

**Surftest - Surface Roughness Instruments**  
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**Contracer - Contour Measuring Instruments**  
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**Roundtest - Roundform Measuring Instruments**  
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**Formtracer - Surface Roughness and Contour Measuring Instruments**  
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# Surftest SJ-210

## Series 178 - Surftest SJ-210

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.

- 2.4" colour graphic LCD with backlight.
- **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.
- **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.
- **Complies with many industry standards** : The surftest SJ-210 complies with the following standards : JIS (JIS-B0601-2001, JIS-B0601-1994, JIS-B0601-1982), VDA, ISO-1997 and ANSI.
- **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.

### Specifications

<b>Drive unit</b>	
Accuracy	(1)
Speed	Measuring : 0,25 mm/s ; 0,5 mm/s Returning : 0,8 mm/s
Total stroke	17,5 mm
Max. length evaluation	12,5 mm (1)
<b>Detector</b> <span style="float: right;">178-296</span>	
Measuring method	Induction method
Measuring range	350 µm (-200 µm to +150 µm)
Stylus	Diamond Tip
Nosepiece radius	40 mm
<b>Display unit</b>	
Profiles	Primary Profile (P), Roughness Profile (R), DIN 4776
Roughness parameters	Ra, Rc, Ry, Rz, Rt, Rmax, Rp, Rv, R3z, Rsk, R <sub>PC</sub> , Rsm, Rz1max, S, HSC, RzJIS, Rppi, RΔa, RΔq, R <sub>LR</sub> , Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rpm, tp, Htp, R, Rx, AR, customizable.
Roughness standards	JIS, DIN EN ISO, ANSI VDA, free patterns and conditions
Measuring (L)	0,08 mm, 0,25 mm, 0,8 mm, 2,5 mm
Sampling (L) Filter	X1 to X10 2 CR-75% without phase compensation, PC-75%, Gauss 50%
Cut-off length	λ : 0,08 mm, 0,25 mm, 0,8 mm, 2,5 mm λ : 2,5 µm, 8 µm
Resolution/ range	0,02 µm/350 µm 0,006 µm/100 µm 0,002 µm/25 µm
Display range	Ra, Rq : 0,01 µm - 100 µm Ry, Rz, Rt, Rp : 0,02 µm - 350 µm PC : 2,5 - 5000/cm mr : 1 - 100% Sm, S : 2 - 4000 µm
Tolerance judgement	Upper/lower limit
Calibrator	Automatic calibration entering
Data output / input	RS-232C interface for input/output, DIGIMATIC output
Mass	500 g

(1) The evaluation length can be specified arbitrarily between 0,3 mm and 16,0 mm (0,01 mm increments)



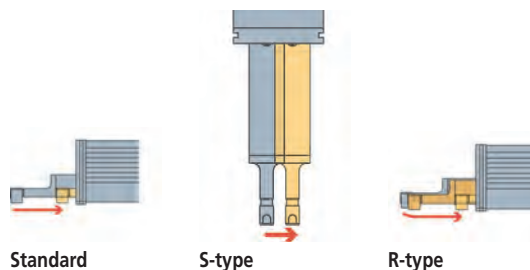
SJ-210

### Metric

No.	Description	Detector measuring force	Stylus Tip angle	Stylus Tip radius
178-560-01D	SJ-210 model	0.75 mN	60°	2 µm
178-562-01D	SJ-210R model	0.75 mN	60°	2 µm
178-564-01D	SJ-210S model	0.75 mN	60°	2 µm

### Inch/Metric

No.	Description	Detector measuring force	Stylus Tip angle	Stylus Tip radius
178-561-01D	SJ-210 model	0.75 mN	60°	2 µm
178-561-02E	SJ-210P model - UK only	4 mN	90°	5 µm
178-563-02E*	SJ-210R model - UK only	4 mN	90°	5 µm
178-565-02E*	SJ-210S model - UK only	4 mN	90°	5 µm



Standard

S-type

R-type

# Surftest SJ-210

## Series 178 - Surftest SJ-210R and SJ-210S

### Standard SJ-210R

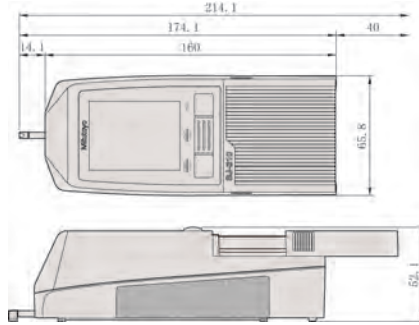
- This model automatically lifts the stylus off the surface and retracts the detector to the start position after every trace. Useful for avoiding stylus damage in applications where the test surface cannot be seen easily.

### SJ-210S

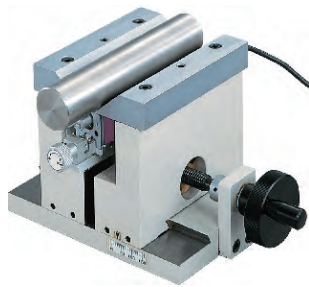
- Transverse drive capability of the SJ-210S model allows testing shrouded surfaces in the transverse direction, e.g. crankshaft bearing surfaces, flanged features or deep grooves.



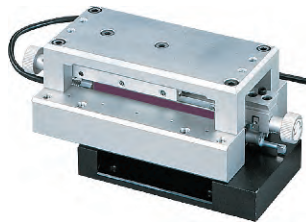
SJ-210



Dimensions



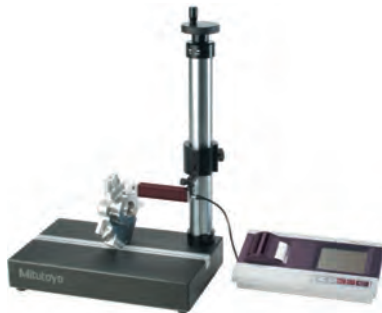
178-033



178-034



178-035



178-029

### Additional Specifications

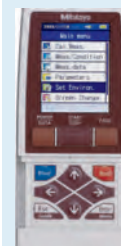
**Other accessories** Other optional and standard accessories are listed later in this section

### Optional accessories

No.	Description
178-029	Granite stand with column 400x250x556 mm
178-033	Measuring device for cylindrical workpieces
178-034	Measuring device as universal fixture
178-035	Measuring device for measuring in pipes
936937	Data cable (1 m)
965014	Data cable (2 m)
02AZD790D	Data cable U-Wave
06ADV380D	Data cable (2 m) USB

### Consumable spares

No.	Description
<b>For R model</b>	
178-235	R-Type drive unit 17,5 mm
<b>For S models</b>	
12AAE643	Adapter tip
12AAE644	Adapter V type
178-233-2	S-Type drive unit 5,6 mm
178-605	Roughness specimen 1 µm
<b>For S/R 4 mN model</b>	
178-390	Detector 5µm/angle 90°
<b>For standard model</b>	
178-230-2	Standard Drive unit 17,5 mm
<b>For standard/R model</b>	
178-601	Roughness specimen 3 µm
<b>For standard/R/S 4 mN inch/mm model</b>	
178-602	Roughness specimen
<b>For standard/S/R 0.75 mN model</b>	
178-296	Standard detector 2 µm
<b>For standard/S/R models</b>	
12AAL066	Protective sheets for display
12BAA303	Cable (1 m) UC to UA
12BAK699	Carrying case
12BAK700	Calibration table
12BAK728	AC adapter



Keyboard protective cover open



Back



Brochure Surftest SJ-210 on request

# Surftest SJ-301

## Series 178 - Surftest SJ-301

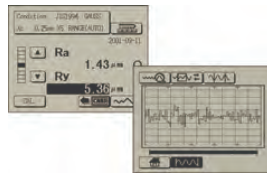
- Portable surface roughness tester featuring dustprotected, touch-sensitive operation panel and integrated printer.
- The large LCD window makes it easy to read measurement result and analysis graphs at a glance.
- Designed to increase operability - the large keypad is used for measuring operations, while the touch panel LCD (special operating pen included) is used for setting various measuring conditions.
- Five different measuring conditions can be stored by the SJ-301. Measurement data may be downloaded to an external PC.
- Adheres to international standards : DIN, ISO, ANSI, JIS and VDA. Measurement data may be stored immediately and evaluated at a later point in time and/or printed.
- An optional memory card is available for storing up to 200-300 measurement/statistical data records, dependent on the capacity of the card.
- **Display range** : Ra, Rq: 0,01  $\mu\text{m}$  - 100  $\mu\text{m}$ , Ry, Rz, Rt, Rv, R3z, Rk, Rpk, Rvk, R, Rp, Rx, AR, W, Wx, Wte: 0,02  $\mu\text{m}$  - 350  $\mu\text{m}$ , S, Sm: 2  $\mu\text{m}$  - 4000  $\mu\text{m}$ , HSC, Pc: 2,5/cm - 5000/cm; Ppi: 6,35 - 12700/inch, dc: - 350  $\mu\text{m}$  - + 350  $\mu\text{m}$ , Lo: 0,1 mm - 99,999 mm, mr, Mr 1, Mr 2: 0 - 100 %, A1, A2: 0 - 15000  $\Delta a$ ,  $\Delta q$ , Ku: 0,01-100, Vo: 0;0000-999,99.

### Specifications

<b>Drive unit</b>	
Speed	0,25 mm/s; 0,5 mm/s Returning 1,0 mm/s
Max. length evaluation	12,5 mm
<b>Detector</b>	
Measuring	Method : Induction Range : 350 $\mu\text{m}$ (-200 $\mu\text{m}$ to +150 $\mu\text{m}$ )
Stylus	Diamond Tip
Nosepiece radius	40 mm
<b>Display unit</b>	
Profiles	Primary Profile (P), Roughness Profile (R), DIN 4776, Motif
Roughness parameters	Ra, Ry, Rz, Rt, Rp, Rq, Rv, S, Sm, Pc, R3z, mr, Rpk, Rvk, sc, Rk, Mr1, Mr2, Lo, Ppi, R, Ar, Rx, A1, A2, Vo HSC, mrd, sk, ku, $\Delta a$ , $\Delta q$ , Wte, Wt, W, AW
Analysis graphs	BAC 1, BAC 2, ADC
Roughness standards	DIN, ISO, ANSI, JIS
Measuring (L)	0,08 mm, 0,25 mm, 0,8 mm, 2,5 mm, 8 mm or input
Sampling (L)	X1, X3, X5, XL
Filter	2RC-75%, 2RC-75% (phase corrected), Gauss -50%
Cut-off length	lc : 0,08 mm, 0,25 mm, 0,8 mm, 2,5 mm, 8 mm, ls : 2,5 $\mu\text{m}$ , 8 $\mu\text{m}$ , 25 $\mu\text{m}$
Resolution/range	0,4 $\mu\text{m}$ /350 $\mu\text{m}$ ; 0,1 $\mu\text{m}$ /100 $\mu\text{m}$ 0,05 $\mu\text{m}$ /50 $\mu\text{m}$ ; 0,01 $\mu\text{m}$ /10 $\mu\text{m}$
Vertical display	10x, 20x, 50x, 100x, 200x, 500x, 1000x, 2000x, 5000x, 10000x, 20000x, 50000x, 100000x, AUTO
Horizontal display	1x, 2x, 5x, 10x, 20x, 50x, 100x, 200x, 500x, 1000x, AUTO
Printer	Thermal Printer (print paper : 58 mm)
Calibrator	Automatic calibration
Statistics	Max/Min,Average value, Standard deviation (s), Pass Ratio, Frequency Distribution Table
Tolerance judgment	Upper/lower limit values for three parameters
Data output / input	RS-232C interface for input/output,DIGIMATIC output,Compact flash card
Measurement conditions storage	5 sets of measuring conditions
Mass	Approx. 1200 g



178-952-4D



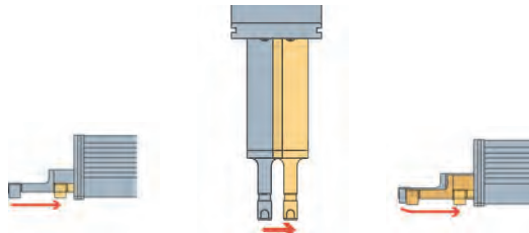
### Metric/Inch

No.	Description	Detector measuring force	Stylus Tip angle	Stylus Tip radius
178-952-4D	SJ-301 model	0.75mN	60°	2 $\mu\text{m}$
178-990-2D	SJ-301R model	0.75mN	60°	2 $\mu\text{m}$
178-939-3D*	SJ-301S model	0.75mN	60°	2 $\mu\text{m}$

### Inch/Metric

UK only

No.	Description	Detector measuring force	Stylus Tip angle	Stylus Tip radius
178-954-4E	SJ-301 model	4mN	90°	5 $\mu\text{m}$
178-955-4E*	SJ-301 model	0.75mN	60°	2 $\mu\text{m}$
178-987-2E	SJ-301R model	4mN	90°	5 $\mu\text{m}$
178-901-3E*	SJ-301S model	4mN	90°	5 $\mu\text{m}$



Standard

S-type

R-type

# Surftest SJ-301

## Series 178 - Surftest SJ-301R and SJ-301S

### SJ-301R

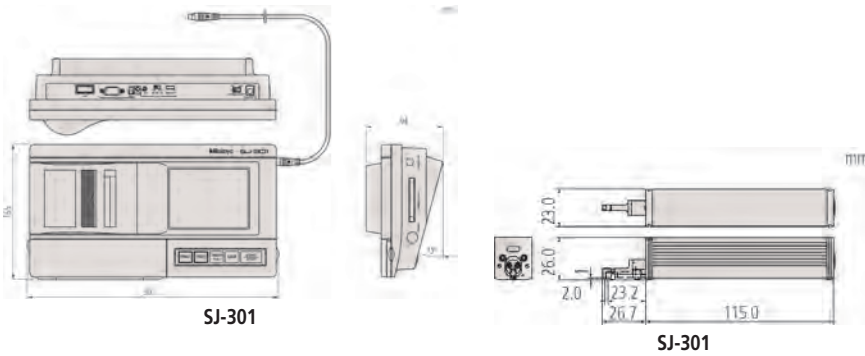
- This model automatically lifts the stylus of the surface and retracts the detector to the start position after every trace. Useful for avoiding stylus damage in applications where the test surface cannot be seen easily.

### SJ-301S

- The transverse drive capability of the SJ-301S model allows testing shrouded surfaces in the transverse direction, e.g. crankshaft bearing surfaces, flanged features or deep grooves.

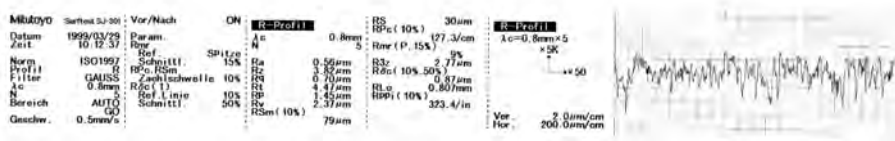
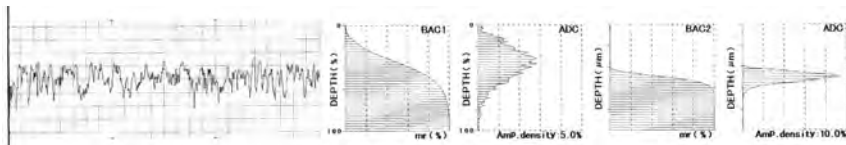


SJ-301



SJ-301

SJ-301



## Additional Specifications

**Other accessories** Other optional and standard accessories are listed later in this section

## Optional accessories

No.	Description
178-029	Granite stand with column 400x250x556 mm
178-033	Measuring device for cylindrical workpieces
178-034	Measuring device as universal fixture
178-035	Measuring device for measuring in pipes
936937	Data cable (1 m)
965014	Data cable (2 m)
02AZD790D	Data cable U-Wave
06ADV380D	Data cable (2 m) USB

## Consumable spares

No.	Description
<b>For R model</b>	
178-235	R-Type drive unit 17,5 mm
<b>For R/S/standard 0.75 mN models</b>	
178-296	Standard detector 2 µm
<b>For R/S/standard models</b>	
12BAA686	Extension cable (1 m)
12BAA688	Battery
12BAA689	Touch pen
12BAA690	Touch Panel Protection
12BAA781	Protective hood
270732	Printer paper (5 rolls)
357651	AC Adapter 9V
<b>For R/standard models</b>	
12AAA216	Height adjustment feet
12AAA217	Nosepiece (flat)
12AAA218	Nosepiece (cylindrical)
178-601	Roughness specimen 3 µm
<b>For S models</b>	
12AAE643	Adapter tip
12AAE644	Adapter V type
178-233-2	S-Type drive unit 5,6 mm
178-605	Roughness specimen 1 µm
<b>For S/R/ 4 mN models</b>	
178-390	Detector 5µm/angle 90°
<b>For standard model</b>	
178-230-2	Standard Drive unit 17,5 mm
<b>For standard/R/S 4 mN inch/mm models</b>	
178-602	Roughness specimen



# Transverse Measurement with the Surftest SJ-210 / SJ-301

## Specifications

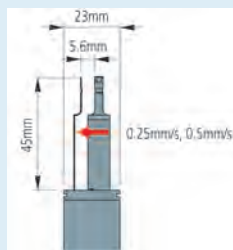
Measuring rate 0.25 mm/s, 0.5 mm/s, linear travel  
 Roughness standards Ra 1 µm (No. 176-605)

## Standard accessories

No.	Description
12AAE643	Adapter tip
12AAE644	Adapter V type

## Optional accessories

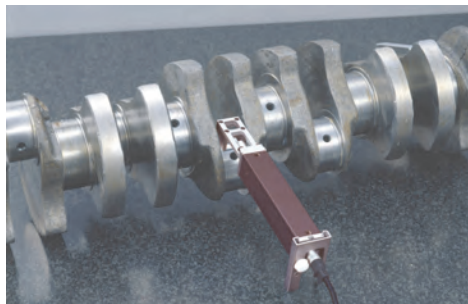
No.	Description
178-296	Standard detector 2 µm
178-390	Detector 5µm/angle 90°
178-391	Detector for soft materials (stylus tip radius 10 µm)
178-392	Small hole detector (min. Ø4,5 mm)
178-393	Detector for very small holes (Ø2,8 mm/ 5µm/angle 90°/4mN)
178-395	Detector 2µm/angle 90°
178-601	Roughness specimen 3 µm
178-604	Roughness specimen 0,5/3 µm
178-605	Roughness specimen 1 µm



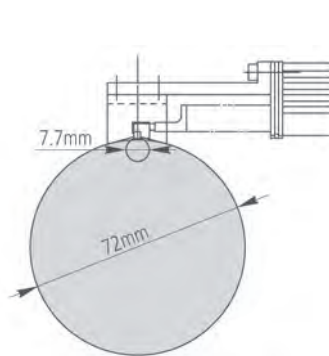
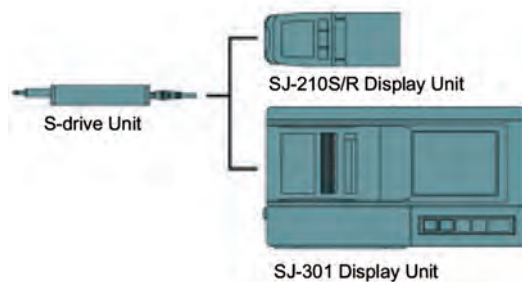
Linear movement

## Series 178 - S-type Drive Unit for Surftest SJ-210 / SJ-301

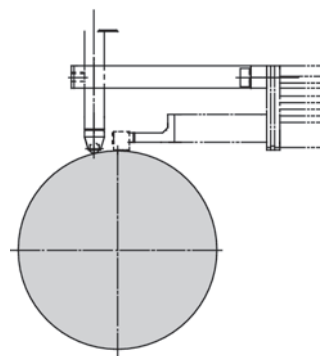
- The S-type transverse drive unit is compatible with the conventional drive units of the Surftest SJ-210 S / SJ-301 and is simply connected to the display unit of these drives.
- A typical application would be to position the S-type unit on a crankshaft journal bearing, as shown in the photograph below. Once started the S-type drive will track the stylus across the surface transversely to its own axis and reliably measure surface roughness in the direction of the crankshaft axis. Transverse tracking simplifies the measurement of surface roughness even in very confined situations, which has long been a problem with conventional instruments which allow only longitudinal measurement.



178-234-2



12AAE644  
Adapter V (standard)



12AAE643  
Adapter tip (standard)



No.	Range
178-234-2	5,6 mm

# Optional Software for SJ-210 and SJ-301

## Series 178 - Control Software for SJ-210/SJ-301

### Optional software : SJ-Tools

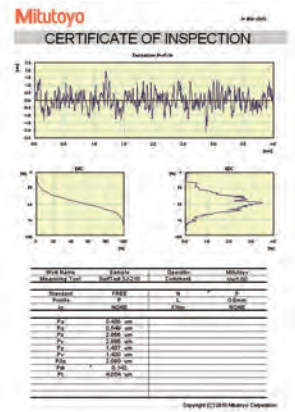
- Output software based on MS Excel (not included in the scope of supply) for controlling the devices and reproducing and storing measurement data.
- Features:
  - Measurement device control
  - Definition of measurement variables
  - Graphic representation of the profile
  - Storage of measurement records
  - Documentation of measurements results
  - Connecting cable

### Optional accessories

No.	Description
12AAA882.	RS-232C connection cable
12AAL068.	USB cable for SJ-210



SJ-Tools input mask for Surftest SJ series



SJ-Tools output record from MS Excel



SJ-Tools output record from MS Excel

# Accessories for SJ-210 and SJ-301

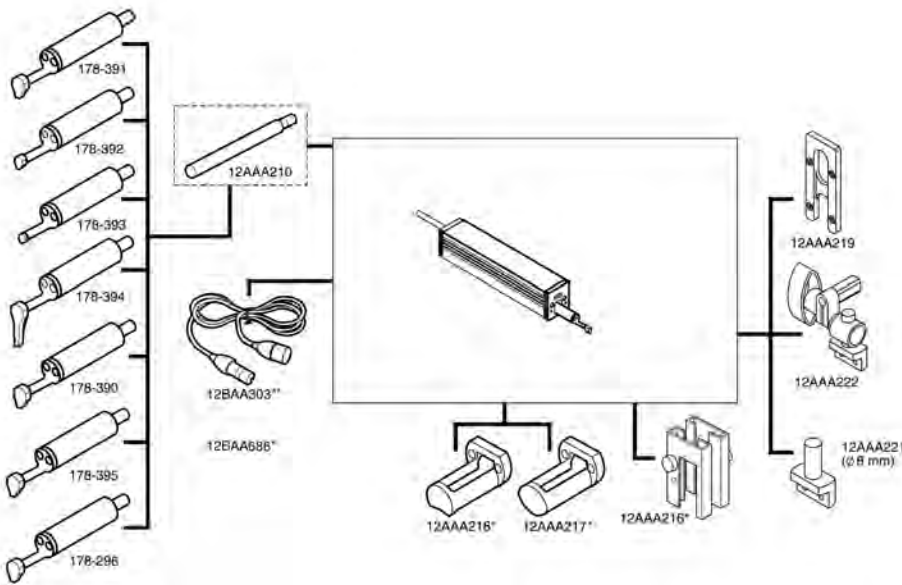
## Series 178 - Standard and Optional Accessories for Surfptest SJ-210/SJ-301

Model		Surfptest SJ-210		Surfptest SJ-210R		Surfptest SJ-210S		Surfptest SJ-301		Surfptest SJ-301R		Surfptest SJ-301S	
No.	Description	Std	Opt	Std	Opt	Std	Opt	Std	Opt	Std	Opt	Std	Opt
011356-4	Memory card SJ								●		●		●
12AAA210	Extension rod length 50 mm		●						●				
12AAA216	Height adjustment feet		●		●		●	●			●		●
12AAA217	Nosepiece (flat)		●					●			●		
12AAA218	Nosepiece (cylindrical)		●					●			●		
12AAA219	Adapter for vertical position		●		●		●		●		●		●
12AAA221	Adapter for magnetic stand		●		●		●		●		●		●
12AAA222	Height gauge adapter		●		●		●		●		●		●
12AAA882.	RS-232C connection cable								●		●		●
12AAA896	Protective film								●		●		●
12AAE643	Adapter tip					●						●	
12AAE644	Adapter V type					●						●	
12AAJ088*	Footswitch		●		●		●						
12AAL066	Protective sheets for display		●		●		●						
12AAL067	RS-232C cable		●		●		●						
12AAL068.	USB cable for SJ-210		●		●		●						
12AAL069	Memory card		●		●		●						
12BAA303	Cable (1 m) UC to UA	●		●		●			●		●		●
12BAA686	Extension cable (1 m)							●		●		●	
12BAA688	Battery							●		●		●	
12BAA689	Touch pen							●		●		●	
12BAA690	Touch Panel Protection							●		●		●	
12BAK700*	Calibration table	●		●		●							
12BAK728	AC adapter	●		●		●							
178-029	Measuring device for measuring in pipes		●		●		●		●		●		●
178-230-2	Standard Drive unit 17,5 mm	●			●		●	●			●		●
178-233-2	S-Type drive unit 5,6 mm		●			●							
178-235	R-Type drive unit 17,5 mm		●	●					●	●			●
178-296	Standard detector 2 µm	●		●			●	●		●			●
178-383	Detector for very small holes Ø4,5 mm		●		●		●		●		●		●
178-384	Detector for very small holes Ø2,8 mm		●		●		●		●		●		●
178-385	Deep groove detector		●		●		●		●		●		●
178-386	Detector for soft materials		●		●	●			●		●	●	
178-387	Detector for soft materials		●		●	●			●		●	●	
178-388	Detector (2 µm/angle 60°/0.75mN)		●		●		●		●		●		●
178-390	Detector 2µm/angle 90°		●		●		●		●		●		●
178-391	Detector for soft materials 10 µm		●		●		●		●		●		●
178-392	Small hole detector (min. Ø4,5 mm)		●		●		●		●		●		●
178-393	Detector for very small holes		●		●		●		●		●		●
178-394	Deep groove detector		●		●		●		●		●		●
178-395	Detector 2µm/angle 90°		●		●		●		●		●		●
178-398*	Detector (5 µm/angle 90°/4mN)		●		●		●		●		●		●
178-421UK	Printer for SJ210		●		●		●						
178-601	Roughness specimen 3 µm	●		●			●	●		●			●
178-604	Roughness specimen 0,5/3 µm		●		●		●		●		●		●
178-605	Roughness specimen 1 µm		●		●	●			●		●	●	
270732	Printer papers (5 rolls)								●		●		●
357651	AC Adapter 9V								●		●		●

