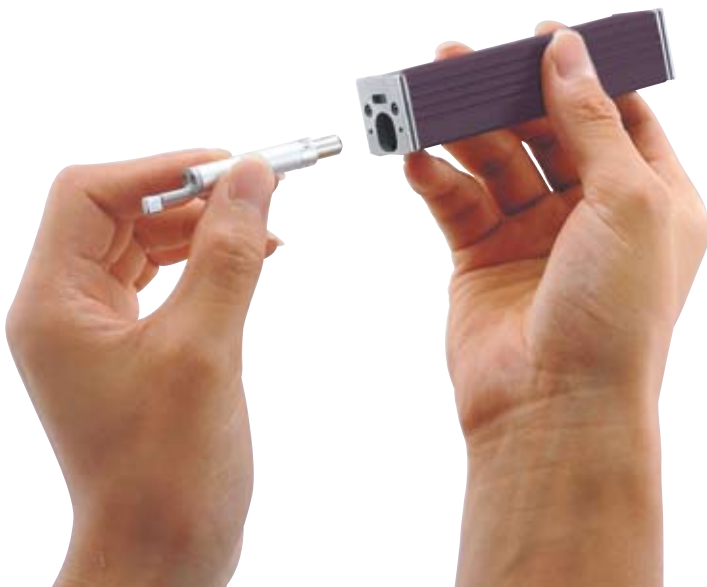
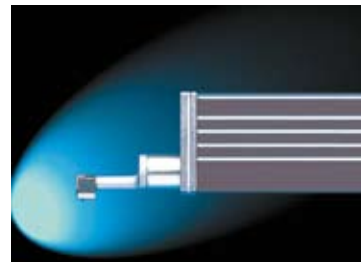
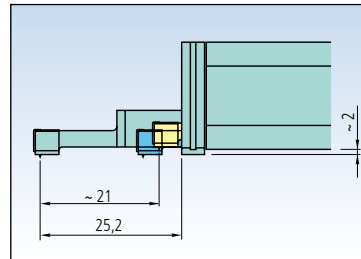
Mobility

- The integral battery in the SJ-301 enables surface roughness measurements to be made even in places where there is no mains connection.
- Portable and practical: the drive unit and probes are stored for transport inside the device (a carrying case is provided with the SJ-301).
- For measuring, the evaluation unit does not have to be taken out of the carrying case. An additional protective film is supplied for the display.



Highly sensitive measurements

- The SJ-301 detector uses the differential inductance method as used in many high-end instruments.
- Profile detail can be seen at a resolution of up to $0.01 \mu\text{m}$ (0.4 inch) in the Z-axis direction.
- Parameters requiring high-accuracy feed, such as S_m and S , can also be measured with the SJ-301.
- The probe can be retracted into the drive unit after making a measurement for maximum protection against accidental damage.



Problem-free probe installation

- Optional probes for measuring features such as small diameters or deep grooves are available as an option.
- No tool is needed when changing the probe. Just remove the probe and replace it with an optional probe.
- Using just an SJ-301, the optional accessories mean that a very wide variety of workpieces can be measured.

Adjustable evaluation length range

- The instrument can be set to measure over a length from 0.3 to 12.5 mm (0.012" to 0.49") in 0.1 mm increments.

