



Surface Texture • Contour Measuring Instrument Series >>>

Surface Roughness

**SURFCOM 1500DX**

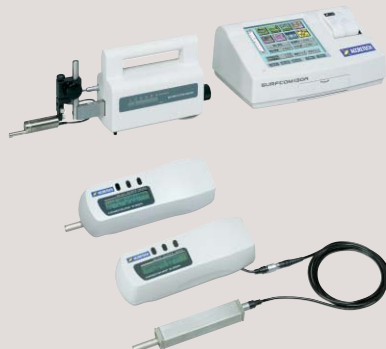
- Linear motor drive unit
- Achieves high-speed low-vibration roughness measurement

**SURFCOM 1400D**

- Superior GUI achieve easy operability.
- Flexible editing of analysis results.

**SURFCOM 480A**

- Color LCD touch panel with wide field of view features high clarity for smooth operation.
- Operator-friendly guidance function, customize function and other functions facilitate on-site measurements.

**SURFCOM 130A**

- LCD touch panel facilitates smooth operation.
- Guidance function displays operation procedures to novice users.

**HANDYSURF E-35A**

- Provision of measuring parameters complying with JIS, ISO, ASME and CNOMO standard and 7-language capability allows world-wide use.
- AI function provides easy operability.

Cross-Feed Device for Surface Texture • Contour Measuring Instruments

**Cross-Feed Device for Surface Texture & Contour Measuring Instruments**

- Ideal for measurement of heavy and long objects.
- Granite used for measuring stand.

Surface Roughness • Contour

**SURFCOM 3000A**

- Simultaneous measurement of surface roughness and contour profile.
- 0.005 μ m resolution and 12 mm measuring range.

**SURFCOM 2800E**

- PC compatibility provides superior operating ease.
- Provided with TIMS advanced integrated software.

**SURFCOM 1800D**

- PC compatibility provides superior operating ease.
- Provided with TIMS advanced integrated software.

LCD Glass Substrate Wave Measuring Instrument • Color PDP Profile Measuring Instrument

**SURFCOM 1400-LCD**

- Measuring range meets a variety of user needs.
- Capable of measuring a wide range of waves and other factors.

**SURFCOM 1400D-PDP**

- Dedicated color PDP profile measuring instrument.
- X-axis drive is motor operated.



ACCRETECH

TOKYO SEIMITSU

Contour

**CONTOURECORD 2600E**

- High-precision dimension and profile analysis.
- Built-in teaching and playback functions.

**CONTOURECORD 1700DX**

- Linear motor drive unit
- Superior operator-friendly functions

**CONTOURECORD 1600D**

- Provided with TIMS advanced integrated software.
- Multiple-profile overlapping/analysis function.

**CONTOURECORD 600D**

- Arc distortion correcting function.
- Upward/downward measurements.
- Superimposing evaluation.



Three-Dimensional Surface Texture Profile

**SURFCOM 3000A-3DF**

- High-performance integrated 3D surface roughness/profile measuring instrument.

**SURFCOM 2800E-3DF
SURFCOM 1800D-3DF**

- 3D surface roughness/profile measuring instrument.

**SURFCOM 1400D-3DF**

- High-performance integrated 3D surface roughness measuring instrument.



Nano Profile Scanner

**Nano Profile Scanner
NPS2100A**

- Evaluation of microscopic profile on nanometer level.
- Unique self-detection cantilever.
- Standard vibration isolation device.
- Achieves high-speed measurement.



Profile Scanners

**Non-Contact 2D Contour Measuring Instrument
PROFILE SCANNER PS100****Non-Contact 3D Contour Measuring Instrument
PROFILE SCANNER PS200**

- Non-contact measurement of contour.
- High-speed/wide-range measurement.





Integrated Surface Texture & Contour Measuring Instrument

SURFCOM 3000A



SURFCOM 3000A-DX



SURFCOM 3000A-STD

* Printer is option.

World's Highest Performance

The SURFCOM 3000A is an integrated surface texture and contour measuring instrument that sets a new paradigm for precision and performance. Resolution is $0.005 \mu\text{m}$ and the ratio of dynamic range to revolution is 2,400,000 : 1.

Analysis of Surface Texture/Profile in One Measurement

The 3000A is provided with ACCRETECH's TIMS integrated measuring system featuring high flexibility and expandability. This enables extremely efficient analysis of surface texture and contour profile in only one trace operation.

Easy to Operate

A variety of measuring assist functions are incorporated, including an AI function, trace display function, repeat function and auto calculation range expansion function. This makes the unit easy to operate even for beginners.

Highly Stable Double-Beam Path-Type Laser Interference Sensor (patented)

Our optical-fiber based laser interference measuring system has been applied to develop a highly stable double-beam path-type laser interference sensor with $0.005 \mu\text{m}$ resolution and a ratio of dynamic range to revolution of 2,400,000 : 1. This revolutionary system enables one-trace evaluation of contour profile and the minute hidden surface profile.



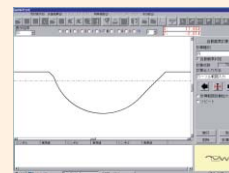
Wide Range • Automatic Measurement

The 3000A has a wide range of 200 mm in the horizontal direction and 12 mm in the vertical direction. It has a motor-driven tilting unit that can tilt 45° , and teaching/playback function that enables automation of everything from measurement to printout.



AI Function

Line, circle or other element can be automatically determined by simply specifying the profile analysis range. This is a representation of our commitment to making measurements as easy as possible.

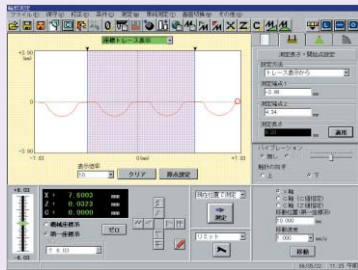


Measurement

Simply Set Measuring Length

The trace input method where the measuring range is specified after a manual trace is effective for precise micro-profile positioning. This also reflects our commitment to making measurements as easy as possible. The conventional method of setting the measuring distance from the starting point can also be used.

Trace display



Analysis

Dimension Line Display

The diameter, angle, pitch and other actual measured values can be entered onto the dimension lines on the measured result diagram. In addition, geometric deviation of roundness, straightness and other values, and surface texture can also be displayed.

Calculation Result/Design Value

Collation Function

This function enables one-glance OK/NG judgment for tolerance collation. The operator does not have to make a pass/fail judgment.

External Output Function

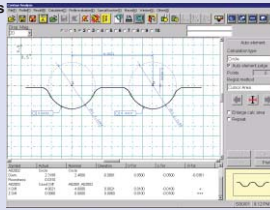
Measured results can be output as a CSV file. This CSV file can be read by a standard spreadsheet program.

Profile Evaluation

Best Fit Function

In order to minimize the error between the differences in the standard settings for the design values and measured values to be compared, the coordinate system with the minimum error between the design/measured values is obtained, and error collation is performed for the profile data at each point.

Measured results



Before best fit



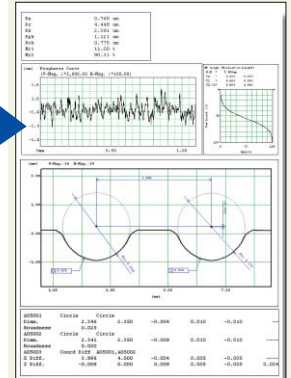
After best fit



Printing

Printout

The results of surface texture and contour profile analysis are output on a single inspection report.



Specifications

Model		SURFCOM 3000A	
		Surface Texture Evaluation	Contour Evaluation
Measuring range	Z axis (vertical)	12mm for 50mm arm, 24mm for 100mm arm	
	X axis (horizontal)	200 mm	
Accuracy	Z axis indication accuracy (vertical)	$\pm (0.3 + 2H / 100) \mu\text{m}$ (H: Measuring height [mm])	
	Resolution	5nm for 50mm arm, 10nm for 100mm arm	
	X axis indication accuracy (horizontal)	$\pm (0.5 + L / 200) \mu\text{m}$ (L: Measuring length [mm])	
	Sampling interval	0.05 – 20 μm	
Straightness accuracy		$(0.05 + 1.5L / 1000) \mu\text{m}$	
Sensing method	Z axis (vertical)	Highly stable double-beam path-type laser interference sensor	
	X axis (horizontal)	Beam diffraction scale	
Processing functions	Parameters / calculation processing	Complies with JIS-2001, JIS-1994, JIS-1982, ISO-1997, ISO-1984, DIN-1990, ASME-1995 & CNOMO Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz-J, R3z, Sm, S, RΔa, RΔq, RΔa, Rλq, TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, Rmr2, Rδc, AVH, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR	Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse), surface calculation, over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, macro function, automatic element discrimination, calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function, profile design value collation, best fit, design value generation, IGES/DXF conversion
	Evaluation curves	Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve	—
	Surface characteristic graph	Load curve, power graph, amplitude distribution (ADF) graph	—
	Tilt correction / standard setting	Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)	Zero point setting, X axis setting, parallel movement, rotary movement
	Speed	Column up/down (Z axis) Measuring (X axis)	3.10 mm/s 0.02 – 1 mm/s (Movement speed: 0.02 – 20 mm/s)
Drive unit	Tilting device	$\pm 45^\circ$ motorized/manual	
Sensor unit	Stylus	Replaceable	
	Measuring force	0.7 mN/ 16 mN or less	
	Stylus radius	2 μm R60° cone for 50mm arm, 500 μm R for 100mm arm	
	Stylus material	Diamond / ruby	
Power source		Single phase AC 100 V $\pm 10\%$, 50/60 Hz	
Power consumption		450 VA	
Installation dimensions		2100 (W) × 900 (D) × 1650 (H) mm	
Weight		350 kg	



Model with Three-Dimensional Roughness Analysis Function

SURFCOM 3000A-3DF



SURFCOM 3000A-3DF-DX

Parallel Processing Dramatically Enhances Efficiency

- The ability to perform analysis/printout during the measurement operation dramatically enhances the efficiency of work by eliminating waiting time. The system is also very economical.

Detailed Analysis of 3D Profiles

- The adoption of a workstation provides a high-speed processing capability with a maximum of 32,000 points (X) and 2,000 scan lines (Y). A variety of sampling data ensures exact evaluation of sophisticated surface profiles.

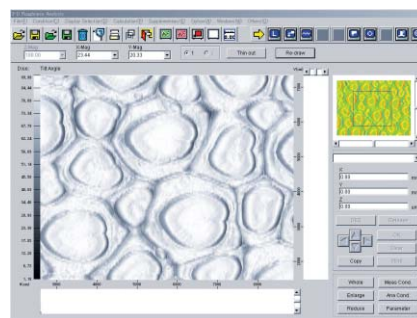
Host of 3D Analysis Software

- It is difficult to evaluate steel plates, painted surfaces, film, glass and other irregular surfaces with two-dimensional roughness. The 3000A-3DF enables three-dimensional profile, contour line, peak height distribution and other types of evaluation, as well as evaluation of the load curves, area and volume of corrosion and wear on machine parts. Power spectrum evaluation of rotating parts enables analysis of vibration and noise.

Enables Reverse Engineering

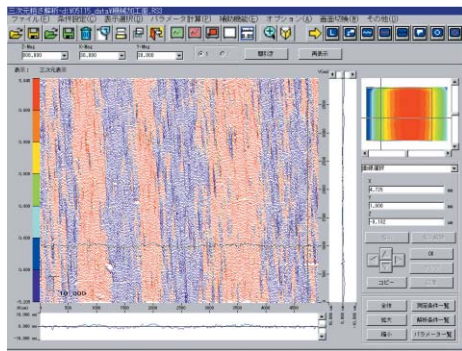
- The surface can be generated from the point group data and transferred to a CAD computer, and free curve analysis can be performed (optional program required).

Enhanced Visualization

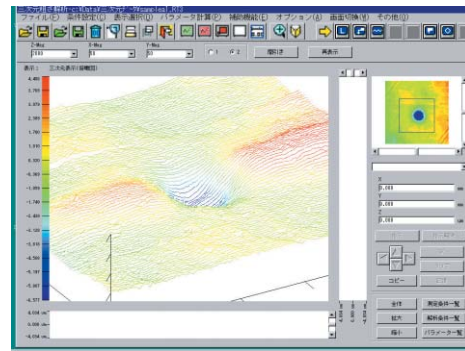


Shark skin (tilt angle density display)

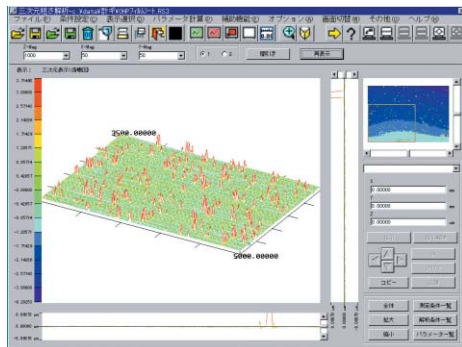
Machined surface (contour line display)



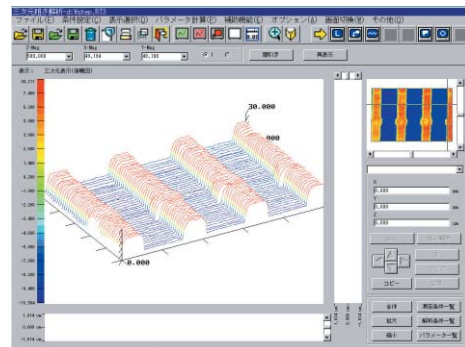
Indented/scratched surface (3D display)



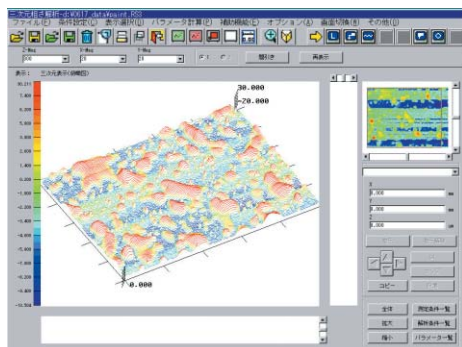
Film surface (3D display)



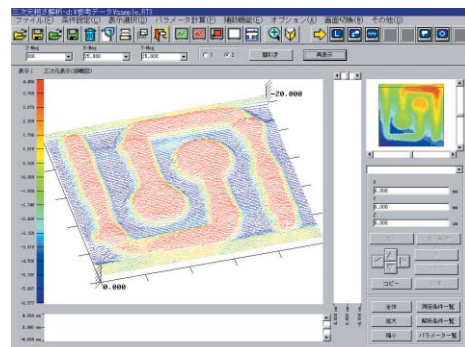
Step profile (3D display)



Painted surface (3D display)



Printed circuit board (3D display)



Specifications

Model		SURFCOM 3000A-3DF
Measuring area		200 (X) × 100 (Y) mm
Table feed pitch (Y)		0.001 – 100 mm
No. of table feed operations (Y)		2 – 2000 times
Straightness	Y axis (front/rear)	(0.05 + 3.0L / 1000) μm
	X axis (horizontal)	(0.05 + 1.5L / 1000) μm
Measuring area		100 × 200 mm
Max. load		10 kg
Recording method		Select color printer or laser printer
Analysis items	Parameters	Center plane average value, square average line, max. height, average value of 10 points, center plane peak height/valley depth, peak count, surface roughness ratio (volume ratio), skewness, kurtosis
	Evaluation curves	Roughness curve, section profile curve, waviness curves (filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve)
	3D analysis display	3D profile display [Airview (hidden line processing, mesh display, height color coding, view-point direction specification)], contour line display, contour line paint-out display, section profile display, peak distribution display, peak height distribution display, load curve display, amplitude distribution (ADF) display, power spectrum *
Auxiliary analysis functions	Parallel processing	Enables simultaneous execution of measurement, analysis and printout
	Printing	Color printing capability (256 colors)
	Enlarged display	Enlarged display of profile, parameter recalculation within specified range
	Other analysis	Tilt correction function, tilt angle calculation (tilt curve) function *, polarity reversal function, shading (256 tones) profile display *
Power source		Single phase AC 100 V ±10%, 50/60 Hz
Power consumption		450 VA
Installation dimensions		2100 (W) × 900 (D) × 1650 (H) mm
Weight		370 kg

* indicates options.



Advanced Functions and Superior Operational Ease

SURFCOM 2800E

SURFCOM 2800E-3DF



SURFCOM 2800E-12

* Printer is optional.



SURFCOM 2800E-3DF

* Printer is optional.

TIMS Integrated Measuring System (Roughness/Contour)

- Simply touch the icon to change between the roughness and contour measuring modes. Measured data can be combined when printed.

AI Function (Roughness) (patented)

- The AI function automatically sets the measuring conditions and executes measurement.

Automatic Operation Log/Playback Function (Roughness/Contour)

- This function automatically stores measurement and analysis procedures in the memory, including drive unit and column movements. This enables CNC measurements to be performed.

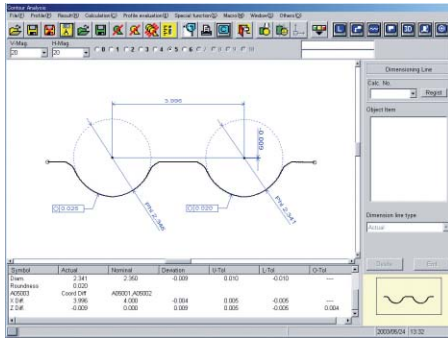
Dimension Line Display Function (Contour)

- This enables dimension lines to be drawn on the diagram along with actual measured values for parameters and geometric deviation.

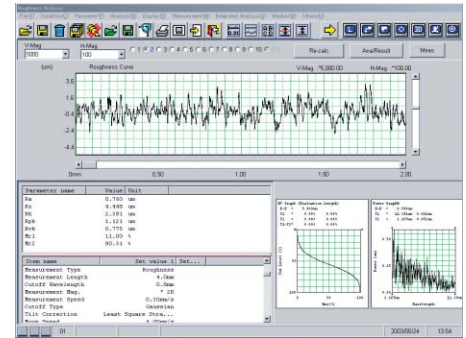
Profile Synthesis Function

- The profile synthesis function eliminates the analysis range limitation created by the stylus angle (contour).

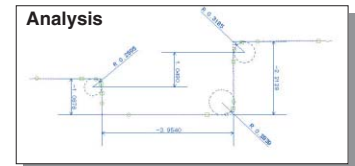
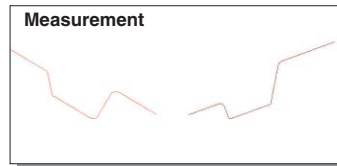
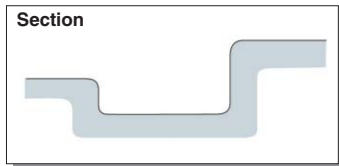
Dimension line display function



Roughness analysis function



Profile synthesis function



With normal measuring systems, limits are imposed on the measuring angle by the detector stylus angle. ACCRETECH has solved this problem by synthesizing the data for two profiles.