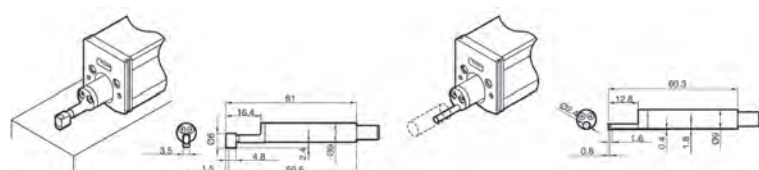
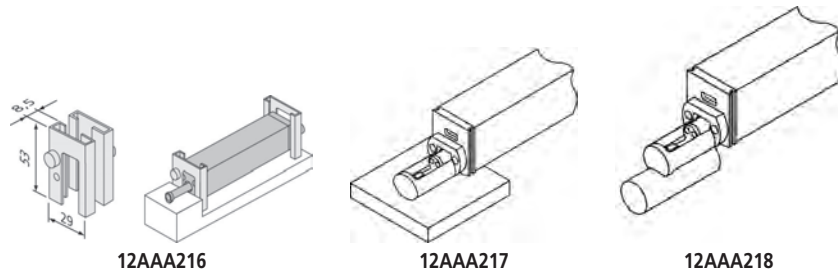
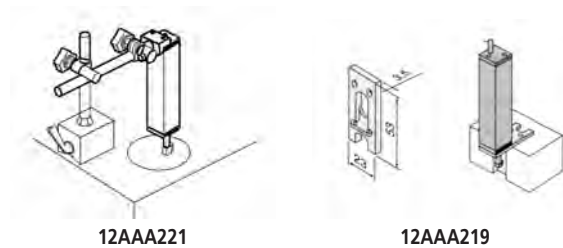
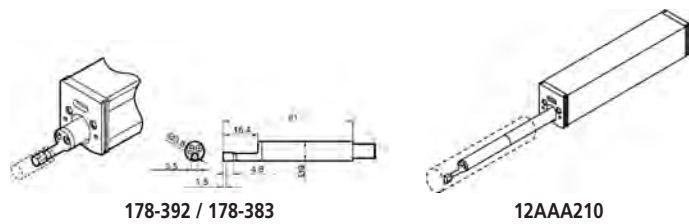
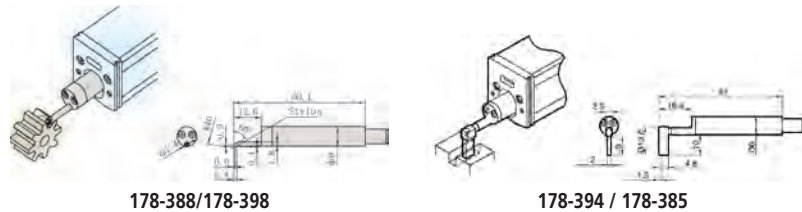


# Accessories for SJ-210 and SJ-301

Series 178



\* Accessories for SJ-301 - \*\* Accessories for SJ-210



178-390/178-381 - 178-387  
178-395/178-296 - 178-386

178-393/178-384

## Optional accessories

No.	Description
12AAA210	Extension rod
12AAA216	Height adjustment feet
12AAA217	Nosepiece (flat)
12AAA218	Nosepiece (cylindrical)
12AAA219	Adapter for vertical position
12AAA221	Adapter for magnetic stand
12AAA222	Height gauge adapter
12BAA303	Cable (1 m) UC to UA
12BAA688	Extension cable (1 m)
178-029	Granite stand with column 400x250x556 mm
178-033	Measuring device for cylindrical workpieces
178-034	Measuring device as universal fixture
178-035	Measuring device for measuring in pipes
178-383	Detector for very small holes (Ø4,5 mm/ 2 µm/angle 60°/0,75mN)
178-384	Detector for very small holes (Ø2,8 mm/ 2 µm/angle 60°/0,75mN)
178-385	Deep groove detector (2 µm/angle 60°/ 0,75mN)
178-386	Detector for soft materials (stylus tip radius 5 µm/angle 90°/4mN)
178-387	Detector for soft materials (stylus tip radius 2 µm/angle 60°/0,75mN)
178-388	Detector (2 µm/angle 60°/0,75mN)
178-390	Detector 5µm/angle 90°
178-391	Detector for soft materials (stylus tip radius 10 µm)
178-392	Small hole detector (min. Ø4,5 mm)
178-393	Detector for very small holes (Ø2,8 mm/ 5µm/angle 90°/4mN)
178-394	Deep groove detector (5 µm/angle 90°/4 mN)
178-395	Detector 2µm/angle 90°
178-398	Detector (5 µm/angle 90°/4mN)



# Surftest SJ-400

## Series 178 - Portable Surface Roughness Testers SJ-401 / 402

- Equipped with 38 roughness parameters that conform to the latest ISO, DIN, ANSI and JIS standards : Ra, Ry, Rz, Rt, Rp, Rv, Sm, S, Pc, R3z, mr(c), Rpk, Rvk,  $\delta_c$ , Rk, Mr1, Mr2, Lo, Ppi, R, AR, Rx, A1, A2, HSC, mr,  $\Delta_a$ , Sk, Ku, Vo,  $\Delta_q$ , W, AW, Wx, Wte, Rz1max (ISO), Rmax (VDA, ANSI).
- A wide range, high-resolution detector and drive unit provide superior high-accuracy measurement.
- A skidless detector and a curved surface compensation function provide efficient evaluation of cylinder surface roughness.
- Ultra-fine steps, straightness and waviness can be measured by using the skidless measurement function.

### Specifications

<b>Drive unit</b>	
Measuring speed	0,05, 0,1, 0,5, 1,0 mm/s
Return speed	0,5, 1,0, 2,0 mm/s
Traverse direction	Backward
Positioning	$\pm 1.5^\circ$ (tilting), 10 mm (up/down)
<b>Detector</b>	
Range / resolution	800/0,01 $\mu$ m, 80/0,001 $\mu$ m, 8/0,0001 $\mu$ m (up to 2400 $\mu$ m with an optional stylus)
Measurement method	Skidless / skidded
Skid radius of curvature	40 mm
Type	Differential inductance
Power supply	Via AC adapter, rechargeable battery
Battery life	Max. 600 measurements (w/o printing) Recharge time : 15 hours
Data output	Via RS-232C interface / SPC output
Mass	<b>Control unit</b> : 1.2 kg <b>Height-tilt adjustment unit</b> : 0.4 kg
<b>Evaluation parameters</b>	Assessed profiles : P (primary), R (roughness), W (filtered waviness), DIN4776, roughness motif, waviness motif Analysis graphs : Bearing Area Curve BAC 1/2, Amplitude Distribution Curve ADC Digital filter : 2CR, PC75, Gaussian Cutoff length : 0,08, 0,25, 1,8, 2,5, 8 mm Sampling length : 0,08, 0,25, 0,8, 2,5, 8 mm or arbitrary length in range 0,1 to 25 mm (0,1 to 50 mm : SJ-402) in 0,1 mm increments Number of sampling lengths : 1, 3 or 5 (limited by traverse range) Printer : Thermal type Printing width : 48 mm (paper width : 58 mm)
Recording magnification	Vertical : 10X to 100,000X, Auto Horizontal : 1X to 1,000X, Auto
<b>Function</b>	Customize : Selection of display/evaluation parameter. Data compensation : R-surface, Tilt compensation. Ruler function : Displays the coordinate difference of any two points. D.A.T. function : Helps to level workpiece prior to skidless measurement. Displacement detection mode : Enables the stylus displacement to be input while the drive unit is stopped. Statistical processing : Max. value, Min. value, Mean value, Standard deviation ( $\sigma$ ), Pass ratio, Histogram. Tolerance judgement : Upper and lower limit values for three parameters can be specified. Measuring condition storage : Five sets of measuring conditions (control unit).



SJ-400

Direct verification on the large touch-screen of the results of calculations and measured profiles (without printing).

### SJ-401 model

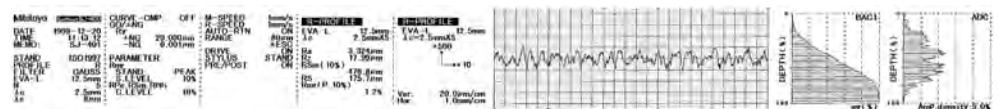
Evaluation range : 25 mm  
Traverse straightness : 0,3  $\mu$ m/25 mm  
Dimensions Drive unit (WxDxH) : 128 x 36 x 47 mm  
Mass Drive unit : 0.6 kg

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-956-4D	0,75 mN	60°	2 $\mu$ m	mm/Inch
178-957-4E	0,75 mN	60°	2 $\mu$ m	mm/Inch
178-946-4D*	4 mN	90°	5 $\mu$ m	mm/Inch
178-947-4E*	4 mN	90°	5 $\mu$ m	Inch/mm

### SJ-402 model

Evaluation range : 50 mm  
Traverse straightness : 0,5  $\mu$ m/50 mm  
Dimensions Drive unit (WxDxH) : 155 x 36 x 47 mm  
Mass Drive unit : 0.7 kg

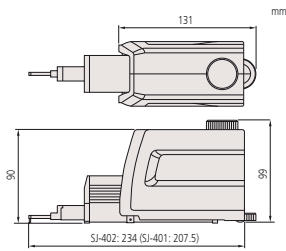
No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-958-4D	0,75 mN	60°	2 $\mu$ m	mm/Inch
178-959-4E	0,75 mN	60°	2 $\mu$ m	Inch/mm
178-940-4D*	4 mN	90°	5 $\mu$ m	mm/Inch
178-945-4E*	4 mN	90°	5 $\mu$ m	Inch/mm



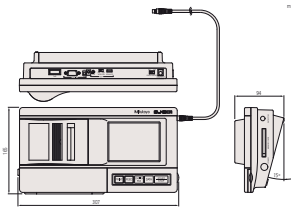
### Printout

# Surftest SJ-400

Series 178 - Portable Surface Roughness Testers SJ-401 / 402



Drive unit



Display unit



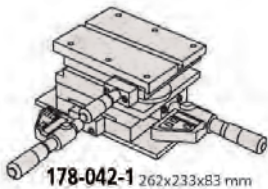
Deep groove measurement



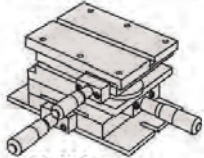
Upside down measurement



R-surface measurement



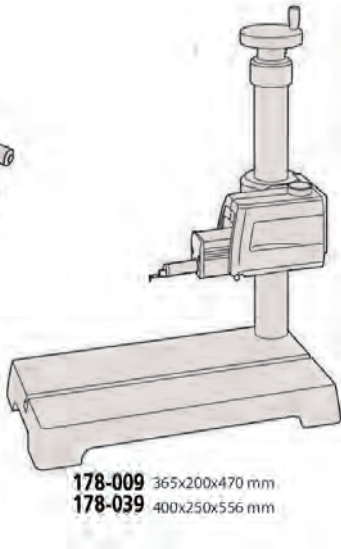
178-042-1 262x233x83 mm



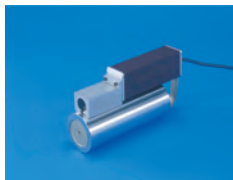
178-043-1 220x189x83 mm



178-019



178-009 365x200x470 mm  
178-039 400x250x556 mm



12AAB358



178-048  
130x100 mm



H-5400  
500 x 320 x 510 mm

## Optional accessories

No.	Description
178-019	Precision vice
12AAB347	Nosepiece for small hole
12AAC753	Nosepiece
12BAA781	Protective hood
<b>Extension</b>	
12AAG202	Extension detector 50 mm
12AAG203	Extension detector 100 mm
<b>SPC</b>	
011356-4	Memory card SJ
264-012-10	Digimatic keyboard interface
264-014-10	USB keyboard signal
936937	Data cable (1 m)
965014	Data cable (2 m)
02AZD790D	Data cable U-Wave
06ADV380D	Data cable (2 m) USB
<b>Stands</b>	
998291	Precision V-block
12AAB358	Cylinder attachment $\phi 15 - 60$ mm
178-009	Column stand 200 mm
178-039	Granite test stand
181-902-10	Hardened V-Block
181-903-10	Hardened V-Block
H-5400	Granite stand
<b>Step specimen</b>	
178-604	Roughness specimen 0,5/3 $\mu\text{m}$
178-605	Roughness specimen 1 $\mu\text{m}$
178-610	Step gauge (1, 2, 5, 10 $\mu\text{m}$ )
178-611	Reference step specimen
<b>Tables</b>	
178-047	Three-axis adjustment table
178-043-1	XY levelling table 25x25 mm
178-042-1	Digimatic XY levelling table 25x25 mm
178-048	Leveling table D.A.T.
178-049	Digital XY leveling table
178-089	Stand 400x250x578 mm

## Consumable spares

No.	Description
12AAB355	Nosepiece
12BAA688	Battery
12BAA689	Touch pen
12BAA690	Touch Panel Protection
178-601	Roughness specimen 3 $\mu\text{m}$
270732	Printer paper (5 rolls)
<b>For 0.75 mN models</b>	
12AAC731	Std Stylus 2 $\mu\text{m}$ , angle 60°
178-396-2	Detector 0,75 mN
357651	AC Adapter 9V
<b>For 4 mN models</b>	
12AAB403	Std Stylus 5 $\mu\text{m}$ , angle 90°
12BAK728	AC adapter
178-397-2	Detector 4 mN
<b>For inch/mm models</b>	
178-602	Roughness specimen

## Optional accessories for Inch

No.	Description
178-053-1	XY levelling table 1x1"
178-052-1	Digital XY levelling table 1x1"
178-612	Step gauge 2, 10 $\mu\text{m}$



# Surftest SJ-500

## Series 178 - With Dedicated Control / Display Unit

A high precision, high-performance type surface roughness tester with a dedicated control unit, featuring a user-friendly display and simple operation

- Equipped with a 7.5-inch, colour TFT LCD, large colour icons and touch panel controls the display unit is easy to read and simple to operate.
- A built-in joystick in the control unit allows quick and easy positioning. The manual knob allows fine positioning of a small stylus for measuring the surface of small holes.
- Simple setup for surface roughness measuring conditions. A simple input function is used to calculate according to ISO/JIS roughness standard drawing instruction symbols. Complicated measuring condition settings can easily be entered by selecting a drawing instruction symbol from the surface roughness menu.



SJ-500

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-532-01D	0,75 mN	60°	2 µm	metric model
178-533-01E*	0,75 mN	60°	2 µm	inch model - UK only
178-532-02D*	4 mN	90°	5 µm	metric model
178-533-02E*	4 mN	90°	5 µm	inch model - UK only

### Specifications

<b>Drive unit</b>	
Measuring range	50 mm
Resolution	0,05 µm
Scale	Linear encoder
Drive speed	0 - 20 mm/s and manual
Measuring speed	0,02 - 5 mm/s
Traverse direction	Backward
Traverse straightness	0,2 µm / 50 mm
Positioning	±1.5° (tilting, with D.A.T. function 30 mm (up/down))

### Detector

Range / resolution	800/0,01 µm, 80/0,001 µm, 8/0,0001 µm
Measurement method	Skidless/skidded
Stylus Type	Diamond, (60° / 2 µmR) Differential inductance

### Control Unit

Display	7.5" colour TFT LCD with backlight
Printer	Built-in thermal type
Drive unit control	Joystick operation with manual adjustment knob

### Evaluation parameters

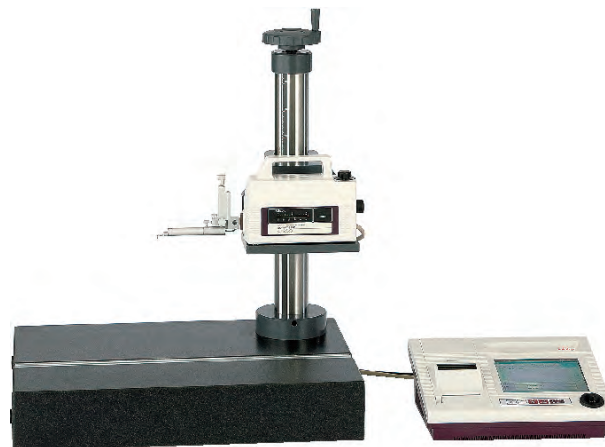
Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Sm, S Pc, mr(c), δc, mr, tp, Htp, Lo, lr, Ppi, HSC, Δa, Δq, Ku, Sk, Rpk, Rvk, Rk, Mr1, Mr2, A1, A2, Vo, λa, λq  
Roughness motif : R, AR, Rx  
Waviness motif : W, AW, Wx, Wte

### Mass

6.7 kg  
Drive unit : 2.7 kg  
Control unit : 4.0 kg

### Optional accessories

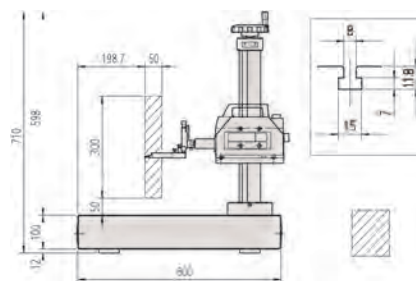
No.	Description
172-142	Centre support
172-143	Centre support riser
998291	Precision V-block
172-234	V-block with clamp (Max. workpiece ø50 mm)
181-902-10	Hardened V-Block
<b>Step specimen</b>	
178-604	Roughness specimen 0,5/3 µm
178-610	Step gauge (1, 2, 5, 10 µm)
178-611	Reference step specimen
<b>Tables</b>	
178-043-1	XY levelling table 25x25 mm
178-042-1	Digimatic XY levelling table 25x25 mm
218-001	Cross-travel table XY range : 100x50 mm
178-085	Stand 600x450x710 mm
178-089	Stand 400x250x578 mm
<b>Vices</b>	
172-144	Rotary vice (Max. workpiece ø60 mm)
178-019	Precision vice
218-003	Rotary vice (heavy-duty type)



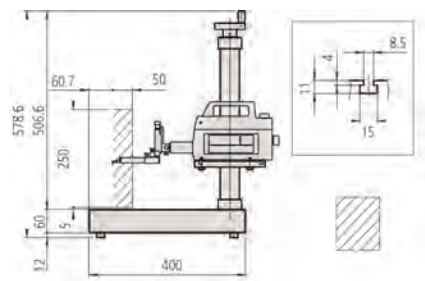
SJ-500 with optional manual column stand



Preview



178-085  
600x450x710 mm



178-089  
400x250x578 mm

# Surftest SV-2100

## Series 178 - Surftest SV-2100

- These instruments meet the highest requirements regarding the measurement of surface texture. They are designed for use in workshops and are equipped with a computer with a colour touch-screen display and built-in printer.
- Compliant with ISO standards.



SV-2100M4

SV-2100S4

### SV-2100M4 model

Vertical travel : 350 mm manual column  
 Granite base size (WxD) : 600 x 450 mm  
 Dimensions (main unit WxDxH) : 716 x 450 x 863 mm  
 Mass : 144 kg

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-636-01D	0,75 mN	60°	2 µm	
178-636-02D*	4 mN	90°	5 µm	
178-637-01E*	0,75 mN	60°	2 µm	UK only
178-637-02E*	4 mN	90°	5 µm	UK only

### SV-2100S4 model

Vertical travel : 350 mm power column  
 Granite base size (WxD) : 600 x 450 mm  
 Dimensions (main unit WxDxH) : 766 x 482 x 966 mm  
 Mass : 147 kg

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-680-01D*	0,75 mN	60°	2 µm	
178-680-02D*	4 mN	90°	5 µm	
178-681-01E*	0,75 mN	60°	2 µm	UK only
178-681-02E*	4 mN	90°	5 µm	UK only

### SV-2100H4 model

Vertical travel : 550 mm power column  
 Granite base size (WxD) : 600 x 450 mm  
 Dimensions (main unit WxDxH) : 766 x 482 x 1166 mm  
 Mass : 157 kg

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-682-01D	0,75 mN	60°	2 µm	
178-682-02D*	4 mN	90°	5 µm	
178-683-01E*	0,75 mN	60°	2 µm	UK only
178-683-02E*	4 mN	90°	5 µm	UK only

### SV-2100W4 model

Vertical travel : 550 mm power column  
 Granite base size (WxD) : 1000 x 450 mm  
 Dimensions (main unit WxDxH) : 1166 x 482 x 1176 mm  
 Mass : 227 kg

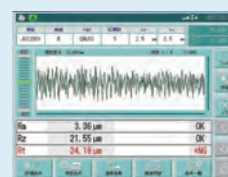
No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-684-01D*	0,75 mN	60°	2 µm	
178-684-02D*	4 mN	90°	5 µm	
178-685-01E*	0,75 mN	60°	2 µm	UK only
178-685-02E*	4 mN	90°	5 µm	UK only

## Specifications

<b>Drive unit</b>	
Measuring range	100 mm
Resolution	0,05 mm, Z2-axis : 1 µm
Scale	Linear encoder, Z2-axis : linear encoder ABS
Drive speed	0 - 40 mm/s Z2-axis : 0 - 20 mm/s
Measuring speed	0,02 - 5 mm/s
Traverse straightness	0,15 µm / 100 mm
<b>Detector</b>	
Range / resolution	800 µm/0,01 µm, 80 µm/0,001 µm, 8 µm/0,0001 µm
Type	Differential inductance
<b>Control Unit</b>	
Display	7.5" colour TFT with backlight
Printer	Built-in thermal type
Drive unit control	Joystick operation with manual adjustment knob

## Optional accessories

No.	Description
172-142	Centre support
172-143	Centre support riser
998291	Precision V-block
172-234	V-block with clamp (Max. workpiece ø50 mm)
181-902-10	Hardened V-Block
<b>Steps</b>	
178-604	Roughness specimen 0,5/3 µm
178-610	Step gauge (1, 2, 5, 10 µm)
178-611	Reference step specimen
<b>Tables</b>	
178-043-1	XY levelling table 25x25 mm
178-042-1	Digimatic XY levelling table 25x25 mm
218-001	Cross-travel table XY range : 100x50 mm
178-089	Stand 400x250x578 mm
<b>Vices</b>	
172-144	Rotary vice (Max. workpiece ø60 mm)
178-019	Precision vice
218-003	Rotary vice (heavy-duty type)



Preview



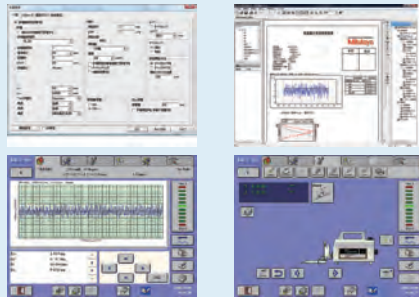
SV series brochure on request



# Surftest SJ-500P - SV-2100M4 (PC type)

## Specifications

<b>Drive unit</b>	
Resolution	0,05 µm
Scale	Linear encoder
Drive speed	0 - 20 mm/s
Measuring speed	0,02 - 5 mm/s
Traverse direction	Backward
Traverse straightness	0,2 µm / 50 mm
Positioning	±1.5° (tilting, with D.A.T. function 30 mm (up/down))
<b>Detector</b>	
Range / resolution	800/0,01 µm, 80/0,001 µm, 8/0,0001 µm
Measurement method	Skidless/skidded
Stylus Type	Diamond Differential inductance
<b>Control Unit</b>	
Drive unit control	PC
<b>Evaluation parameters</b>	
SURFPAK-EZ and FORMTRACEPAK software features are detailed on the brochure	



## Specifications

<b>Drive unit</b>	
Resolution	0,05 µm, Z2-axis : 1 µm
Scale	Linear encoder, Z2-axis : linear encoder ABS
Drive speed	0 - 40 mm/s, Z2-axis : 0 - 20 mm/s
Measuring speed	0,02 - 5 mm/s
Traverse direction	Backward
Traverse straightness	0,15 µm / 100 mm
<b>Detector</b>	
Range / resolution	800/0,01 µm, 80/0,001 µm, 8/0,0001 µm
Type	Differential inductance
Drive unit control	PC
<b>Evaluation parameters</b>	
SURFPAK-EZ and FORMTRACEPAK software features are detailed on the brochure	



Series SJ-SV with PC and software  
Brochure on request

## Series 178 - Surftest SJ-500P

These are highly precise, high-performance surface roughness testers that use the advantages of sophisticated analysis software. The SJ-500P is a stand-alone instrument whereas the SV-2100M4 is a benchtop machine incorporating a precision column with manual drive.