Specifications SJ-301

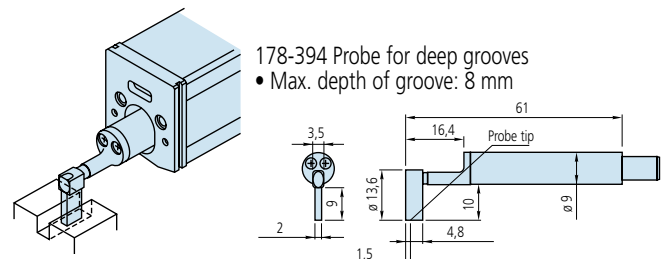
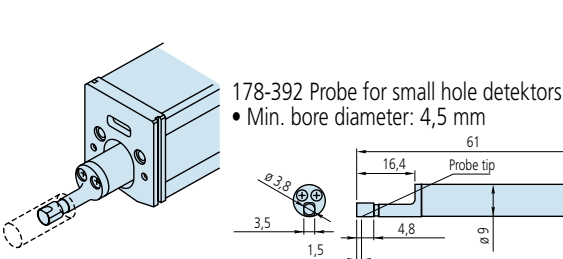
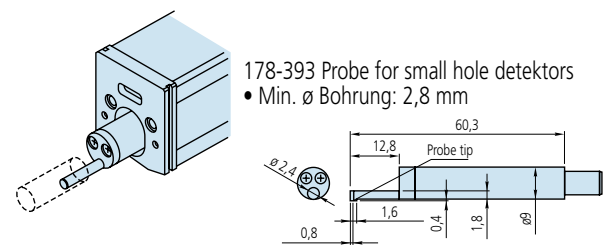
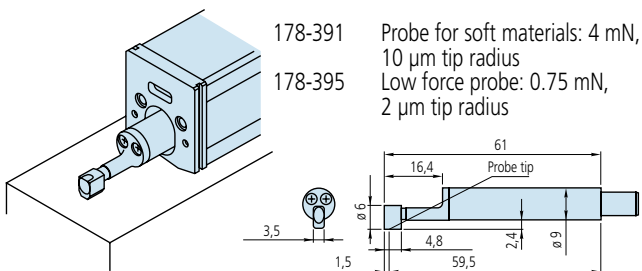
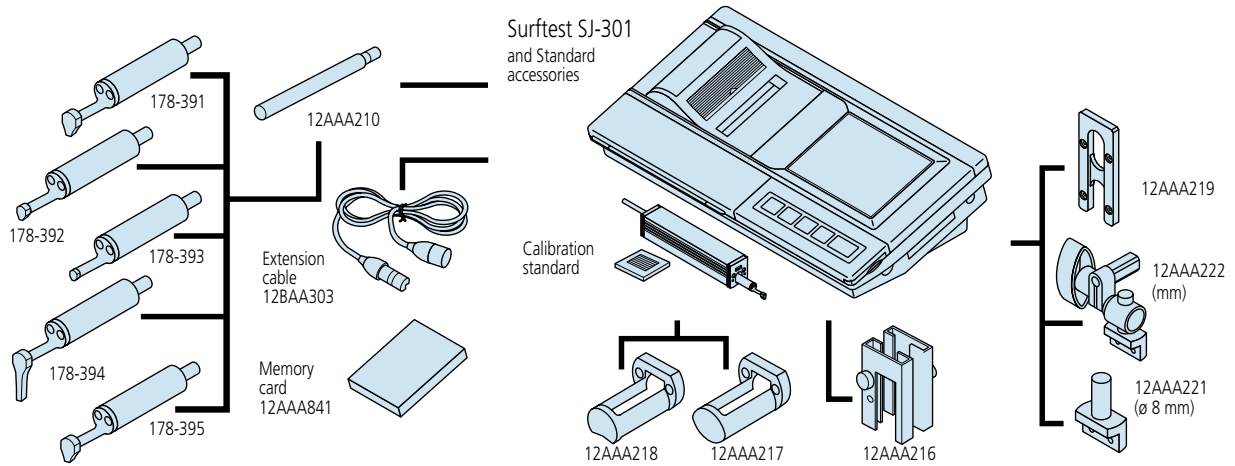
Code No.* 178-952-2