Specifications

Model		SURFCOM 2800E	
		Surface Texture Evaluation	Contour Evaluation
Measuring range	Z axis (vertical)	800 μm	50 mm
	X axis (horizontal)	100 mm (200 mm with -22 system)	100 mm (200 mm with -22 system)
Accuracy	Z axis indication accuracy (vertical)	—	$\pm (0.8 + 4H / 100) \mu\text{m}$ (H: Measuring height [mm])
	Resolution	—	0.025 μm
	X axis indication accuracy (horizontal)	—	$\pm (1 + 2L / 100) \mu\text{m}$ (L: Measuring length [mm])
	Resolution	—	0.1 μm
Straightness accuracy		$(0.05 + 1.5L / 1000) \mu\text{m}$ (L: Measuring length [mm])	
Sensing method	Z axis (vertical)	Differential transducer	Laser beam diffraction scale
	X axis (horizontal)	Moiré striped scale	Moiré striped scale
Processing functions	Parameters / calculation processing	Complies with JIS, ISO, DIN, ASME & CNOMO Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz-J, R3z, Sm, S, R Δ a, R Δ q, R λ a, R λ q, TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, R δ c, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR	Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse), coordinate control (zero point setting, X axis setting, parallel movement, rotary movement), surface calculation, over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, macro function, automatic element discrimination, calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function, profile design value collation, best fit, design value generation, IGES/DXF conversion
	Evaluation curves	Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve	Zero point setting, X axis setting, parallel movement, rotary movement
	Surface characteristic graph	Surface characteristic graph, load curve graph, power graph, amplitude distribution (ADF) graph	—
	Tilt correction / standard setting	Tilt correction, linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)	—
Recording	Vertical magnification	Set desired value or automatic: 0.1, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K*, 500K*	0.01 – 10,000,000 (arbitrary or automatic) 0.01 – 10,000,000 (arbitrary or automatic)
	Horizontal magnification	Set desired value or automatic: 1, 2, 5, 10, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K	—
Type of filter		Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)	—
Cut-off value		Set: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm (7 stages)	—
Speed	Column up/down (Z axis)	3 mm/s	
	Measuring (X axis)	0.03, 0.06, 0.15, 0.3, 0.6, 1.5, 3, 6 mm/s	
Sensor unit	Stylus	Replaceable	Replaceable
	Measuring force	0.7 mN	30 mN or less
	Stylus radius	2 μm R	25 μm R
	Stylus material	Diamond	Carbide alloy
Power source		Single phase AC 100 V $\pm 10\%$, 50/60 Hz	
Power consumption		380 VA	
Installation dimensions		1850 (W) $\times$ 800 (D) $\times$ 750 (H) mm	
Weight		150 kg	

NEW



Adopted the latest "Linear Motor" technology
Realization of high speed, low vibration and
highly accurate measurement

SURFCOM 1900DX

Next Generation Drive Unit with Linear Motor (patent pending)

- The world's highest level of measuring speed and lowest vibration enable consistent high-magnification measurements to be performed. The non-contact drive and simple structure (no feed screw or gear box) of the linear motor ensures stable vibration-free operation over an extended period.

High Speed Measurements Dramatically Boost Productivity

- Surprisingly high speeds have been achieved: Max. 3 mm/s for roughness measurement, Max. 20 mm/s for waviness measurement and movement speed of 60 mm/s. The teaching/playback function automates the series of processes, from measurement to pasting of data to generate the inspection report, boosting measuring efficiency by five to ten times (compared to other ACCRETECH model).

Space Saving

- A new design creates a fresh image, and the footprint has been reduced by approximately 25% (compared to previous model). This helps reduce expenses when installing the unit in a constant-temperature room.

Newly Developed High-Performance Compact Detector (Roughness)

- A newly developed detector with a compact design that can perform a wide range of high-magnification measurements has been incorporated. This has provided a measuring range of $1000\ \mu\text{m}$ with an outer diameter of 14mm, and measuring magnification of 500,000 times.

Higher Precision Enables Measurement of Difficult Workpieces (Contour)

- A measuring accuracy of $2.5\ \mu\text{m}$ (Measuring range: 5mm) that is adequate for measuring molds and other precision parts has been achieved. This dramatic increase in measuring precision enables measurement of workpieces that required a higher-end model in the past, substantially increasing the range of applications.

Easy Evaluation of Contour of General-Purpose Parts (Contour)

- Accurate data can be obtained quickly for the contour of parts that were evaluated with a projector or tool microscope in the past. The measuring results can be used as is on the inspection report.

Superior ACCRETECH Functions (Roughness/Contour)

Automatic Element Discrimination Function (AI Function)

The element (point, line, circle) is automatically determined without being specified by the operator.

Dimension Line Display Function

This enables dimension lines to be drawn on the diagram along with actual measured values for parameters and geometric deviation.

Automatic Crowning Function

The maximum or minimum workpiece values are automatically detected.

Calculation Point Repeat Function

Overall analysis of workpieces with profiles that are repeated can be executed by analyzing only one pattern.

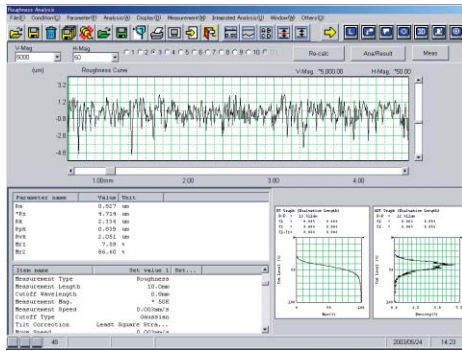
Workpiece Trace Function

The measuring range can be determined without setting the values by manually tracing the workpiece once.

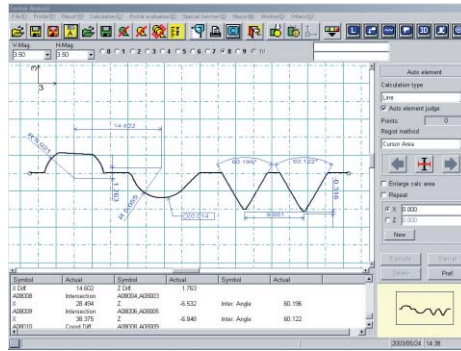
This function is ideal for measurement of intricate shapes.

Import/Export Function

Image data can be pasted in the measured results, and measurement waveform data can be pasted in standard programs.



Roughness analysis function



Contour analysis function

Specifications

Model		SURFCOM 1900DX	
		Surface Texture Evaluation	Contour Evaluation
Measuring range	Z axis (vertical)	1000 μm	50 mm
	X axis (horizontal)	100 mm	100 mm
Accuracy	Z axis indication accuracy (vertical)	—	$\pm(2.5+12H/100)\mu\text{m}/5\text{mm}$ range, $\pm(3.5+4H/100)\mu\text{m}/5\text{mm}$ range, H: Measuring height (mm)
	Resolution	—	0.1 $\mu\text{m}/\pm 5\text{mm}$ range, 0.4 $\mu\text{m}/20\text{mm}$ range, 1 $\mu\text{m}/50\text{mm}$ range
	X axis indication accuracy (horizontal)	—	$\pm(1 + 2L / 100) \mu\text{m}$, L: Measuring length (mm)
	Resolution	—	0.04 μm
Straightness accuracy		(0.05 + 1.0L / 1000) μm , L: Measuring length (mm)	
Sensing method	Z axis (vertical)	Differential inductance	Differential transformer
	X axis (horizontal)	Moiré striped scale	Moiré striped scale
Processing functions	Parameters / calculation processing	Complies with JIS-2001, JIS-1994, JIS-1982, ISO, DIN, ASME & CNOMO Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz-J, R3z, Sm, S, RΔa, RΔq, RΔa, RΔq, TIL TA, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, RΔc, AVH, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR	
	Evaluation curves	Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve	—
	Surface characteristic graph	Load curve graph, power graph, amplitude distribution (ADF) graph	—
	Tilt correction	Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)	—
Recording	Vertical magnification	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K, 500K, arbitrary, auto	0.01 - 10,000,000 (Possible for any or automatic value) 0.01 - 10,000,000 (Possible for any or automatic value)
	Horizontal magnification	0.1, 1, 2, 5, 10, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, arbitrary, auto	—
Type of filter		Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)	—
Cut-off value		Set: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm (7 stages)	—
Speed	Column up/down (Z axis)	3 - 10 mm/s	
	Measuring (X axis)	0.03 - 20 mm/s	
Sensor unit	Stylus	Replaceable	Replaceable
	Measuring force	0.7 mN	30 mN or less
	Stylus radius	2 μm R	25 μm R
	Stylus material	Diamond	Carbide alloy
Measuring feed direction		-	Push/pull, both directions
Measuring orientation		-	Up/down, both directions
Power source		Single phase AC 100 V $\pm 10\%$, 50/60 Hz	
Power consumption		400 VA	
Installation dimensions		1250 (W) $\times$ 850 (D) $\times$ 1500 (H) mm	
Weight		Approx. 125 kg	



Advanced Functions and Superior Operational Ease

SURFCOM 1800D

SURFCOM 1800D-3DF



SURFCOM 1800D-12
* Printer is optional.



SURFCOM 1800D-3DF
* Printer is optional.

[TIMS] Integrated Measuring System (Roughness/Contour)

- Simply touch the icon to change between the roughness and contour measuring modes. Measured data can be combined when printed.

AI Function (Roughness) (patented)

- The AI function automatically sets the measuring conditions and executes measurement.

Automatic Operation Log/Playback Function (Roughness/Contour)

- This function automatically stores measurement and analysis procedures in the memory, including drive unit and column movements. This enables CNC measurements to be performed.

Automatic Element Discrimination Function [AI Function] (Contour)

- The element (point, line, circle) is automatically determined without being specified.

Dimension Line Display Function (Contour)

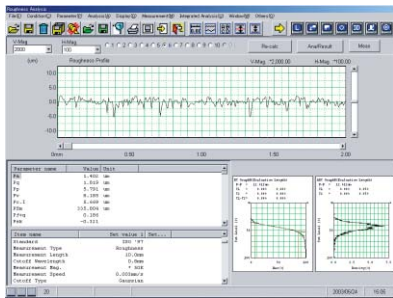
- This enables dimension lines to be drawn on the diagram along with actual measured values for parameters and geometric deviation.

Profile Synthesis Function

- The profile synthesis function eliminates the analysis range limitation created by the stylus angle.



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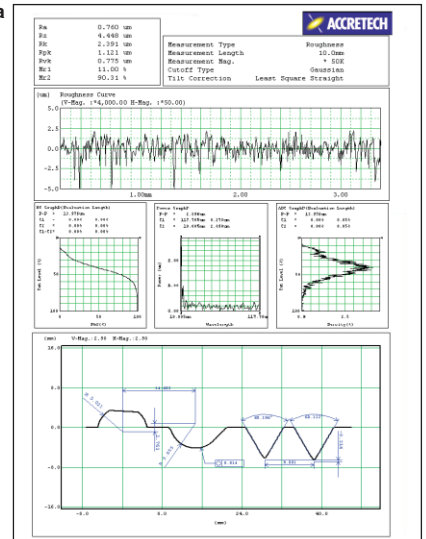


Roughness analysis function



Peak and valley function

Print data



Specifications

Model		SURFCOM 1800D	
		Surface Texture Evaluation	Contour Evaluation
Measuring range	Z axis (vertical)	800 μm	50 mm
	X axis (horizontal)	100 mm (200 mm with -22 system)	100 mm (200 mm with -22 system)
Accuracy	Z axis indication accuracy (vertical)	—	$\pm 0.25\%$ full scale ($\pm 4 \mu\text{m}$ or less for 5 mm range)
	Resolution	—	0.1 $\mu\text{m}/\pm 2.5\text{mm}$, 0.4 $\mu\text{m}/\pm 10\text{mm}$, 1 $\mu\text{m}/\pm 25\text{mm}$,
	X axis indication accuracy (horizontal)	—	$\pm (1 + 2L / 100) \mu\text{m}$ L: Measuring length [mm]
	Resolution	—	0.1 μm
Straightness accuracy		(0.05 + 1.5L / 1000) μm (L: Measuring length [mm])	
Sensing method	Z axis (vertical)	Differential transformer ducer	Differential transformer ducer
	X axis (horizontal)	Moiré striped scale	Moiré striped scale
Processing functions	Parameters / calculation processing	Complies with JIS-2001, JIS-1994, JIS-1982, ISO, DIN, ASME & CNOMO Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz.J, R3z, Sm, S, R Δ a, R Δ q, R Δ l, R Δ l, TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, R Δ c, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR	Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse), coordinate control (zero point setting, X axis setting, parallel movement, rotary movement), surface calculation, over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, macro function, automatic element discrimination, calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function
	Evaluation curves	Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve	—
	Surface characteristic graph	Load curve graph, power graph, amplitude distribution (ADF) graph	—
	Tilt correction	Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)	—
Recording	Vertical magnification	50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K*, 500K*, arbitrary, auto	0.01 - 10,000,000 (Possible for any or automatic value) 0.01 - 10,000,000 (Possible for any or automatic value)
	Horizontal magnification	1, 2, 5, 10, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, arbitrary, auto	—
Type of filter		Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)	—
Cut-off value		Set: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm (7 stages)	—
Speed	Column up/down (Z axis)	3 mm/s	
	Measuring (X axis)	0.03, 0.06, 0.15, 0.3, 0.6, 1.5, 3, 6 mm/s (8 speeds)	
Sensor unit	Stylus	Replaceable	Replaceable
	Measuring force	0.7 mN	30 mN or less
	Stylus radius	2 μm R	25 μm R
	Stylus material	Diamond	Carbide alloy
Measuring feed direction		—	Push/pull, both directions
Measuring orientation		—	Up/down, both directions
Power source		Single phase AC 100 V $\pm 10\%$, 50/60 Hz	
Power consumption		380 VA	
Installation dimensions		1850 (W) $\times$ 800 (D) $\times$ 750 (H) mm	
Weight		150 kg	

* When high-magnification pickup is used.

Quick Response!**Linear Motor Achieves High-Speed, Low-Vibration Roughness Measurements****SURFCOM 1500DX****SURFCOM 1500DX-3DF**

SURFCOM 1500DX



SURFCOM 1500DX-3DF

● **World's First Linear Motor in a Roughness Instrument (patent pending)**

The world's highest level of measuring speed and lowest vibration enable consistent high-magnification measurements to be performed.

The non-contact drive and simple structure (no feed screw or gear box) of the linear motor ensures stable vibration-free operation over an extended period.

● **High Speed Measurements Dramatically Boost Productivity**

Extremely high speeds have been achieved: Max. 3 mm/s for roughness measurement, Max. 20 mm/s for waviness measurement and movement speed of 60 mm/s (compared to other ACCRETECH model).

● **Newly Developed High-Performance Compact Detector**

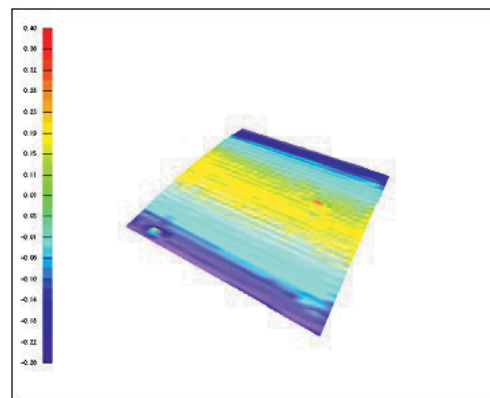
A newly developed detector with a compact design that can perform a wide range of high-magnification measurements has been incorporated.

This has provided a measuring range of 1000 μm with an outer diameter of 14mm, and measuring magnification of 500,000 times.

● **Space Saving**

A new design creates a fresh image, and the footprint has been reduced by approximately 25% (compared to previous model).

This helps reduce expenses when installing the unit in a constant-temperature room.

**Glass flatness measurement**

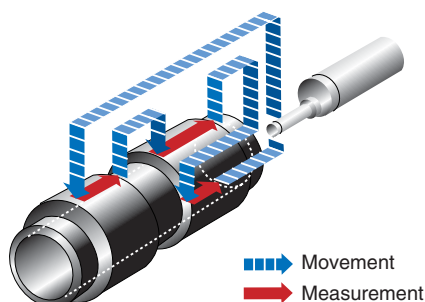
Measuring range	20mm × 20mm
	1000 lines (Y direction)
Conventional machine	165 minutes
S1500DX-3DF	22 minutes

AI Function Simplifies Measurements (patented)

- The unit automatically selects the measuring conditions without setting them in advance (roughness measurement). In addition, a lesson mode is available to teach the user the operation procedures. This is a reflection of ACCRETECH's commitment to create measuring instruments that anyone can use.

Automation Enhances Measurement Efficiency

- The teaching function can be used to automate a series of operations, from measurement at multiple locations to generation of an inspection report by pasting the data.
- Moving speed of 60mm/s has been realized, which enables drastic increase of measuring efficiency in sequent measurement of whole surfaces.



Evaluation Functions Dramatically Strengthened

- A variety of customer requests for more evaluation functions have been reflected in the 1400D. These include accommodation of standards for film thickness measurement (step/area), wear volume calculation (superimposed profile area) and LCD glass substrate (special waviness).

TIMS Flexible Measuring System

- The TIMS next-generation integrated measuring system is a new breakthrough from ACCRETECH. It links different programs with a single icon, enhancing the ease of analysis.

Complies with World Standards

- The 1400D complies with the latest ISO, JIS, DIN, ASME, CNOMO and other standards, and has satisfied the European Directives for the CE Marking. It can be used with English, Japanese, German, French and Italian (please consult with ACCRETECH when taking it to a different country).

Reanalysis After One Measurement

- Data can be reanalyzed after one measurement is performed. The measurement standard (linear, first half, latter half, round surface, both end) can be changed to set the measuring range for analysis, or the defective data for a notch can be removed.

Outstanding Expandability

- The unit can be easily and efficiently upgraded to meet evolving needs. This includes upgrading from two-dimensional to three-dimensional roughness, or adding profile capability.

Flexible input and output function

- Import and export function enables to paste picture data into measured result and to paste measured wave form data into a program on the market.

Specifications

● Two-Dimensional Roughness

Model		SURFCOM 1500DX
Measuring range / Resolution	X axis (horizontal)	100mm/0.04 μ m or 32,000 points (max. data items) (300,000 data uptake points)
	Z axis (vertical)	1000 μ m/0.02 μ m – 6.4 μ m/0.0001 μ m
Straightness		(0.05 + 1.0L / 1,000) μ m L = Measuring length (mm)
Analysis items	Standards	Complies with JIS-2001, JIS-1994, JIS-1982, ISO-1997, ISO-1984, DIN-1990, ASME-1995 and CNOMO.
	Parameters	Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz.J, R3z, Sm, S, R Δ a, R Δ q, R λ a, R λ q TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, R δ c AVH, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR
	Evaluation curves	Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve
	Special graphs	Load curve, amplitude distribution (ADF) curve, power graph
	Tilt correction	Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)
Magnification	Vertical magnification (Z axis)	Set desired value or automatic: 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K, 500K
	Horizontal magnification (X axis)	Set desired value or automatic: 0.1, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K
Type of filter		Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)
Measuring speed		(Roughness) 0.03 - 3 mm/s (Waviness) 0.03 - 20 mm/s
Moving speed		(Z axis) - 10 mm/s (X axis) - 60 mm/s
Detector		Tip radius: 2 μ m, Material: Diamond, Measuring force: 0.7 mN
Special functions	Measuring AI	AI function provides easy procedures, enabling beginners to make measurements.
	Waveform superimposition	Waveform curve for a maximum of 10 data items can be superimposed (ideal for wear evaluation).
	Automatic operation	Simplified auto mode and teaching mode enable fully automatic operation.

● Other Specifications

Power source/consumption	AC 100 V $\pm$ 10%, 50/60 Hz, 300 VA
Installation dimensions	1250 (W) $\times$ 850 (D) $\times$ 1500 (H) mm
Weight	Approx. 125 kg

Refer to S1400D-3DF for 3D roughness specifications.



TOKYO SEIMITSU



Superior Operating Ease & Automation of Measurements to Inspection Reports

SURFCOM 1400D



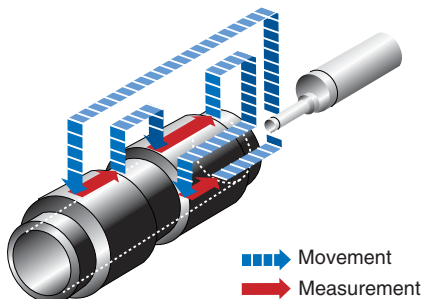
SURFCOM 1400D-12
* Printer is optional.