- A built-in joystick in the control unit allows quick and easy positioning. The manual knob allows fine positioning of a small stylus for measuring the surface of small holes.
- Simple setup for surface roughness measuring conditions. A simple input function is used to calculate according to ISO/JIS roughness standard drawing instruction symbols. Complicated measuring condition settings can easily be entered by selecting a drawing instruction symbol from the surface roughness menu.



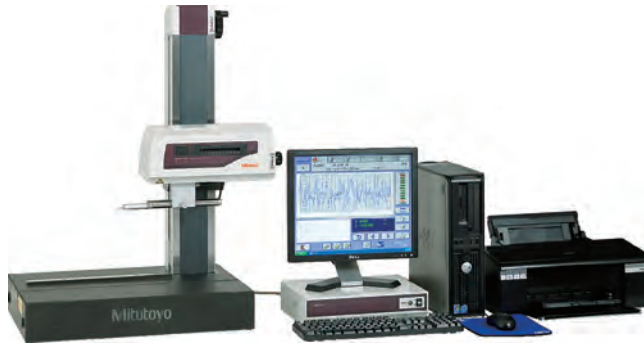
### SJ-500P Model with PC (Personal Computer)

X-axis measuring range : 50 mm

Mass : 6.5 kg (Main unit : 2.7 kg, PC I/F Unit : 3.8 kg)

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-530-01D	0,75 mN	60°	2 µm	metric model
178-531-01E*	0,75 mN	60°	2 µm	inch model - UK only
178-530-02D*	4 mN	90°	5 µm	metric model
178-531-02E	4 mN	90°	5 µm	inch model - UK only

## Series 178 - Surftest SV-2100M4 (PC type)



### SV-2100M4P (PC type)

X-axis measuring range : 100 mm

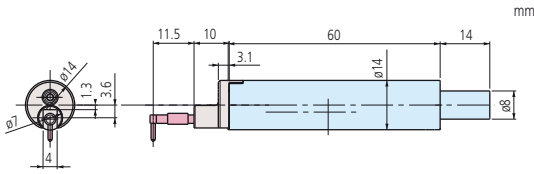
Vertical travel : 350 mm manual column

Granite base size (WxD) : 600 x 450 mm

Dimensions (main unit WxDxH) : 716 x 450 x 863 mm

No.	Detector measuring force	Stylus Tip angle	Stylus Tip radius	Note
178-634-01D*	0,75 mN	60°	2 µm	metric model
178-635-01E*	0,75 mN	60°	2 µm	inch model - UK only
178-634-02D*	4 mN	90°	5 µm	metric model
178-635-02E*	4 mN	90°	5 µm	inch model - UK only

# Optional styli for SJ-400/SJ-500/SV-2100/SV-(C)3100/SV-(C)4100



178-396-2 : Detector 0.75 mN  
178-397-2 : Detector 4 mN

## Specifications

**Probes** 178-396-2 : 0.75 mN measuring force with the standard stylus 12AAC731 (radius 2 μm, angle 60°)  
178-397-2 : 4 mN measuring force with stylus 12AAB403 (radius 5 μm, angle 90°)

Stylus				Nose pad	
<b>Standard</b>					
				No. 12AAB345	
No.	Radius	Angle			
12AAE882	1 μm	60°			
12AAE924*	1 μm	90°			
12AAC731	2 μm	60°			
12AAB403	5 μm	90°			
12AAB415	10 μm	90°			
12AAE883	250 μm	60°			
<b>For small hole</b>					
No.	Radius	Angle			
12AAC732	2 μm	60°			
12AAB404	5 μm	90°			
12AAB416	10 μm	90°			
<b>For extra small hole</b>					
No.	Radius	Angle			
12AAC733	2 μm	60°			
12AAB405	5 μm	90°			
12AAB417	10 μm	90°			
No.	Radius	Angle			
12AAJ662	0.5 mm	-			
<b>Ultra small hole</b>					
No.	Radius	Angle			
12AAC734	2 μm	60°			
12AAB406	5 μm	90°			
12AAB418	10 μm	90°			

# Optional styli for SJ-400/SJ-500/SV-2100/SV-(C)3100/SV-(C)4100

## For deep hole (double-length)

No.	Radius	Angle
12AAC740	2 $\mu\text{m}$	60°
12AAB413	5 $\mu\text{m}$	90°
12AAB425	10 $\mu\text{m}$	90°
12AAE886*	250 $\mu\text{m}$	60°
12AAE892	2 $\mu\text{m}$	60°
12AAE908	5 $\mu\text{m}$	90°
12AAE898	2 $\mu\text{m}$	60°
12AAE914	5 $\mu\text{m}$	90°
12AAE938	2 $\mu\text{m}$	60°
12AAE940*	5 $\mu\text{m}$	90°

## Stylus for deep groove 30/40 mm

No.	Radius	Angle
12AAC737	2 $\mu\text{m}$	60°
12AAB407	5 $\mu\text{m}$	90°
12AAB419*	10 $\mu\text{m}$	90°
12AAE894	2 $\mu\text{m}$	60°
12AAE910	5 $\mu\text{m}$	90°
12AAE895	2 $\mu\text{m}$	60°
12AAE911	5 $\mu\text{m}$	90°

## For deep hole (triple-length)

No.	Radius	Angle
12AAC741	2 $\mu\text{m}$	60°
12AAB414	5 $\mu\text{m}$	90°
12AAB426*	10 $\mu\text{m}$	90°

## Stylus for rolling circle waviness surface roughness (178-611 required)

No.	Radius
12AAB338	0.8 mm
12AAE884	0.8 mm

## For bottom surface

No.	Radius	Angle
12AAE899	2 $\mu\text{m}$	60°
12AAE915*	5 $\mu\text{m}$	90°

## Stylus for eccentric arm

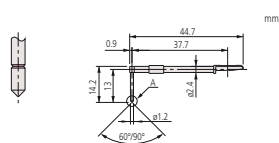
No.	Radius	Angle
12AAC739	2 $\mu\text{m}$	60°
12AAB412	5 $\mu\text{m}$	90°
12AAB424*	10 $\mu\text{m}$	90°

## For corner hole

No.	Radius	Angle
12AAE897	2 $\mu\text{m}$	60°
12AAE913*	5 $\mu\text{m}$	90°

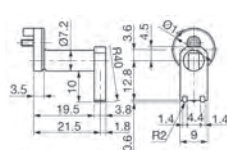
# Optional styli for SJ-400/SJ-500/SV-2100/SV-(C)3100/SV-(C)4100

## For deep groove 10 mm

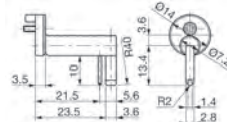


No.	Radius	Angle
12AAC735	2 μm	60°
12AAB409	5 μm	90°
12AAB421	10 μm	90°

## Nose pad

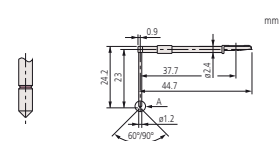


No.
12AAB349

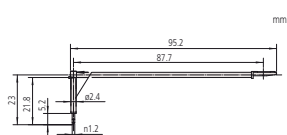


No.
12AAC755

## For deep groove 20 mm

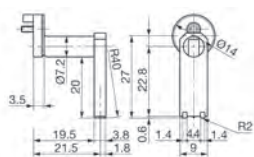


No.	Radius	Angle
12AAC736	2 μm	60°
12AAB408	5 μm	90°
12AAB420*	10 μm	90°



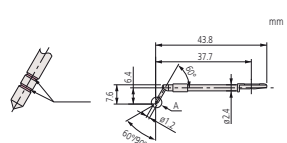
## Double length

## Nose pad

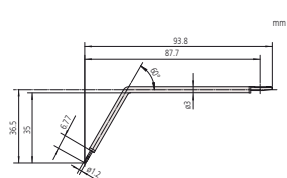


No.
12AAB348

## For gear teeth

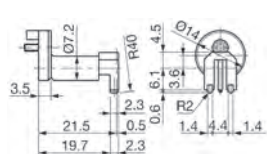


No.	Radius	Angle
12AAB339	2 μm	60°
12AAB410	5 μm	90°
12AAB422*	10 μm	90°



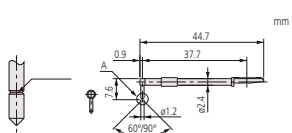
## Double-length

## Nose pad



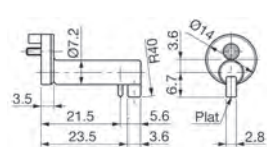
No.
12AAB353

## For Knife edge detector



No.	Radius	Angle
12AAC738	2 μm	60°
12AAB411	5 μm	90°
12AAB423*	10 μm	90°

## Nose pad



No.
12AAC756





# Surftest SV-3100

## Series 178 - Surftest SV-3100

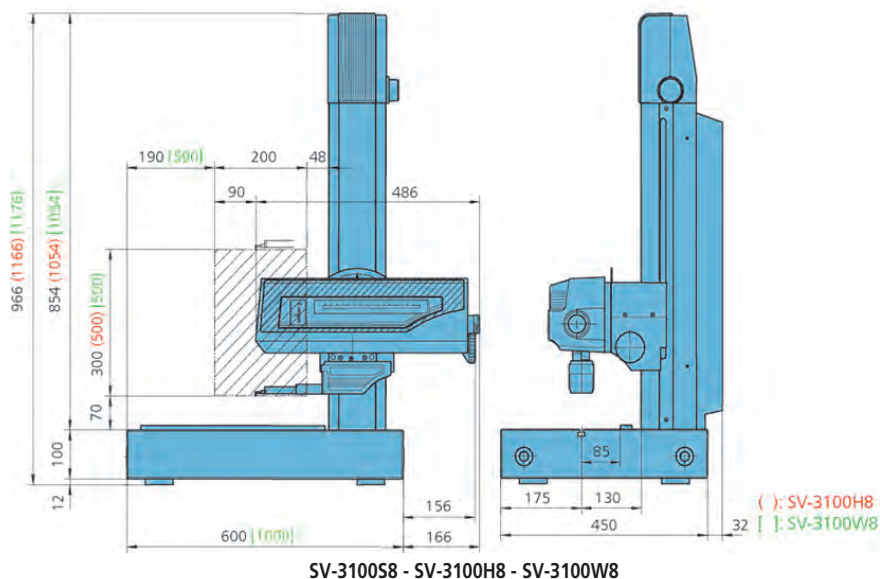
### Dimensions and Optional accessories

X-axis measuring range : 200 mm

X-axis Traverse straightness : 0.5 µm/200 mm

Model	SV-3100S8-1	SV-3100S8-2	SV-3100H8-1	SV-3100H8-2	SV-3100W8-1	SV-3100W8-2
No.	178-456D-1*1 178-476D-1*	178-456D-2*1 178-476D-2*	178-457D-1*1 178-477D-1*	178-457D-2*1 178-477D-2*	178-458D-1*1 178-478D-1*	178-458D-2*1 178-478D-2*
Order No. UK only	178-466E-1*1	178-466E-2*1	178-467E-1*1	178-467E-2*1	178-468E-1*1	178-468E-2*1
Order No. UK only	178-486E-1	178-486E-2	178-487E-1	178-487E-2	178-488E-1	178-488E-2
Stylus Tip angle	60°	90°	60°	90°	60°	90°
Stylus Tip radius	2 µm	5 µm	2 µm	5 µm	2 µm	5 µm
Detector measuring force	0.75 mN	4 mN	0.75 mN	4 mN	0.75 mN	4 mN
Vertical travel	300 mm power column	300 mm power column	500 mm power column	500 mm power column	500 mm power column	500 mm power column
Granite base size (WxD)	600 x 450 mm	600 x 450 mm	600 x 450 mm	600 x 450 mm	1000 x 450 mm	1000 x 450 mm
Dimensions main unit (WxDxH)	766 x 482 x 966 mm	766 x 482 x 966 mm	766 x 482 x 1166 mm	766 x 482 x 1166 mm	1166 x 482 x 1176 mm	1166 x 482 x 1176 mm
Mass main unit	140 kg	140 kg	150 kg	150 kg	220 kg	220 kg

\*1 : Models without X-axis inclination function



### Optional accessories

No.	Description
178-024	Stand for vibration isolator
998291	Precision V-block
178-019	Precision vice
181-902-10	Hardened V-Block
<b>Steps</b>	
178-610	Step gauge (1, 2, 5, 10 µm)
178-611	Reference step specimen
178-612	Step gauge 2, 10 µm
<b>Tables</b>	
178-047	Three-axis adjustment table
178-097	Y-axis table
178-043-1	XY levelling table 25x25 mm
12AAD975	θ1-axis table
178-053-1	XY levelling table 1x1"
178-078	θ2-axis table
178-042-1	Digimatic XY levelling table 25x25 mm
178-025	Dynamic vibration isolator
178-023	Manual vibration isolator
178-052-1	Digital XY levelling table 1x1"
178-089	Stand 400x250x578 mm



178-097  
Using X-axis Table



12AAD975  
Using Rotary Table θ1



178-078  
Using Rotary Table θ2



SV-3100 brochure on request

# Surftest Extreme SV-3000CNC

## Series 178 - CNC Surface Roughness Testers Surftest Extreme SV-3000CNC

- Each axis has a maximum drive speed of 200 mm/s, permitting high-speed positioning for increased throughput of multiple-profile/multiple-workpieces measurement tasks.
- For models equipped with the  $\alpha$ -axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the drive unit.
- For models equipped with the Y-axis table, it is possible to expand the measuring range for multi-profile workpieces, etc., through positioning in the Y-axis direction.
- The detector unit incorporates an anti-collision safety device, causing the detector unit to automatically stop if its main body collides with a workpiece or jig.
- Inclined plane measurement is possible through 2-axis simultaneous control in the X and Y directions.



SV-3000CNC  
with personal computer system and software

### Specifications

<b>X1 axis</b>	
Measuring range	200 mm
Resolution	0.05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0-60 mm/s (joystick)
Measuring speed	
Traverse	0.02 - 2 mm/s
direction	Backward
Traverse	0.5 $\mu$ m / 220 mm
straightness	
<b><math>\alpha</math> axis</b>	
Inclination angle	-45° to +10°
Resolution	0.000225°
Rotational speed	1 rpm
<b>Z2 axis (column)</b>	
Resolution	0.05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0-60 mm/s (joystick)
Base size (WxH)	750 x 600 mm
Base material	Granite
<b>Detector</b>	
Range / resolution	800/0.01 $\mu$ m, 80/0.001 $\mu$ m, 8/0.0001 $\mu$ m
Measuring force	4 mN (178-396-2) 0.75 mN (178-397-2)
Stylus tip	Diamond, 90°/5 $\mu$ mR 60°/2 $\mu$ mR : low force type
Dimensions (WxDxH)	800 x 651 x 1000 mm
Mass	800 x 651 x 1200 mm *1 240 kg (250 kg*1)
<b>Optional Accessories</b>	
Mechanism	<b>Vibration isolation stand</b> Diaphragm air spring
Natural frequency	2.5 - 3.5Hz
Levelling	Automatic control with mechanical valves
Air supply pressure	0.4 MPa
Max. loading capacity	350 kg
Dimensions (WxDxH)	1000 x 895 x 715 mm
Mass	280 kg
<b>Y-axis table unit</b>	
Measuring range	200 mm
Minimum reading	0.05 $\mu$ m
Scale unit	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0-60 mm/s (joystick)
Max. loading capacity	20 kg
Traverse	0.5 $\mu$ m/200 mm
straightness	
Linear displacement accuracy (at 20°C)	$\pm(2+2L/100)$ $\mu$ m
Table size	200 x 200 mm
Dimensions (WxDxH)	320 x 646 x 105 mm
Mass	35 kg

\*1 High column model

L : Dimension between two measurement points

Model	SV-3000CNC - 1S	SV-3000CNC - 1H	SV-3000CNC - 2S	SV-3000CNC - 2H
No.	178-521-2*	178-541-2*	178-522-2*	178-542-2*
Z2-axis vertical travel	300 mm	500 mm	300 mm	500 mm
$\alpha$ -axis unit	-	-	Installed	Installed

Model	SV-3000CNC - 3S	SV-3000CNC - 3H	SV-3000CNC - 4S	SV-3000CNC - 4H
No.	178-523-2*	178-543-2*	178-524-2*	178-544-2
Z2-axis vertical travel	300 mm	500 mm	300 mm	500 mm
Y-axis table unit	Installed	Installed	Installed	Installed
$\alpha$ -axis unit	-	-	Installed	Installed



SV-CNC Series brochure on request

# Surftest Extreme SV-M3000CNC

## Series 178 - Surftest Extreme SV-M3000CNC

- A CNC Surface Roughness Tester that handles measurement of large/heavy workpieces such as engine blocks, crankshafts, etc.
- Combined with the surface roughness detector swiveling unit, S-3000AR (optional), continuous measurement over the bottom, top and side surface of a workpiece is possible.
- With an optional large table for supporting a load of 100 kg or a large  $\theta 2$  table continuous automatic measurement of large workpieces is possible.
- Suitable for automatic surface roughness measurement and/or large and heavy workpieces.
- An 800 mm Y-axis stroke makes measurement of multiple profiles on large workpieces possible.
- The load table has a self-contained structure ensuring that various size workpieces, and standard and custom jigs, auto-feed devices, etc., are easily accommodated.



No.	Detector hold type (Essential option)		
	Standard	Long type	Rotation type
178-549-2*	S-3000 178-071	S-3000L 178-072	S-3000AR 178-073

### Specifications

<b>X1 axis</b>	
Measuring range	200 mm
Resolution	0,05 $\mu\text{m}$
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0-50 mm/s (joystick)
Measuring speed	0,02 - 2 mm/s
Traverse straightness	0,5 $\mu\text{m}/200$ mm 0,7 $\mu\text{m}/200$ mm (long-type detector) 0,5 $\mu\text{m}/200$ mm (rotary-type detector, up/down direction) 0,7 $\mu\text{m}/200$ mm (long-type detector, forward/backward direction)
<b><math>\alpha</math> axis</b>	
Inclination angle	-45° to +10°
Resolution	0.000225°
Inclination speed	6°/s
<b>Z2 axis (column)</b>	
Vertical travel	500 mm
Resolution	0,05 $\mu\text{m}$
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max., CNC) 0-50 mm/s (joystick)
<b>Detector</b>	
Range / resolution	800/0,01 $\mu\text{m}$ , 80/0,001 $\mu\text{m}$ , 8/0,0001 $\mu\text{m}$ (up to 2400 $\mu\text{m}$ with an optional stylus)
Measuring force	4 mN (178-396-2) 0.75 mN (178-397-2 low force type)
Stylus tip	Diamond, 90° / 5 $\mu\text{mR}$ (60° / 2 $\mu\text{mR}$ low force type)
Type	Differential inductance
<b>Y-axis</b>	
Measuring range	800 mm
Resolution	0,05 $\mu\text{m}$
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max., CNC) 0-50 mm/s (joystick)
Measuring speed	0,02 - 2 mm/s
Traverse straightness	0,5 $\mu\text{m}/50$ mm, 2 $\mu\text{m}/800$ mm (standard), 0,7 $\mu\text{m}/50$ mm, 3 $\mu\text{m}/800$ mm (long-type detector), 0,7 $\mu\text{m}/50$ mm, 3 $\mu\text{m}/800$ mm (rotary-type detector, up/down direction)
<b>Base unit</b>	
Size (WxH)	600 x 1500 mm
Material	Steel
Loading capacity	300 kg
Dimensions (WxDxH)	1085 x 1695 x 1922 mm
Mass	1600 kg (including vibration isolation unit)
<b>Software</b>	
<b>FORMTRACEPAK V5</b>	
Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. You can also perform contour evaluation that allows free analysis of level differences, angles, pitch, area and other characteristics based on surface roughness data. In addition, you can create an original inspection certificate by setting the print format to suit your particular requirements.	

# Contracer CV-1000 / CV-2000

## Series 218 - Contour Measuring Instrument

- The Z-axis is equipped with a digital scale in the detecting unit. This gives you a wider range of measurement with higher resolution. No more reliance on measurement magnifications.
- A data analysis system (personal computer system and Formtracepak software) is available.

### Specifications

#### X-axis

Measuring range	50 or 100 mm
Resolution	0,2 µm
Scale	Reflective-type linear encoder
Drive speed	0,2, 1 mm/s and manual
Measuring speed	0,2, 0,5 mm/s
Measuring direction	Backward
Traverse straightness	CV-1000 : 3,5 µm/50 mm CV-2000 : 3,5 µm/100 mm with the X axis in horizontal orientation

Linear displacement accuracy (at 20°C)	±(3.5+2L/100) µm L : drive length (mm)
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#### Inclining range

CV-2000 : ±45°

#### Z2-axis (column)

Column type	Power drive (S4) or Manual (M4)
Vertical travel	250 mm (S4), 320 mm (M4)
Drive speed	1 - 5 mm/s and manual

#### Z1-axis

##### (detector unit)

Measuring range	25 or 40 mm
Resolution	CV-1000 : 0,4 µm CV-2000 : 0,5 µm
Scale	Arc encoder
Linear displacement accuracy (at 20°C)	±(3.5+14H/25) µm H : Measurement height from the horizontal position (mm)
Stylus up/down operation	Arc movement
Stylus orientation	Downward
Measuring force	10 - 30 mN
Traceable angle	Ascending 77°, descending 87° (using the standard stylus provided and depending on the surface roughness)

Stylus tip	Radius : 25 µm, carbide-tip
Base size (WxH)	CV-2000 : 650 x 450 mm
Base material	CV-2000 : Granite
Mass	CV-1000N2 : 5 kg CV-2000M4 : 115.8 kg CV-2000S4 : 124 kg

Power supply	100 - 240V AC ±10%, 50/60 Hz
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#### CV-1000N2

shown attached to the optional column stand

The CV-1000 is portable and can be moved to the machine-shop for measuring large workpieces.



#### CV-2000M4

In conjunction with a personal computer, the Formtracepak contour analysis software provides various modes of measurement and analysis.



#### CV-2000S4

Stationary contour measuring system with an attractive price-performance ratio. For efficient use in production or in the laboratory.

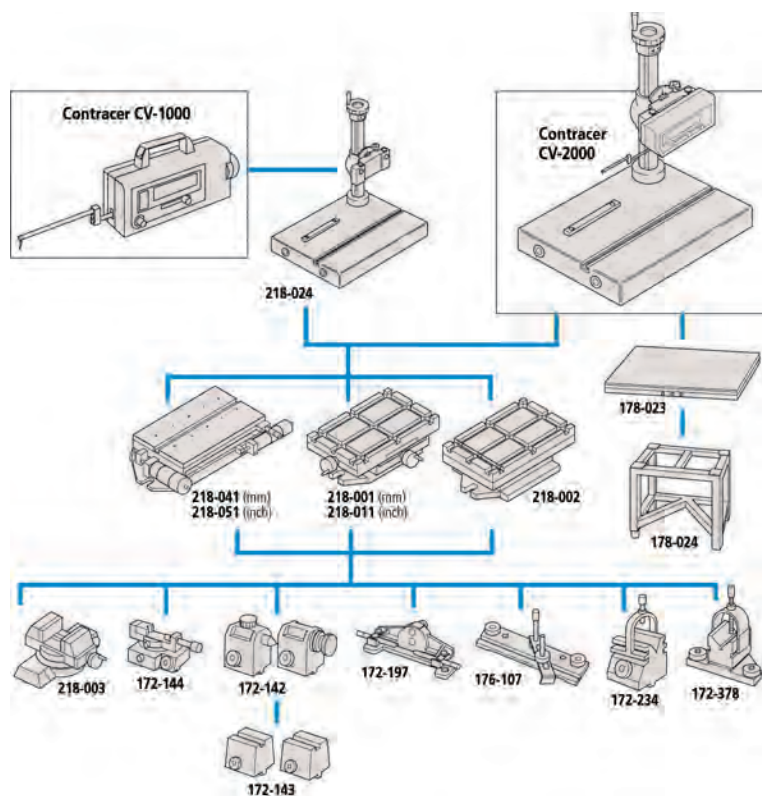


# Contracer CV-1000 / CV-2000

## Series 218 - Contour Measuring Instruments

### Specifications and accessories

Model	CV-1000N2	CV-2000M4	CV-2000S4
No.	218-611D 218-621E	218-631D 218-641E	218-632D* 218-642E*
X1-axis measuring range	50 mm	100 mm	100 mm
Z1-axis measuring range	25 mm	40 mm	40 mm
Z2-axis vertical travel	-	320 mm	250 mm
Z2-axis column type	-	Manual	Power
Note	218-621E UK only	218-641E UK only	218-642E UK only



Accessories



Application examples



### Additional Specifications

Other optional accessories Refer to the Arms and Styli page

### Optional accessories

No.	Description
172-142	Centre support
172-143	Centre support riser
172-144	Rotary vice (Max. workpiece ø60 mm)
172-197	Swivel centre support
178-024	Stand for vibration isolator
218-001	Cross-travel table XY range : 100x50 mm
172-378	V-block with clamp (Max. workpiece ø25 mm)
218-041	Cross-travel table XY range : 50x25 mm
172-234	V-block with clamp (Max. workpiece ø50 mm)
218-003	Rotary vice (heavy-duty type)
176-107	Holder with clamp
178-023	Manual vibration isolator
218-002	Rugged table
218-024	Column stand for CV-1000 (vertical travel 320 mm, inclination ±45°)
998862	Pin gauge unit for calibration (mm)

### Optional accessories for Inch

No.	Description
218-011	Cross-travel table XY range : 4x2"
218-051	Cross-travel table XY range : 2x1"
998861	Pin gauge unit for calibration (inch)



# Contracer CV-3100 / CV-4100

## Series 218 - Contour Measuring Instruments

- Significantly increased drive speed further reduces total measurement time.
- In order to maintain the traverse straightness specification for an extended period of time, Mitutoyo has adopted highly rigid ceramic guides that combine the characteristics of smallest secular change and remarkable resistance to abrasion.
- The drive unit of the CV-4100 series is equipped with a Laser Hologage detector giving excellent narrow/wide range accuracy and resolution to Z1-axis measurements.