Drive Unit	Z-axis stroke: 350 μm , X-axis feed: 12,5 mm
Measuring range	Measuring: 0,25 mm/s, 0,5 mm/s
Speed	Returning: 1 mm/s
Cable length	1 m
Mass	190 g
Standard Probe	Code No. 178-395
Type	Differential inductance
Measuring range	350 μm (-200 μm to +150 μm)
Stylus	Diamond cone
Tip radius	2 μm
Skid radius	40 mm
Contact force	0,75 mN
Recorded profiles	Primary profile (R), Roughness profile (R), DIN EN ISO 13565-1, MOTIF.R, MOTIF.W
Roughness parameters	Ra, Ry, Rz, Rt, Rp, Rq, Rv, Sm, S, Pc, R3z, mr, Rpk, Rvk, sc, Rk, Mr1, Mr2, Lo, Ppi, R,AR, Rx, A1, A2, Vo, HSC. mrd, sk, Ku, Da, Dq, Wte, W, AW
Analysis graphs	BAC1, BAC2, ADC
Roughness standards	JIS, DIN, ISO, ANSI
Evaluation length (L)	0,08 mm, 0,25 mm, 0,8 mm, 2,5 mm, 8 mm
Cut-off wavelengths	lc: 0,08 mm, 0,25 mm, 0,8 mm, 2,5 mm, 8 mm ls: 2,5 μm , 8 μm , 25 μm
No. of sampling lengths	x1, x3, x5, xL**
Digital filters	2CR, PC75 (phasen-korrigiert), Gauß
Resolution/range	0,4 μm / 350 μm , 0,1 μm / 100 μm , 0,05 μm / 50 μm , 0,01 μm /10 μm
Display range	Ra, Rq: 0,01 μm - 100 μm Ry, Rz, Rt, Rp, Rv, R3z, Rk, Rpk, Rvk, R, Rx, W, Wx, Wte: 0,02 μm - 350 μm Aw, AR: 2,0 - 350 m S, Sm: 2 μm - 4000 μm PC: 2,5 / cm - 5000 / cm sc: -350 μm - 350 μm (-14000 -14000 Min) Lo: 0,1 mm - 99,999 mm mr, Mr1, Mr2, mrd: 0 - 100% A1, A2: 0 - 15000 a, q, Ku: 0.01 - 100 Vo: 0,0000 - 999,99
Display magnification	Vertical: 10 x, 20 x, 50 x, 100 x, 200 x, 500 x, 1000 x, 2000 x, 5000 x, 10000 x, 20000 x, 50000 x, 100000 x, AUTO Horizontal: 1 x, 2 x, 5 x, 10 x, 20 x, 50 x, 100 x, 200 x, 500 x, 1000 x, AUTO
Printer type	Thermal, print width 48 mm (1.9")
Statistics	Max/Min and mean value (for all parameters) Standard deviation(s), Pass ratio, Frequency histogram
Tolerance evaluation	Upper/lower tolerance for three parameters
Setup storage	Five setups
Auto-sleep off	After five minutes of inactivity
Calibration	Automatic by input of the calibrated value and measurement of the roughness specimen supplied
Power supply	Via AC adapter (7.5 VDC, 1.5W) or built-in battery
Rechargeable battery	Charging time: 15 hours (for 1,000 measurements without printing)
Data output	RS-232C input/output interface, SPC output
Mass	Approximately 1200 g

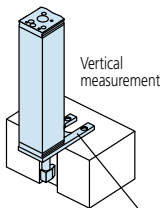
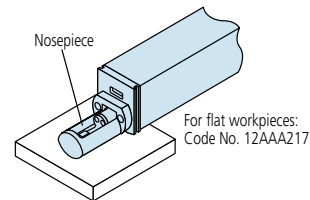
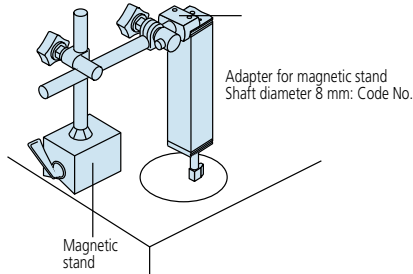
* The total measuring length can be selected as desired within the range 0.3 to 12.5 mm (0.012" to 0.49")