AI Function Simplifies Measurements (patented)

- The unit automatically selects the measuring conditions without setting them in advance (roughness measurement). In addition, a lesson mode is available to teach the user the operation procedures. This is a reflection of ACCRETECH's commitment to create measuring instruments that anyone can use.

Automation Enhances Measurement Efficiency

- The teaching function can be used to automate a series of operations, from measurement at multiple locations to generation of an inspection report by pasting the data.



TIMS Flexible Measuring System

- The TIMS next-generation integrated measuring system is a new breakthrough from ACCRETECH. It links different programs with a single icon, enhancing the ease of analysis.

Complies with World Standards

- The 1400D complies with the latest ISO, JIS, DIN, ASME, CNOMO and other standards, and has satisfied the European Directives for the CE Marking. It can be used with English, Japanese, German, French and Italian (please consult with ACCRETECH when taking it to a different country).

Reanalysis After One Measurement

- Data can be reanalyzed after one measurement is performed. The measurement standard (linear, first half, latter half, round surface, both end) can be changed to set the measuring range for analysis, or the defective data for a notch can be removed.

Outstanding Expandability

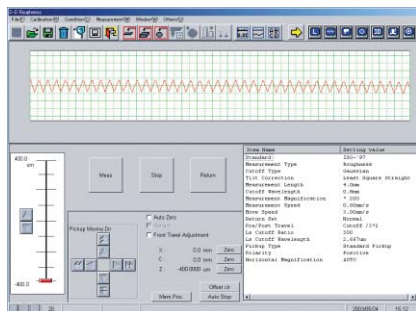
- The unit can be easily and efficiently upgraded to meet evolving needs. This includes upgrading from two-dimensional to three-dimensional roughness, or adding profile capability.

Evaluation Functions Dramatically Strengthened

- A variety of customer requests for more evaluation functions have been reflected in the 1400D. These include accommodation of standards for film thickness measurement (step/area), wear volume calculation (superimposed profile area) and LCD glass substrate (special waviness).

Measurement

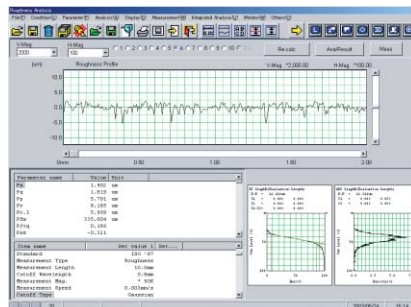
- Easy operation with icons and pull-down menus. Icons can be edited according to individual preferences.
- Real-time display of data.
- Unit can be controlled using manual mode, joystick or mouse.



Measuring screen

Analysis

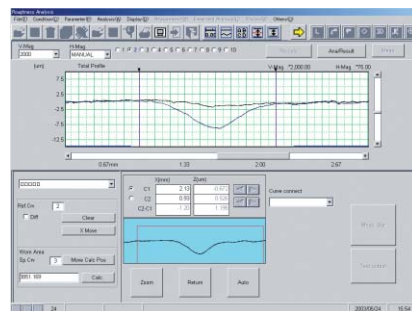
- Desired measuring standard and evaluation range can be set.
- Evaluation according to different standards can be performed by simply recalculating the data.



Analysis screen

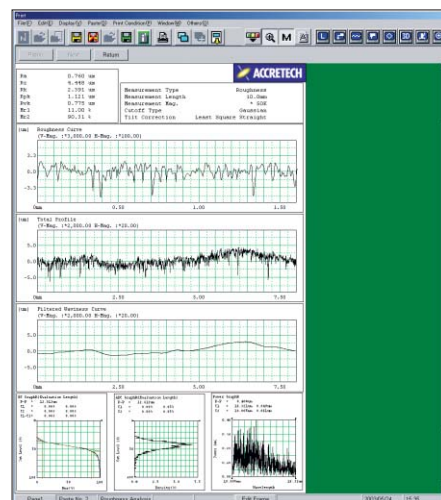
- Superimposition Function

Differences before and after machining can be determined by superimposing data on the screen and calculating the different area figures for both sets of data. Up to 10 data items on the screen can be stored, and evaluation can be performed by superimposing the data sets.



Printing

- The measured results can be formatted according to individual requirements and printed as an inspection report.



Specifications

●Two-Dimensional Roughness

Model		SURFCOM 1400D
Measuring range / Resolution	X axis (horizontal)	100mm/0.1 μ m or 32,000 points (max. data items)
	Z axis (vertical)	800 μ m/0.02 μ m – 25 μ m/0.0004 μ m (6.4 μ m/0.0001 μ m*)
Straightness		(0.05 + 1.5L / 1,000) μ m L = Measuring length (mm)
Analysis items	Standards	Complies with JIS-2001, JIS-1994, JIS-1982, ISO-1997, ISO-1984, DIN-1990, ASME-1995 and CNOMO.
	Parameters	Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz.J, R3z, Sm, S, RΔa, RΔq, RΔa, RΔq, TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, Rdc, AVH, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR
	Evaluation curves	Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve
	Special graphs	Load curve, amplitude distribution (ADF) curve, power graph
Magnification	Tilt correction	Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)
	Vertical magnification (Z axis)	Set desired value or automatic: 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K*, 500K*
Type of filter		Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)
Measuring speed		0.03, 0.06, 0.15, 0.3, 0.6, 1.5, 3, 6 mm/s
Detector		Tip radius: 2 μ m, Material: Diamond, Measuring force: 0.7 mN
Special functions	Measuring AI	AI function provides easy procedures, enabling beginners to make measurements.
	Waveform superimposition	Waveform curve for a maximum of 10 data items can be superimposed (ideal for wear evaluation).
	Automatic operation	Simplified auto mode and teaching mode enable fully automatic operation.

●Other Specifications

Power source/consumption	AC 100 V $\pm$ 10%, 50/60 Hz, 300 VA
Installation dimensions	1700 (W) $\times$ 500 (D) $\times$ 750 (H) mm
Weight	Approx. 125 kg (2D model), Approx. 135 kg (3D model)

* When high-magnification pickup is used.





Versatile Analysis of Minute Surface Characteristics

SURFCOM 1400D-3DF

SURFCOM 1400D-3DF-12

Parallel Processing Dramatically Enhances Efficiency

- The ability to perform analysis/printout during the measurement operation dramatically enhances the efficiency of work by eliminating waiting time. The system is also very economical.

Detailed Analysis of 3D Profiles

- The system has a high-speed processing capability with a maximum of 32,000 points (X) and 2,000 scan lines (Y). A variety of sampling data ensures exact evaluation of sophisticated surface profiles.

Host of 3D Analysis Software

- It is difficult to evaluate steel plates, painted surfaces, film, glass and other irregular surfaces with two-dimensional roughness. The 1400D-3DF enables three-dimensional profile, contour line, peak height distribution and other types of evaluation, as well as evaluation of the load curves, area and volume of corrosion and wear on machine parts. Power spectrum evaluation of rotating parts enables analysis of vibration and noise.

Specifications**●Two-Dimensional Roughness**

Model		SURFCOM 1400D-3DF
Fixed pitch drive unit	Measuring range (Y axis)	50 mm
	Feed pitch	0.001 – 10 mm
	Feed cycles	2 – 2,000 times
	Straightness accuracy	$(0.05 + 3.0L / 1,000) \mu\text{m}$ L = Measuring length (mm)
	Max. load	5 kg
Analysis items	3D roughness parameters	SRa, SRq, SRmax, SRz, SRp, SRv, SPc, SSI, SRsk, SRsku, SMr1, SMr2, SRpk, SRvk, SRk, SVO, SK
	Display analysis function	3D display, contour line display, contour line paint-out display, contour line intensity display, section profile display, peak distribution display, Airview (hidden line processing, mesh display, view-point direction specification), load curve display, amplitude distribution (ADF) curve display, peak height distribution display
	3D tilt correction	Plane correction (all data, display range, point specification, specified range [rectangular, circular, polygonal]), spherical surface correction*, cylindrical surface correction*, parabolic correction*
Special functions	Parallel processing	Enables simultaneous measurement, analysis and printing, and boosts throughput.
	Total measuring system	Provides effective links between 2D and 3D analysis, enabling generation of integrated inspection reports.
	Expandability (optional program set)	Shading*, peak height average value*, average tilt angle calculation*, power spectrum* (multi-section), section profile area distribution*, tilt angle intensity

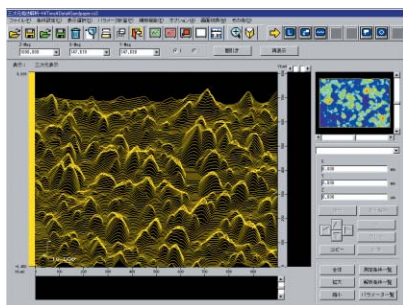
●Other Specifications

Power source/consumption	AC 100 V $\pm 10\%$, 50/60 Hz, 300 VA
Installation dimensions	1700 (W) $\times$ 500 (D) $\times$ 750 (H) mm
Weight	Approx. 125 kg (2D model), Approx. 135 kg (3D model)

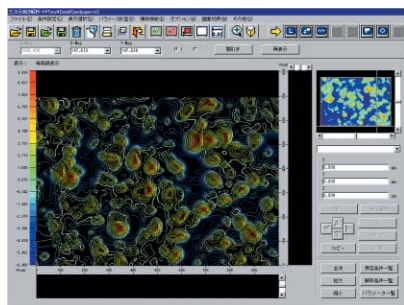
*: Indicates optional functions. NOTE: Accuracy guarantee for 3D roughness is up to 10K.

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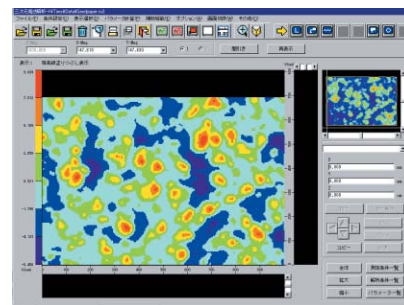
Standard Functions



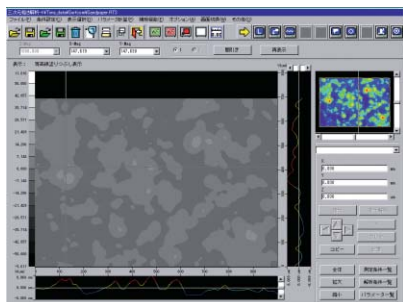
3D display



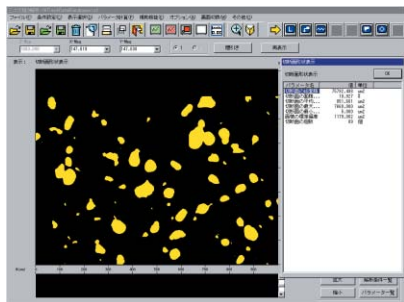
Contour line display



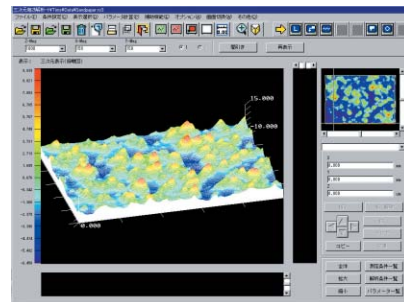
Contour line paint-out display



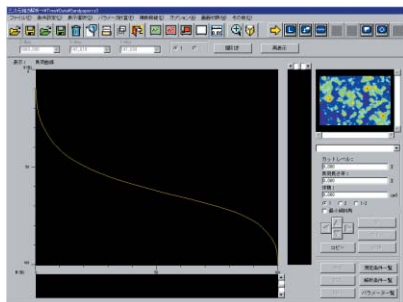
Gray display



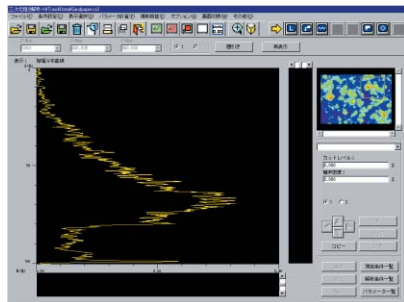
Cut surface display



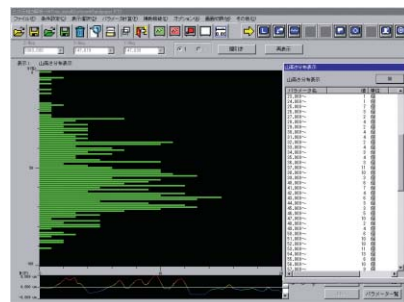
Airview



Load curve

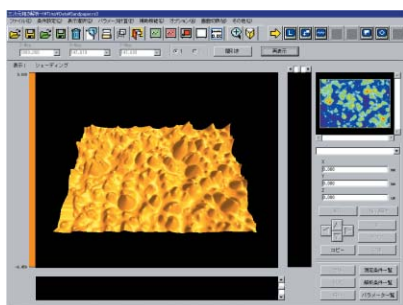


Amplitude distribution curve

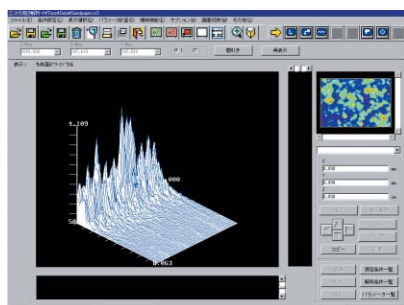


Peak height distribution

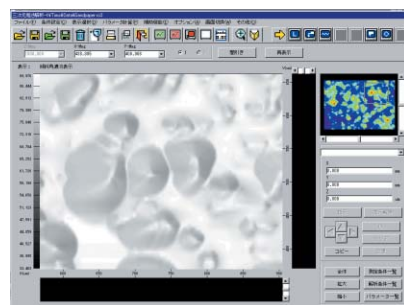
Options



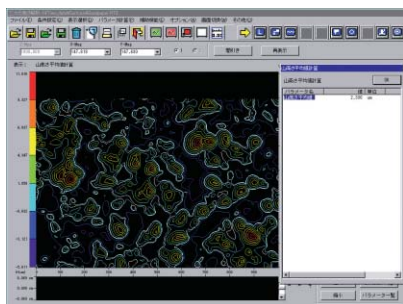
Shading display



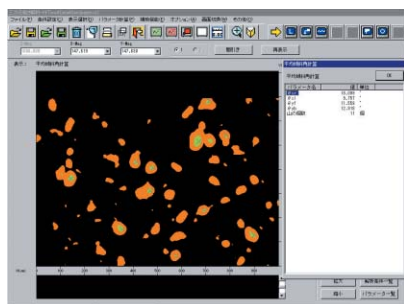
Multi-section power spectrum



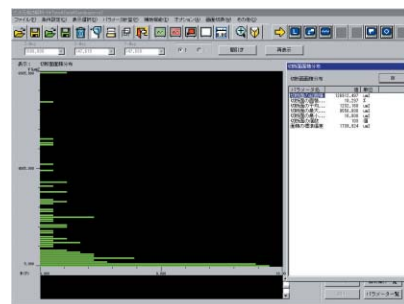
Tilt angle density display



Peak height average value calculation



Average tilt angle calculation



Cut surface area distribution

LCD Glass Substrate Waviness Measuring Instrument

SURFCOM 1400D-LCD

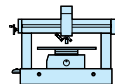
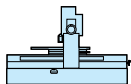
- Wide measuring range to effectively meet user needs: 300 × 250, □500, □650, □900, □1300mm.
- Capable of measuring swell, roughness, bowing, step profile and other characteristics.
- Uses SURFCOM 1400D computer for data processing unit.

**【 Measuring Range 】**

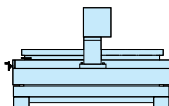
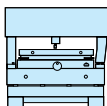
X axis drive distance
300mm type



X/Y axis drive distance
□500mm type
□600mm type



X/Y axis drive distance
□900mm type
□1300mm type

**Specifications**

Model	SURFCOM 1400D-LCD
Vertical measuring magnification	Set desired value or automatic: 50 – 500 K *
Horizontal measuring magnification	1 – 20 K
Measuring force:	Set desired value or automatic: 50 – 500 K *
Straightness accuracy L: Measuring length (mm)	Set desired value or automatic: 1 – 20 4 mN or less Measuring range: 300, 600 & 650 types (0.05 + 1.5L / 1000) μm Measuring range: 900 type (0.1 + 1.5L / 1000) μm
Parameters	Measuring range: 1300 type (0.2 + 1.5L / 1000) μm Roughness: 36 types, Waviness: 24 types

* When high-magnification pickup is used.

Color PDP Profile Measuring Instrument

SURFCOM 1400D-PDP

- Dedicated instrument for optimal measurement of film deposition thickness on color PDP front substrates and rib height on back substrates.
- Motor driven X/Y Motor driven tracing driver itself (Range: 900 mm in X direction and 1300 mm in Y direction). Measurements can be performed within this movement range.
- Uses SURFCOM 1400D computer for data processing unit.



Data processing unit

**Specifications**

Model	SURFCOM 1400D-PDP
X-Y movement range	X= 900mm (motor driven), Y=1300mm (motor driven)
X-Y movement speed	Max. 100 mm/sec.
Measuring height	50 mm: Z axis stroke (manual)
Drive unit tilt angle	±5° (manual)
Roughness measuring range	100mm: X axis direction
Straightness accuracy	(0.05 + 1.5L / 1000) μm L: Measuring length (mm)
Vertical recording magnification	Set desired value or automatic: 50-50K *
Horizontal recording magnification	Set desired value or automatic: 1-20K *
Measuring force	0.7 mN
Load	20 kg or less
Power source	AC 100 V ±10%, 50/60 Hz
External dimensions	2040 (W) × 1420 (D) × 1350 (H) mm (excluding CPU)
Weight	Approx. 1800 kg

* When high-magnification pickup is used.



Column Cross Feed Device for Texture · Contour Measuring Instruments

- Enables efficient measurement of heavy items like cylinder blocks and long items such as crankshafts.
- Ideal for automobile and machine tool parts.
- Motor-driven or manual type can be selected for X axis feed according to individual requirements.
- Long-lasting granite used for measuring stand.

Picture shows connection with SURFCOM 1400D
(motor driven X axis)

* Vibration isolation table is optional.

Specifications

Model	Column Cross Feed Device for Texture · Contour Measuring Instruments
Movement range	X direction stroke: 780 mm
	Y direction stroke: 50 mm
	Z direction stroke: Select 250, 450 or 650 mm
Allowable load	100 kg
Applicable models	SURFCOM 480A, 1400D, 1800D, 2800E CONTOURECORD 1600D, 2600E

Applications

● Wafer Profile Measurement

CCD camera enables exact positioning.



Sample configuration with
SURFCOM 1400D and CCD camera

● Hard Disk Measurement

Dedicated software available for SURFCOM 480A.



Measurement of hard disk
using SURFCOM 480A

● Non-Contact Measurement

The use of an optical pickup allows measurement of plastic, film, paper and other soft materials.



E-DT-SL-12B optical pickup

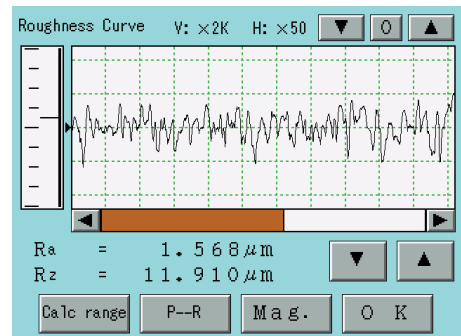
Field Surface Texture Measuring Instrument with Outstanding Operating Ease



SURFCOM 480A



SURFCOM 480A-12



Can use English/Japanese/German/
French/Italian and Spanish!
JIS2001 compliant!

TFT Color LCD Touch Panel

The color LCD touch panel with a wide field of view features high clarity. Simply touch the desired icon to perform operation. Touch panel input can be performed by using your finger or with the touch-pen provided, facilitating on-site measurements.



Customize Icons

The customize function can be used to create a special menu where only the icons that are used most frequently are displayed, substantially enhancing operational efficiency.