### Specifications

#### X-axis

Measuring range	100 or 200 mm
Resolution	0,05 µm
Scale	Linear encoder
Drive speed	0 - 80 mm/s and manual
Measuring speed	0,02 - 5 mm/s
Measuring direction	Forward/Backward
Traverse straightness	0,8 µm/100 mm, 2 µm/200 mm with the X axis in horizontal orientation
Linear displacement accuracy (at 20°C)	CV3100S4/H4/W4 : ±(1+0.01L) µm CV4100S4/H4/W4 : ±(0.8+0.01L) µm CV3100S8/H8/W8 : ±(1+0.02L) µm CV4100S8/H8/W8 : ±(0.8+0.02L) µm L : Drive length (mm)
Inclining range	±45°

#### Z2-axis (column)

Vertical travel	300 or 500 mm
Resolution	1 µm
Scale	ABSOLUTE linear encoder
Drive speed	0 - 20 mm/s and manual

#### Z1-axis (detector unit)

Measuring range	±25 mm
Resolution	CV-3100 : 0,2 µm CV-4100 : 0,05 µm
Scale	CV-3100 : Linear encoder CV-4100 : Laser Hologage
Linear displacement accuracy (at 20°C)	CV-3100 : ±(2+14HI/100) µm CV-4100 : ±(0.8+10.5HI/25) µm H : Measurement height from the horizontal position (mm)
Stylus up/down operation	Arc movement
Stylus orientation	Upward/Downward
Measuring force	30 mN
Traceable angle	Ascending 77°, descending 87° (using the standard stylus provided and depending on the surface roughness)
Stylus tip	Radius : 25 µm, carbide tip
Base size (WxH)	600 x 450 mm or 1000 x 450 mm
Base material	Granite
Mass	S4/S8 : 140 kg H4/H8 : 150 kg W4/W8 : 220 kg
Power supply	100 - 240V AC ±10%, 50/60 Hz
Power consumption	400W (main unit only)

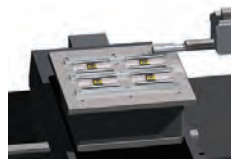


#### Combination calibration fixture

A dedicated calibration gauge that enables the user to calibrate the instrument for Z-axis gain, symmetry, stylus-tip radius, in a single procedure.



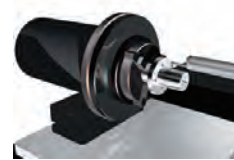
CV-3100 / CV-4100



Using Y-axis table



Using Rotary Table 01



Using Rotary Table 02

# Contracer CV-3100 / CV-4100

## Series 218 - Contour Measuring Instrument

### Dimensions and specifications

#### CV-3100

Model	CV-3100S4	CV-3100H4	CV-3100W4	CV-3100S8	CV-3100H8	CV-3100W8
No.	218-421D 218-431E*	218-422D 218-432E*	218-423D 218-433E*	218-426D* 218-436E*	218-427D 218-437E*	218-428D 218-438E*
X1-axis measuring range	100 mm	100 mm	100 mm	200 mm	200 mm	200 mm
Vertical travel (power column)	300 mm	500 mm	500 mm	300 mm	500 mm	500 mm
Granite base size (WxD)	600x450 mm	600x450 mm	1000x450 mm	600x450 mm	600x450 mm	1000x450 mm
Dimensions main unit (WxDxH)	756x482x966 mm	756x482x1166 mm	1156x482x1176 mm	766x482x966 mm	768x482x1166 mm	1166x482x1176 mm

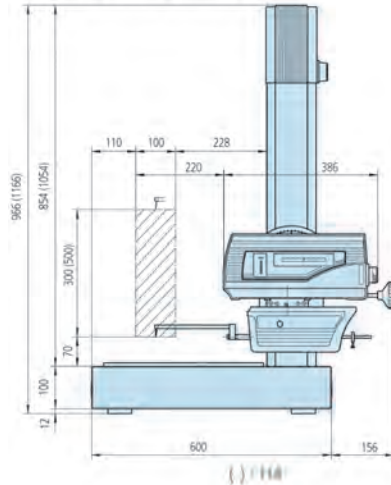
UK only for E-suffixed product numbers

#### CV-4100

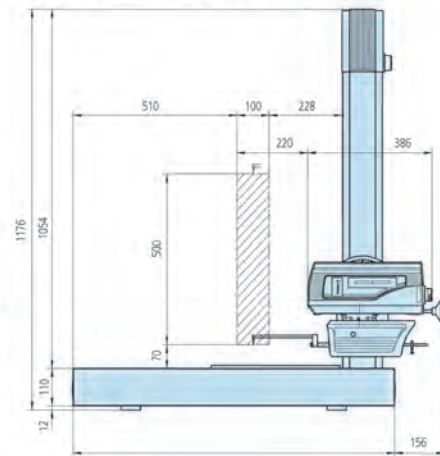
Model	CV-4100S4	CV-4100H4	CV-4100W4	CV-4100S8	CV-4100H8	CV-4100W8
No.	218-461D 218-471E*	218-462D* 218-472E*	218-463D* 218-473E*	218-466D* 218-476E*	218-467D 218-477E*	218-468D 218-478E*
X1-axis measuring range	100 mm	100 mm	100 mm	200 mm	200 mm	200 mm
Vertical travel (power column)	300 mm	500 mm	500 mm	300 mm	500 mm	500 mm
Granite base size (WxD)	600x450 mm	600x450 mm	1000x450 mm	600x450 mm	600x450 mm	1000x450 mm
Dimensions main unit (WxDxH)	756x482x966 mm	756x482x1166 mm	1156x482x1176 mm	766x482x966 mm	768x482x1166 mm	1166x482x1176 mm

UK only for E-suffixed product numbers

#### CV-3100S4/H4, CV-4100S4/H4

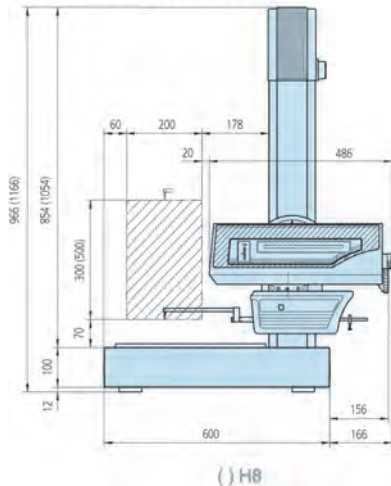


#### CV-3100W4, CV-4100W4

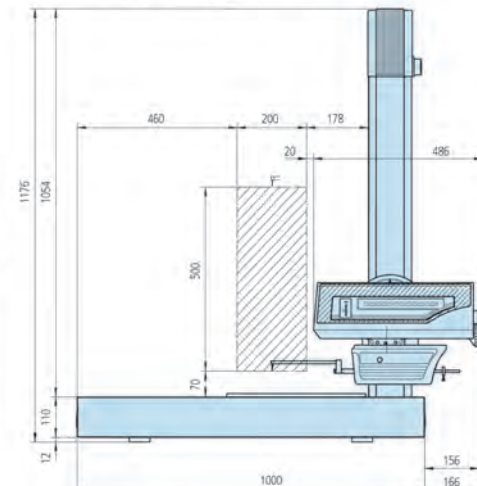


Dimensions

#### CV-3100S8/H8, CV-4100S8/H8



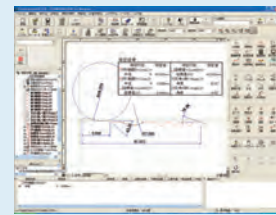
#### CV-3100W8, CV-4100W8



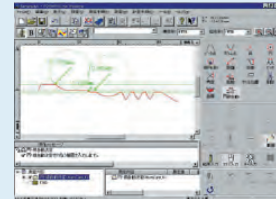
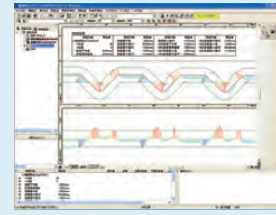
### Additional Specifications

#### Software FORMTRACEPAK V5

Allows control of the optional motor-driven Y-axis table and rotary table for efficient measurement automation. Contour evaluation can be performed using analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. An original inspection certificate can be created by setting the print format to selected requirements.



Measurement Control Screen



Automatic Circle/Line Application Function

# Contracer Extreme CV-3000CNC/CV-4000CNC

## Series 218 - CNC Contour Measuring Instruments

- High-accuracy CNC Contour/Form measuring instrument.
- X1, Y and Z2-axes have a maximum drive speed of 200 mm/s, which permits high-speed positioning for higher throughput potential of multiple-profile/multiple-workpiece measurement tasks.
- For models with the  $\alpha$  axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the X1-axis.
- The drive unit of the CV-4000CNC series is equipped with a Laser Hologage detector giving excellent narrow/wide range accuracy and resolution in the Z1-axis.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- Enables inclined plane measurements through 2-axis simultaneous control in the X and Y-axis directions.
- Since the Z1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis software is via USB.

### Specifications

<b>X1-axis</b>	
Measuring range	200 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)
Measuring speed	0,02 - 2 mm/s Forward/backward
Traverse straightness	2 $\mu$ m/200 mm with the X-axis in horizontal orientation
Linear displacement accuracy (at 20°C)	<b>CV-3000CNC</b> : $\pm(1+4L/200)$ $\mu$ m <b>CV-4000CNC</b> : $\pm(0.8+4L/200)$ $\mu$ m L : Drive length (mm)
<b><math>\alpha</math>-axis</b>	
Inclination angle	-45° to +10°
Resolution	0.000225°
Inclination	6%/s
<b>Z2-axis (column)</b>	
Vertical travel	300 or 500 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)
<b>Z1-axis (detector unit)</b>	
Measuring range	$\pm 25$ mm
Resolution	<b>CV-3000CNC</b> : 0,2 $\mu$ m <b>CV-4000CNC</b> : 0,05 $\mu$ m
Scale	<b>CV-3000CNC</b> : Linear encoder <b>CV-4000CNC</b> : Laser Hologage
Linear displacement accuracy (at 20°C)	<b>CV-3000CNC</b> : $\pm(2+14HI/100)$ $\mu$ m <b>CV-4000CNC</b> : $\pm(0.8+10.5HI/25)$ $\mu$ m H : Measurement height from the horizontal position (mm)
Stylus up/down operation	Arc movement
Stylus orientation	Upward/downward
Measuring force	30 mN
Traceable angle	Ascending 77°, descending 87° using the standard stylus provided and depending on the surface roughness)
Stylus tip	Radius : 25 $\mu$ m, carbide tip
<b>Y-axis table unit</b>	
Resolution	0,05 $\mu$ m
Measuring range	200 mm
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)
Max. loading capacity	20 kg
Traverse straightness	0,5 $\mu$ m/200 mm
Linear displacement accuracy (at 20°C)	$\pm(2-2L/100)$ $\mu$ m L : Length between two arbitrary points (mm)



# Contracer Extreme CV-3000CNC/CV-4000CNC

## Series 218 - CNC Contour Measuring Instrument

### Dimensions and specifications

#### CV-3000CNC

Model	CV-3000CNC-1S	CV-3000CNC-2S	CV-3000CNC-3S	CV-3000CNC-4S
No.	218-521-2*	218-522-2*	218-523-2*	218-524-2*
Z2-axis vertical travel	300 mm	300 mm	300 mm	300 mm
Y-axis table unit	-	-	Installed	Installed
$\alpha$ -axis unit	-	Installed	-	Installed
Dimensions main unit (WxDxH)	800x620x1000 mm	800x620x1000 mm	800x620x1000 mm	800x620x1000 mm

#### CV-3000CNC Extreme

Model	CV-3000CNC-1H	CV-3000CNC-2H	CV-3000CNC-3H	CV-3000CNC-4H
No.	218-541-2*	218-542-2*	218-543-2*	218-544-2*
Z2-axis vertical travel	500 mm	500 mm	500 mm	500 mm
Y-axis table unit	-	-	Installed	Installed
$\alpha$ -axis unit	-	Installed	-	Installed
Dimensions main unit (WxDxH)	800x620x1200 mm	800x620x1200 mm	800x620x1200 mm	800x620x1200 mm

#### CV-4000CNC

Model	CV-4000CNC-1S	CV-4000CNC-2S	CV-4000CNC-3S	CV-4000CNC-4S
No.	218-561-2*	218-562-2*	218-563-2*	218-564-2*
Z2-axis vertical travel	300 mm	300 mm	300 mm	300 mm
Y-axis table unit	-	-	Installed	Installed
$\alpha$ -axis unit	-	Installed	-	Installed
Dimensions main unit (WxDxH)	800x620x1000 mm	800x620x1000 mm	800x620x1000 mm	800x620x1000 mm

#### CV-4000CNC Extreme

Model	CV-4000CNC-1H	CV-4000CNC-2H	CV-4000CNC-3H	CV-4000CNC-4H
No.	218-581-2*	218-582-2*	218-583-2*	218-584-2*
Z2-axis vertical travel	500 mm	500 mm	500 mm	500 mm
Y-axis table unit	-	-	Installed	Installed
$\alpha$ -axis unit	-	Installed	-	Installed
Dimensions main unit (WxDxH)	800x620x1200 mm	800x620x1200 mm	800x620x1200 mm	800x620x1200 mm

### Specifications

<b>Optional Accessories</b>	<b>Vibration isolation stand</b>
Mechanism	Diaphragm air spring
Natural frequency	2.5 - 3.5 Hz
Levelling	Automatic control with mechanical valves
Air supply pressure	390 kPa
Max. loading capacity	350 kg
Dimensions (WxDxH)	1000 x 895 x 715 mm
Mass	280 kg

### Additional Specifications

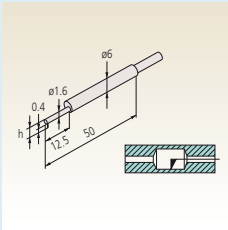
#### Software FORMTRACEPAK V5

Allows control of the optional motor-driven Y-axis table and rotary table for efficient measurement automation. Contour evaluation can be performed using analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. An original inspection certificate can be created by setting the print format to selected requirements.

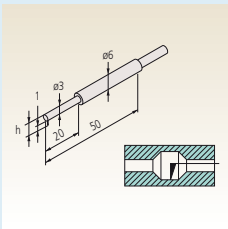




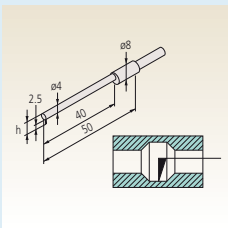
# Optional Arms and Styli for Contour Measurement



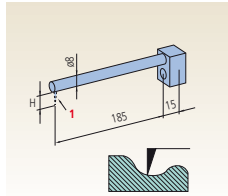
Small hole : 932693 / 12AAE873  
 Tip shape : Single bevel / Cone  
 Tip angle : 20° / 30°  
 Tip radius : 25 µm / 25 µm  
 Tip material : Carbide / Carbide



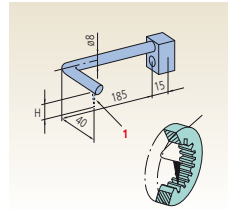
Small hole : 932694 / 12AAE874  
 Tip shape : Single bevel / Cone  
 Tip angle : 20° / 30°  
 Tip radius : 25 µm / 25 µm  
 Tip material : Carbide / Carbide



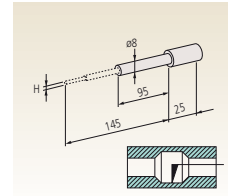
Small hole : 932695 / 12AAE875  
 Tip shape : Single bevel / Cone  
 Tip angle : 20° / 30°  
 Tip radius : 25 µm / 25 µm  
 Tip material : Carbide / Carbide



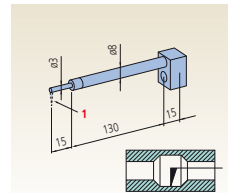
Arm Straight type  
CV-1000-2000



Arm Eccentric type  
CV-1000/2000



Arm for small-hole stylus  
CV-1000/2000



Arm for small-hole stylus

## Applicable Arms for CV-1000 and CV-2000

No.	Arm	Compatible stylus height (H)
935110	Small hole	0,4, 1, 2,5 mm
935111	Straight type	6 mm
935112	Straight type	12 mm
935113	Straight type	20 mm
935114	Straight type	30 mm
935115	Straight type	42 mm
935116	Eccentric type	6 mm
935117	Eccentric type	12 mm
935118	Eccentric type	20 mm

## Applicable Arms for CV-3100/4100, CV-3000CNC/4000CNC, SV-C3100/4100 and SV-C3000CNC/4000CNC

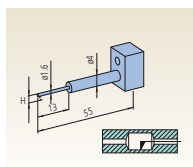
No.	Arm	Compatible stylus height (H)
12AAE294	Straight type	6 mm
12AAE295	Straight type	12 mm
996506	Straight type	20 mm
996507	Straight type	30 mm
996508	Straight type	42 mm
996509*	Eccentric type	6 mm
996510*	Eccentric type	12 mm
996511	Eccentric type	20 mm
996512	Eccentric type	30 mm
996513	Eccentric type	42 mm
12AAE296	Small hole	Small-hole stylus

## Applicable Styli for CV-1000 and CV-2000

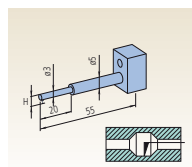
No.	Stylus	Stylus height (H)
932693	Small hole, carbide-tipped one-sided cut	2 mm
932694	Small hole, carbide-tipped one-sided cut	4 mm
932695	Small hole, carbide-tipped one-sided cut	6,5 mm
12AAE873	Small hole, carbide-tipped cone	2 mm
12AAE874*	Small hole, carbide-tipped cone	4 mm
12AAE875*	Small hole, carbide-tipped cone	6,5 mm

## Applicable Styli for CV-3100/4100, CV-3000CNC/4000CNC, SV-C3100/4100 and SV-C3000CNC/4000CNC

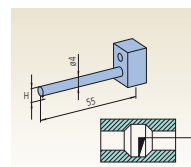
No.	Stylus	Stylus height (H)
12AAE297	Small hole, carbide tipped one-sided cut	2 mm
12AAE298	Small hole, carbide tipped one-sided cut	4 mm
12AAE299	Small hole, carbide tipped one-sided cut	6,5 mm



Small hole : 12AAE297  
 Tip shape : Single bevel  
 Tip angle : 20°  
 Tip radius : 25 µm  
 Tip material : Carbide



Small hole : 12AAE298  
 Tip shape : Single bevel  
 Tip angle : 20°  
 Tip radius : 25 µm  
 Tip material : Carbide



Small hole : 12AAE299  
 Tip shape : Single bevel  
 Tip angle : 20°  
 Tip radius : 25 µm  
 Tip material : Carbide

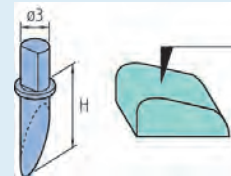


# Optional Arms and Styli for Contour Measurement

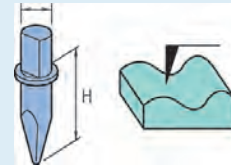
## Styli

Applicable Styli for  
CV-1000/2000, CV-3100/4100, CV-3000CNC/4000CNC, SV-C3100/4100 and SV-C3000CNC/4000CNC

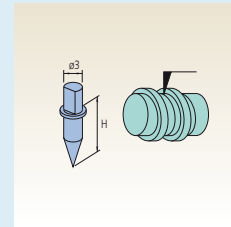
No.	Stylus	Stylus height (H)
354882	Single bevel, carbide tipped	6 mm
354883	Single bevel, carbide tipped	12 mm
354884	Single bevel, carbide tipped	20 mm
354885	Single bevel, carbide tipped	30 mm
354886	Single bevel, carbide tipped	42 mm
354887	Cross ground, carbide tipped	6 mm
354888	Cross ground, carbide tipped	12 mm
354889	Cross ground, carbide tipped	20 mm
354890	Cross ground, carbide tipped	30 mm
354891	Cross ground, carbide tipped	42 mm
12AAE865	Cone, carbide-tipped angle 20°	6 mm
12AAE866	Cone, carbide-tipped angle 20°	12 mm
12AAE867	Cone, carbide-tipped angle 20°	20 mm
12AAE868*	Cone, carbide-tipped angle 20°	30 mm
12AAE869	Cone, carbide-tipped angle 20°	42 mm
354892	Cone, sapphire-tipped angle 30°	6 mm
354893	Cone, sapphire-tipped angle 30°	12 mm
354894	Cone, sapphire-tipped angle 30°	20 mm
355129	Cone, diamond-tipped angle 50°	20 mm
354895	Cone, sapphire-tipped angle 30°	30 mm
354896	Cone, sapphire-tipped angle 30°	42 mm
12AAA566*	Cone, carbide-tipped angle 30°	6 mm
12AAA567*	Cone, carbide-tipped angle 30°	12 mm
12AAA568	Cone, carbide-tipped angle 30°	20 mm
12AAA569	Cone, carbide-tipped angle 30°	30 mm
12AAA570*	Cone, carbide-tipped angle 30°	42 mm
354897	Knife edge, carbide tipped	6 mm
354898	Knife edge, carbide tipped	12 mm
354899	Knife edge, carbide tipped	20 mm
354900	Knife edge, carbide tipped	30 mm
354901	Knife edge, carbide tipped	42 mm
354902	Ball, carbide tipped	6 mm
354903	Ball, carbide tipped	12 mm
354904	Ball, carbide tipped	20 mm
354905	Ball, carbide tipped	30 mm
354906	Ball, carbide tipped	42 mm



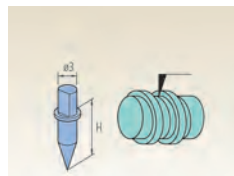
**Single bevel**  
Tip angle : 12°  
Tip radius : 25 µm  
Tip material : Carbide



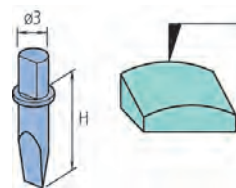
**Cross ground**  
Tip angle : 20°  
Tip radius : 25 µm  
Tip material : Carbide



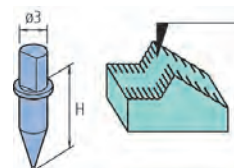
**Cone**  
Tip angle : 30/50°  
Tip radius : 25 µm  
Tip material : Carbide/Sapphire/Diamond  
(355129 : 50°, Diamond)



**Cone**  
Tip angle : 20°  
Tip radius : 25 µm  
Tip material : Carbide



**Knife edge**  
Tip angle : 20°  
Edge width : 3 mm  
Tip radius : 25 µm  
Tip material : Carbide



**Ball**  
Ball : Ø1 mm  
Tip material : Carbide

# Optional Accessories for Automatic Measurement

For SV series, SV-C series, CV series and CNC Models

## Y-axis table

For SV, SV-C and CV (not CNC models)

Enables efficient, automatic measurement of multiple aligned workpieces and multiple points on a single measurement surface.

(It allows semi-automatic measurement with a Manual Type Machine by using these items.)

No.	Travel range	Resolution	Positioning accuracy	Drive speed	Maximum load
178-097	200 mm	0,05 µm	±3 µm	Max. 80 mm/s	50 kg

## Ø1-axis table : 12AAD975\*1

For efficient measurement in the axial/transverse directions. When measuring a cylindrical workpiece, automatic alignment can be performed in combination with the Y-axis table.

\*1 (Ø1-axis mounting plate (12AAE630) is required when directly installing on the base of the SV-3100)

No.	Displacement	Resolution	Maximum load	Rotational speed
12AAD975	360°	0.004°	12 kg	Max. 10°/s

## Ø2-axis table : 178-078\*1

You can measure multiple points on a cylindrical workpiece and automate front/rear-side measurement

\*1 (Ø2-axis mounting plate (12AAE718) is required when directly installing on the base of the SV-3100)

No.	Displacement	Resolution	Maximum load (loading moment)	Rotational speed
178-078*	360°	0.0072°	4 kg (343 N*cm or less)	Max. 18°/s

## Automatic-leveling table : 178-087 (SV, CV, CS3200)

## Automatic-leveling table : 178-037 (CNC Models)

This is a stage that performs fully automatic leveling as measurement starts, freeing the user from this troublesome operation. Fully automatic leveling can be done quickly by anyone. In addition, the operation is easy and reliable.