** The evaluation length can be set within a range of 0.3 mm to 12.5 mm.

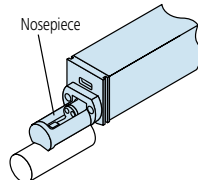
Accessories and optional probes



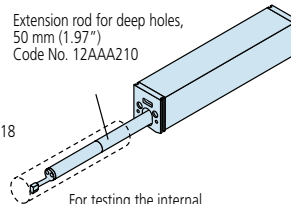
Applicaton examples



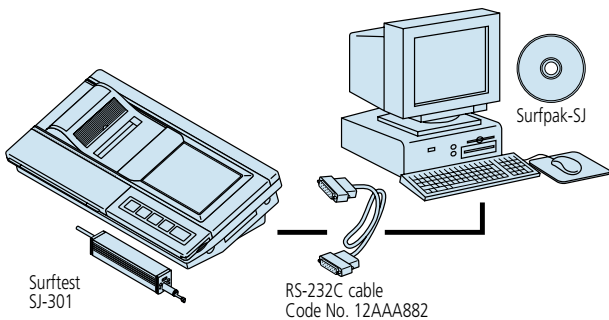
Adapter for vertical positioning:
Code No. 12AAA219



For cylindrical workpieces: Code No. 12AAA218
 • Max. diameter: 30 mm (1.18")
 • Guides and protects the probe tip during measurement



For testing the internal surface of deep holes
 Note: the probe extension rod may not be used for upside-down measurements

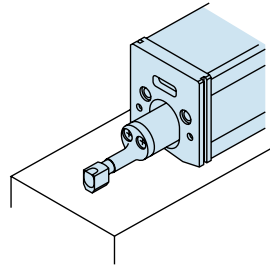


Operating with surface analysis software

The SJ-301 can be used in conjunction with Mitutoyo's Surfpak-SJ software for more extensive surface analysis. Combined with Surfpak-SJ, the SJ-301 achieves the operational and evaluation capabilities of a high-end surface-testing instrument. The compact design enables space-saving expansion to form a stationary system.

Standard accessories

178-395	Standard probe
12AAA216	Supporting feet, pair
12BAA686	Connecting cable (1 m)
12BAA689	Stylus for the touch panel
12BAA690	Touch panel protection sheet
357651	AC adapter
12BAA688	Batteries
541106	Screwdriver
12BAA781	Carrying case
355556	Set of screws for carrying case
99MBB092A	Operating instructions
99MBB093A	Quick Reference Guide
178-602A	Nosepiece for cylindrical workpiece
353134	Nosepiece for flat workpiece



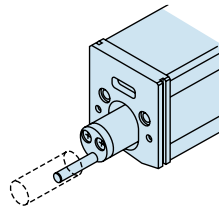
Standard probe



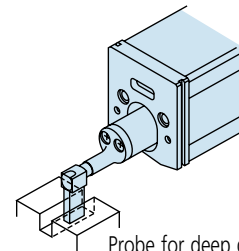
Nosepiece for cylindrical workpiece

Optional accessories

178-390	Low-force probe: 0.75 mN, 2 μ m (80 μ inch) stylus tip radius
178-391	Probe for soft materials, 4mN, 10 μ m (400 μ inch) tip radius
178-392	Probe for small holes, \varnothing 4.5 mm (0.177")
178-393	Probe for very small holes, \varnothing 2.8 mm (0.110")
178-394	Probe for deep grooves
12AAA219	Adapter for vertical positioning
12AAA221	Adapter for magnetic stand with \varnothing 8 mm shaft
12AAA222	Metric height gauge adaptor, 9 x 9 mm
12AAA210	Probe extension rod, 50 mm (1.97")
936937	SPC cable (1 m)
965014	SPC cable (2 m)
12BAA303	Extension cable
12AAA882	RS-232C cable
12AAA841	Memory card
12AAA896	LCD protective film, 10 pieces
12AAA879	Printer paper, 5 rolls
12AAA217	Nosepiece for flat workpieces
12AAA218	Nosepiece for cylindrical workpieces



Probe for very small holes

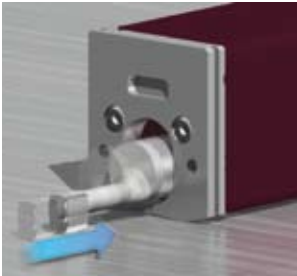


Probe for deep grooves



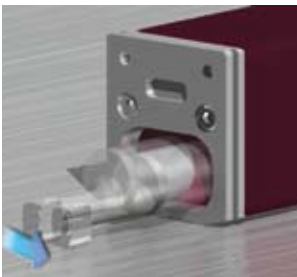
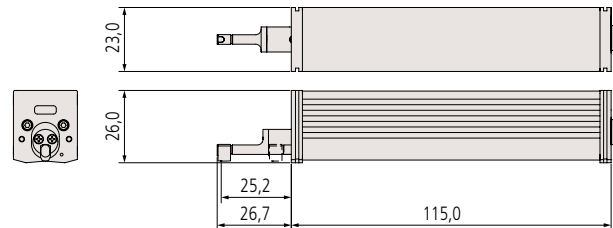
Different optional accessories