AI Function (patented)

The AI (artificial intelligence) function automatically selects the ideal cut-off value, measuring range and other conditions by simply entering the parameters and allowable values denoted on the machining drawing. This automates measurement.



Guidance Function

This function guides the user through the measuring procedures, enabling beginners to make measurements.



Memo Function

A short note or diagram can be entered with the touch pen and printed using the memo function.

Supports International Standards

The 480A supports analysis parameters for JIS (2001/1994/1982), ISO, DIN, ASME and CNOMO standards, and can be switched between English, Japanese, German, Italian, French and Spanish. In addition, any power source between AC100V and 240V can be used, and the unit satisfies the European Directives for the CE Marking.



Host of Analysis Functions

The unit incorporates 34 types of roughness parameters (Ra, Rz, Ry, Sm, S, tp, etc.) and 32 types of waviness parameters. The steps on electrical parts, film thickness, surface area and other items can be analyzed.



Tilt Correction Function

Six types of automatic tilt correction are provided: Linear, first half, latter half, both end, round surface and spline curve (patented).



Evaluation Range Setting (patented)

The waveform on the screen is enclosed by two cursors, allowing the desired evaluation range to be set and the parameters to be calculated.



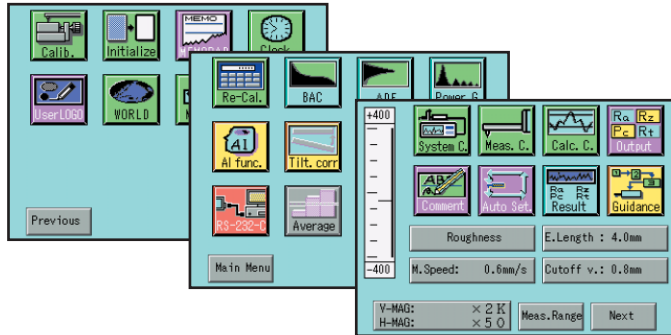
PC Card Slot

Measuring conditions, measured result management or measured data can be output in binary and text format. This data can be easily read from the PC card slot on a personal computer.

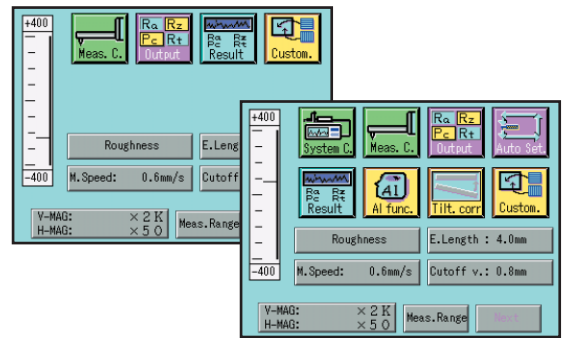
Sample Display

The customize function on the main menu allows icons to be edited and arranged as desired.

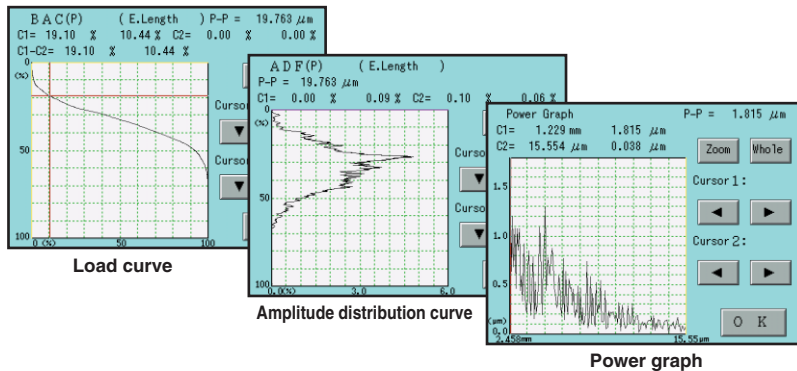
Main Menu



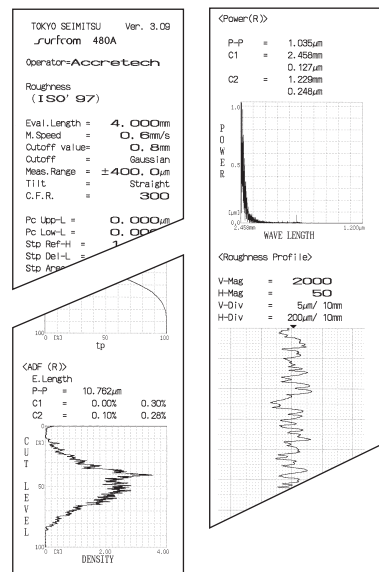
Sample Customized Display



Analysis Results



Sample Data Sheet



Specifications

Model			SURFCOM 480A
Measuring range	X axis (horizontal)		100mm
	Z axis (vertical)		800μm (Measuring range/resolution: 800μm/10nm, 80μm/1nm, 8μm/0.1nm)
Straightness accuracy			(0.05 + 1.5L / 1,000) μm L = Measuring length (mm)
Analysis items	Standards		Complies with JIS-2001, JIS-1994, JIS-1982, ISO-1997, ISO-1984, DIN-1990, ASME-1995 and CNOMO.
	Parameters		Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz.J, R3z, Sm, S, RΔa, RΔq, Rλa, Rλq, TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, Rδc, AVH, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR
	Evaluation curves		Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve
	Special graphs		Load curve, amplitude distribution (ADF) curve, power graph
	Tilt correction		Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)
Magnification	Vertical magnification (Z axis)		Set desired value or automatic: 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K*, 500K*
	Horizontal magnification (X axis)		Set desired value or automatic: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1K, 2K
Type of filter			Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)
Measuring speed			0.03, 0.06, 0.15, 0.30, 0.60, 1.5, 3, 6 mm/s (8 speeds)
Detector			Tip radius: 2μm, Material: Diamond, Measuring force: 0.7 mN
Special functions	Measuring AI		AI function provides easy procedures, enabling beginners to make measurements.
	Step analysis function		Ideal for film thickness and surface area measurement of semiconductor parts.
	PC card		Output as text file allows transfer of data to personal computer.
Standard accessories			Standard specimen (E-MC-S24B), recording paper (E-CH-S21A), touch-pen (E-MA-S54A), instruction manual
Power source/consumption			AC 100 – 240 V ±10%, 50/60 Hz, 90 VA
Installation dimensions			1000 (W) × 800 (D) × 750 (H) mm
Weight			105 kg

* When high-magnification pickup is used.

Compact Field Surface Texture Measuring Instrument with High Operational Ease



SURFCOM 130A

LCD Panel Simplifies Operation

- Simply select the desired operation from the color LCD touch panel with a wide field of view or the reasonable monochrome LCD.

Highly Portable Compact Unit

- The unit is small enough for use at virtually any location.

Supports International Standard Analysis Parameters

- Select the desired standard: JIS, ISO, DIN, ASME or CNOMO.

Satisfies European Directives for CE Marking

TFT color LCD

Monochrome LCD



Best of Class Straightness Accuracy
0.3 μ m/50mm!



Can use English/Japanese/German/
French/Italian and Spanish!



Customize Icons

The customize function can be used to create a special menu where only the icons that are used most frequently are displayed, substantially enhancing operational efficiency.



AI Function (patented)

The AI (artificial intelligence) function automatically selects the ideal cut-off value, measuring range and other conditions by simply entering the parameters and allowable values denoted on the machining drawing. This automates measurement.



Guidance Function

This function guides the user through the measuring procedures, enabling beginners to make measurements.



Memo Function

A short note or diagram can be entered with the touch pen and printed using the memo function.



Host of Analysis Functions

The unit incorporates 34 types of roughness parameters (Ra, Rz, Ry, Sm, S, tp, etc.) and 32 types of waviness parameters. The steps on electrical parts, film thickness, surface area and other items can be analyzed.



Tilt Correction Function

Six types of automatic tilt correction are provided: Linear, first half, latter half, both end, round surface and spline curve (patented).



Evaluation Range Setting (patented)

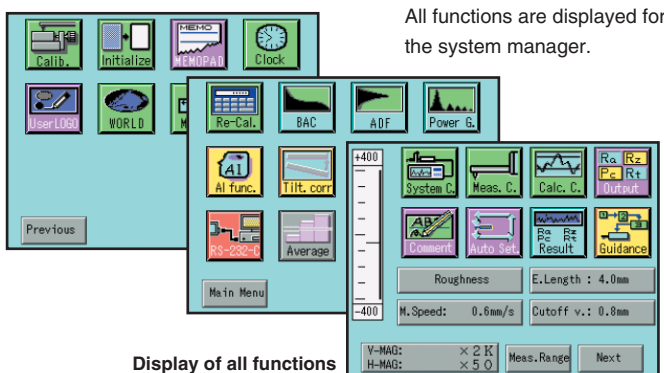
The waveform on the screen is enclosed by two cursors, allowing the desired evaluation range to be set and the parameters to be calculated.



PC Card Slot

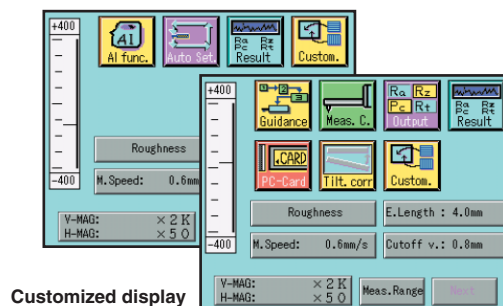
Measuring conditions, measured result management or measured data can be output in binary and text format. This data can be easily read from the PC card slot on a personal computer.

Convenient Mode Select Function for System Manager/Operator

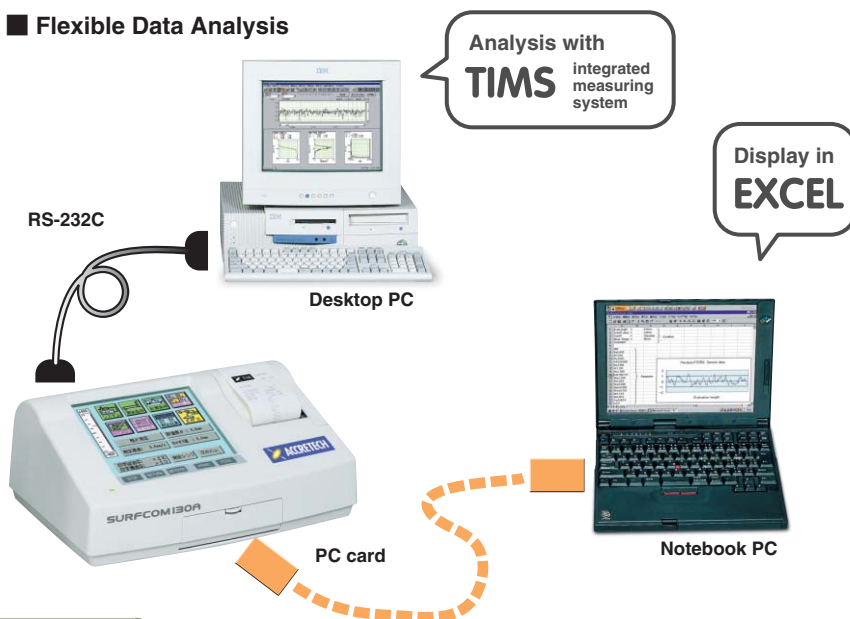


All functions are displayed for the system manager.

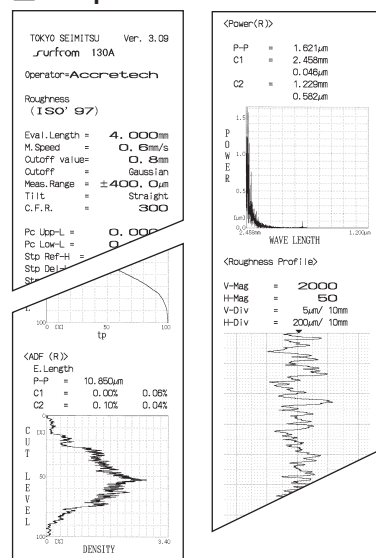
Only the required functions are displayed for the operator.



Flexible Data Analysis



Sample Data Sheet



Specifications

Model			SURFCOM 130A
Measuring range	X axis (horizontal)		50mm
	Z axis (vertical)		800μm (Measuring range/resolution: 800μm/10nm, 80μm/1nm, 8μm/0.1nm)
Straightness accuracy			0.3 μm / 50 mm
Analysis items	Standards		Complies with JIS-2001, JIS-1994, JIS-1982, ISO-1997, ISO-1984, DIN-1990, ASME-1995 and CNOMO.
	Parameters		Ra, Rq, Ry, Rp, Rv, Rc, Rz, Rmax, Rt, Rz.J, R3z, Sm, S, RΔa, RΔq, λa, Rλq, TILT A, Ir, Pc, Rsk, Rku, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, tp, Rmr, tp2, Rmr2, Rdc, AVH, Hmax, Hmin, AREA, NCRX, R, Rx, AR, NR, CPM, SR, SAR
	Evaluation curves		Section profile curve, roughness curve, filtered waviness curve, filtered center line waviness curve, rolling circle waviness curve, rolling circle center line waviness curve, DIN4776 special curve, roughness motif curve, waviness motif curve, envelope waviness curve
	Special graphs		Load curve, amplitude distribution (ADF) curve, power graph
	Tilt correction		Linear correction, round surface correction, first half correction, latter half correction, both end correction, spline curve correction (linear, round surface and both end correction possible at arbitrary range)
Magnification	Vertical magnification (Z axis)		Automatic: 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K
	Horizontal magnification (X axis)		Automatic: 1, 2, 5, 10, 20, 50, 100, 200, 500, 1K, 2K, 5K
Type of filter			Standard filter (2RC), phase compensation filter (2RC), phase compensation filter (Gaussian)
Measuring speed			0.3, 0.6, 1.5, 3 mm/s (4 speeds)
Detector			Tip radius: 2μm, Material: Diamond, Measuring force: 0.7 mN
Special functions	Measuring AI		AI function provides easy procedures, enabling beginners to make measurements.
	Step analysis function		Ideal for film thickness and surface area measurement of semiconductor parts.
	PC card		Output as text file allows transfer of data to personal computer.
Standard accessories			Automatic (E-MC-S24B), recording paper (E-CH-S21A), touch-pen (E-MA-S54A), instruction manual
Power source/consumption			AC 100 – 240 V ±10%, 50/60 Hz, 30 VA
Installation dimensions			700 (W) × 300 (D) × 150 (H) mm
Weight			8 kg

* PC card (E-MU-S550A) and PC connection cable (E-SC-S288A) are optional.



Extra Compact Unit with Host of Functions

HANDYSURF E-35A



AI Function Achieves Easy Operability

- The AI function (patent pending) automatically sets the ideal values for measuring range, evaluation length, cut-off value and recording magnification (when printer is used) according to the surface being measured.

Use Anywhere in the World

- The E-35A supports JIS (2001/1994/1982), ISO, DIN, ASME and CNOMO standards, and can be switched between English, Japanese, German, Italian, French, Spanish and Portuguese. In addition, the unit satisfies the European Directives for the CE Marking.



Directly Transfer Data to PC

- The standard RS-232C serial port allows measuring conditions, parameter values and profile curve data to be directly transmitted to a PC.

Data Storage/Rechargeable Battery

- Ten different data items can be stored in the internal memory, and the measured data can be called at any time. Both the HANDYSURF and printer have built-in rechargeable batteries, making them ideal for on-site measurements where a power source is not readily available.

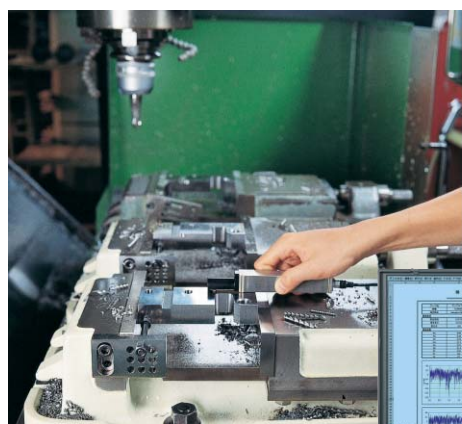
Measurements from Any Orientation

- The compact lightweight HANDYSURF unit can be used to make measurements in a horizontal, vertical, tilted or any other orientation. The display and drive units can be used together as a one-piece instrument, or separated for measurement purposes according to individual requirements.

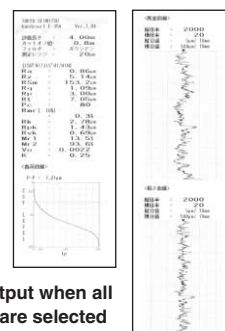
Replaceable Displacement Pickup

- The displacement pickup enables exact and faithful measurement of surface roughness. Since it is replaceable, dedicated optional pickups can be used for extra small holes and deep grooves, facilitating a diverse range of measurements.

7-language capability, supports world standards, rechargeable battery, PC compatible **Worldwide Compatibility**



Compact printer II

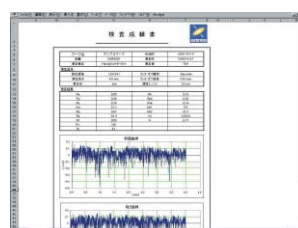


Sample output when all functions are selected



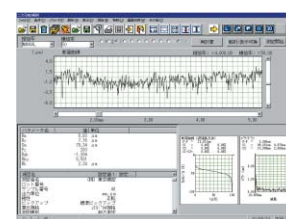
PC Compatible

* Notebook PC connection cable (E-SC-S248A) with macro program is option.



Inspection Report Generation

Data can be read by Excel for generation of an inspection report.



TIMS Light (option)

TIMS Light integrated ACCRETECH measuring system enables versatile advanced analysis.

Specifications

Model			HANDYSURF E-35A
Measuring range	Z axis (vertical)		$\pm 160 \mu\text{m}$
	X axis (horizontal)		12.5 mm
Resolution	Z axis (vertical)		$0.01 \mu\text{m} / \pm 20 - 0.08 \mu\text{m} / \pm 160 \mu\text{m}$
Analysis items	Standards supported		Complies with JIS-2001, JIS-1994, JIS-1982, ISO-1997, ISO-1984, DIN-1990, ASME-1995 and CNOMO.
	Parameters	JIS-2001 motif	Pt, Ra, Rq, Rz, Rzmax, Rp, Rt, R3z, RSm, Pc, Rk, Rpk, Rvk, Mr1, Mr2, VO, K, Rmr R, Rx, AR, W, Wx, AW, Wte
	Evaluation curves		Section profile curve, roughness curve, ISO 13565 special curve, roughness motif curve, waviness motif curve, envelope waviness curve
Filter	Cut-off method		Gaussian Filter, 2RC filter
	Cut-off value		λc : 0.08, 0.25, 0.8, 2.5 mm λs : 2.5, 8 μm
Evaluation length	Fixed mode		Cut-off value $\times 5$
	Arbitrary mode		0.4 - 12.5 mm (Unit: 0.1 mm)
Drive speed			0.6 mm/s (return speed 1 mm/s)
Pickup	Sensing method		Differential inductance (displacement type)
	Stylus		Diamond, 90° cone, 5 μm R
	Measuring force		4 mN or less
	Skid		Sapphire, 32 mm R (trace direction)
Power source			Built-in rechargeable battery (charged with AC adapter)
Power consumption			Approx. 1 VA
Weight			Approx. 600 g
External dimensions			210 (W) $\times$ 70 (D) $\times$ 60 (H) mm
Standard accessories			Reference specimen (E-MC-S24B), rear adjustment piece (E-WJ-S64A), extension cable (E-SC-S255A), Handy case (E-MA-S35A), AC adapter, instruction manual

●Printer (option)

Name			Compact Printer II
Model			E-RC-S25A
Printing method			Thermal line dot
Recording curves			Section profile curve, roughness curve, load curve, roughness motif curve, waviness motif curve, envelope waviness curve
Recording magnification	Vertical direction (V)		$\times 100, \times 200, \times 500, \times 1K, \times 2K, \times 5K, \times 10K, \text{AUTO}$
	Horizontal direction (H)		$\times 1, \times 2, \times 5, \times 10, \times 20, \times 50, \times 100, \times 200, \text{AUTO}$
Weight			Approx. 390 g
External dimensions			140 (W) $\times$ 100 (D) $\times$ 40 (H) mm
Accessories			Recording paper: E-CH-S25A, Connection cable: E-SC-S245A

* Excel is a trademark of Microsoft Corporation.