No.	Inclination adjustment angle	Maximum load	Table dimensions
178-087*	± 2°	7 kg	130 x 100 mm
178-037*	± 2°	7 kg	130 x 100 mm

## Quick chuck

This Chuck is useful when measuring small workpieces. You can easily clamp them with its knurled ring.

No.	Retention range	Dimensions
211-032	Inner latch : OD ø1 - ø36 mm Inner latch : ID ø14 - ø70 mm outer latch : OD ø1 - ø75 mm	ø118 x 41 mm

## Micro-chuck

This chuck is suitable for clamping extra-small diameter workpieces (ø1 mm or less), which cannot be retained with the centering chuck.

No.	Retention range	Dimensions
211-031	OD : ø0 - ø1.5 mm	ø118 x 48.5 mm

## Vibration isolation table

Used to isolate instruments from externally generated vibration transmitted through the floor. Ideal for Laboratories, they are available in several sizes and load-carrying capacities.

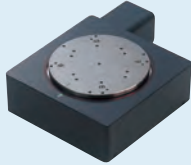
### Functions :

- Adjustable feet
- BiAir® Technology included
- Accuracy ±0.1 or ±0.01 mm
- Vertical and Horizontal frequency : 2.5 Hz
- Optional wheel
- Work surface polished granite

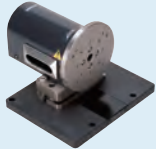
No.	Width	Depth	Height	Maximum load
B-LTH100-63	1000 mm	630 mm	760 mm	270 kg
B-LTH90-70	900 mm	700 mm	500 mm	800 kg



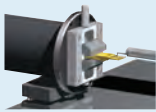
178-097



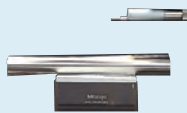
12AAD975



178-078



178-087



211-032



211-031



B-LTH100-63  
B-LTH90-70

# Optional Accessories for Surftest and Formtracer

## Compatible with Desktop Models



### 3-axis Adjustment Table

No.	Description
178-047	This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digital micrometers are adjusted accordingly. A flat-surfaced workpiece can also be levelled with this table.

### Levelling Table

No.	Table top	Leveling range	XY travel
178-043-1	130 x 100 mm	±1.5°	±12.5 mm
178-053-1*	5.12 x 3.94"	±1.5°	±0.49"
178-016	130 x 100 mm	±1.5°	40 mm

### Digital Levelling Table

No.	Table top	Leveling range	XY travel
178-042-1	130 x 100 mm	±1.5°	±12.5 mm

### Calibration Stand

No.	Description
12AAG175*	For mounting a roughness specimen or step gauge during calibration

### V-Block

No.	Description
998291	Workpiece diameter : 11 mm to 160 mm Can be mounted on a levelling table

### Precision Vice

No.	Description
178-019	Max. workpiece size : 36 mm Can be mounted on a levelling table

### Cross-travel Table

No.	Table top	XY travel
218-001	280 x 180 mm	100 x 50 mm
218-011*	11.02 x 7.09"	4 x 2"
218-041	280 x 152 mm	50 x 25 mm
218-051*	11.02 x 5.98"	2 x 1"

### Rotary Vice

No.	Description
218-003	Two-slide jaw type Max. workpiece size : ø60 mm Minimum reading : 1°

## Optional accessories

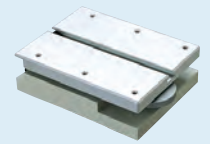
No.	Description
172-142	Centre support
172-143	Centre support riser
172-197	Swivel centre support
172-378	V-block with clamp (Max. workpiece ø25 mm)
172-234	V-block with clamp (Max. workpiece ø50 mm)
176-107	Holder with clamp



178-047



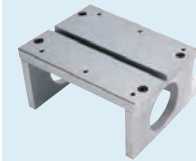
178-043-1/178-053-1



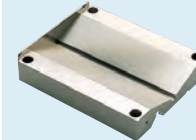
178-016



178-042-1



12AAG175



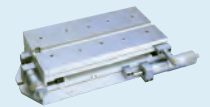
998291



178-019



218-001/218-011



218-041/218-051



218-003

# Roundtest RA-10

## Series 211 - Roundtest Measuring Instrument

Compact roundness tester combines outstanding cost/performance with full measurement capabilities and user-friendly operation.

- The control panel has large keys and an intuitive layout for easy operation.
- One-touch setup recall function : complex setups can be stored in advance and recalled with a single key stroke. Zero-set function : the detector level can be set to zero (0) with a single key stroke, thus relieving the user of the need for meticulous detector positioning.
- The positioning handles for vertical (Z-axis) and radial (X-axis) adjustments are positioned on the slider for best operability.
- Despite being a low-priced model, the turntable with air bearings offers rotational accuracy as high as  $(0.04+6H/1000)\mu\text{m}$ , thus assuring a precision that compares well with that of higher-priced models.
- Measurement results and recorded profiles are easy to view on the large LCD panel display.
- The machine has a compact body with integrated electronics and printer, making it ideal for installation in space-restricted locations.

### Specifications

<b>Turntable</b>	
Rotational accuracy	$(0.04+6H/1000)\mu\text{m}$ H: Probing height (mm)
Rotational speed	6 rpm
Turntable diameter	150 mm
Maximum probing diameter	100 mm
Maximum workpiece diameter	320 mm
Maximum turntable loading	10 kg
<b>Vertical column (Z axis)</b>	
Vertical travel	117 mm
Maximum probing height	152 mm above turntable surface
Maximum probing depth	100 mm (min. ID : 30 mm)
<b>Horizontal arm (X-axis)</b>	
Horizontal travel	75 mm (including 25 mm past the turntable axis)
Measuring range	$\pm 1000 \mu\text{m}$
Measuring force	70 to 100 mN
Standard stylus	<b>12AAB681</b> , carbide ball, $\phi 1.6\text{mm}$
Measuring direction	Bi-directional
Stylus angle adjustment	$\pm 45^\circ$ (with graduations)
<b>Data analysis unit</b>	
Processing unit	Built-in
Data analysis items	Roundness, Coaxiality, Concentricity, Flatness, Circular runout (radial)
Type of roundness evaluation	LSC, MZC, MIC, MCC
Recording device	Built-in thermal line printer (optional external printer)
Recording magnification	X5 to X200,000 (15-step)
Roughness component reduction	Low pass filter, band pass filter
Filter type	2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, Filter OFF
Cutoff values	15 $\mu\text{m}$ , 50 $\mu\text{m}$ , 150 $\mu\text{m}$ , 500 $\mu\text{m}$ , 15-50 $\mu\text{m}$ , 15-500 $\mu\text{m}$ , 50-500 $\mu\text{m}$
Number of measuring sections	Roundness, coaxiality, flatness: 1 to 5; Radial runout: 1 to 3; Concentricity: 2.
<b>Air supply</b>	
Air pressure	390 kPa
Air consumption	30 L/min
<b>Power supply</b>	100-240 VAC, 50/60 Hz
<b>Dimensions (WxDxH)</b>	450 x 360 x 486 mm
<b>Mass</b>	26 kg



RA-10 with optional X-axis stop and Z-axis scale unit



X-axis



Z-axis



211-016



997090



211-045



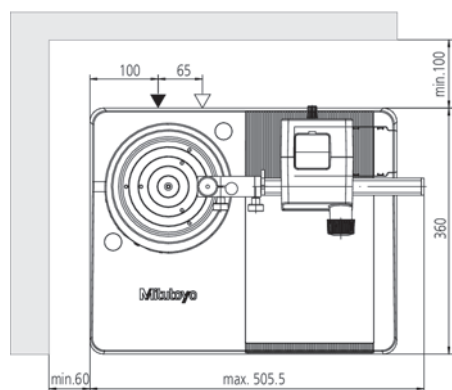
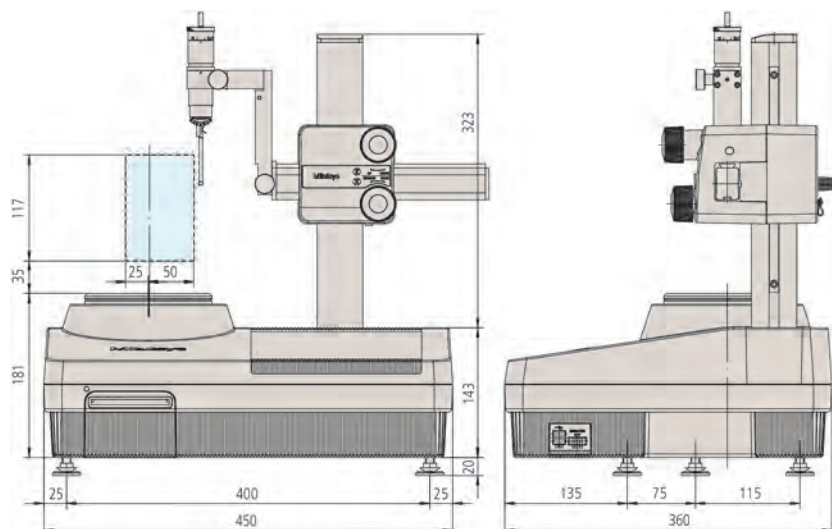
211-013



# Roundtest RA-10

## Series 211 - Roundtest Measuring Instrument

### Dimensions and accessories



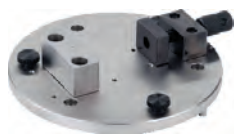
No.	Model
211-601D*	RA-10
211-601E*	RA-10 UK only



211-052



211-055



211-053



211-054



211-051



12AAH425



211-032



211-031

### Optional accessories

No.	Description
211-045	Magnification checking gauge
211-032	Quick chuck OD: 1-79 mm, ID: 16-79 mm
211-031	Micro-chuck OD: 1-1,5 mm
356038	Auxiliary stage for a low-height workpiece
997090	Gauge block set for calibration
12AAH318	Z-axis scale unit
12AAH320	X-axis stop
12AAH402	Collet (ø0,5-1,0 mm)
12AAH403	Collet (ø1,0-1,5 mm)
12AAH404	Collet (ø1,5-2,0 mm)
12AAH405	Collet (ø2,0-2,5 mm)
12AAH406	Collet (ø2,5-3,0 mm)
12AAH407	Collet (ø3,0-3,5 mm)
12AAH408	Collet (ø3,5-4,0 mm)
12AAH409	Collet (ø4,0-5,0 mm)
12AAH410	Collet (ø5,0-6,0 mm)
12AAH411	Collet (ø6,0-7,0 mm)
12AAH412	Collet (ø7,0-8,0 mm)
12AAH413	Collet (ø8,0-9,0 mm)
12AAH414	Collet (ø9,0-10,0 mm)
12AAH420	Spacer for reference hemisphere
12AAH425	Alignment table with DAT function (mm)
12AAH426	Alignment table with DAT function (inch/mm)
12AAH427	Alignment table with mechanical heads
211-013	Vibration damping stand
211-016	Reference hemisphere
211-051	Collet chuck (OD : 0,5- 10 mm)
211-052	Quick chuck
211-053	V-block jig A (for ø50 mm)
211-054	V-block jig B (for ø50 mm)
211-055	OD/ ID mating jig (for ø10 mm)

### Consumable spares

No.	Description
12AAH181	Printer paper 10 rolls/set
358592	Element for air filter
358593	Element for air regulator



# Roundtest RA-120/120P

## Series 211 - Roundtest Measuring Instrument

The Roundtest RA-120/120P instruments are compact, affordable, and simple-to-use devices for measuring roundform geometry on the shop floor. They provide the outstanding data analysis capabilities required of a laboratory roundness measuring instrument having a  $\pm 1000 \mu\text{m}$  wide-range detector and a precision turntable with excellent rotational accuracy.

- The RA-120 has a dedicated processor and control panel incorporated in the main unit for control of operations.
- The RA-120P is a PC based model with all operations controlled via ROUNDPAK software (optional).

### Specifications

<b>Turntable</b>	
Rotational accuracy	Radial : $(0.04+6H/10000)\mu\text{m H}$ : Probing height (mm) Axial : $0.04+6X/10000)\mu\text{m X}$ : Probing radius (mm)
Rotational speed	6 rpm
Turntable diameter	150 mm
Centering range	$\pm 3 \text{ mm}$
Levelling range	$\pm 1^\circ$
Maximum probing diameter	280 mm
Maximum workpiece diameter	440 mm
Maximum turntable loading	25 kg
<b>Vertical column (Z axis)</b>	
Vertical travel	280 mm
Maximum probing height	280 mm above turntable surface
Maximum probing depth	100 mm (minimum ID: 30 mm)
<b>Horizontal arm (X-axis)</b>	
Horizontal travel	165 mm (including 25 mm past the turntable axis)
Measuring range	$\pm 1000 \mu\text{m}$
Measuring force	70 to 100 mN
Standard stylus	<b>12AAB681</b> , carbide ball, $\phi 1.6 \text{ mm}$
Measuring direction	Bi-directional
Stylus angle adjustment	$\pm 45^\circ$ (with graduations)
<b>Data analysis unit</b>	
Processing unit	Built-in (PC with Roundpak-120P)
Data analysis items	Roundness, coaxiality, flatness, circular runout (radial), circular runout (axial), squareness (to axis), squareness (to plane), thickness deviation, parallelism
Type of roundness evaluation	LSC, MZC, MIC, MCC
Recording device	Built-in thermal line printer (optional external printer)
Recording magnification	X5 to X200,000, Auto (X1 to X500,000)
Roughness component reduction	Low pass filter, band pass filter
Filter type	2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, filter OFF
Cutoff values	15 upr, 50 upr, 150 upr, 500 upr, 15-50 upr, 15-500 upr, 50-500 upr, manual setting
Number of measuring sections	5 maximum
<b>Air supply</b>	
Air pressure	390 kPa
Air consumption	30L/min
<b>Power supply</b>	
Dimensions (WxDxH)	100-240 VAC, 50/60 Hz
Mass	450 x 360 x 636 mm
	32 kg (main unit), 2 kg (air regulator)



RA-120



Axis X (optional)



Z-axis scale unit (optional)



RA-120P

# Roundtest RA-120/120P

## Series 211 - Roundness Measuring Instrument

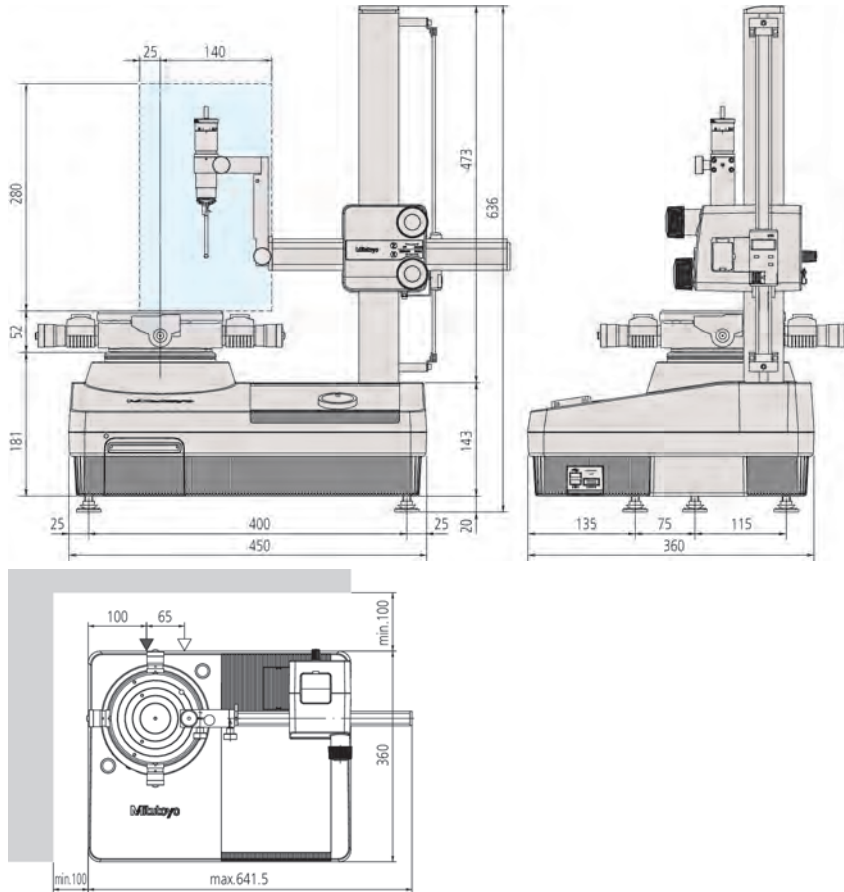
DAT (Digital Adjustment Table) function

The turntable displays centering and levelling adjustments digitally, making this challenging task simple enough for even an untrained operator to perform:

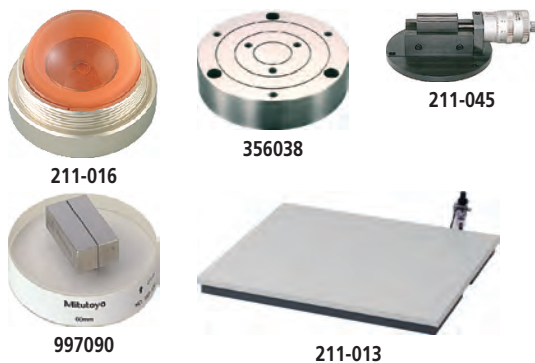
1. Preliminary measurement of two cross sections on the workpiece.
2. Following preliminary measurement, the centering and levelling adjustment values are displayed on the monitor.
3. The digital micrometer heads on the rotary table are adjusted to match the values displayed.
4. Centering and levelling is complete.

Centering range :  $\pm 3$  mm

Levelling (inclination) range :  $\pm 1^\circ$



No.	Model
211-621D	Roundtest RA-120 with mechanical turntable
211-621E*	Roundtest RA-120 with mechanical turntable UK type
211-622D	Roundtest RA-120 with DAT function
211-623E*	Roundtest RA-120 with DAT function inch/mm
211-625D*	Roundtest RA-120P with mechanical turntable
211-626D	Roundtest RA-120P with DAT function
211-627E*	Roundtest RA-120P with DAT function inch/mm



## Specifications

- Functions
- Notched workpiece measurement
  - Recalculation of datum / measurement data
  - Limaçon function compensates for eccentricity
  - Rotation of 3D display<sup>1\*</sup>
  - Real-time display<sup>1\*</sup>
  - Simplified layout (divided layout)<sup>1\*</sup>
  - Hair line, auxiliary line, hidden line, fill line<sup>1\*</sup>
  - Colour settings for measurement data<sup>1\*</sup>
  - Offsetting of recorded profile<sup>1\*</sup>
  - Data deletion<sup>1\*</sup>
  - Graph analysis (displacement/angle between measurement points)<sup>1\*</sup>
  - Power spectrum analysis<sup>1\*</sup>
  - Gear tooth analysis<sup>1\*</sup>
  - Harmonic analysis<sup>1\*</sup>
  - Text data output (via CSV format)<sup>1\*</sup>
- <sup>1\*</sup>Function of ROUNDPAK software

## Optional accessories

No.	Description
211-014	Three jaw chuck (OD: 2-78 mm, ID: 25-68 mm)
211-045	Magnification checking gauge
211-032	Quick chuck OD: 1-79 mm, ID: 16-79 mm
211-031	Micro-chuck OD: 1-1,5 mm
356038	Auxiliary stage for a low-height workpiece
997090	Gauge block set for calibration
12AAH320	X-axis stop
12AAJ166	ROUNDPAK Software (inch/mm)
12AAJ167	ROUNDPAK Software (mm)
211-013	Vibration damping stand
211-016	Reference hemisphere
211-061	Collet chuck (OD: 0,5-10mm)

## Consumable spares

No.	Description
12AAH181	Printer paper 10 rolls/set
358592	Element for air filter
358593	Element for air regulator



# Roundtest RA-220

## Series 211 - Roundtest Measuring Instrument

The RA-220 is a small, manual type roundness/cylindricity measuring instrument.

### FEATURES

- Exceptional analysis capabilities and easy operation
- Equipped with X- and Z-axis fine adjustment
- Scale is incorporated in the Z axis
- Equipped with inside/outside diameter continuous measurement function
- Equipped with DAT function
- Employs a wide range detector
- Compact and highly accurate (equipped with premium quality air-bearing)



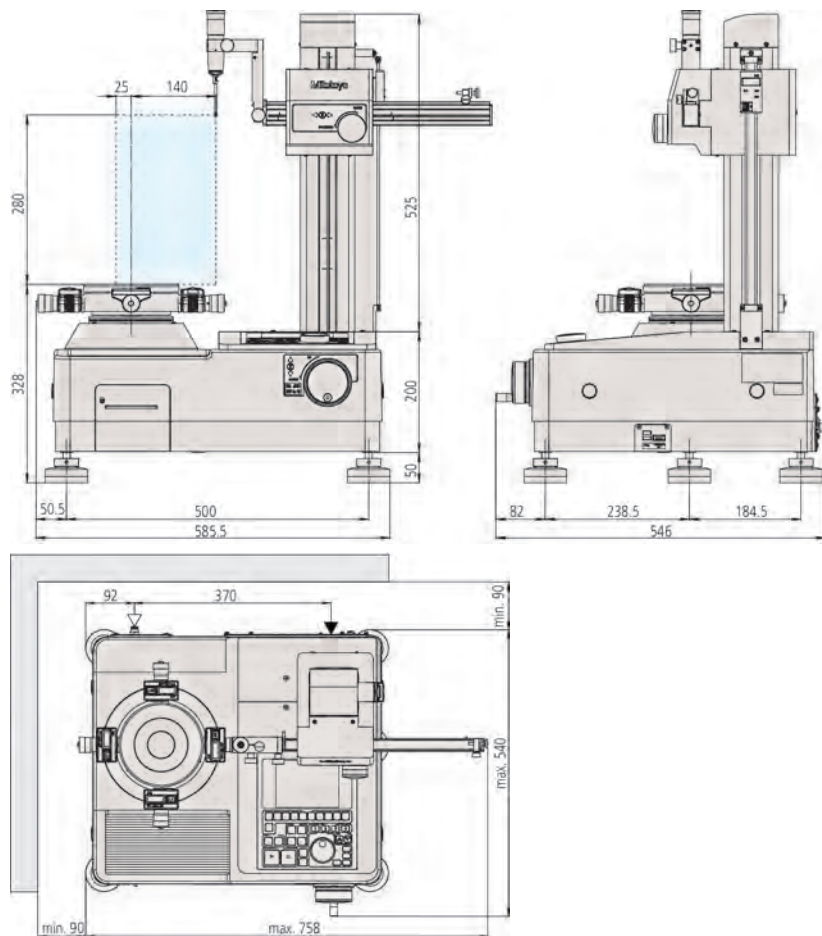
### Specifications

<b>Turntable</b>	Rotational accuracy : Radial : (0.04+6H/10000) $\mu$ m H: Probing height (mm) Axial : (0.04+6H/10000) $\mu$ m X : Probing radius (mm) Rotational speed : 6 rpm Turntable diameter : 150 mm Centering range : $\pm$ 3 mm Levelling range : $\pm$ 1° Maximum probing diameter : 280 mm (380 mm: when the detector orientation is changed to the vertical position, only samples 50 mm or more above the turntable surface can be measured due to the need for arm clearance) Maximum workpiece diameter : 470 mm Maximum turntable loading : 25 kg
<b>Vertical column (Z-axis)</b>	Vertical travel : 280 mm Straightness (over narrow range) : 0,2 $\mu$ m/ 20 mm Straightness (over entire range) : 0,5 $\mu$ m/ 100 mm Parallelism with turntable axis: 0,5 $\mu$ m / 100 mm Maximum probing height : 280 mm from turntable top Maximum probing depth : 100 mm (minimum ID : $\varnothing$ 30 mm)
<b>Horizontal arm (X-axis) Probe and Stylus</b>	Horizontal travel : 165 mm (including 25 mm past the turntable axis) Measuring range : $\pm$ 1000 $\mu$ m ( $\pm$ 30%) Measuring force : 70 to 100mN Standard stylus : <b>12AAB681</b> , carbide ball, $\varnothing$ 1.6 mm Measuring direction : Bi-directional Stylus angle adjustment : $\pm$ 45° (with graduations)
<b>Data analysis system</b>	Processing unit : Built-in Data analysis items : Roundness, coaxiality, concentricity, flatness, circular runout (radial), circular runout (axial), squareness (to axis), squareness (to plane), thickness deviation, parallelism, cylindricity Type of roundness evaluation : LSC, MZC, MIC, MCC Recording device : Built-in thermal line printer (optional external printer) Recording magnification : X5, X10, X20, X50, X100, X200, X500, X1k, X2k, X5k, X10k, X20k, X50k, X100k, X200k Roughness component reduction : low pass filter, band pass filter Filter type : 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian, filter OFF Cutoff values : 15 $\mu$ pr, 50 $\mu$ pr, 150 $\mu$ pr, 500 $\mu$ pr, 15-50 $\mu$ pr, 15-500 $\mu$ pr, 50-500 $\mu$ pr Number of measuring sections : Roundness, coaxiality, flatness: 5; Radial runout, squareness (to axis): 1 to 3; Concentricity, thickness deviation, parallelism: 2; Squareness (to plane): 3; Cylindricity: 3 to 5.
<b>Air supply</b>	Air pressure : 390 Kpa Air consumption : 30 L/min
<b>Power supply</b>	100-240VAC, 50/60 Hz
<b>Dimensions (WxDxH)</b>	450x360x636 mm
<b>Mass</b>	151 kg (main unit), 2 kg (air regulator)

# Roundtest RA-220

## Series 211 - Roundness Measuring Instrument

### Dimensions and accessories



No.	Model
211-642D*	RA-220 (mm)
211-643D*	RA-220 (mm/inch)
211-643E	RA-220 (inch)

### Optional accessories

No.	Description
211-014	Three jaw chuck (OD: 2-78 mm, ID: 25-68 mm)
211-045	Magnification checking gauge
178-025	Dynamic vibration isolator
211-032	Quick chuck OD: 1-79 mm, ID: 16-79 mm
211-031	Micro-chuck OD: 1-1,5 mm
356038	Auxiliary stage for a low-height workpiece
997090	Gauge block set for calibration
12AAH320	X-axis stop
211-061	Collet chuck (OD: 0,5-10mm)

### Consumable spares

No.	Description
12AAH181	Printer paper 10 rolls/set
358592	Element for air filter
358593	Element for air regulator



211-032



211-014



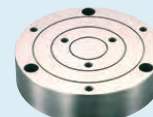
211-031



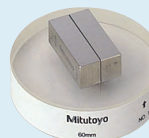
211-061



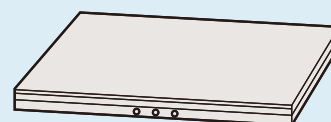
211-045



356038



997090



178-025



# Roundtest RA-1400

## Series 211 - Roundness Measuring Instrument

The RA-1400 Series Roundtest is a roundness measuring instrument equipped with state-of-the-art technologies including an automatic measurement function, an arc measuring function and a DAT (Digital Adjustment Table) mechanism which makes workpiece centering and levelling quick and easy.