Drive units



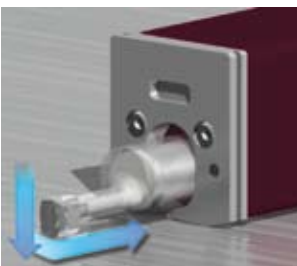
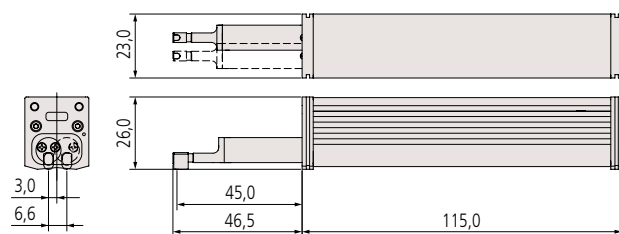
Standard drive unit for SJ-201P/SJ-301

Base model with standard
drive unit



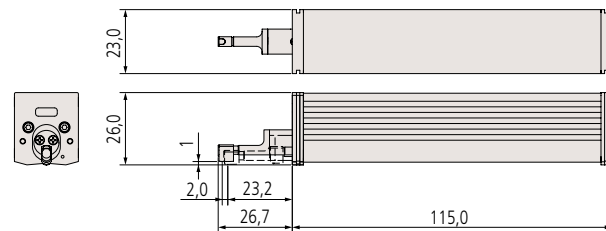
S drive unit for SJ-201S/SJ-301S

The S drive unit has been de-
veloped for special measur-
ing tasks and is used exclu-
sively for measurement in Y direc-
tion (transverse tracing).



R drive unit for SJ-201R/SJ-301R

This drive unit (front lift type)
extends the base model
(measurement in X-axis
direction).



Before starting measurement the stylus tip is not in touch with the workpiece. As soon as the drive unit starts moving in the measuring direction, the detector is lowered onto the workpiece surface. When measurement is finished the probe system remains in contact with the measuring surface. When the detector unit is returned, the stylus is lifted from the workpiece surface before reaching the measuring start position.

Transverse-tracing S-Drive unit for SJ-201/301

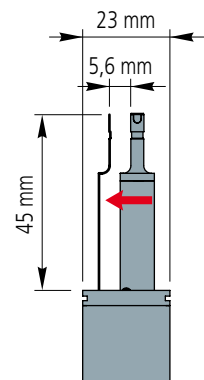


Just put the crankshaft down onto the measuring station. The new transversetracing S-drive unit enables rapid measurement of the bearing surface roughness in the axial direction. The transverse tracing function has been designed especially for surface roughness measurement on features in narrow spaces, previously so problematic for conventional units offering only longitudinal tracing capability.