Nano Profile Scanner

NPS2100A

The NPS2100A has a probe tip diameter that can be measured in the tens of nanometers. Using this probe to scan the workpiece surface enables irregularities to be displayed in three dimensions with nanometer level resolution.

The measuring unit has a self detecting type cantilever and vibration isolation mechanism as standard features. In addition, it is compact enough to be used on a desk and features outstanding operational ease.

NEW



Nanometer Level Profile Evaluation

- The NPS2100A performs analysis of minute profiles ranging from less than a nanometer to 10 micrometers.

Unique Self Detecting Cantilever

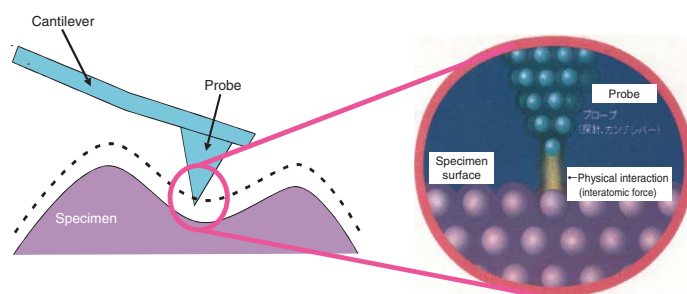
- The cantilever incorporates a unique sensor that detects deflection. It is easy to install and operate. The optical axis does not need to be adjusted since it does not use a laser optical system, and can be taken anywhere for measurements.

Standard Vibration Isolation Mechanism

- The provision of a vibration isolation mechanism that consists of a coil spring and gel damper allows measurements to be performed at virtually any location.

High-Speed Measurement

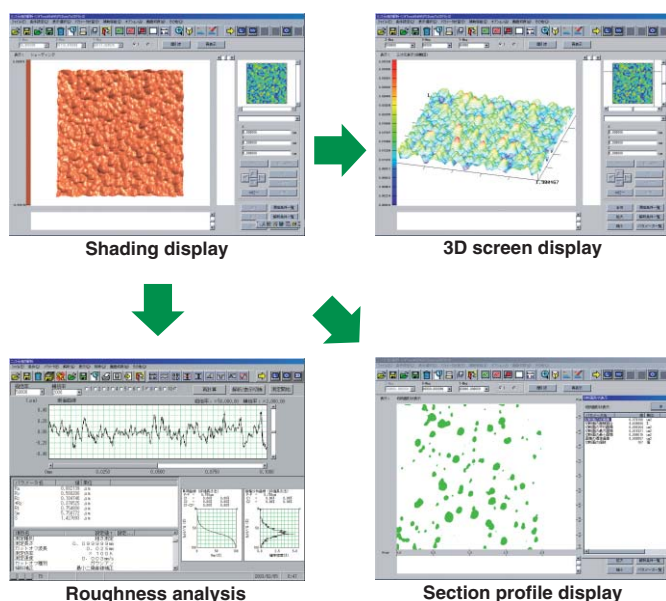
- High efficiency measurement of 12 seconds to 1800 seconds per frame is realized. The scanned profile can be monitored during measurement.



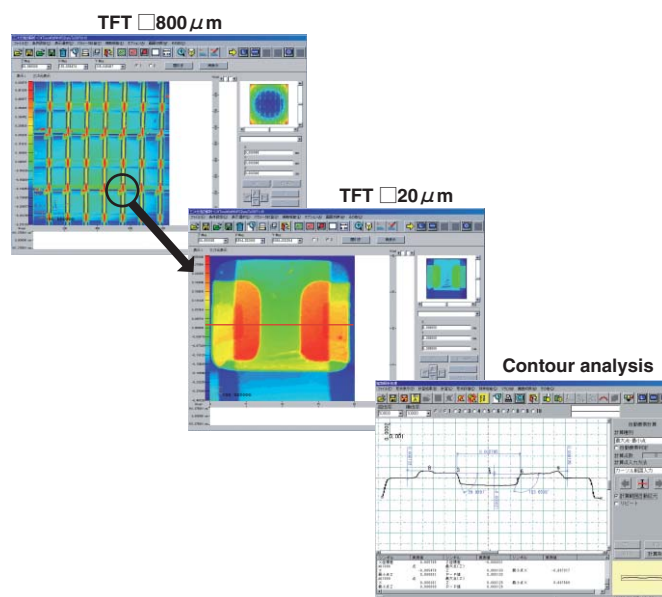
Principle of NPS2100A Sensor

The interaction (interatomic force or repulsion) that acts between the probes and the specimen surface is detected in order to measure the microscopic surface shape.

■ Analysis with TIMS Integrated Program



Roughness Analysis of Coating Film



Contour Analysis of LCD Substrate

NPS2100A Applications

Semiconductors

Device pattern profile evaluation, film grain evaluation

Recording Media

Disk surface evaluation, chemical texture/bit profile evaluation, magnetic tape/magnetic head surface evaluation

Liquid Crystal • Other Displays

LCD panel surface evaluation, touch panel gap measurement, ITO film grain evaluation

Crystal Devices

Crystal oscillator/electrode surface roughness evaluation, SAW filter surface film thickness/step measurement

Ceramics • Glass

Surface/section profile evaluation, coating surface film thickness/step measurement, lens/optical filter profile evaluation

Electronic Devices

Surface profile evaluation, roughness/step measurement, plated surface evaluation, defect analysis

Molecular Materials

Polyamide film surface treatment evaluation, processed paper surface evaluation, paint film/coating film thickness/step measurement

Machine Tools

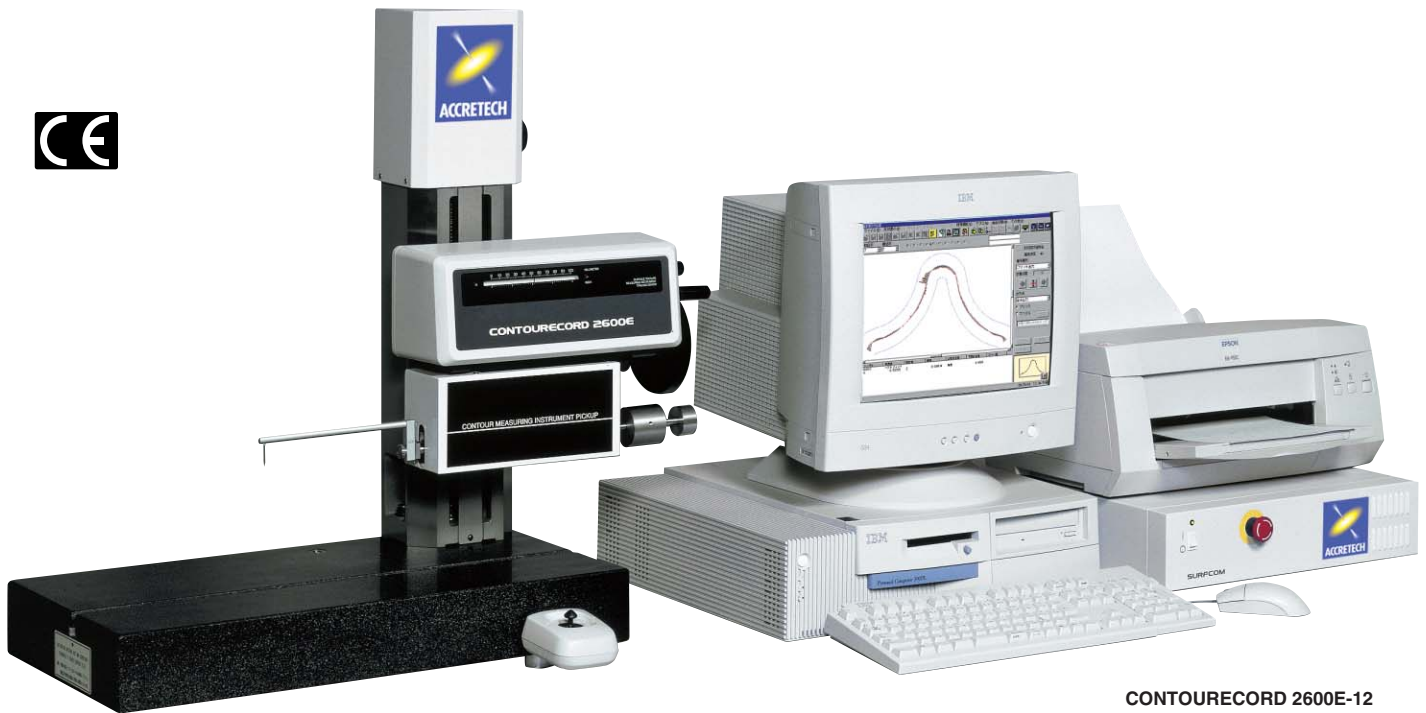
Grinding process evaluation, wear surface evaluation

Specifications

Model		NPS2100A
Measuring range	X axis/Y axis	Max. 800 × 800 mm
	Z axis	Max. ±10 μm
Resolution	Z axis	0.3 nm
Workpiece stand	Movement distance	10 mm in X, Y and Z directions
	Workpiece shape	Max. φ60mm, Thickness: 8.5 mm
Scanning speed		12 seconds – 1800 seconds / frame
Measuring modes		Contact mode, dumping mode
Evaluation functions		3D display, contour line display, Smeared contour display, contour line density display, section profile display, peak distribution display, airview (hidden line processing, mesh display, height color coding, view-point direction specification), load curve display, amplitude distribution (ADF) display, peak height distribution display
Standard accessories		Self detecting type cantilever (For contact mode: 10 pieces/box, For Dumping mode: 10 pieces/box), pin set for cantilever, standard sample, optical microscope set, instruction manual

High Precision Contour Measurement
 $1\text{ }\mu\text{m}$ or Less in Z Direction (for displacement of 5mm)

CONTOURECORD 2600E



CONTOURECORD 2600E-12

* Printer is option.

Auto Element Judgment (AI Function)

- The 2600E automatically determines the type of element (point • line • circle).

Dimension Display Function

- The actual measured values for parameters and geometric deviation can be displayed on the diagram.

Profile Synthesis Function

- The limitations on the analysis range due to the angle of the stylus are addressed with the synthesis function.

Peak and Valley Function

- This function enables the maximum workpiece point to be detected by tracing with the stylus, simplifying alignment.

Calculation Point Repeat Function

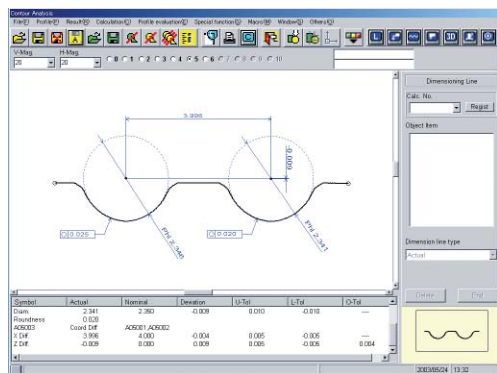
- Overall workpiece analysis can be executed after completing only one pattern analysis for workpieces where certain shapes are repeated.

High Precision Contour Profile Evaluation

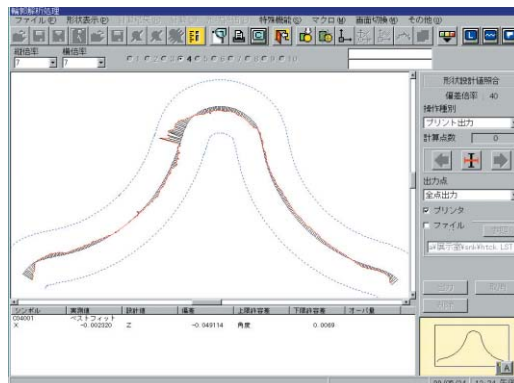
- The 2600E is ideal for the evaluation of non-spherical lenses, optical fiber connectors, ball screws and other parts where high profile accuracy is required.

Host of Contour Evaluation Functions

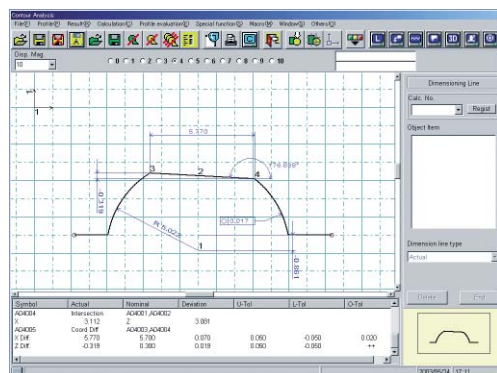
- A wide range of evaluation are provided. Standard functions include a measured data (point data)/design value deviation collation function, design value generation function, best fit function and IGES/DXF conversion function to facilitate communication with CAD systems.



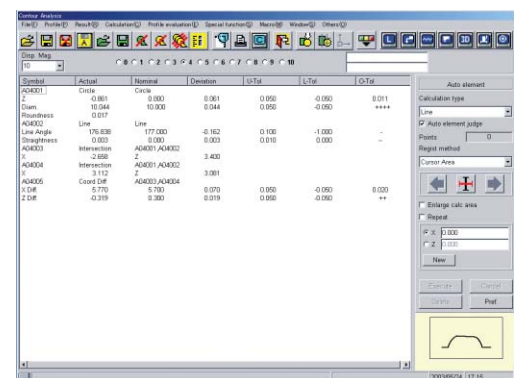
Dimension line display function



Contour profile design value collation



Contour profile dimension analysis



Calculation result/design value collation

Specifications

Model			CONTOURECORD 2600E
Measuring range	Z axis (vertical)		50 mm
	X axis (horizontal)		100 mm (200 mm on -22 system)
Accuracy	Z axis indication accuracy		$\pm (0.8 + 4H / 100) \mu\text{m}$ H: Measuring height (mm)
	Measuring resolution		0.025 μm
	X axis indication accuracy		$\pm (1 + 2L / 100) \mu\text{m}$ L: Measuring length (mm)
	Measuring resolution		0.1 μm
Straightness accuracy			1 $\mu\text{m} / 100 \text{ mm}$
Sensing method	Z axis		Laser beam diffraction scale
	X axis		Moiré striped scale
Recording	Vertical magnification		0.01~10,000,000 (Possible for any or automatic value)
	Horizontal magnification		0.01~10,000,000 (Possible for any or automatic value)
Speed	Column up/down (Z axis)		3 mm/s
	Measuring (X axis)		0.03, 0.06, 0.15, 0.3, 0.6, 1.5, 3, 6 mm/s
Min. measuring pitch			0.1 μm
Max. measuring points			100,000 (Max. 10 profiles)
Radius of stylus			0.025 mm R
Measuring force			30 mN or less
Measuring feed direction			Push/pull, both directions
Measuring orientation			Up/down, both directions
Calculation processing functions			Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse), coordinate control (zero point setting, X axis setting, parallel movement, rotary movement), surface calculation, over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, macro function, automatic element discrimination, calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function, profile design value collation, best fit, design value generation, IGES/DXF conversion
Power source			Single phase AC 100 V $\pm 10\%$, 50/60 Hz
Power consumption			380 VA
Installation dimensions			1400 (W) $\times$ 800 (D) $\times$ 750 (H) mm
Weight			150 kg

* Printer is not included in power consumption.

Cutting-Edge Linear Motor Dramatically Boosts Precision The New Standard in Contour Measuring

CONTOURECORD 1700DX



Higher Precision

- A measuring accuracy that is adequate for measuring molds and other precision parts has been achieved. This dramatic increase in measuring precision enables measurement of workpieces that required a higher-end model in the past, substantially increasing the range of applications.

World's First Linear Motor in a Roughness Instrument (patent pending)

- The world's highest level of measuring speed and lowest vibration enable consistent high-magnification measurements to be performed. The non-contact drive and simple structure (no feed screw or gear box) of the linear motor ensures stable vibration-free operation over an extended period.

High Efficiency Measurements

- The teaching/playback function automates the series of processes, from measurement to pasting of data to generate the inspection report. A maximum measuring speed of 20 mm/s and maximum movement speed of 60 mm/s dramatically enhance measuring efficiency.

Space Saving

- A new design creates a fresh image, and the footprint has been reduced by approximately 25% (compared to previous model). This helps reduce expenses when installing the unit in a constant-temperature room.

Easy Evaluation of Contour of General-Purpose Parts (Contour)

Accurate data can be obtained quickly for the contour of parts that were evaluated with a projector or tool microscope in the past. The measuring results can be used as is on the inspection report.

Superior ACCRETECH Functions

Automatic Element Discrimination Function (AI Function)

The element (point, line, circle) is automatically determined without being specified by the operator.

Dimension Line Display Function

This enables dimension lines to be drawn on the diagram along with actual measured values for parameters and geometric deviation.

Automatic Crowning Function

The maximum or minimum workpiece values are automatically detected.

Calculation Point Repeat Function

Overall analysis of workpieces with profiles that are repeated can be executed by analyzing only one pattern.

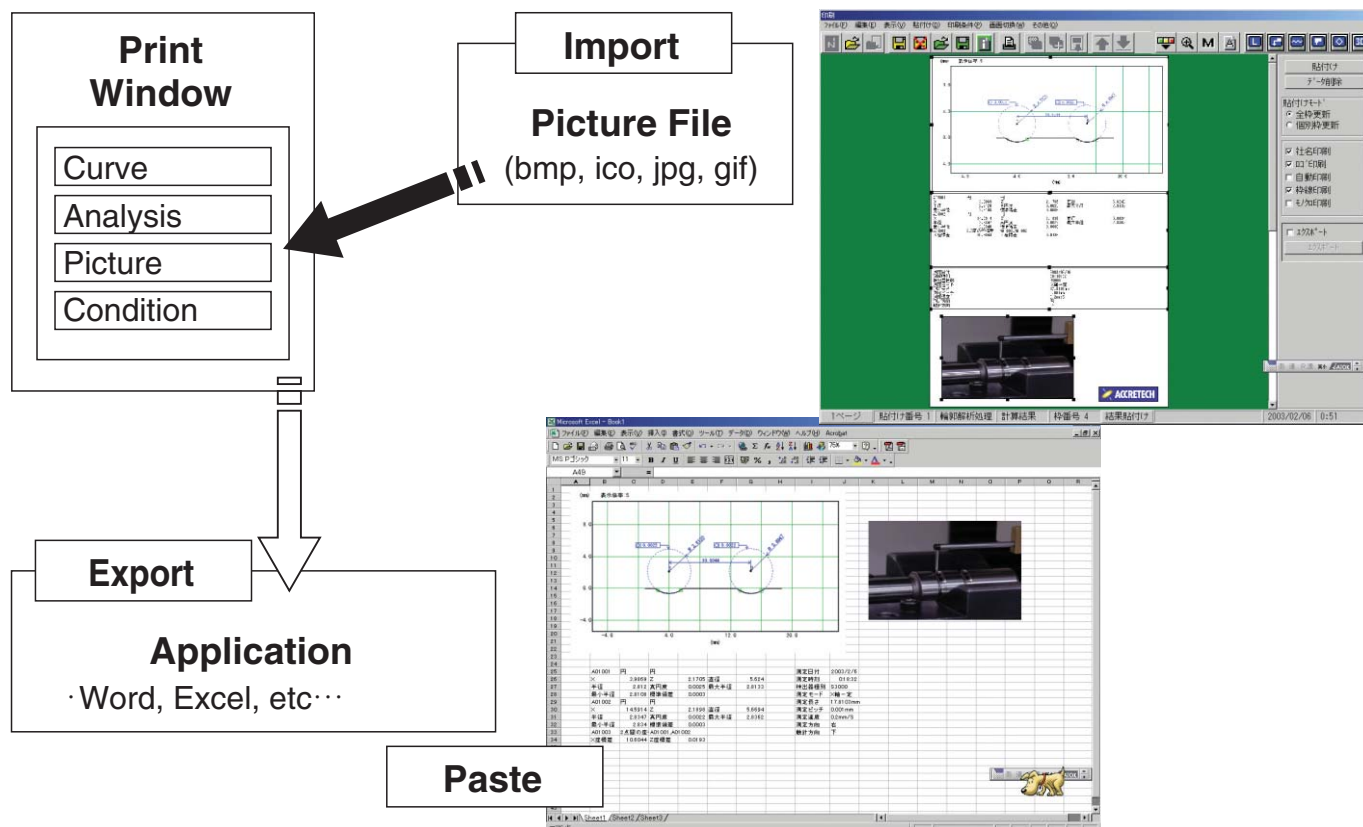
Workpiece Trace Function

The measuring range can be determined without setting the values by manually tracing the workpiece once.