### Specifications

<b>Turntable</b>	Rotational accuracy radial : (0.02+6H/10000) $\mu\text{m}$ Rotational accuracy axial : (0.02+6R/10000) $\mu\text{m}$ H : Probing height, R : Probing radius Rotational speed : 4, 6, 10 rpm Turntable diameter : 150 mm Centering range : $\pm 3$ mm (with DAT function) Levelling range : $\pm 1^\circ$ (with DAT function) Max. probing diameter : 100 mm*1 Max. workpiece diameter : 400 mm Max. turntable loading : 10 kg Vertical travel : 150 mm
<b>Vertical column (Z-axis)</b>	Positioning speed : Max. 15 mm/s with joystick operation (manual feed available) Measuring speed : 0,5, 1, 2, 5 mm/s Max. probing height : 150 mm (OD, ID) Max. probing depth : 90 mm
<b>Horizontal arm (X-axis)</b>	Horizontal travel : 75 mm (including 25 mm past the turntable axis) Positioning speed : Max. 8 mm/s with joystick operation (Manual feed available)
<b>Probe and Stylus</b>	Measuring range : $\pm 400$ $\mu\text{m}$ Measuring force : 7 to 10 mN Standard stylus : <b>12AAB681</b> , carbide ball, $\phi 1.6$ mm Measuring direction : Bi-directional Stylus angle adjustment : $\pm 45^\circ$ (with graduations)
<b>Data analysis system</b>	Analysis software : Roundpak Filter type : 2CRPC-75% (phase corrected), 2CRPC-50% (phase corrected), 2CR-75%, 2CR-50%, Gaussian, filter OFF Cutoff values : 15 upr, 50 upr, 150 upr, 500 upr, 1500 upr, 15-150 upr, 15-500 upr, 15-1500 upr, 50-500 upr, 50-1500 upr, 150-1500 upr, Manual setting Type of for roundness evaluation : LSC, MZC, MIC, MCC
<b>Air supply</b>	Air pressure : 390 kPa (4 kgf/cm <sup>2</sup> ) Air consumption : 30L/min.
Power supply	100-240 VAC, 50/60 Hz
Dimensions (WxDxH)	635 x 430 x 620 mm
Mass	95 kg

\*1 when using an optional auxiliary probe holder (**12AAB597**), the possible measuring range is between  $\phi 70$  mm and  $\phi 220$  mm.

An optional auxiliary stage (**356038**) is required to provide clearance when measurements 20 mm or less in the radial direction from the turntable axis and 20 mm or less from the turntable surface are to be made.

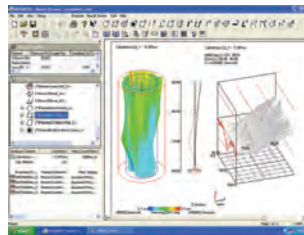


RA-1400  
with personal computer system and software



### Measurement through X-axis tracking

Measurement while tracing the surface form of the measured object is possible through a built-in linear scale in the X-axis. This type of measurement is useful when the roundness/cylindrical form displacement, or the taper, exceeds the measuring range of the detector and X-axis motion is necessary.



### Roundpak Preview

The latest roundness/cylindrical form analysis program

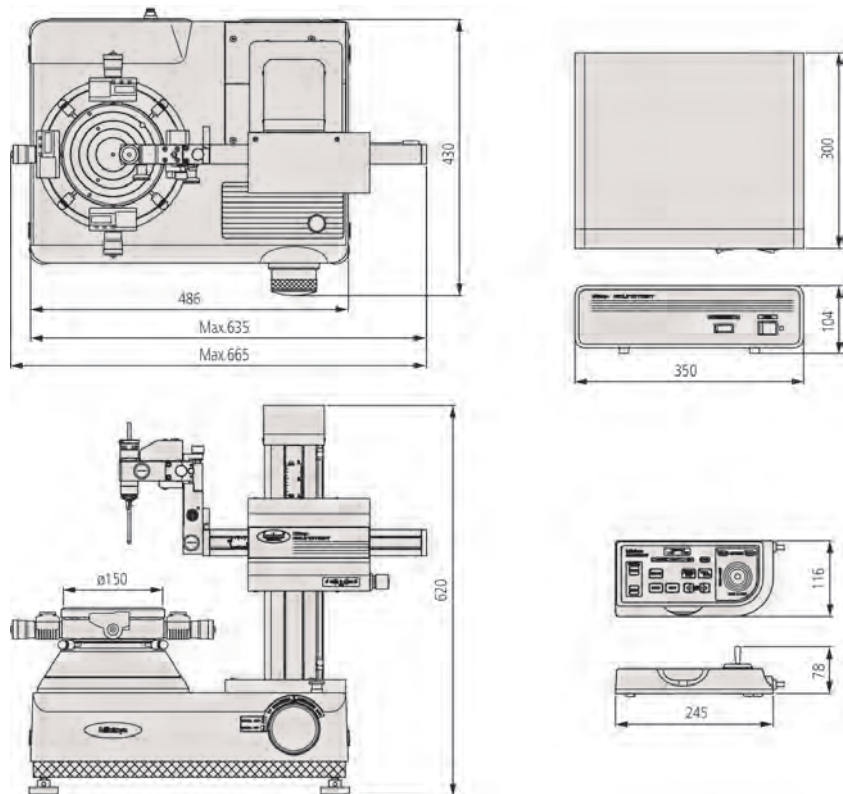
# Roundtest RA-1400

## Series 211 - Roundness Measuring Instrument

### Dimensions and accessories

#### DAT (Digital Adjustment Table) function

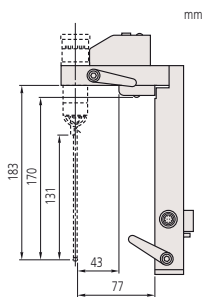
- See the Roundtest RA-120/120P pages for a description of how to use this function.



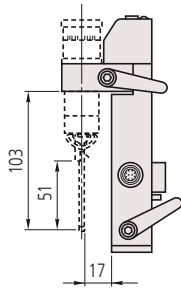
Dimensions

No.	Description
211-721D*	RA-1400
211-731E*	RA-1400 UK only

mm



12AAB569



12AAB597

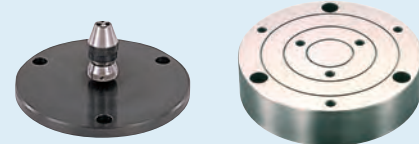
#### Optional accessories

No.	Description
211-014	Three jaw chuck (OD: 2-78 mm, ID: 25-68 mm)
211-045	Magnification checking gauge
178-025	Dynamic vibration isolator
211-032	Quick chuck OD: 1-79 mm, ID: 16-79 mm
356038	Auxiliary stage for a low-height workpiece
211-031	Micro-chuck OD: 1-1,5 mm
12AAB569	Extension probe holder (2X higher)
12AAB597	Auxiliary probe holder for large diameter workpiece



211-032

211-014



211-031

356038



211-045



350850

# Roundtest RA-1600

## Series 211 - Roundness Measuring System

- The RA-1600 Series Roundtest is a roundness measuring system equipped with a highly accurate turntable that enables simple and accurate centering and levelling of the workpiece.
- Incorporates flexible data analysis software Roundpak.
- Compact, but with top-end precision and includes a function to prevent damaging collisions in the Z-axis.
- Equipped with DAT mechanism to boost measurement efficiency.
- Includes a remote control box for easy operation.

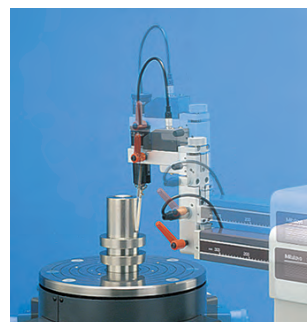


RA-1600

### Specifications

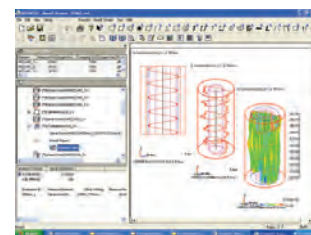
<b>Turntable</b>	Rotational accuracy radial : (0.02+6H/10000) $\mu$ m Rotational accuracy axial : (0.02+6X/10000) $\mu$ m H : Measuring height with reference to turntable surface (mm) JIS B7451-1997 X : Radial distance with reference to turntable axis (mm) Rotational speed : 4, 6, 10 rpm Effective turntable diameter : 150 mm Centering range : $\pm 3$ mm (with DAT function) Levelling range : $\pm 1^\circ$ (with DAT function) Max. probing diameter : 280 mm Max. workpiece diameter : 560 mm Max. turntable loading : 25 kg Straightness (over narrow range) : 0,20 $\mu$ m/100 mm Straightness (over wide range) : 0,30 $\mu$ m/300 mm Parallelism with turntable axis : 1,5 $\mu$ m/300 mm Positioning speed : Max. 15 mm/s (Measurement : 0,5, 1, 2, 5 mm/s) Max. probing height : (ID, OD) 300 mm*1 Max. probing depth : over $\phi 32$ : 91 mm (with standard stylus), over $\phi 7$ : 50 mm (with standard stylus)
<b>Vertical column (Z-axis)</b>	Straightness of drive: 2,7 $\mu$ m/140 mm Perpendicularity to turntable axis : 1,6 $\mu$ m/140 mm Traverse range: 165 mm (from table axis -25 mm to 140 mm) Positioning speed: Max. 8 mm/s (Measurement 0,5, 1, 2, 5 mm/s)
<b>Horizontal arm (X-axis)</b>	Measuring force : 10-50 mN (5-level) (ID/OD measuring position with standard stylus) Measuring range : standard $\pm 400$ $\mu$ m/ $\pm 4$ $\mu$ m/ $\pm 4$ $\mu$ m, tracking $\pm 5$ mm Tip shape, material : $\phi 1.6$ mm tungsten carbide Other : IN/OUT one-touch switching, Stylus angle scale markings ( $\pm 45^\circ$ ), Z-axis collision detection function
<b>Detector</b>	Air pressure : 0.39 MPa Air consumption : 22L/min. (standard state)
<b>Air supply</b>	Power supply 100-240 VAC, 50/60 Hz Power consumption 80 W
<b>Power supply</b>	Dimensions 890 x 490 x 840 mm (WxDxH)
<b>Power consumption</b>	Mass Main unit (NET) : 170 kg

\*1 when using an optional auxiliary stage for measuring a workpiece whose height is 20 mm or less.

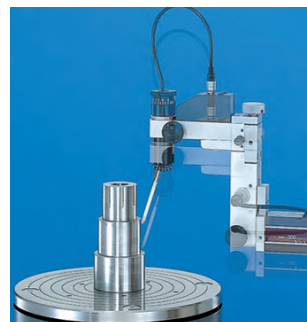


Spiral Measurement/Analysis (RA-1600)

Provided with a spiral measurement function that combines turntable rotation and rectilinear motion allowing cylindricity, coaxiality and other form characteristics to be measured in continuous data stream mode.



Spiral-mode cylinder measurement

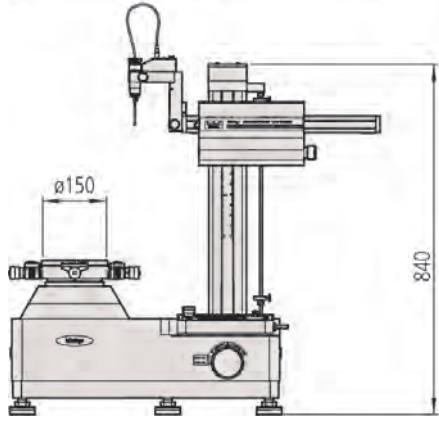
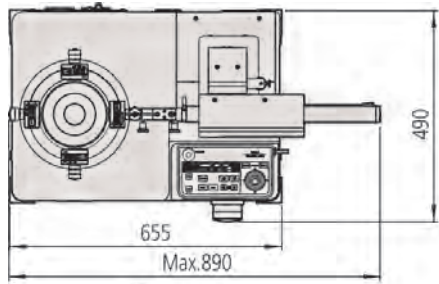


Positioning function of turntable (RA-1600)

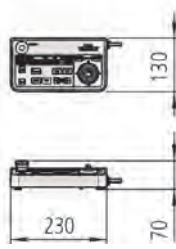
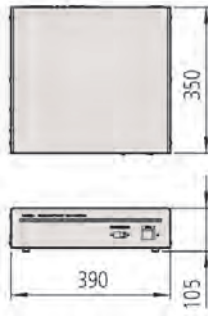
Automatic measurement that incorporates rectilinear motion is possible at any position (angle) in relation to turntable rotation.

# Roundtest RA-1600

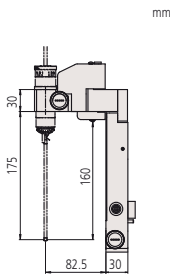
## Series 211 - Roundness Measuring System



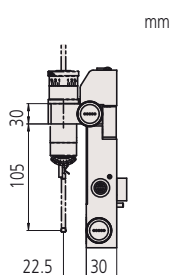
Dimensions



No.	Description
211-723D	RA-1600
211-723E	RA-1600 UK only



12AAF203



12AAF204

### Specifications

Accessories

Refer to Accessories page



211-014



211-032



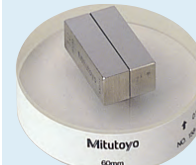
211-031



211-045



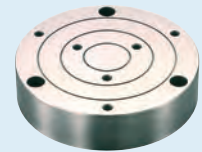
350850



997090



211-016



356038



Desktop type



# Roundtest RA-2200

## Series 211 - Roundness/Cylindricity Measuring System

All models are equipped with a highly accurate turntable that enables simple and accurate centering and levelling of the workpiece, which account for the majority of the essential setup work for measuring roundness/cylindricity.

Wide variety of models available to suit any application.

- RA-2200AS/AH

The models are supplied as standard with an automatic centering and levelling turntable, freeing the operator from the centering and levelling task.

- RA-2200DS/DH

The models are supplied as standard with a navigation function that quickly and simply guides the operator through the centering and levelling task, as though the task were being performed by an expert.

### Highly accurate and easy-to-use turntable

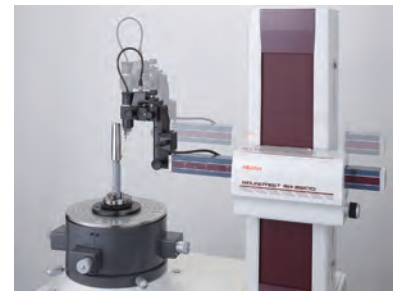
With extremely high rotational accuracy, both in the radial and axial directions, the turntable allows high accuracy flatness testing to be performed in addition to roundness and cylindricity measurements.

Incorporating an Automatic Adjustment Table (AAT), the top-of-the-line RA-2200AS/AH models relieve the operator of workpiece centering and levelling.

A guidance system (DAT) is incorporated into the turntables on the RA-2200DS/DH models to help the operator perform manual centering and levelling smoothly and simply.

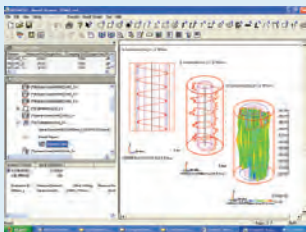


RA-2200



### Specifications

<b>Turntable</b>	Rotational accuracy radial : (0.02+3.5H/10000) $\mu\text{m}$ Rotational accuracy axial : (0.02+3.5X/10000) $\mu\text{m}$ H : Measuring height with reference to turntable surface (mm) JIS B7451-1997 X : Radial distance with reference to turntable axis (mm) Rotational speed : 2, 4, 6, 10 rpm Levelling range : $\pm 1^\circ$ (with DAT function) Max. probing diameter : 300 mm Max. workpiece diameter : 580 mm Max. turntable loading : 30 kg
<b>Vertical column (Z-axis)</b>	Straightness (over narrow range) : 0, 10 $\mu\text{m}/100\text{ mm}$ Straightness (over wide range) : DS: 0, 15 $\mu\text{m}/300\text{ mm}$ - DH : 0, 25 $\mu\text{m}/500\text{ mm}$ Parallelism with turntable axis : DS: 0, 7 $\mu\text{m}/300\text{ mm}$ - DH: 1, 2 $\mu\text{m}/500\text{ mm}$ Positioning speed : Max. 50 mm/s (Measurement : 0, 5, 1, 2, 5 mm/s) Max. probing height (ID, OD) : DS: 300 mm - DH : 500 mm Max. probing depth : over $\phi 32$ : 85 mm (with standard stylus), over $\phi 7$ : 50 mm (with standard stylus)
<b>Horizontal arm (X-axis)</b>	Straightness of drive: 0, 7 $\mu\text{m}/150\text{ mm}$ Perpendicularity to turntable axis : 1 $\mu\text{m}/150\text{ mm}$ Traverse range: 175 mm (From turntable axis -25 mm to 150 mm) Positioning speed : Max. 30 mm/s (Measurement 0, 5, 1, 2, 5 mm/s)
<b>Probe and Stylus</b>	Measuring range : $\pm 400\text{ }\mu\text{m} \pm 40\text{ }\mu\text{m} \pm 4\text{ }\mu\text{m}$ ( $\pm 5\text{ mm}$ : tracking range) Measuring force : 10-50mN (5-level switching) (ID/OD measurement style with standard stylus) Stylus : $\phi 1,6\text{ mm}$ tungsten carbide Other : 2 direction one-touch switching type, stylus angle scale marking ( $\pm 45^\circ$ ), contention detection function for Z-axis direction
<b>Air supply</b>	Air pressure : 0.39 MPa Air consumption : 30L/min. (standard state)
<b>Power supply</b>	100-240 VAC, 50/60 Hz
<b>Mass</b>	180 kg (DS main unit), 200 kg (DH main unit)



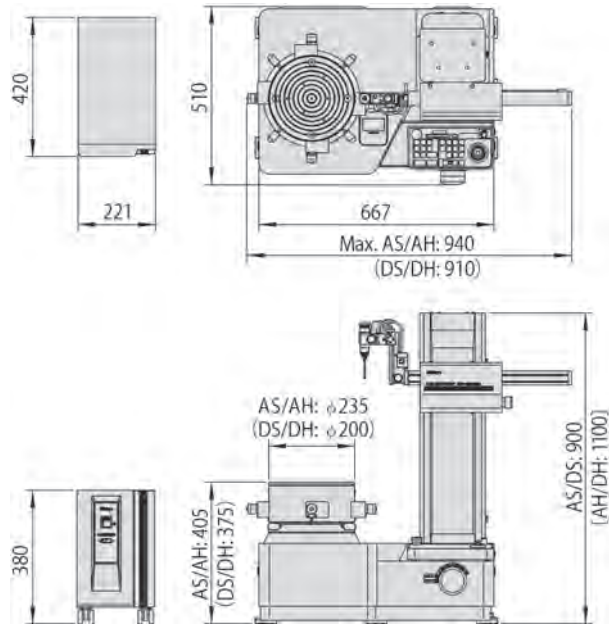
ROUNDPAK

Simple to operate even with a full set of parameters and analysis functions.

# Roundtest RA-2200

## Series 211 - Roundness/Cylindricity Measuring System

### Accessories and dimensions



### Specifications

Accessories Refer to Accessories and Arm and Styli pages



211-014



211-032



211-031



211-045



350850  
Cylindrical square

No.	Model	Order No. UK only	Effective table diameter	Centering/levelling adjustment 1*	Centering range	Column travel	Basic unit mass
211-511D	RA-2200AS	211-511E	235 mm	AAT	± 3 mm	300 mm (standard column)	180 kg
211-512D	RA-2200AH	211-512E	235 mm	AAT	± 3 mm	500 mm (high column)	200 kg
211-513D	RA-2200DS	211-514E	200 mm	DAT	± 5 mm	300 mm (standard column)	180 kg
211-515D	RA-2200DH	211-516E	200 mm	DAT	± 5 mm	500 mm (High column)	200 kg

1\* AAT : Automatic Adjustment Table  
DAT : Digital Adjustment Table

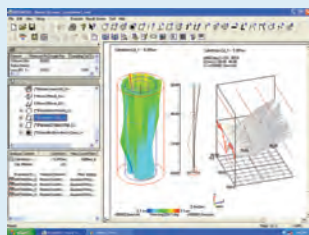
# Roundtest RA-H5200

## Series 211 - High-precision Roundness/Cylindricity Measuring System

- A roundness/cylindricity measuring system developed to combine world-class accuracy with high maneuverability/analytical capability.
- This system can perform many other functions as well, such as tracking measurement and automatic OD/ID measurement.
- Available with the standard column specification (Z-axis traverse of 350 mm) or an extended specification (Z-axis traverse of 550 mm) for handling taller workpieces.

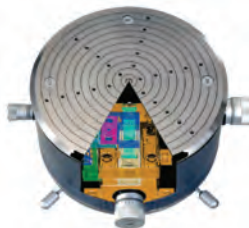
### Specifications

<b>Turntable</b>	Rotational accuracy radial : (0.02+3.5H/10000) $\mu\text{m}$ Rotational accuracy axial : (0.02+3.5X/10000) $\mu\text{m}$ H : Probing height (mm) X : Distance from rotational turntable axis (mm) Rotational speed : 2, 4, 6, 10 rpm (Auto centering 20 rpm) Effective turntable diameter : 300 mm Centering range : $\pm 5$ mm (with AAT function) Levelling range : $\pm 1^\circ$ (with AAT function) Max. probing diameter : 400 mm Max. workpiece diameter : 680 mm Max. turntable loading : 80 kg (Auto centering 65 kg)
<b>Vertical column (Z-axis)</b>	Traverse speed : Max. 60 mm/s (Measurement : 0,5/1,0/2,0/5,0 mm/s) Max. probing depth with standard stylus : 85 mm for $\phi 32$ or more, 50 mm for $\phi 7$ or more
<b>Horizontal arm (X-axis)</b>	Straightness : 0,4 $\mu\text{m}/200$ mm Horizontal to turntable axis : 0,5 $\mu\text{m}/200$ mm (reference generatrix) Traverse range : 225 mm (including 25 mm past the turntable axis) Travel speed : Max. 50 mm/s (Measurement 0,5, 1,0, 2,0, 5,0 mm/s)
<b>Detector</b>	Measuring force : 10-50 mN (5-level switching) Measuring range : standard $\pm 400$ $\mu\text{m}/\pm 40$ $\mu\text{m}/\pm 4$ $\mu\text{m}$ , follow : $\pm 5$ mm Tip shape, material : $\phi 1,6$ mm tungsten carbide ball Other : Bi-directional one-touch switching type, collision detection function for Z-axis direction, Stylus angle scale markings ( $\pm 45^\circ$ )
<b>Air supply</b>	Air pressure : 0.39 MPa Air consumption : 45L/min. (standard state)
<b>Power supply</b>	100-240V AC, 50/60 Hz
<b>Power consumption</b>	80 W
<b>Dimensions (WxDxH)</b>	890 x 490 x 840 mm
<b>Mass</b>	Vibration isolator : 170 kg



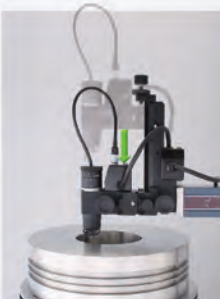
### Roundpak The latest roundness/cylindrical form analysis program

\*1 when using an optional auxiliary stage for measuring a workpiece whose height is 20 mm or less.



### Highly accurate, automatic centering/levelling turntable

The performance of this turntable has been achieved through exceptional manufacturing accuracy of the critical components, in addition to a high-accuracy air-bearing that provides superior rigidity. The resulting rotational accuracy, the heart of a roundness/cylindricity measuring system, is world-class at 0.02+3.5H/10000  $\mu\text{m}$ .