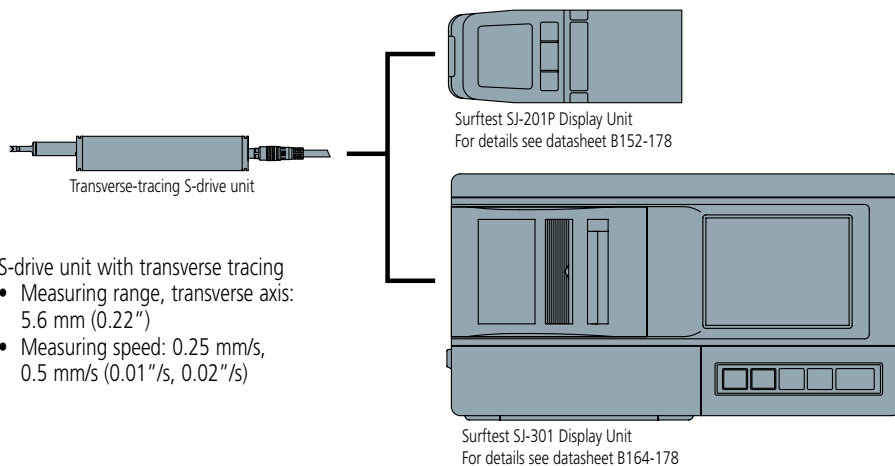


Photo: Measuring a wire-cut surface in orthogonal direction

The new S-drive unit, in combination with a digital height gauge and associated adapter, offers the user great flexibility in positioning as shown in this example of testing a wire-cut surface.



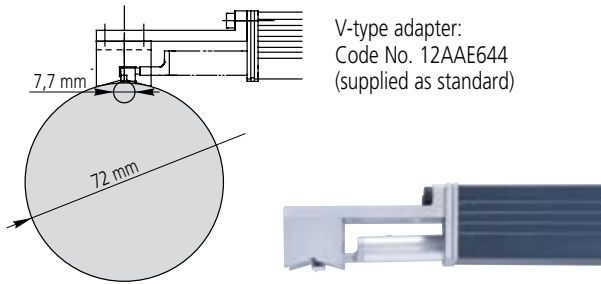
0.25 mm/s, 0.5 mm/s (0.01"/s, 0.02"/s) linear drive speed



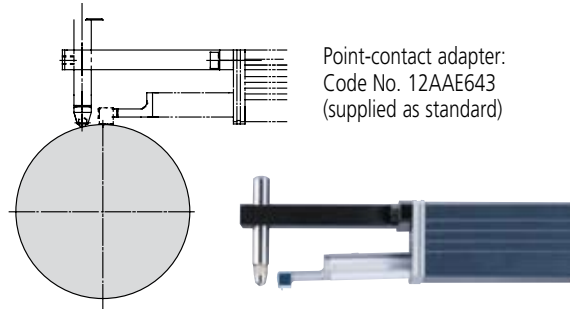
- S-drive unit with transverse tracing
- Measuring range, transverse axis: 5.6 mm (0.22")
 - Measuring speed: 0.25 mm/s, 0.5 mm/s (0.01"/s, 0.02"/s)

The new S drive unit for transverse tracing is compatible with the standard drive units of Surftest SJ-201P/M and SJ-301. Just connect it to the display unit.

Technical Data S-Drive



V-type adapter:
Code No. 12AAE644
(supplied as standard)



Point-contact adapter:
Code No. 12AAE643
(supplied as standard)

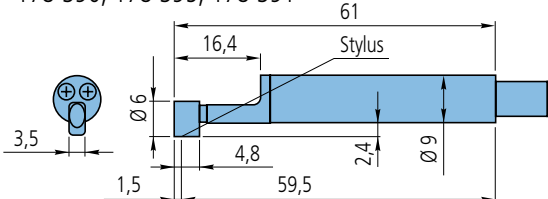
Code No.	Drive Unit	Detector	Display Unit	Roughness standard	Adapter
178-899-2D	S-Drive	0,75 mN	SJ-201P (mm)	Ra 1 μ m	V-type, Point-contact
178-939-2D	S-Drive	Low force	SJ-301 (mm)	Ra 1 μ m	V-type, Point-contact
178-234-2	S-Drive	—	—	—	V-type, Point-contact
178-233-2	S-Drive	—	—	—	V-type, Point-contact
178-605	—	—	—	Ra 1.0 μ m	—
178-606	—	—	—	Ra 1.0 mm (39,5 μ in)	—
12AAE643	—	—	—	—	Point-contact
12AAE644	—	—	—	—	V-type

The following conventional detectors can also be used:

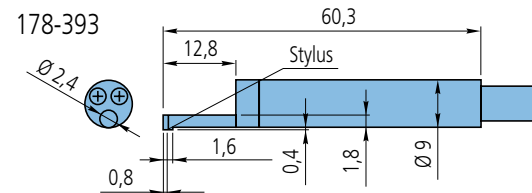
- 178-390: Standard detector: 4 mN, 5 μ m (200 μ inch) probe tip radius
- 178-391: Low-force detector: 0.75 mN, 2 μ m (80 μ inch) probe tip radius
- 178-395: Detector for soft materials: 4mN, 10 μ m (400 μ inch) probe tip radius
- 178-392: Detector for small hole detector: min. hole diameter 4.5 mm (0.177")
- 178-393: Detector for small hole detector: min. hole diameter 2.8 mm (0.110")

Note: Deep-groove detector Code No. 178-394 cannot be used.