This function is ideal for measurement of intricate shapes.

Import/Export Function

Image data can be pasted in the measured results, and measurement waveform data can be pasted in standard programs.



Specifications

Model			CONTOURECORD 1700DX
Measuring range	Z axis (vertical)		50mm
	X axis (horizontal)		100mm
Accuracy	Z axis indication accuracy	$\pm(2.5+2H/100) \mu\text{m}/5\text{mm range, } 20\text{mm range, } \pm(3.5+4H/100) \mu\text{m}/50\text{mm range}$ H: Measuring height (mm)	
	Measuring resolution	0.1 $\mu\text{m}/5\text{mm range, } 0.4 \mu\text{m}/20\text{mm range, } 1 \mu\text{m}/50\text{mm range}$	
	X axis indication accuracy	$\pm(1+2L/100) \mu\text{m}$ L: Measuring length (mm)	
	Measuring resolution	0.04 μm	
Straightness accuracy		1 $\mu\text{m} / 100 \text{ mm}$	
Sensing method	Z axis	Differential transducer (trans)	
	X axis	Moiré striped scale	
Recording	Vertical magnification	0.01 – 10,000,000 (Possible for any or automatic value)	
	Horizontal magnification	0.01 – 10,000,000 (Possible for any or automatic value)	
Speed	Column up/down (Z axis)	10 mm/s	
	Measuring (X axis)	0.03 - 20 mm/s	
Min. measuring pitch		1 μm	
Max. measuring points		100,000 (Max. 10 profiles)	
Radius of stylus		0.025 mm R	
Measuring force		30 mN or less	
Measuring feed direction		Push/pull, both directions	
Measuring orientation		Up/down, both directions	
Calculation processing functions		Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse), coordinate control (zero point setting, X axis setting, parallel movement, rotary movement), surface calculation, over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, macro function, automatic element discrimination, calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function, profile design value collation, best fit, design value generation, IGES/DXF conversion	
Power source		Single phase AC 100 V $\pm 10\%$, 50/60 Hz	
Power consumption		400VA	
Installation dimensions		1250 (W) $\times$ 850 (D) $\times$ 1500 (H) mm	
Weight		125kg	

Enhanced Operational Ease

CONTOURECORD 1600D



CONTOURECORD 1600D-12

* Printer is option.

Auto Element Judgment (AI Function)

- The 1600D automatically determines the type of element (point • line • circle).

Dimension Display Function

- The actual measured values for parameters and geometric deviation can be displayed on the diagram.

Profile Synthesis Function

- The limitations on the analysis range due to the angle of the stylus are addressed with the synthesis function.

Peak and Valley Function

- This function enables the maximum workpiece point to be detected by tracing with the stylus, simplifying alignment.

Calculation Point Repeat Function

- Overall workpiece analysis can be executed after completing only one pattern analysis for workpieces where certain shapes are repeated.

Workpiece Trace Function

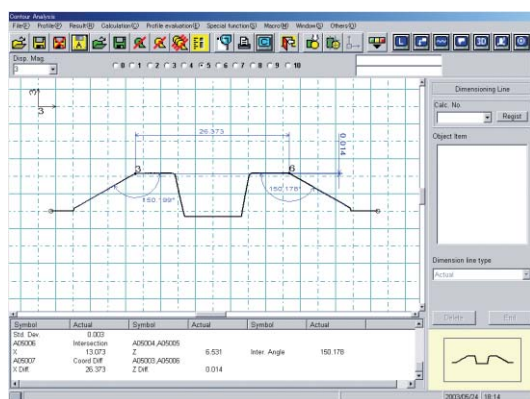
- The measuring range can be determined by tracing the workpiece once. This is effective for measurement of minute profiles.

Easy Evaluation of Part Contour

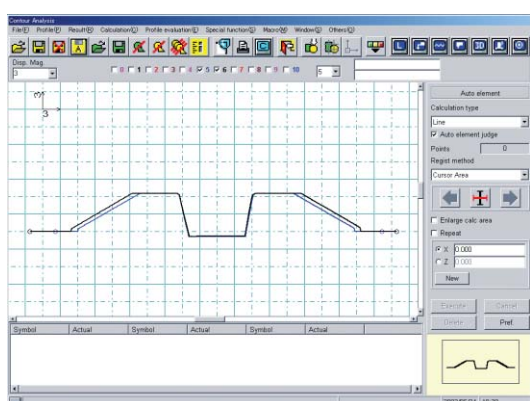
- Exact data on parts that were previously evaluated with a projector or tool microscope can be obtained in a short period of time. The measured results can be used as is for inspection reports.

High Efficiency Measurement

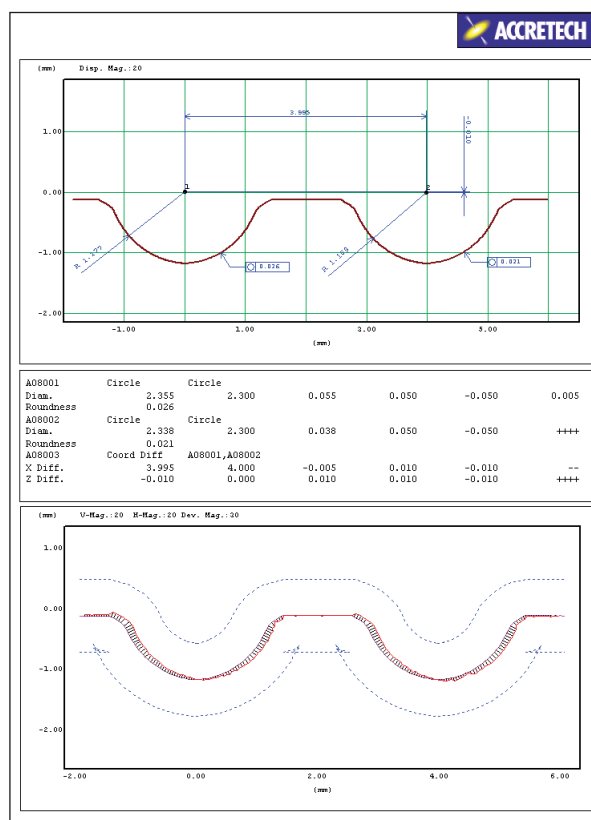
- The teaching/playback function automates the entire process, from measurement to pasting of the data into an inspection report.



Dimension line display function



Overlap display



Printed data sheet

Specifications

Model			CONTOURECORD 1600D
Measuring range	Z axis (vertical)		50 mm
	X axis (horizontal)		100 mm (200 mm on -22 system)
Accuracy	Z axis indication accuracy		±0.25% / full scale (±4 μm or less for 5mm range)
	Measuring resolution		0.1 μm / 2.5 ±2.5mm, 0.4 μm / ±10mm, 1 μm / ±25mm
	X axis indication accuracy		± (1 + 2L / 100) μm L: Measuring length (mm)
	Measuring resolution		0.1 μm
Straightness accuracy			1 μm / 100 mm
Sensing method	Z axis		Differential transducer (trans)
	X axis		Moiré striped scale
Recording	Vertical magnification		0.01 – 10,000,000 (Possible for any or automatic value)
	Horizontal magnification		0.01 – 10,000,000 (Possible for any or automatic value)
Speed	Column up/down (Z axis)		3 mm/s
	Measuring (X axis)		0.03, 0.06, 0.15, 0.3, 0.6, 1.5, 3, 6 mm/s
Min. measuring pitch			1 μm
Max. measuring points			100,000 (Max. 10 profiles)
Radius of stylus			0.025 mm R
Measuring force			30 mN or less
Measuring feed direction			Push/pull, both directions
Measuring orientation			Up/down, both directions
Calculation processing functions			Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse), coordinate control (zero point setting, X axis setting, parallel movement, rotary movement), surface calculation, over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, macro function, automatic element discrimination, calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function, profile design value collation, best fit, design value generation, IGES/DXF conversion
Power source			Single phase AC 100 V ±10%, 50/60 Hz
Power consumption			380 VA
Installation dimensions			1850 (W) × 800 (D) × 750 (H) mm
Weight			150 kg

* Printer is not included in power consumption.

Highly Reliable, Easy to Operate Unit for Internal Sections

CONTOURECORD 600D



Easy Measurement of Profile

The 600D facilitates easy and quick measurement of contour profiles with relatively large undulations, such as thread ridges, hole taper, mold profile and gauge contour profile.

High Precision

The unit has unique position detection mechanisms in the vertical (Z) and horizontal (X) directions, enabling very accurate and reliable enlarged drawing of profiles with a high-precision X-Y recorder.

Facilitates Difficult Measurements

- This unit can measure internal sections and other profiles that cannot be measured with a projector or tool microscope unless the work-piece is cut.

Outstanding Operational Ease

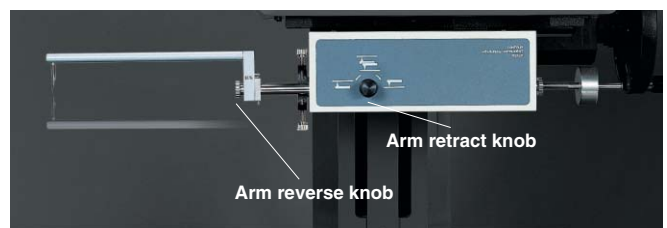
- The X axis and Y axis can be motor fed with a joystick or manually fed, enhancing the efficiency of measurements.

Select Optimum Measuring Magnification/Speed

- The optimum measuring magnification between 1 and 2,000 times can be selected according to individual requirements. (500 to 2000 magnification are optional.)

Arc Distortion Correction Function

- This function automatically corrects for arc distortion caused by the lever type detector. The function even works when using a special long arm, reversing the arm or other special method, ensuring accurate recording.



Measure Long Holes/Large Workpieces

- Long holes can be measured by using a special arm that is longer than the standard arm.

Various Safety Mechanisms

The 600D incorporates a variety of safety mechanisms, including an electric retract mechanism to prevent breakage of the stylus tip and an overload auto-stop function to protect the detector by monitoring for overscale or sticking of the stylus.

Low Measuring Force Adjustment Function (option)

This function enables measurements to be performed on easily deformed workpieces with a low measuring force of 2 mN.

Low measuring force adjustment weight (0102406)

Min. measuring force: 2mN

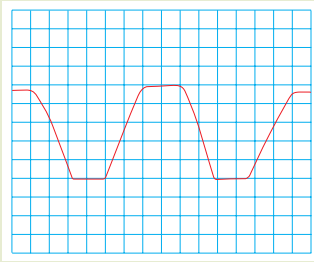
Measuring force range: 2 – 10 mN

Adjustment: 1 mN / graduation

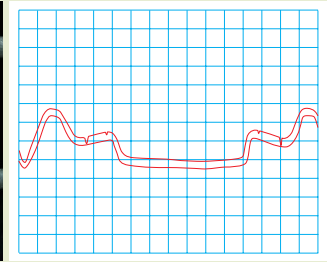


Sample Data Sheet

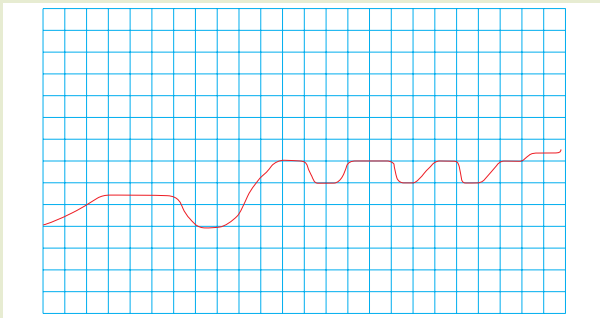
Plastic gear measurement



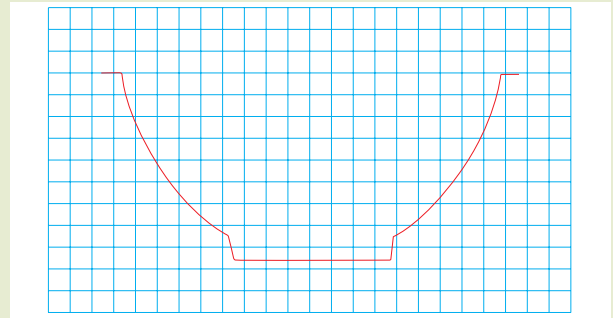
Pull-top measurement



Plastic bolt profile measurement



Flashlight mirror measurement



Specifications

Model			CONTOURECORD 600D
Measuring range	Z axis (vertical)		50 mm
	X axis (horizontal)		100 mm (200 mm on -22 system)
Accuracy	Z axis indication accuracy		0.25% / full scale
	X axis indication accuracy		$\pm (1 + 2L / 100) \mu\text{m}$
Straightness accuracy			1 μm / 100 mm
Sensing method	Z axis		Differential transducer (trans)
	X axis		Moiré striped scale
Recording	Vertical magnification (Z axis)		1, 2, 5, 10, 20, 50, 100, 200, 500*, 1000*, 2000*
	Horizontal magnification (X axis)		1, 2, 5, 10, 20, 50, 100, 200, 500*, 1000*, 2000*
Speed	Column up/down (Z axis)		3 mm/s
	Measuring (X axis)		0.03, 0.06, 0.15, 0.3, 0.6, 1.5, 3, 6 mm/s
Min. measuring pitch			1 μm
Stylus	Tip radius		25 μm R
	Material		Carbide alloy
Measuring force			30 mN or less
Measuring feed direction			Change between push measurement and pull measurement
Measuring orientation			Change between upward measurement and downward measurement
Stylus follow angle	Up		Max. 77° (smooth surfaces)
	Down		Max. 87° (smooth surfaces)
Power source			Single phase AC 100 V $\pm 10\%$, Specify 50 or 60 Hz
Power consumption			300 VA
Installation dimensions			1200 (W) $\times$ 450 (D) $\times$ 717 (H) mm**
Weight			120 kg**
Standard accessories			Stylus (DT45502), recording paper (A3 leaf), ceramic pen (red, HC503P-RD), set of tool consumables, instruction manual, inspection certificate

*: Indicates high-magnification detector. **: Specifications for -12 system



High-Speed Non-Contact Analysis of Contour Profiles

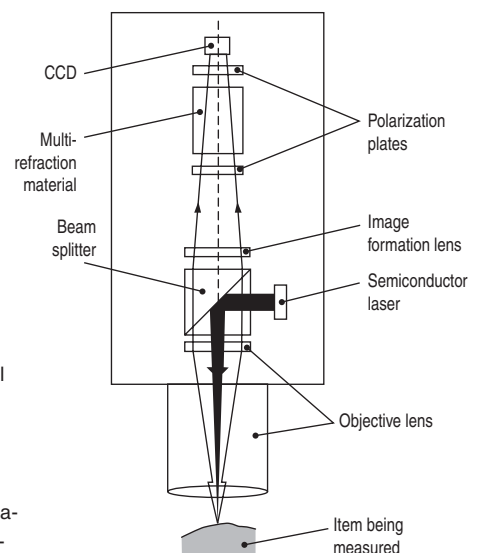
PS200 Profile Scanner



* Printer is optional.

PS200 Profile Scanner

Measurement Principle



Non-Contact Contour Profile Measurement

- This revolutionary product enables the contour profile of multiple refraction materials to be measured.

Wide Measuring Range

- Measurements can be performed between 0 mm and 35 mm by changing the objective lens. A wide work distance range of 9 – 70 mm enhances operation ease.

Wide Angle Measurement

- The use of scattered light achieves a measuring angle of 85 degrees.

High-Speed Measurement

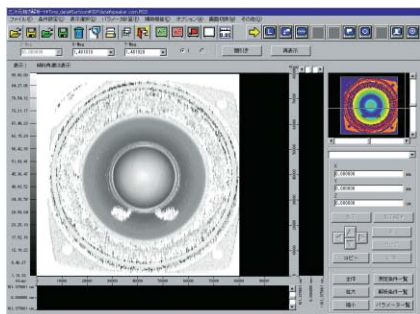
- The maximum measuring speed of 50 mm/sec. is equal to 10 times the efficiency of conventional units.

Ideal for Soft Materials

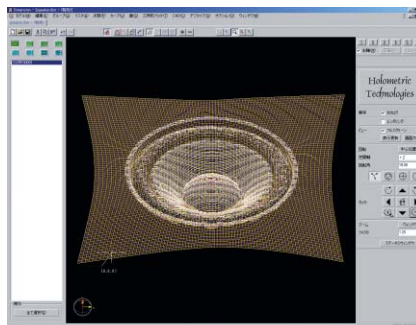
- The PS200 is ideal for soft workpieces that were difficult to measure in the past, such as rubber that is easily deformed (can be measured with black), leaf springs that experience elastic deformation with only a small amount of measuring force, seals and other materials that are soft and cannot be measured with the contact method.

Extensive Application Technology

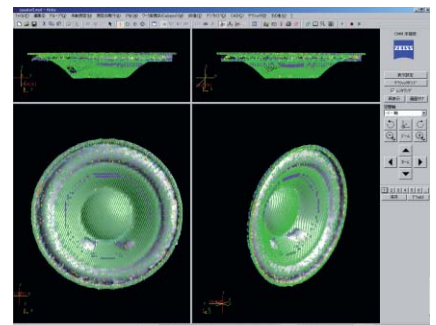
The PS200 can be used as a digitizer and connected to a CAD, free curve program or other network to facilitate reverse engineering.