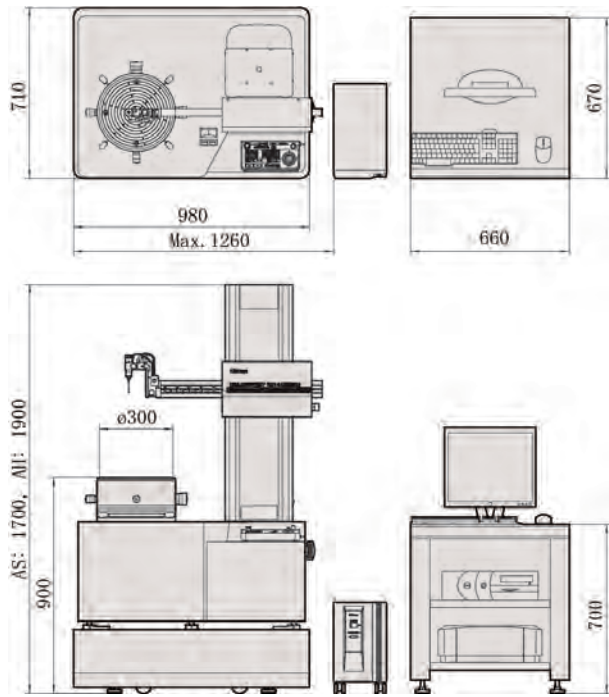
### Sliding detector-unit holder provided as a standard feature

The detector-unit holder is equipped with a sliding mechanism, enabling one-touch measurement of a workpiece with a deep hole having a thick wall, which has been difficult with the conventional standard arm. Sliding distance : 112 mm.

# Roundtest RA-H5200

Series 211

Dimensions and accessories



Dimensions

No.	Model	Order No. UK only	Column travel Z-axis	Straightness ( $\lambda c 2,5$ mm)	Parallelism to turntable axis	Max. probing height ID/OD	Mass main unit
211-531D	RA-H5200AS	211-531E	350 mm Standard	0,05 $\mu$ m/100 mm 0,14 $\mu$ m/350 mm	0,2 $\mu$ m/350 mm	350 mm	650 kg
211-532D	RA-H5200AH	211-532E	550 mm High	0,05 $\mu$ m/100 mm 0,2 $\mu$ m/550 mm	0,32 $\mu$ m/550 mm	550 mm	670 kg

## Specifications

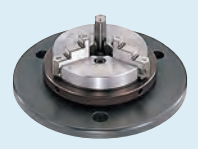
Accessories Refer to Accessories and Arm and Styli pages

## Optional accessories

No.	Description
12AAF203	Double length holder for extra-deep holes (160 mm)
12AAF204	Large diameter holder for measuring a larger OD (70 to 520 mm)
12AAF205	Triple length holder for extra-deep holes (240 mm)



211-014



211-032



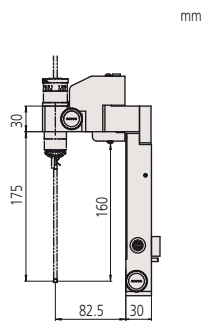
211-031



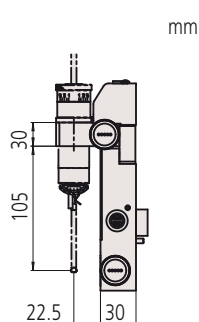
211-045



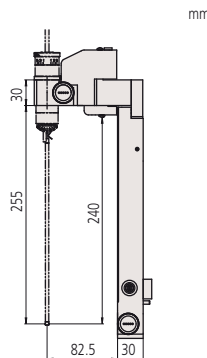
350850



12AAF203



12AAF204



12AAF205



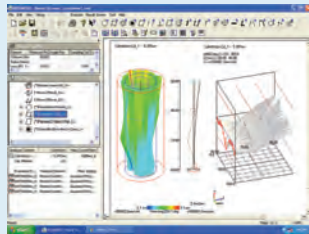
# Roundtest RA-2200CNC

## Series 211 - High-precision Roundness/Cylindricity Measuring System

- A CNC system that combines high accuracy with automatic CNC measurements to greatly improve productivity and efficiency.
- The turntable provides high rotational accuracy (radial 0.02+3.5H/10000  $\mu\text{m}$  ; axial 0.02+3.5X/10000  $\mu\text{m}$ ), enabling the system to measure flatness and other characteristics, in addition to roundness/cylindricity, at a level that suits any application.

### Specifications

<b>Turntable</b>	Rotational accuracy radial : (0.02+3.5H/10000) $\mu\text{m}$ Rotational accuracy axial : (0.02+3.5X/10000) $\mu\text{m}$ H : Probing height (mm) X : Distance from turntable axis (mm) Rotational speed : 2, 4, 6, 10 rpm Effective turntable diameter : 235 mm Centering range : $\pm 3$ mm (with AAT function) Levelling range : $\pm 1^\circ$ (with AAT function) Max. probing diameter : 256 mm Max. workpiece diameter : 580 mm Max. turntable loading : 30 kg Traverse speed : Max. 50 mm/s (Measurement : 0,5/1,0/2,0/5,0 mm/s) Max. probing depth with standard stylus : 26 mm for $\phi 12.7$ or more, 104 mm for $\phi 32$ or more
<b>Vertical column (Z-axis)</b>	Straightness: 0,7 $\mu\text{m}/150$ mm Horizontal to turntable axis: 1,0 $\mu\text{m}/150$ mm (reference generatrix) Traverse range: 175 mm (from turntable axis -25 mm to 150 mm) Travel speed: Max. 30 mm/s (Measurement 0.5, 1.0, 2.0, 5.0 mm/s)
<b>Horizontal arm (X-axis)</b>	Measuring force : 40 mN Stylus : $\phi 1.6$ mm tungsten carbide Measuring range (standard) : $\pm 400$ $\mu\text{m}$ , $\pm 40$ $\mu\text{m}$ , $\pm 4$ $\mu\text{m}$ Measuring range (follow) : $\pm 5$ mm Air pressure : 0.39 MPa Air consumption : 30L/min. (standard state)
<b>Probe and Stylus</b>	
<b>Air supply</b>	
<b>Power supply</b>	100-240 VAC, 50/60 Hz
<b>Mass</b>	180 kg (standard column), 200 kg (high column)

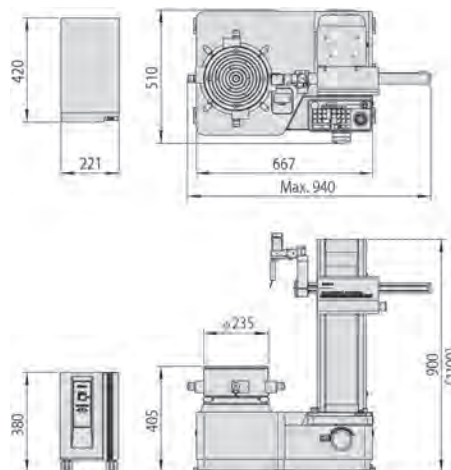


**Roundpak**  
The latest roundness/cylindrical form analysis program



RA-2200 CNC + vibration isolator with side table

No.	Order No. UK only	Column travel
211-517D	211-517E	300 mm (standard column)
211-518D	211-518E	500 mm (high column)



# Roundtest RA-H5200CNC

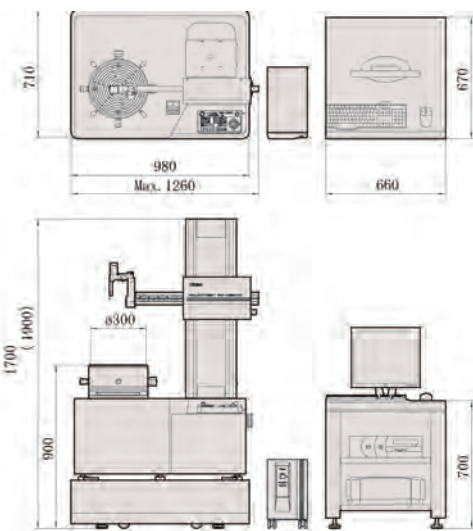
## Series 211 - High-precision Roundness/Cylindricity Measuring System

- A CNC system that combines high accuracy with automatic CNC measurements to greatly improve productivity and efficiency.
- Automatic orientation control for the detector unit enables this system to automatically execute high-speed, operator-less measurements.
- Available with the standard column specification (Z-axis traverse of 350 mm) or an extended specification (Z-axis traverse of 550 mm) for handling taller workpieces.



RA-H5200CNC  
with personal computer system and software

No.	Model	Order No. UK only	Column travel Z-axis	Straightness ( $\lambda c$ 2,5 mm)	Parallelism to turntable axis	Max. probing height ID/OD	Mass main unit
211-533D	RA-H5200CNC Standard	211-533E	350 mm	0,05 $\mu\text{m}/100$ mm 0,14 $\mu\text{m}/350$ mm	0,2 $\mu\text{m}/350$ mm	350 mm	650 kg
211-534D	RA-H5200CNC High	211-534E	550 mm	0,05 $\mu\text{m}/100$ mm 0,2 $\mu\text{m}/550$ mm	0,32 $\mu\text{m}/550$ mm	550 mm	670 kg

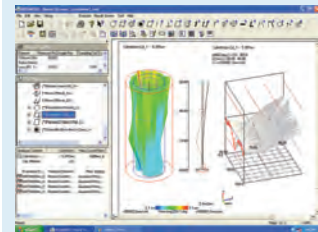


Dimensions

## Specifications

<b>Turntable</b>	Rotational accuracy radial : (0.02+3.5H/10000) $\mu\text{m}$ Rotational accuracy axial : (0.02+3.5X/10000) $\mu\text{m}$ H : Probing height (mm) X : Distance from rotational turntable axis (mm) Rotational speed : 2, 4, 6, 10 rpm (Auto centering 20 rpm) Effective turntable diameter : 300 mm Centering range : $\pm 5$ mm (with AAT function) Levelling range : $\pm 1^\circ$ (with AAT function) Max. probing diameter : 356 mm Max. workpiece diameter : 680 mm Max. turntable loading : 80 kg (Auto centering 65 kg)
<b>Vertical column (Z-axis)</b>	Traverse speed : Max. 60 mm/s (Measurement : 0,5/1,0/2,0/5,0 mm/s) Max. probing depth with standard stylus : 104 mm for $\phi 32$ or more, 26 mm for $\phi 12,7$ or more
<b>Horizontal arm (X-axis)</b>	Straightness: 0,4 $\mu\text{m}/200$ mm Horizontal to rotation turntable axis: 0,5 $\mu\text{m}/200$ mm (reference generatrix) Traverse range: 225 mm (including 25 mm past the turntable axis) Travel speed : Max. 50 mm/s (Measurement 0,5, 1,0, 2,0, 5,0 mm/s)
<b>Detector</b>	Measuring force : approx. 40 mN Measuring range : standard $\pm 400$ $\mu\text{m}/\pm 40$ $\mu\text{m}/\pm 4$ $\mu\text{m}$ , follow : $\pm 5$ mm Tip shape, material : $\phi 1,6$ mm tungsten carbide ball Other : Collision function, measuring direction : 1
<b>Air supply</b>	Air pressure : 0.39 MPa Air consumption : 45L/min. (standard state)
<b>Power supply</b>	100-240V AC, 50/60 Hz
<b>Mass</b>	Vibration isolator : 170 kg

**Optional Accessories** Refer to page Accessories



**Roundpak**  
The latest roundness/cylindrical form analysis program

# Optional Styli for Roundtest

Interchangeable styli for RA-10, RA-120/120P, RA-220, RA-1400, RA-1600, RA-2200, RA-H5200

## Standard accessories

No.	Description
12AAL021	Styli standard type for RA

## Optional accessories

No.	Description
12AAL022	Styli for notch
12AAL023	Styli for deep groove
12AAL024	Styli for corner
12AAL025	Styli for cutter mark
12AAL026	Styli for small hole (ø0,8)
12AAL027	Styli for small hole
12AAL028	Styli for small hole (ø1,6)
12AAL029	Styli for extra small hole (Depth : 3 mm)
12AAL030	Styli ø1.6 mm ball
12AAL031	Styli for disc
12AAL032	Styli for crank (tip: ø0,5mm)
12AAL033	Styli for crank (tip: ø1 mm)
12AAL034	Styli for flat surface
12AAL035	Styli for 2x-long type *1
12AAL036	Styli for 2X-long type notch *1
12AAL037	Styli for 2X-long type deep groove *1
12AAL038	Styli for 2X-long type corner *1
12AAL039	Styli for 2X-long type cutter mark *1
12AAL040	Styli for 2X-long type small hole *1
12AAL041	Styli for 3X-long type small hole *2
12AAL042	Styli for 3X-long type deep groove *2
12AAL043	Stylus shank
12AAL044	Stylus shank (standard groove)
12AAL045	Stylus shank (2X-long groove)

\*1 Not available for RA-120, RA-120P and RA-220

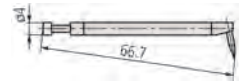
\*2 Measuring is only possible in the vertical direction



12AAL021 - Standard type  
ø 1,6mm tungsten carbide



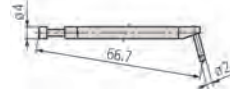
12AAL022 - Notch  
ø 3 mm tungsten carbide



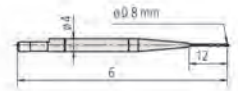
12AAL023 - Deep groove  
0,25 mm radius sapphire



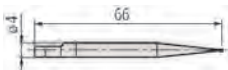
12AAL024 - Corner  
0,25 mm radius sapphire



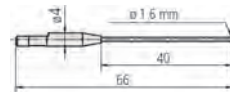
12AAL025 - Cutter mark  
15 mm radius tungsten carbide



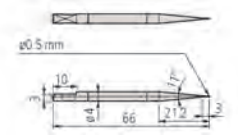
12AAL026 - Small hole (ø0.8)  
ø 0,8 mm tungsten carbide



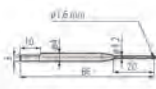
12AAL027 - Small hole  
ø 1 mm tungsten carbide



12AAL028 - Small hole (ø1.6)  
ø 1,6 mm tungsten carbide



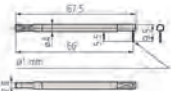
12AAL029 - Extra small hole (Depth :  
3 mm)  
ø 0,5 mm tungsten carbide



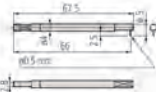
12AAL030 - ø 1,6 mm ball  
ø 1,6 mm tungsten carbide



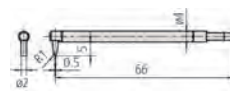
12AAL031 - Disc  
ø 12 mm



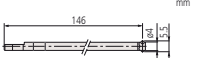
12AAL033 - Crank (tip: ø 1 mm)  
ø 1 mm tungsten carbide, Depth 5,5  
mm



12AAL032 - Crank (tip : ø0.5 mm)  
ø 0,5 mm tungsten carbide, Depth :  
2,5 mm



12AAL034 - Flat surface  
tungsten carbide



12AAL035 - 2X-long type  
ø 1,6 mm tungsten carbide



12AAL036 - 2X-long type notch  
ø 3 mm tungsten carbide



12AAL037 - 2X-long type deep  
groove  
ø 0,25 mm radius sapphire



12AAL038 - 2X-long type corner  
ø 1 mm tungsten carbide / sapphire



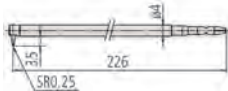
12AAL039 - 2X-long type cutter mark  
15 mm radius tungsten carbide



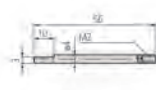
12AAL040 - 2X-long type small  
hole  
ø 1 mm tungsten carbide



12AAL041 - 3X-long type  
ø 1,6 mm tungsten carbide



12AAL042 - 3X-long type deep groove  
SR0,25 mm sapphire



12AAL043 - Stylus shank  
For mounting CMM stylus  
(mounting thread M2)



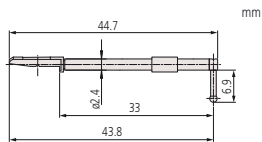
12AAL044 - (standard groove)  
For mounting CMM stylus  
(mounting thread M2)



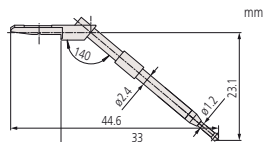
12AAL045 - Stylus shank (2X-long  
groove)  
For mounting CMM stylus  
(mounting thread M2)

# Optional Styli for Roundtest

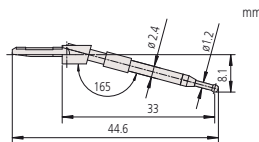
Interchangeable styli for RA-2200CNC, RA-H5200CNC



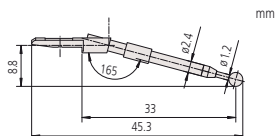
**12AAE310 - Groove**  
ø 1,6 mm tungsten carbide



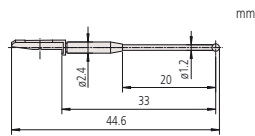
**12AAE302 - Flat surface**  
ø 1,6 mm tungsten carbide



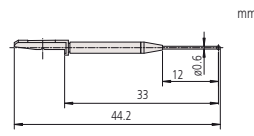
**12AAE301 - General purpose**  
ø 1,6 mm tungsten carbide



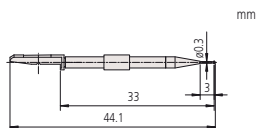
**12AAE309 - Notch**  
ø 3 mm tungsten carbide



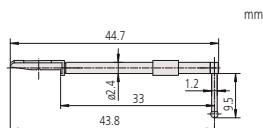
**12AAE303 - ø 1,6 mm ball**  
ø 1,6 mm tungsten carbide



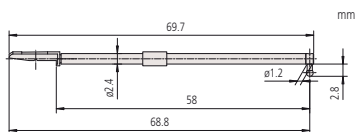
**12AAE304 - ø 0,8 mm ball**  
ø 0,8 mm tungsten carbide



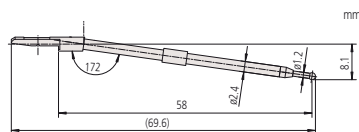
**12AAE305 - ø 0,5 mm ball**  
ø 0,5 mm tungsten carbide



**12AAE308 - Deep groove**  
ø 1,6 mm tungsten carbide



**12AAE306 - Deep hole A**  
ø 1,6 mm tungsten carbide



**12AAE307 - Deep hole B**  
ø 1,6 mm tungsten carbide



Cutter mark



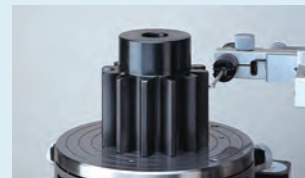
Corner



Small hole

## Optional accessories

No.	Description
12AAE301	Styli general purpose for RA-CNC
12AAE302	Styli flat surface for RA-CNC
12AAE303	Styli ball ø 1,6 mm for RA-CNC
12AAE304	Styli ball ø 0,8 mm for RA-CNC
12AAE305	Styli ball ø 0,5 mm RA-CNC
12AAE306	Styli deep hole A RA-CNC
12AAE307	Styli deep hole B RA-CNC
12AAE308	Styli deep groove RA-CNC
12AAE309	Styli notch for RA-CNC
12AAE310	Styli groove for RA-CNC



Notched workpiece measurement



Flatness measurement



ID measurement



# Optional Accessories for Roundtest

## Optional accessories for Roundtest and Roundtest Extreme

### Centering chuck (ring operated)

Suitable for holding small parts with easy-to-operate knurled-ring clamping

No.	Holding capacity	External dimensions	Mass
211-032	Internal jaw: ID = $\varnothing$ 16 - 69 mm External jaw: OD = $\varnothing$ 1 - 79 mm	$\varnothing$ 118 x 41 mm	1.2 kg

### Micro-chuck

Used for clamping a workpiece (less than  $\varnothing$ 1 mm) that the centering chuck cannot handle

No.	Holding capacity	External dimensions	Mass
211-031	$\varnothing$ 0,1 - 1,5 mm	$\varnothing$ 118 x 48,5 mm	0.6 kg

### Centering chuck (key operated)

Suitable for holding longer parts and those requiring a relatively powerful clamp

No.	Holding capacity	External dimensions	Mass
211-014	Internal jaws: OD = $\varnothing$ 1 - 35 mm, ID = $\varnothing$ 25 - 68 mm External jaws: OD = $\varnothing$ 35 - 78 mm	$\varnothing$ 157 x 70,6 mm	3.8 kg

### Magnification calibration gauge

Used for normalizing detector magnification by calibrating detector travel against displacement of a micrometer spindle

No.	Max. calibration range	Graduation	Mass
211-045	400 $\mu$ m	0,2 $\mu$ m	4 kg

### Vibration isolator and Vibration isolator stand

No.	Description	Vibration isolation method	External dimensions (WxDxH)
178-025	For RA-2200 and RA-2200CNC	Air suspension, diaphragm isolation system	750x550x59 mm
178-024	Stand for RA-2200 and RA-2200CNC		

### Auxiliary workpiece stand

No.	Description
356038	Used for measuring a workpiece whose diameter is 40 mm or less and whose height is 20 mm or less

### Cylindrical square

Used for checking and aligning turntable axis parallel to the Z-axis column

No.	Squareness	Straightness	Cylindricity	Roundness	Mass
350850	3 $\mu$ m	1 $\mu$ m	2 $\mu$ m	0,5 $\mu$ m	7.5 kg

### Magnification checking kit

A combination of gauge blocks and an optical flat

No.	Description
997090	Standard accessory for RA-H5200 and RA-H5200CNC

### Origin-point gauge

A gauge for zero setting of the R-axis and Z-axis

No.	Description
998382	Standard accessory for RA-2200 and RA-H5200



211-032



211-031



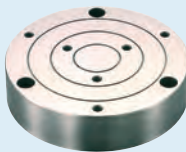
211-014



211-045



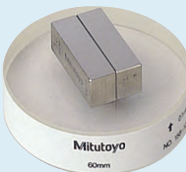
178-025



356038



350850



997090



998382

# Formtracer SV-C3100 / SV-C4100

## Series 525 - Surface Roughness / Contour Measuring System

- Drastically increased drive speed further reduces total measurement time.
- Mitutoyo has adopted highly rigid ceramic guides, combining small secular change and remarkable resistance to abrasion, to maintain the traverse straightness specification for an extended period of time.
- The drive unit and column are equipped with highly accurate linear encoders (ABS type on the Z2-axis). This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurement of parts which are difficult to position.



SV-C3100S4  
with personal computer system and software

**Surface Roughness Measurement**  
Compliant with JIS '82/'94/'01, ISO, ANSI, DIN, VDA, and other international surface roughness standards.



Using Y-axis Table



**Contour Drive Measurement**  
The contour drive unit of SV-C4100 series is equipped with a Laser Hologage detector giving excellent narrow/wide range accuracy and resolution in the Z1-axis.



Using Rotary Table 01



Using Rotary Table 02

## Specifications

### Common

Base size (WxH) 600 x 450 mm (S/H model) or 1000 x 450 mm (W model)

### Contour measurement

#### X-axis

Measuring range 100 mm or 200 mm  
Resolution 0,05  $\mu$ m  
Scale Reflective-type linear encoder  
Drive speed 0 - 80 mm/s and manual  
Measuring speed 0,02 - 5 mm/s / Forward/backward  
Traverse straightness 0,8  $\mu$ m/100 mm, 2  $\mu$ m/200 mm (with the X-axis in horizontal orientation)

Linear displacement accuracy (at 20°C)  $\pm(1+0.01L)$   $\mu$ m (SV-C3100S4, H4, W4)  
 $\pm(0.8+0.01L)$   $\mu$ m (SV-C4100S4, H4, W4)  
 $\pm(1+0.02L)$   $\mu$ m (SV-C3100S8, H8, W8)  
 $\pm(0.8+0.02L)$   $\mu$ m (SV-C4100S8, H8, W8)

L=Drive length (mm)  
Inclining range  $\pm 45^\circ$  (with X-axis inclination unit)

#### Z2-axis (column)

Vertical travel 300 mm or 500 mm  
Resolution 1  $\mu$ m  
Scale ABSOLUTE linear encoder  
Drive speed 0 - 20 mm/s and manual

#### Z1-axis (detector unit)

Measuring range  $\pm 25$  mm  
Resolution 0,2  $\mu$ m (SV-C3100), 0,05  $\mu$ m (SV-C4100)

Scale Linear encoder (SV-C3100)  
Laser Hologage (SV-C4100)  
Linear displacement accuracy (at 20°C)  $\pm(2+14H/100)$   $\mu$ m (SV-C3100)  
 $\pm(0.8+10.5H/25)$   $\mu$ m (SV-C4100)  
H = Measurement height from the horizontal position (mm)  
Arc movement

#### Stylus up/down operation

Stylus orientation Upward/downward  
Measuring force 30 mN  
Traceable angle Ascending :  $77^\circ$ , descending :  $87^\circ$   
Stylus tip Radius : 25  $\mu$ m, carbide tip

### Surface roughness

#### X1-axis

Measuring range 100 mm or 200 mm  
Resolution 0,05  $\mu$ m  
Scale Linear encoder  
Drive speed 0 - 80 mm/s and manual  
Traverse direction Backward  
Traverse straightness (0.05+1L/1000)  $\mu$ m (S4, H4, W4)  
0,5  $\mu$ m/200 mm (S8, H8, W8)

#### Z2-axis (column)

Vertical travel 300 mm or 500 mm  
Resolution 1  $\mu$ m  
Scale ABSOLUTE linear encoder  
Drive speed 0 - 20 mm/s and manual

#### Detector

Range/resolution 800/0,01  $\mu$ m, 80/0,001  $\mu$ m, 8/0,0001  $\mu$ m (up to 2400  $\mu$ m with an optional stylus)  
Measuring force 4 mN or 0.75 mN (low force type)  
Stylus tip Diamond,  $90^\circ$  / 5  $\mu$ mR ( $60^\circ$  / 2  $\mu$ mR low force type)  
Type Differential inductance

# Formtracer SV-C3100 / SV-C4100

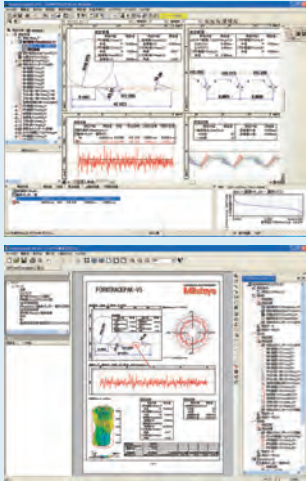
## Series 525 - Formtracer SV-C3100 / SV-C4100

### Specifications

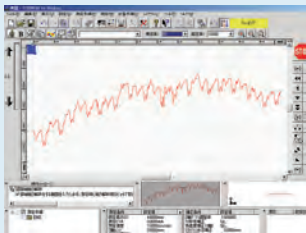
#### Software FORMTRACEPAK V5

Allows control of the optional motor-driven Y-axis table and rotary table for efficient measurement automation.