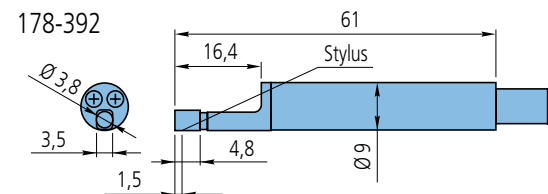
178-390, 178-395, 178-391



178-393

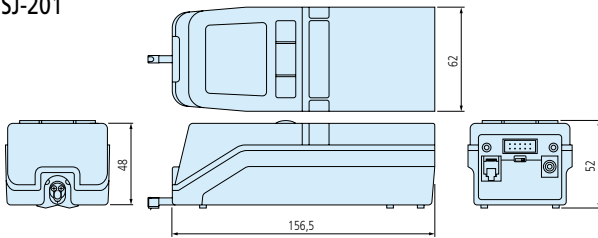


178-392

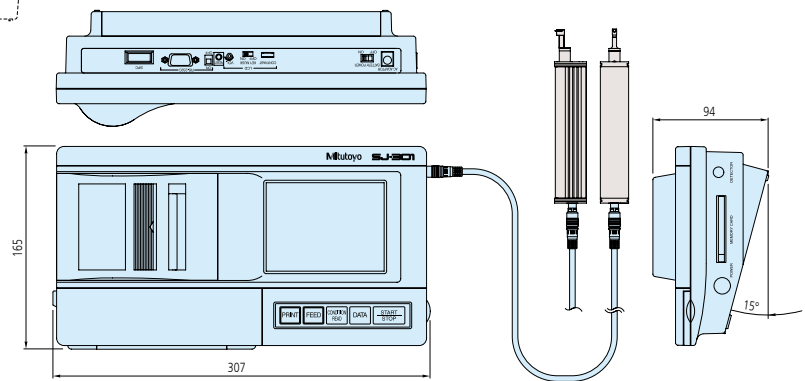


Dimensions

SJ-201



SJ-301

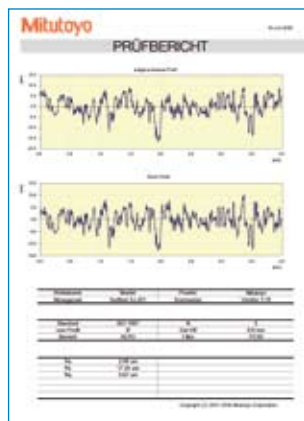


Software SJ-Tools for surface roughness testers SJ-201 and SJ-301 (optional)

Software application based on Microsoft Excel* for instrument control and display and storage of measured data.

* Microsoft Excel not included.

- Controlling the roughness tester
- Defining measurement conditions
- Graphical display of profiles
- Storage of measuring reports
- Result documentation



SJ-Tools output chart from MS-Excel



SJ-Tools entry mask for SurfTest SJ series

When using Mitutoyo surface roughness testers you will benefit from the competitive edge in experience and expertise of the world's leading expert in production measurement technology. Make use of the knowledge from decades to solve the tasks of tomorrow - applying highest standards regarding quality, performance and progressiveness.



Ask for the overview brochure "Surface Measurement".

Get concise information about Mitutoyo's wide variety of groundbreaking surface measuring technique.

- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Test Equipment and Seismometers
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

Mitutoyo Nederland b.v.
Storkstraat 40
3905 KX Veenendaal
T 0031 318 534911
F 0031 318 534811
sales@mitutoyo.nl
www.mitutoyo.nl

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