Digitizing with PS200

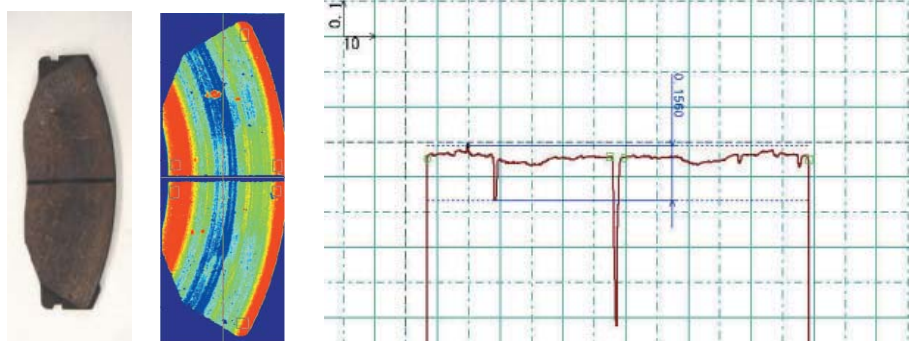


Point group data generation
by DIMENSION program (option)

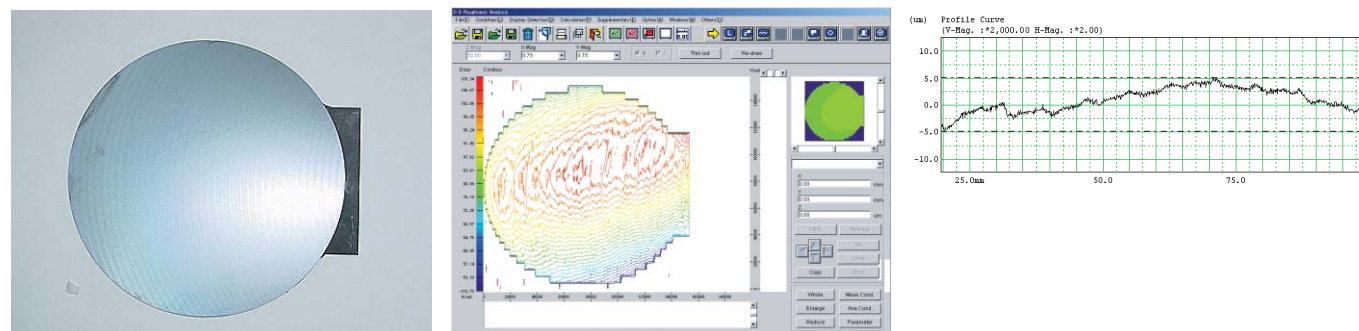


Collation of point group data and CAD data by
HOLOS program (option)

Example of break pad wear evaluation



Example of silicon wafer slicing accuracy



Specifications

Model			PS 200
Measuring range	Z axis (vertical)		0 – 35 mm (selected by changing objective lens)
	Y axis (front/rear)		200 mm
	X axis (horizontal)		200 mm
Objective lens	Resolution		0.15 – 4 μm (selected by changing objective lens)
	Work distance		9 – 70 mm (selected by changing objective lens)
Straightness accuracy	Y axis (front/rear)		2 μm / 200 mm
	X axis (horizontal)		2 μm / 200 mm
Sample data	Max. measuring points (X axis)		7,000 points
	Lines (Y axis)		2,000 lines
Measuring speed	X axis (horizontal)		Max. 50 mm/s
Feed pitch	Y axis (front/rear)		0.001 – 10 mm
Analysis items	Processing functions	Basic	Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse),
		Additional	Over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, area calculation, macro function, automatic element discrimination (AI), calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function
		3D display	3D display, contour line display, smeared contour display, contour line intensity display, section profile display, peak distribution display, Airview (hidden line processing, mesh display, view-point direction specification), load curve display, amplitude distribution (ADF) curve display, peak height distribution display
Power source			Single phase 100 V $\pm 10\%$, 50/60 Hz
Power consumption			350 VA
Installation dimensions			1300 (W) $\times$ 800 (D) $\times$ 800 (H) mm
Weight			280 kg

● Lenses

Model	Type I	Type II	Type III	Type IV	Type V
Measuring range	0.6 mm	1.8 mm	8 mm	18 mm	35 mm
Resolution (1 σ)	0.15 μm	0.4 μm	1 μm	2 μm	4 μm
Accuracy (2 σ)	2 μm /0.3 mm	3 μm /0.9 mm	6 μm /4 mm	10 μm /9 mm	15 μm /17.5 mm
	4 μm /0.6 mm	6 μm /1.8 mm	12 μm /8 mm	20 μm /18 mm	30 μm /35 mm
Work distance	12 mm	15 mm	42 mm	65 mm	90 mm
Spot diameter	5 $\times$ 11 μm	12 $\times$ 22 μm	15 $\times$ 45 μm	25 $\times$ 65 μm	35 $\times$ 75 μm

* Power consumption does not include printer.

Efficient Non-Contact Measurement of Steep Profiles

PS100 Profile Scanner

PS100 Profile Scanner

Features**High-Speed Measurement**

- The PS100 provides a measuring speed that is equal to 10 times the efficiency of conventional units (compared to ACCRETECH unit).

Low Running Costs

- This unit enables line-side measurements to be made very economically. Running costs are especially low since no consumables are required for the non-contact stylus.

High Measuring Efficiency

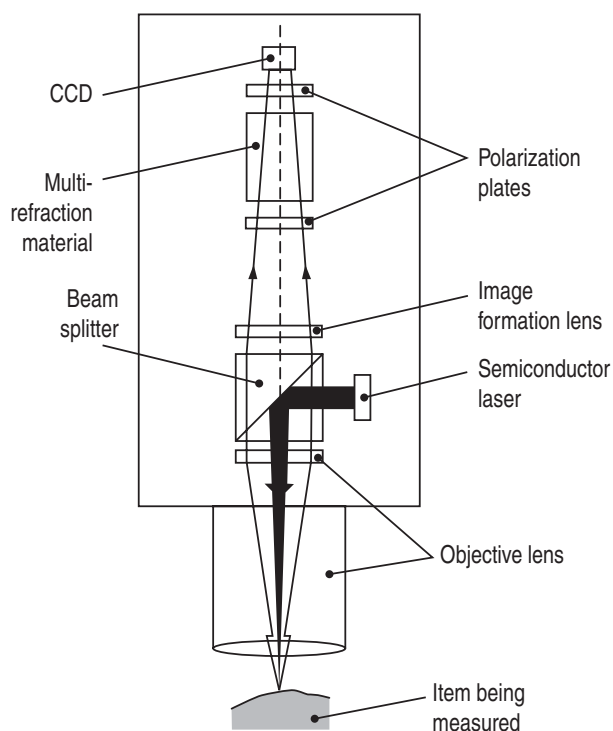
- The unit is easy to operate and provides high throughput. Operation can be automated by using the teaching function to register all procedures, from measurement to analysis and printout.

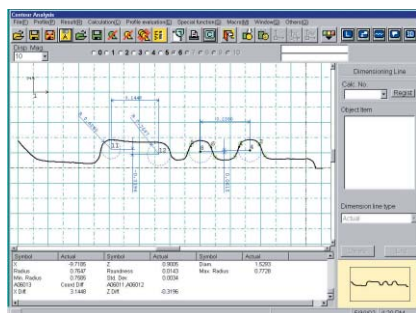
Wide Measuring Range

- By changing the lens, non-contact measurements of profiles up to a maximum of 35 mm can be performed.

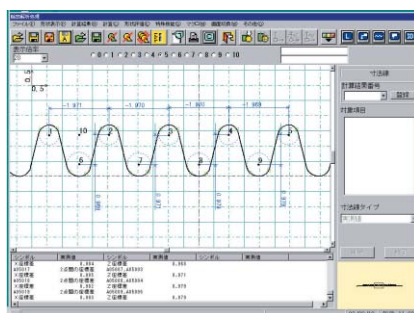
Non-Contact Measurement of Steep Profiles

- Steep profiles can be easily measured. Normally, a measuring angle between 20 and 30° is the limit for optical measurements, but the PS100 is capable of a steep angle in excess of 80°.

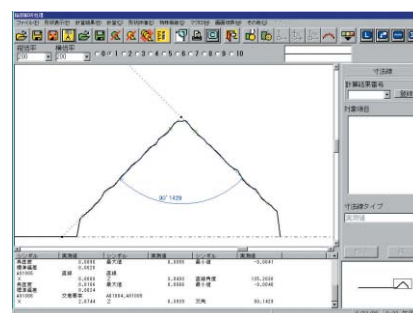
Measurement Principle



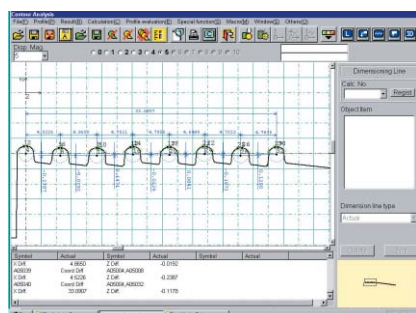
PET bottle mouth profile



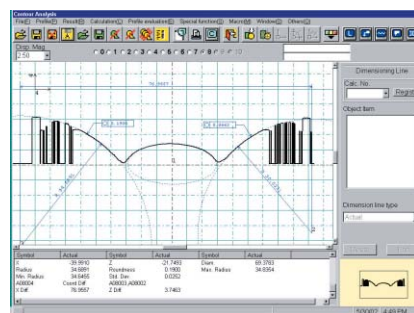
Embossed paper profile



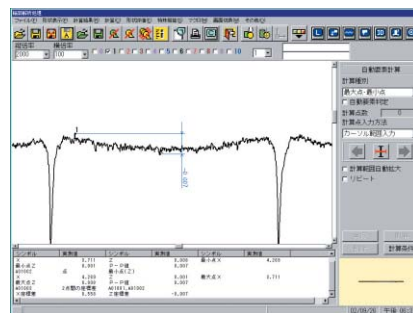
Wafer cutting plate profile



Paper cup stock profile



Speaker cone profile



Ceramic chip flatness

Specifications

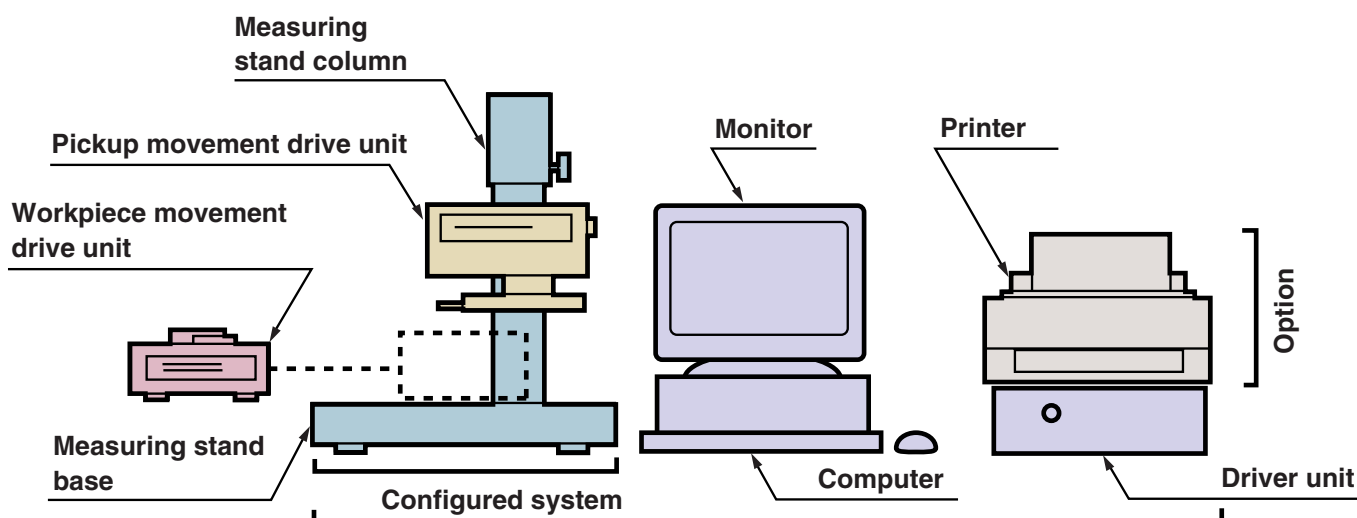
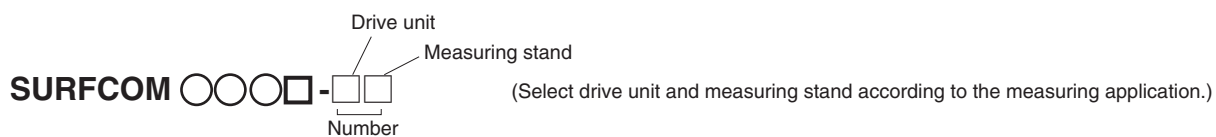
Model		PS 100
Measuring range	Z axis (vertical)	0 – 35 mm (selected by changing objective lens)
	X axis (horizontal)	200 mm
Objective lens	Resolution	0.15 – 4 μm (selected by changing objective lens)
	Work distance	9 – 70 mm (selected by changing objective lens)
Straightness accuracy	X axis (horizontal)	2 μm / 200 mm
Sample data	Max. measuring points (X axis)	7,000 points
Measuring speed	X axis (horizontal)	Max. 50 mm/s
Analysis items	Processing functions	Point, line, circle, partial circle, ellipse, max. point/min. point, distance, coordinate difference, polar coordinate difference, orthogonal/polar coordinate difference display, intersecting elements (point-line, line-line, circle-line, circle-circle, line-ellipse), symmetric elements (point-point, point-circle, point-ellipse, line-line, circle-circle, circle-ellipse, ellipse-ellipse),
	Additional	Over-pin calculation, dimension line display function, calculation result/design value collation, mirror reversal, profile synthesis function, area calculation, macro function, automatic element discrimination (AI), calculation point repeat function, workpiece trace function, peak and valley function, auto operation log/playback function
Power source		Single phase 100 V $\pm 10\%$, 50/60 Hz
Power consumption*		430 VA
Installation dimensions		1200 (W) $\times$ 800 (D) $\times$ 950 (H) mm
Weight		170 kg

● Lenses

Model	Type I	Type II	Type III	Type IV	Type V
Measuring range	0.6 mm	1.8 mm	8 mm	18 mm	35 mm
Resolution (1 σ)	0.15 μm	0.4 μm	1 μm	2 μm	4 μm
Accuracy (2 σ)	2 $\mu\text{m}/0.3$ mm	3 $\mu\text{m}/0.9$ mm	6 $\mu\text{m}/4$ mm	10 $\mu\text{m}/9$ mm	15 $\mu\text{m}/17.5$ mm
	4 $\mu\text{m}/0.6$ mm	6 $\mu\text{m}/1.8$ mm	12 $\mu\text{m}/8$ mm	20 $\mu\text{m}/18$ mm	30 $\mu\text{m}/35$ mm
Work distance	12 mm	15 mm	42 mm	65 mm	90 mm
Spot diameter	5 $\times$ 11 μm	12 $\times$ 22 μm	15 $\times$ 45 μm	25 $\times$ 65 μm	35 $\times$ 75 μm

* Power consumption does not include printer.

SURFCOM • CONTOURECORD System Configuration



* The optional printer can be an A3/A4 printer, laser printer or color printer.

Drive Unit		Measuring Stand	
- 1 □	Pickup movement E-RM-S72B Max. movement distance: 100 mm	- 4 □	Workpiece movement E-RM-S75A Max. movement distance: 50 mm
- 2 □	E-RM-S74A Max. movement distance: 200 mm	- 5 □	E-RM-S76A Max. movement distance: 150 mm
- 3 □	Low-speed drive unit E-RM-S141A Max. movement distance: 100 mm	- 6 □	E-RM-S77A Max. movement distance: 300 mm
		- 1 □	Column: Manual Base dimensions: 600 × 320 mm Measuring height: 250 mm Allowable load: 50 kg
		- 3 □	Column: Motorized Base dimensions: 600 × 320 mm Measuring height: 450 mm Allowable load: 50 kg
		- 2 □	Column: Motorized Base dimensions: 600 × 320 mm Measuring height: 250 mm Allowable load: 50 kg
		- 4 □	Column: Motorized Base dimensions: 1000 × 450 mm Measuring height: 450 mm Allowable load: 100 kg

* Drive unit model differs for SURFCOM 480A

E-RM-S72B→E-RM-S71A

E-RM-S74A→E-RM-S73A

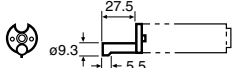
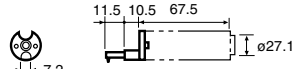
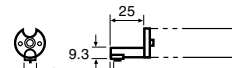
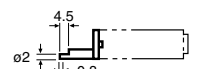
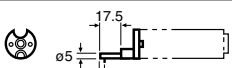
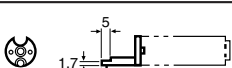
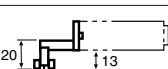
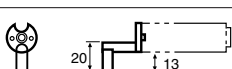
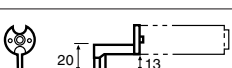
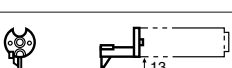
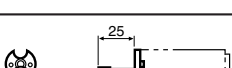
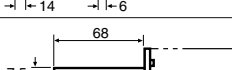
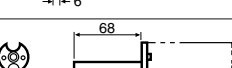
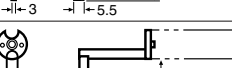
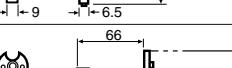
E-RM-S141A→E-RM-S78A

* -4□, -5□ and -6□ configurations not available for the CONTOURECORD series.

Nosepieces

Applicable Models

- S130A ■ S1400D, S1400D-3DF
- S480A ■ S1800D, S1800D-3DF
- S2800E, S2800E-3DF

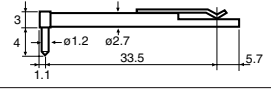
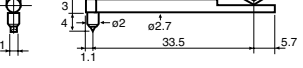
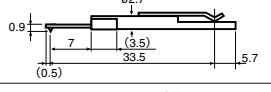
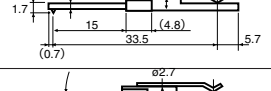
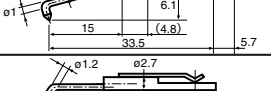
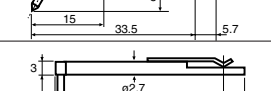
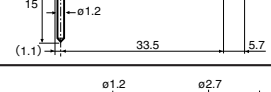
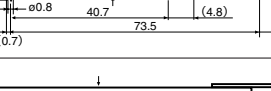
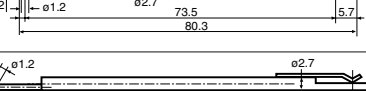
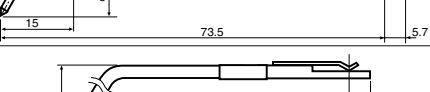
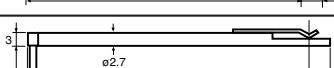
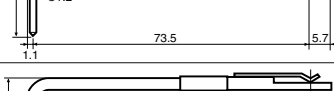
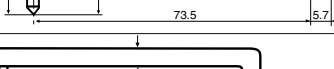
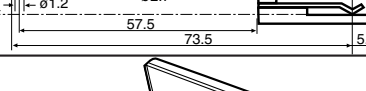
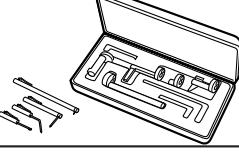
Measuring Application	Model	Outer Appearance	Applicable Stylus	Skid Shape	Remarks
General purpose	010 2701		010 2501 DT43801	32mmR sapphire	• Tip skid • Standard pickup built in
Skidless	010 2702*		All styluses	-----	• For protection • For front travel adjustment
Horizontal tracing of ordinary planes	010 2703*		010 2501 DT43801		• Both side override skid • Skid radius for horizontal tracing: 4.5mm
Extra fine holes	010 2704		010 2511 DT43811	8mmR tool steel	• Double sided straddling skid • Position adjustment with stylus required
Fine holes	010 2705		010 2512 DT43812	8mmR tool steel	• Tip skid
Thin groove tooth surfaces	010 2706		010 2512 DT43812	8mmR tool steel	• Double sided straddling skid
Curved surfaces	010 2707		010 2515 DT43815	32mmR sapphire	• Sliding skid
Deep grooves	010 2708		010 2515 DT43815	32mmR sapphire	• Double sided straddling skid
Narrow deep grooves	010 2709*		010 2515 DT43815	32mmR sapphire	• Tip skid
R grooves	010 2710*		010 2515 DT43815	0.8mmR ruby	• One side override skid • Magnification: 5,000 or more • Position adjustment with stylus required • Recording only
Small round bars	010 2711		010 2501 DT43801	32mmR sapphire	• Double sided straddling skid • Skid position adjustment required • Three types of skis provided for $\phi 2 - 4$, $\phi 4 - 8$, $\phi 8 - 16$
Long holes	010 2722*		010 2522 DT43822	32mmR sapphire	• Tip skid
Deep grooves in holes	010 2723		010 2525 DT43825	32mmR sapphire	• Tip skid • Position adjustment with stylus required
Extra deep grooves	010 2724		010 2526 DT43826	32mmR sapphire	• Double sided straddling skid • Position adjustment with stylus required
Bottom surface of O-ring grooves	010 2726		010 2525 DT43825	0.8mmR ruby	• Double sided straddling skid • Magnification: 5,000 or more • Position adjustment with stylus required

* Indicates stylus/nose piece set (DT43800 and 010 2640).