Contour evaluation can be performed using analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. An original inspection certificate can be created by setting the print format to selected requirements.



Contour Measurement screen



Surface Roughness Measurement screen



SV-C3100/4100 brochure on request

#### Metric SV-C3100

No.	Model	Detector 0.75 mN	Detector 4 mN	Z2-axis 300 mm	Z2-axis 500 mm	X-axis 100 mm	X-axis 200 mm
525-421D-1	SV-C3100S4	●		●		●	
525-421D-2*	"		●	●		●	
525-422D-1	SV-C3100H4	●			●	●	
525-422D-2*	"		●		●	●	
525-423D-1	SV-C3100W4	●			●	●	
525-423D-2*	"		●		●	●	
525-426D-1*	SV-C3100S8	●		●			●
525-426D-2*	"		●	●			●
525-427D-1	SV-C3100H8	●			●	●	●
525-427D-2*	"		●		●	●	●
525-428D-1*	SV-C3100W8	●			●	●	●
525-428D-2*	"		●		●	●	●

#### Metric SV-C4100

For Contour Measurement with Z1-axis, high accuracy :  $\pm(0.8+0.5HI/25)$   $\mu\text{m}$

No.	Model	Detector 0.75 mN	Detector 4 mN	Z2-axis 300 mm	Z2-axis 500 mm	X-axis 100 mm	X-axis 200 mm
525-461D-1*	SV-C4100S4	●		●		●	
525-461D-2*	"		●	●		●	
525-462D-1	SV-C4100H4	●			●	●	
525-462D-2*	"		●		●	●	
525-463D-1*	SV-C4100W4	●			●	●	
525-463D-2*	"		●		●	●	
525-466D-1*	SV-C4100S8	●		●			●
525-466D-2*	"		●	●			●
525-467D-1	SV-C4100H8	●			●	●	●
525-467D-2*	"		●		●	●	●
525-468D-1*	SV-C4100W8	●			●	●	●
525-468D-2*	"		●		●	●	●

#### Inch SV-C3100 model UK only

No.	Model	Detector 0.75 mN	Detector 4 mN	Z2-axis 300 mm	Z2-axis 500 mm	X-axis 100 mm	X-axis 200 mm
525-431E-1*	SV-C3100S4	●		●		●	
525-431E-2*	"		●	●		●	
525-432E-1*	SV-C3100H4	●			●	●	
525-432E-2*	"		●		●	●	
525-433E-1*	SV-C3100W4	●			●	●	
525-433E-2*	"		●		●	●	
525-436E-1*	SV-C3100S8	●		●			●
525-436E-2*	"		●	●			●
525-437E-1*	SV-C3100H8	●			●	●	●
525-437E-2*	"		●		●	●	●
525-438E-1*	SV-C3100W8	●			●	●	●
525-438E-2*	"		●		●	●	●

#### Inch SV-C4100 model UK only

For Contour Measurement with Z1-axis, high accuracy :  $\pm(0.8+0.5HI/25)$   $\mu\text{m}$

No.	Model	Detector 0.75 mN	Detector 4 mN	Z2-axis 300 mm	Z2-axis 500 mm	X-axis 100 mm	X-axis 200 mm
525-471E-1*	SV-C4100S4	●		●		●	
525-471E-2*	"		●	●		●	
525-472E-1*	SV-C4100H4	●			●	●	
525-472E-2*	"		●		●	●	
525-473E-1*	SV-C4100W4	●			●	●	
525-473E-2*	"		●		●	●	
525-476E-1*	SV-C4100S8	●		●			●
525-476E-2*	"		●	●			●
525-477E-1*	SV-C4100H8	●			●	●	●
525-477E-2*	"		●		●	●	●
525-478E-1*	SV-C4100W8	●			●	●	●
525-478E-2*	"		●		●	●	●

# Formtracer Extreme SV-C3000CNC / SV-C4000CNC

## Series 525 - Surface Roughness / Form Measuring Instrument

- High-accuracy CNC Surface Roughness/Form Measuring Instrument that allows measurement of surface roughness and form/contour with one unit.
- Each axis has the maximum drive speed of 200 mm/s, which permits high-speed positioning that has the potential to produce a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models with the  $\alpha$ -axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the detector unit.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple-workpieces, etc., through positioning in the Y-axis direction.
- The contour drive unit of SV-C4000CNC series is equipped with a Laser Hologage detector giving excellent narrow/wide range accuracy and resolution in the Z1-axis.
- Enables inclined plane measurements through 2-axis simultaneous control in the X and Y directions.
- When the detector for form/contour measurement is replaced with that for surface roughness measurement, or vice versa, it is a simple, one-touch replacement without re-routing of the connecting cables.
- Since the Z1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis software is via USB.



SV-C3000CNC  
with personal computer system and software



Surface Roughness drive unit

Contour drive unit

## Specifications

### Common

Base size (WxH)	750 x 600 mm
Base material	Granite
Mass	240 kg (250 kg high column type)

### Contour Measurement

#### X-axis

Measuring range	200 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)

#### Measuring speed

Traverse straightness	2 $\mu$ m/200 mm
Linear displacement accuracy (at 20°C)	$\pm(1+4/200L)$ $\mu$ m
Inclining range	-45° to +10°
Resolution	0.000225°
Inclination speed	6°/s

#### Z2-axis (column)

Vertical travel	300 mm or 500 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)

#### Z1-axis (detector unit)

Measuring range	$\pm 25$ mm
Resolution	0,2 $\mu$ m (SV-C3000CNC) 0,05 $\mu$ m (SV-C4000CNC)
Scale	Linear encoder (SV-C3000CNC) Laser Hologage (SV-C4000CNC)
Linear displacement accuracy (at 20°C)	$\pm(2+14H/100)$ $\mu$ m (SV-C3000CNC) $\pm(0.8+10.5H/25)$ $\mu$ m (SV-C4000CNC)
Stylus up/down operation	Arc movement
Stylus orientation	Downward
Measuring force	30 mN
Traceable angle	Ascending 77°, descending 87° (using the standard stylus provided and depending on the surface roughness)

#### Stylus tip

#### X1-axis

Measuring range	200 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)

#### Measuring speed

Traverse direction	Backward
Traverse straightness	0,5 $\mu$ m / 200 mm

#### $\alpha$ -axis

Inclination angle	-45° to +10°
Resolution	0.000225°
Inclination speed	6°/s

#### Z2-axis (column)

Vertical travel	300 mm or 500 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)

#### Detector

Range/resolution	<b>Optional</b> 800/0,01 $\mu$ m, 80/0,001 $\mu$ m, 8/0,0001 $\mu$ m (up to 2400 $\mu$ m with an optional stylus)
Measuring force	4 mN or 0.75 mN (low force type)
Stylus tip	Diamond, 90°/R5 $\mu$ m (60°/R2 $\mu$ m low force type)
Type	Differential inductance



# Formtracer Extreme SV-C3000CNC / SV-C4000CNC

## Series 525 - Surface Roughness/Form Measuring Instrument

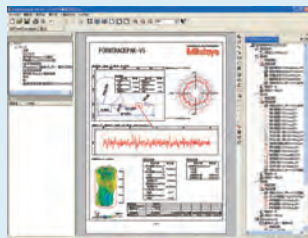
### Specifications

<b>Optional Accessories</b>	Vibration isolation stand
Mechanism	Diaphragm air spring
Natural frequency	2.5 - 3.5 Hz
Levelling	Automatic control with mechanical valves
Air supply pressure	0.4 Mpa
Max. loading capacity	350 kg
Dimensions (WxDxH)	1000 x 895 x 715 mm
Mass	280 kg
<b>Y-axis table unit</b>	
Measuring range	200 mm
Minimum reading	0,05 µm
Scale unit	Reflective-type linear encoder
Drive speed	200 mm/s (max. CNC) 0 - 60 mm/s (joystick)
Max. loading capacity	20 kg
Traverse straightness	0,5 µm / 200 mm
Linear displacement accuracy (at 20°C)	±(2+2L/100) µm, contour mode L : Dimension between two measured points (mm)
Table size	200 x 200 mm
Dimensions (WxDxH)	320 x 646 x 105 mm
Mass	35 kg

### Additional Specifications

#### Software FORMTRACEPAK V5

Allows control of the optional motor-driven Y-axis table and rotary table for efficient measurement automation. Contour evaluation can be performed using analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. An original inspection certificate can be created by setting the print format to selected requirements.



Formtracer brochure on request

### SV-C3000CNC

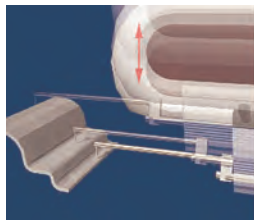
Model	SV-C3000CNC-1S	SV-C3000CNC-2S	SV-C3000CNC-3S	SV-C3000CNC-4S
No.	525-521-2*	525-522-2*	525-523-2*	525-524-2*
Z2-axis vertical travel	300 mm	300 mm	300 mm	300 mm
Y-axis table unit	-	-	Installed	Installed
α-axis unit	-	Installed	-	Installed

Model	SV-C3000CNC-1H	SV-C3000CNC-2H	SV-C3000CNC-3H	SV-C3000CNC-4H
No.	525-541-2*	525-542-2*	525-543-2*	525-544-2
Z2-axis vertical travel	500 mm	500 mm	500 mm	500 mm
Y-axis table unit	-	-	Installed	Installed
α-axis unit	-	Installed	-	Installed

### SV-C4000CNC

Model	SV-C4000CNC-1S	SV-C4000CNC-2S	SV-C4000CNC-3S	SV-C4000CNC-4S
No.	525-621-2*	525-622-2*	525-623-2*	525-624-2*
Z2-axis vertical travel	300 mm	300 mm	300 mm	300 mm
Y-axis table unit	-	-	Installed	Installed
α-axis unit	-	Installed	-	Installed

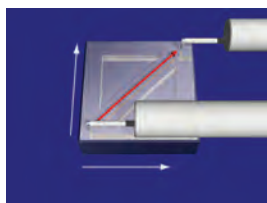
Model	SV-C4000CNC-1H	SV-C4000CNC-2H	SV-C4000CNC-3H	SV-C4000CNC-4H
No.	525-641-2*	525-642-2*	525-643-2*	525-644-2*
Z2-axis vertical travel	500 mm	500 mm	500 mm	500 mm
Y-axis table unit	-	-	Installed	Installed
α-axis unit	-	Installed	-	Installed



Z2-axis



Y-axis



X-axis



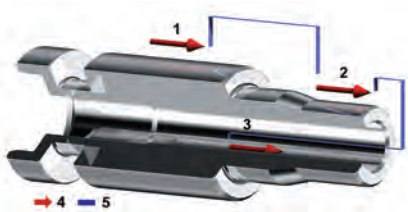
# Formtracer CS-3200

## Series 525 - Surface Roughness / Contour measuring System

- Featuring a wide measuring range and high-resolution detector, many kinds of measurement from contours to surface roughness are covered. Single-unit measurement reduces setup labour and measurement time.
- Drastically increased drive speed (X-axis : 80 mm/s, Z2-axis : 20 mm/s) further reduces total measurement time.



CS-3200S4  
with personal computer system and software



- 1: Outside diameter
- 2: Outside diameter
- 3: Inside diameter
- 4: Measurement element
- 5: Positioning element

Continuous measurement example (Outside diameter 1 - Outside diameter 2 - Inside diameter)

The drive unit (X-axis) and column (Z2-axis) are equipped with high-accuracy linear scales (ABS type) enabling fully automatic measurement combining vertical and horizontal movement. This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurements of parts which are difficult to position.



Measuring range in Z1-axis (height) direction is drastically increased from 5 mm to 50 mm when contour detector units 3000\*1 or 4000\*1 are specified. (Both are factory-fitted options.)

\*1 : Styli for CS-3200 cannot be used. Styli for contour measuring instruments CV-3100/4100 series can be used. Supports contour measurement only.

## Specifications

### Common

Base size (WxH)	600 x 450 mm
Base material	Granite
Dimensions (WxDxH)	756 x 482 x 966 mm (main unit)
Mass	140 kg (main unit)

### X-axis

Measuring range	100 mm
Resolution	0,05 µm
Drive speed	0 - 80 mm/s and manual
Measuring speed	Surface : 0,02/0,05/0,1/0,2 mm/s Contour : 0,02/0,05/0,1/0,2/0,5/1 mm/s
Measuring direction	Forward/backward

Traverse straightness	0,2 µm/100 mm (with the X-axis in horizontal orientation)
Linear displacement accuracy (at 20°C)	±(0.8+0.01L) µm
Inclining range	L : Drive length (mm)

### Z1-axis

Measuring range	5 mm
Resolution	80 nm (5 mm range) 8 nm (0,5 mm range) 0,8 nm (0,05 mm range)
Linear displacement accuracy (at 20°C)	±(1.5+12HI/100) µm

Stylus orientation	Downward
Measuring force	0.75 mN
Traceable angle	±65° (using the standard chisel-cut stylus and depending on the surface roughness)

Stylus tip (standard)	Angle : 60°, radius : 2 µm
Stylus tip (cone)	Diamond tip Angle : 30°, radius : 25 µm Sapphire tip

### Z2-axis (column)

Column travel	300 mm
Resolution	1 µm
Drive speed	0 - 20 mm/s and manual

# Formtracer CS-3200

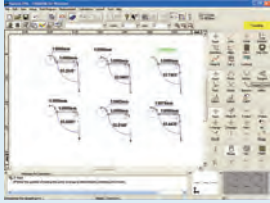
Series 525 - Surface Roughness / Contour measuring System

Specifications and Styli

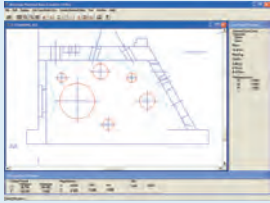
Model	CS-3200S4
No.	525-401D* 525-411E*
X1-axis measuring range	100 mm
Z2-axis vertical travel	300 mm
Note	UK only for 525-411E



Measuring instrument control



Contour analysis



Design data creation (CAD file import)



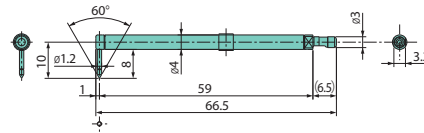
Contour verification



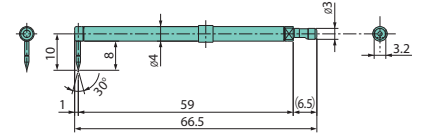
Inspection certificate creation



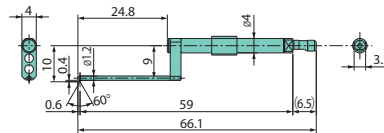
Formtracer brochure on request



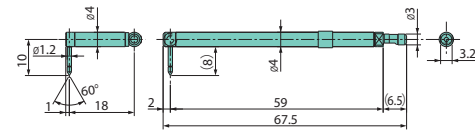
12AAD554  
Standard stylus



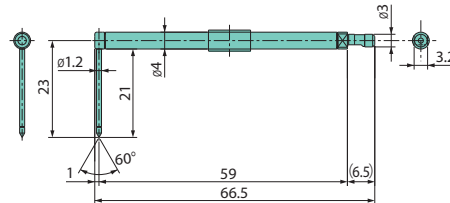
12AAD552  
Cone stylus



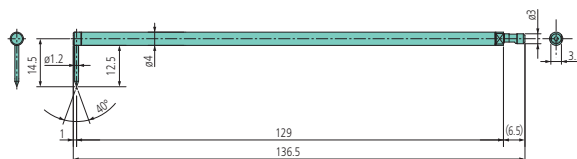
12AAD556  
Small hole stylus



12AAD558  
Eccentric type stylus



12AAD560  
Deep groove stylus



12AAD562  
2x-long stylus



# Formtracer Extreme CS-5000CNC / CS-H5000CNC

## Series 525 - CNC Form Measuring Instruments

- High-accuracy stylus type CNC Surface Measuring Instrument that allows simultaneous measurement of surface roughness and form/contour.
- The X1 and Z2-axis have maximum drive speeds of 40 mm/s and 200 mm/s, respectively. This permits high-speed positioning that has the potential to produce a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- A Mitutoyo Laser Hologscale is incorporated in the X1- and Z1-axes so that high resolution (X1-axis : 6.25 nm, Z1-axis : 4 nm / 8 nm) is achieved and batch measurement of form/contour and surface roughness can be made.
- The active control method is employed for the Z1-axis detector to implement a wide-range measurement capability wherein the variation in dynamic measuring force is restricted.
- Since the Z1-axis detector incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or jig.
- For models with the  $\alpha$  axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power tilting the X1-axis.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- Supplied with the easy-to-operate Remote Box, on which the user can make any movement by selecting the required axis which is easily identified by the icon on the key top.
- Uses USB for communicating with the Data Processing / Analysis Unit (optional).



CS-H5000CNC  
with personal computer system and software



Wide range detector employing active control technology

## Specifications

<b>X1-axis</b>	
Measuring range	200 mm
Resolution	0,00625 $\mu$ m
Scale	Laser Hologscale
Drive speed	Max. 40 mm/s (CNC mode) 0 - 40 mm/s (joystick control mode)
Measuring speed	0,02 - 0,2 mm/s (surface) 0,02 - 2 mm/s (form/contour)
Measuring direction	Forward/backward
Traverse straightness	<b>CS-5000CNC</b> : (0.1+0.0015L) $\mu$ m with standard stylus (0.2+0.0015L) $\mu$ m with 2X-long stylus <b>CS-H5000CNC</b> : (0.05+0.0003L) $\mu$ m with standard stylus (0.1+0.0015L) $\mu$ m with 2X-long stylus
Linear displacement accuracy (at 20°C)	<b>CS-5000CNC</b> : $\pm(0.3+0.002L)$ $\mu$ m <b>CS-H5000CNC</b> : $\pm(0.16+0.001L)$ $\mu$ m L : Measured length (mm)
<b>Z1-axis</b>	
Measuring range	12 mm (with standard stylus), 24 mm (with 2X-long stylus)
Resolution	<b>CS-5000</b> : 0,004 $\mu$ m (with standard stylus) 0,008 $\mu$ m (with 2X-long stylus) <b>CS-H5000</b> : 0,001 $\mu$ m (with standard stylus), 0,002 $\mu$ m (with 2X-long stylus)
Linear displacement accuracy (at 20°C)	<b>CS-5000</b> : $\pm(0.3+10.02H)$ $\mu$ m <b>CS-H5000</b> : $\pm(0.07+10.02H)$ $\mu$ m H : Measured height (mm)
Stylus up/down operation	Arc movement
Scale	Laser Hologscale
Measuring force	4 mN (with standard stylus) 0.75 mN (with 2X-long stylus)
Traceable angle	60° ascending, 60° descending (depending on the workpiece surface condition)
Stylus tip (ball stylus)	Radius : 5 $\mu$ m, angle : 40°, diamond (Radius : 0,25 mm, sapphire)
Stylus orientation	Downward
<b>Z2-axis (column)</b>	
Measuring range	300 mm
Resolution	0,05 $\mu$ m
Scale	Reflective-type linear encoder
Drive speed	Max. 200 mm/s (CNC mode) 0 - 50 mm/s (joystick control mode)
Base size (WxD)	750 x 600 mm
Base material	Granite
<b>Y-axis</b>	
Measuring range	200 mm
Resolution	0,05 $\mu$ m
Drive speed	Max. 200 mm/s (CNC mode) 0 - 50 mm/s (joystick control mode)
Max. table loading allowable	20 kg
Traverse straightness	0,5 $\mu$ m/200 mm
Linear displacement accuracy (at 20°C)	$\pm(2+2L/200)$ $\mu$ m
<b>Congestion</b>	
Dimensions (WxDxH)	800 x 620 x 1000 mm 800 x 620 x 120 mm high column type
Mass	240 kg 250 kg high column type



# Formtracer Extreme CS-5000CNC / CS-H5000CNC

## Series 525 - CNC Form Measuring Instruments

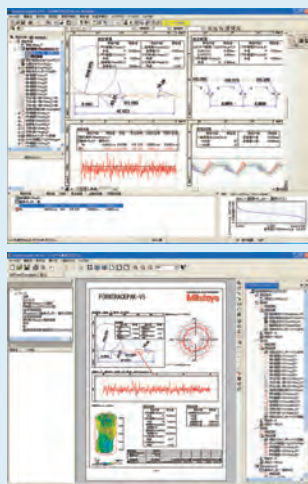
### Specifications and Styli

#### Specifications

##### Software FORMTRACEPAK V5

Allows control of the optional motor-driven Y-axis table and rotary table for efficient measurement automation.

Contour evaluation can be performed using analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. An original inspection certificate can be created by setting the print format to selected requirements.



Preview



ASPHERICALPAK  
Aspherical lens analysis program

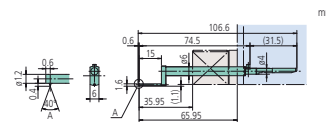
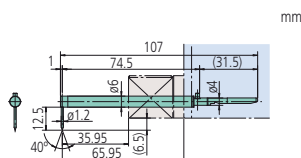
#### CS-5000CNC

Model	CS-5000CNC-1S	CS-5000CNC-2S	CS-5000CNC-3S	CS-5000CNC-4S
No.	525-721-2*	525-722-2*	525-723-2*	525-724-2
Z2-axis vertical travel	300 mm	300 mm	300 mm	300 mm
Y-axis table unit	-	-	Installed	Installed
$\alpha$ -axis unit	-	Installed	-	Installed

Model	CS-5000CNC-1H	CS-5000CNC-2H	CS-5000CNC-3H	CS-5000CNC-4H
No.	525-741-2*	525-742-2*	525-743-2*	525-744-2*
Z2-axis vertical travel	500 mm	500 mm	500 mm	500 mm
Y-axis table unit	-	-	Installed	Installed
$\alpha$ -axis unit	-	Installed	-	Installed

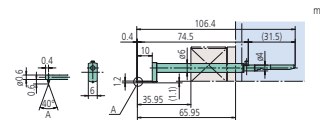
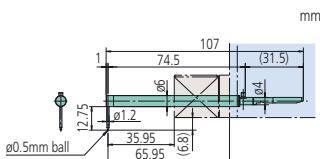
#### CS-H5000CNC

Model	CS-H5000CNC-1S	CS-H5000CNC-2S
No.	525-761-2*	525-763-2*
Z2-axis vertical travel	300 mm	300 mm
Y-axis table unit	-	Installed
$\alpha$ -axis unit	-	-



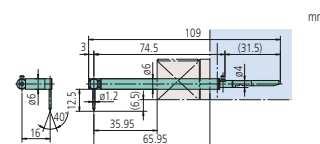
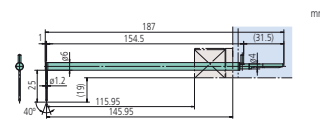
12AAD651 : Standard-length stylus for small hole

12AAD543 : Standard-length stylus (radius 5  $\mu$ m)  
12AAJ037 : For CS-H5000CNC



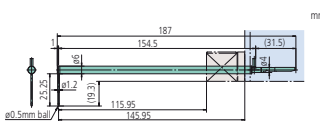
12AAD652 : Standard-length stylus for extra-small hole

12AAD544 : Standard-length ball stylus (radius 0,5 mm)

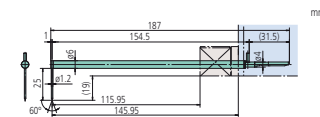


12AAD545 : Double-length stylus (radius 5  $\mu$ m)  
12AAJ039 : For CS-H5000CNC (radius 2  $\mu$ m, angle 60°)

12AAD653 : Standard-length eccentric stylus



12AAD546 : Double-length ball stylus



12AAJ041 : Double-length stylus (radius 2  $\mu$ m)