Replaceable Profile Styluses

Applicable Models

■ S130A	■ S1400D, S1400D-3DF
■ S480A	■ S1800D, S1800D-3DF
	■ S2800E, S2800E-3DF

Measuring Application	Model	Outer Appearance	Specifications	Remarks
General purpose 	DT43801		2μmR, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible • Standard specifications
Fine wires, knife edges 	DT43802		2μmR, 60° ax-shaped diamond, 0.7mN	• Downward measurements
Extra fine holes, gear flank 	DT43811		2μmR, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible
Fine holes/ thin grooves 	DT43812*		2μmR, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible
Hole bottom/ conical surfaces 	DT43813		2μmR, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible
Corners/ tooth surfaces 	DT43814*		2μmR, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible
Deep grooves, round grooves 	DT43815*		2μmR, 60° conical diamond, 0.8mN	• Downward measurements • Large waveform distortion
Fine long holes 	DT43821		2μmR, 60° conical diamond, 3mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less
Low magnification, long holes 	DT43822*		2μmR, 60° conical diamond, 3mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×20,000 or less
Low magnification, corners 	DT43824		2μmR, 60° conical diamond, 4mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×20,000 or less
Deep groove corners 	DT43827		2μmR, 60° conical diamond, 4mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less
Deep hole grooves, O ring groove bottom surfaces 	DT43825		2μmR, 60° conical diamond, 3.4mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×20,000 or less • Large waveform distortion
Extra deep grooves 	DT43826		2μmR, 60° conical diamond, 4mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less • Large waveform distortion
High magnification, contour profiles 	DT43828		2μmR, 60° conical diamond, 3mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less
Stylus set 	DT43800		2μmR	Nosepiece: 010 2702, 010 2703, 010 2709, 010 2710, 010 2722 Stylus: DT43812, DT43814, DT43815, DT43822

* Indicates stylus/nose piece set (DT43800).

Measuring force is value when E-DT-S03A/E-DT-SE19A is mounted.



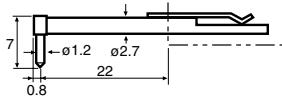
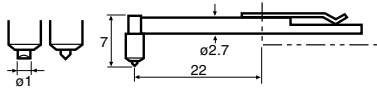
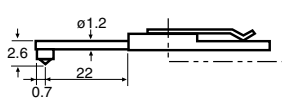
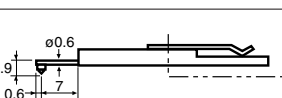
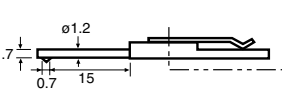
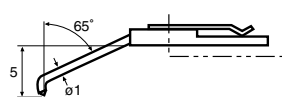
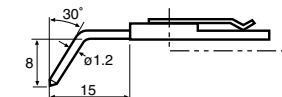
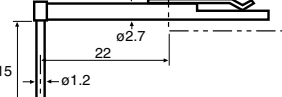
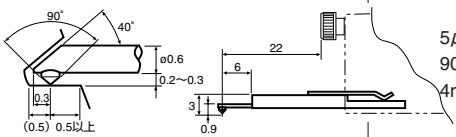
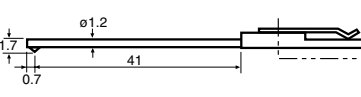
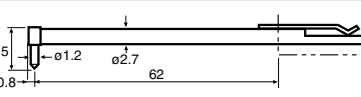
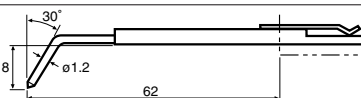
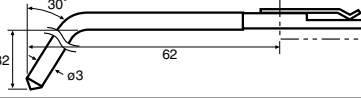
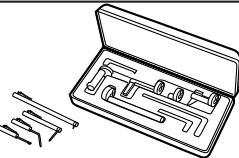
ACCRETECH

TOKYO SEIMITSU

Replaceable Profile Styluses

Applicable Models

■ S130A	■ S1400D, S1400D-3DF
■ S480A	■ S1800D, S1800D-3DF
	■ S2800E, S2800E-3DF

Measuring Application	Model	Outer Appearance	Specifications	Remarks
General purpose 	010 2501		5μmR, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible
Fine wires, Knife edges 	010 2502		5μmR, 90° knife edge-shaped diamond, 5mN	
Medium fine holes 	010 2509		5μmR, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible
Extra fine holes/ gear flank 	010 2511		5μmR, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible
Fine holes/ thin grooves 	010 2512*		5μmR, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible
Hole bottom/ conical surfaces 	010 2513		5μmR, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible
Corners/ tooth surfaces 	010 2514*		5μmR, 60° conical diamond, 4mN	• All orientations • Horizontal tracing possible
Deep holes, round grooves 	010 2515*		5μmR, 90° conical diamond, 5mN	
Gear tooth profiles, thread flank 	010 2518		5μmR, 90° conical diamond, 4mN	• Magnification: ×20,000 or less
Fine long holes 	010 2521		5μmR, 90° conical diamond, 5mN	• Sensitivity: 1/2 • Magnification: ×10,000 or less
Low magnification, long holes 	010 2522*		5μmR, 90° conical diamond, 5mN	• Sensitivity: 1/2 • Magnification: ×20,000 or less
Low magnification, corners 	010 2524		5μmR, 60° conical diamond, 5mN	• Sensitivity: 1/2 • Magnification: ×20,000 or less
Deep groove corners 	010 2527		5μmR, 60° conical diamond, 8mN	• Sensitivity: 1/2 • Magnification: ×10,000 or less • Large waveform distortion
Stylus set 	010 2640		5μmR	Nosepiece: 010 2702, 010 2703, 010 2709, 010 2710, 010 2722 Stylus: 010 2512, 010 2514, 010 2515, 010 2522

* Indicates stylus/nose piece set (010 2640).

Measuring force is value when E-DT-S01A/E-DT-SE18A is mounted.



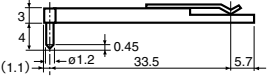
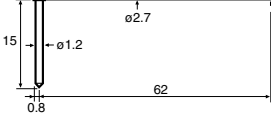
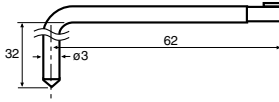
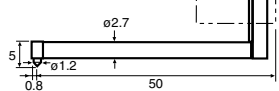
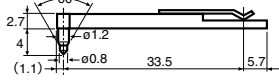
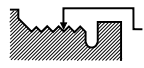
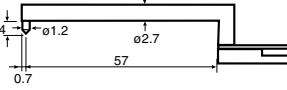
ACCRETECH

TOKYO SEIMITSU

Replaceable Profile Styluses

Applicable Models

■ S130A	■ S1400D, S1400D-3DF
■ S480A	■ S1800D, S1800D-3DF
	■ S2800E, S2800E-3DF

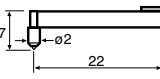
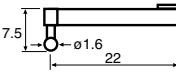
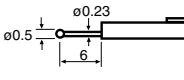
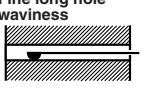
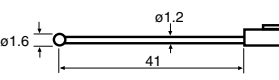
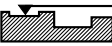
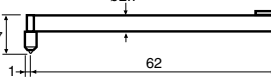
Measuring Application	Model	Outer Appearance	Specifications	Remarks
Soft material 	010 2508		10μmR, 90° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible • Specifications are for when E-DT-S02A is mounted
Deep hole grooves • bottom surface of O ring grooves 	010 2525		10μmR, 90° conical diamond, 8mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×25,000 or less • Large waveform distortion
Extra deep grooves 	010 2526		10μmR, 90° conical diamond, 8mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less • Large waveform distortion
Bottom surface of holes 	010 2541		10μmR, 90° conical diamond, 8mN	• Magnification: ×20,000 or less • Large waveform distortion • Dedicated connecting rod used
High magnification measurement 	010 2506		1μmR, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible • Specifications are for when E-DT-S04A is mounted
High magnification contour profiles 	010 2528		1μmR, 60° conical diamond, 8mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less

* Measuring force is value when E-DT-S01A/E-DT-SE18A is mounted.

Replaceable Profile Styluses

Applicable Models

■ S130A	■ S1400D, S1400D-3DF
■ S480A	■ S1800D, S1800D-3DF
	■ S2800E, S2800E-3DF

Measuring Application	Model	Outer Appearance	Specifications	Remarks
Steps 	010 2504		250μmR, 60° conical sapphire, 5mN	• All orientations
Waviness 	010 2505**		800μmR, ruby, 4mN	• All orientations
Extra fine hole profiles 	010 2510		250μmR, tool steel, 4mN	• All orientations • Magnification: ×5,000 or less
Fine long hole waviness 	010 2520		800μmR, ruby, 5mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×10,000 or less
Large steps 	010 2523		250μmR, sapphire, 5mN	• Downward measurements • Sensitivity: 1/2 • Magnification: ×25,000 or less

** Items not denoted with two asterisks are manufactured after receipt of order.
Measuring force is value when E-DT-S01A/E-DT-SE18A is mounted.

Pickups

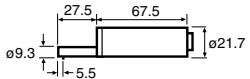
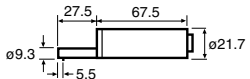
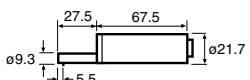
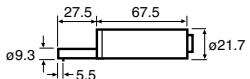
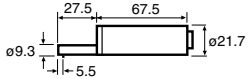
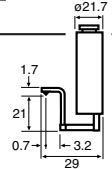
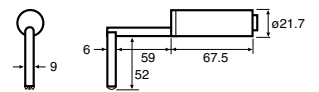
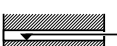
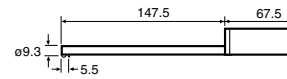
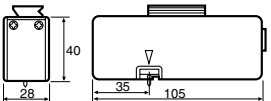
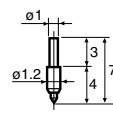
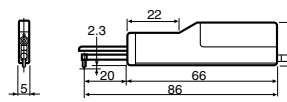
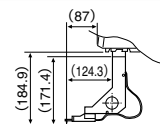
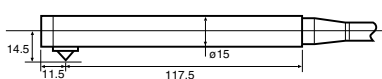
Applicable Models

■ S480A

■ S1400D, S1400D-3DF

■ S1800D, S1800D-3DF

■ S2800E, S2800E-3DF

Measuring Application	Model	Outer Appearance	Specifications	Remarks
General purpose 	E-DT-S01A		$5\mu\text{mR}$, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible • Provided with 0102501 dedicated stylus
Soft materials 	E-DT-S02A		$10\mu\text{mR}$, 90° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible • Provided with 0102508 dedicated stylus
Low measuring force 	E-DT-S03A		$2\mu\text{mR}$, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible • Standard specifications • Provided with DT43081 dedicated stylus
High magnification 	E-DT-S04A		$1\mu\text{mR}$, 60° conical diamond, 0.7mN	• All orientations • Horizontal tracing possible • Provided with 0102506 dedicated stylus
Non-continuous measurement 	E-DT-S05A		$5\mu\text{mR}$, 90° conical diamond, 4mN	• All orientations • Horizontal tracing possible • Front travel: $110 - 120\mu\text{m}$ • Other specifications are same as for E-DT-S01A
Grooves in holes 	E-DT-S06A		$5\mu\text{mR}$, 90° conical diamond, 4mN	• Front travel: $200\mu\text{m}$ • Only for skidless measurement • Max. magnification: $\times 10,000$ • Dedicated connecting rod required (010 2746) • Provided with 0102542 dedicated stylus
Ultra deep grooves 	E-DT-S07A		$5\mu\text{mR}$, 90° conical diamond, 4mN	• Front travel: $200\mu\text{m}$ • Stylus cannot be replaced • Max. magnification: $\times 10,000$ • Sensitivity: 1/2
Ultra long holes 	E-DT-S08A		$5\mu\text{mR}$, 90° conical diamond, 4mN	• Front travel: $200\mu\text{m}$ • Stylus cannot be replaced • Max. magnification: $\times 10,000$ • Sensitivity: 1/5
High magnification 	E-DT-SH01A			• Max. magnification: $\times 500,000$ • Measuring force: 0.2mN • Provided with 016 2854 stylus
Stylus for E-DT-SH01A	016 2854		$1\mu\text{mR}$, 90° conical diamond	
	010 2567		$1\mu\text{mR}$, 60° conical diamond	
	010 2210		$10\mu\text{mR}$, 60° conical diamond	
	010 2211		$5\mu\text{mR}$, 60° conical diamond	
	010 2212		$0.5\mu\text{mR}$, 60° conical diamond	
	010 2213		90° $2.5\mu\text{m}$ width knife edge, diamond	
Thin pickup	DT42001		$5\mu\text{mR}$, 90° conical diamond, 10mN	• Magnification: $\times 5,000$ or less • Horizontal tracing possible • Provided with 0102501 dedicated stylus
Pickup holder for thin pickup	E-DH-S60A			• Used for horizontal tracing of crankshaft pins, journals or other such parts
Non-contact measurement	E-DT-SL12B		Measuring range: $300\mu\text{m}$ Spot diameter: $2\mu\text{m}$ Work distance: 4.5mm	• Color confocal point type • Light source: Halogen light bulb • Life: 1000 H

Replaceable Styluses for S3000A

Applicable Models ■ S3000A, S3000A-3DF

Measuring Application	Model	Outer Appearance	Specifications	Remarks
General purpose	DM48505		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - Standard accessory - For roughness & contour measurement
General purpose highly rigid stylus	DM48507		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - For roughness & contour measurement
Highly rigid stylus for contours	DM48508		500μmR, ruby ball, 0.7mN	- Stroke: 24mm - Standard accessory - For contour measurement
Highly rigid stylus for contours	DM48509		500μmR, ruby ball, 3.2mN	- Stroke: 30mm - For contour measurement
Up/down measuring stylus	DM48510		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - For roughness & contour measurement
Right angle stylus	DM48511		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - Offset: 13.5mm - For roughness & contour measurement
Small hole stylus	DM48513		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - Stylus height: 2mm - For roughness & fine contour measurement
Extra small hole stylus	DM48514		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - Stylus height: 1mm - For roughness & fine contour measurement
Deep hole stylus	DM48515		2μmR, 60° conical diamond, 0.7mN	- Stroke: 12mm - Stylus height: 25mm - For roughness & contour measurement
General purpose stylus	DM48588		5μmR, 30° conical diamond, 0.7mN	- Stroke: 12mm - For roughness & contour measurement

S3000A Accessories

Measuring Application	Model	Outer Appearance	Specifications	Remarks
Dust cover	E-CV-S29A			For DX measuring stand
Dust cover	E-CV-S30A			For STD (E-VS-R16A)

Contour Styluses

Applicable Models

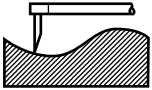
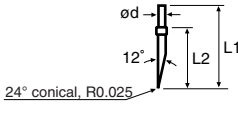
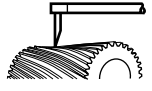
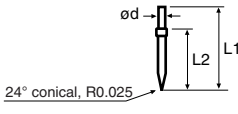
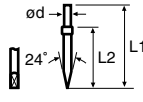
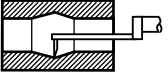
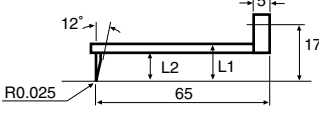
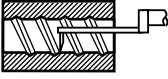
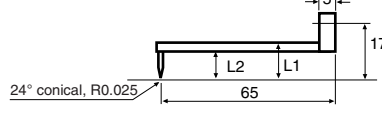
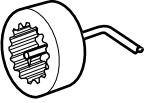
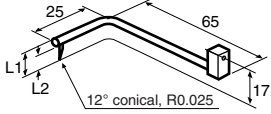
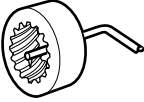
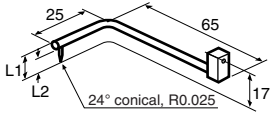
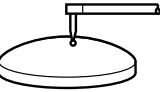
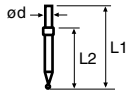
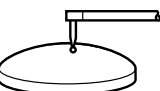
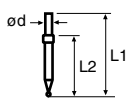
■ E60A

■ C600D

■ C1600D

■ S1800D, S1800D-3DF

Stylus material: Cemented carbide

Measuring Application	Model	Outer Appearance	Specifications			Remarks
			d	L1	L2	
General purpose 	DT45501		3	60	52	
	DT45502		3	34	26	
	DT45503		2	21	13	
General purpose 	DT45504		3	60	52	• Standard accessory (C1600D, S1800D) (C1700, S1900)
	DT45505*		3	34	26	
	DT45506		2	21	13	
Edge line 	DT45507		3	60	52	
	DT45508*		3	34	26	
	DT45509		2	21	13	
Small holes 	DT45081		---	12	9	
	DT45082		---	7	5	
	DT45083		---	3.5	1.5	
Small hole threads 	DT45084*		---	12	9	
	DT45085		---	7	5	
	DT45086*		---	3.5	1.5	
Ordinary offset 	DT45087		---	12	9	• Offset: 25mm
	DT45088		---	7	5	
	DT45089		---	3.5	1.5	
Helix surface offset 	DT45090		---	12	9	• Offset: 25mm
	DT45091		---	7	5	
	DT45092		---	3.5	1.5	
High precision 	DT45522		3	60	52	• $\phi 0.7$ ruby ball
	DT45523		3	34	26	
	DT45524		2	21	13	
High precision 	DT45525		3	60	52	• $\phi 1$ ruby ball
	DT45526		3	34	26	
	DT45527		2	21	13	

* Indicates stylus/arm set (010 2999).

Contour Arms

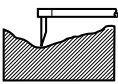
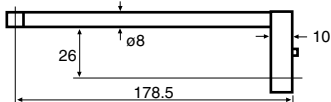
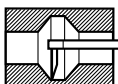
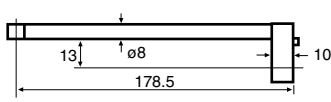
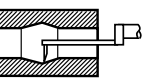
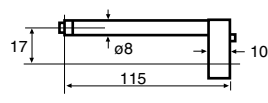
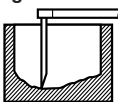
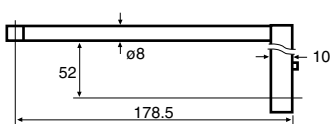
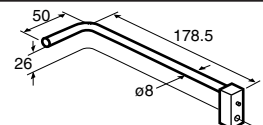
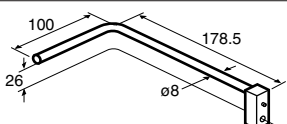
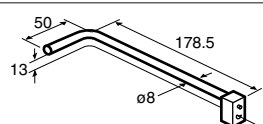
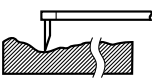
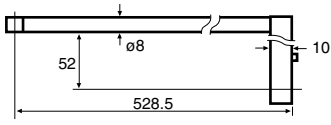
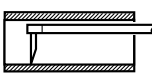
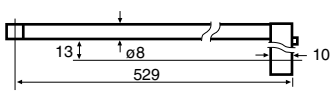
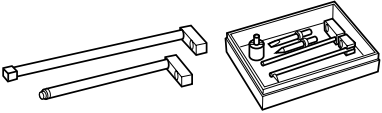
Applicable Models

■ E60A

■ C600D

■ C1600D

■ S1800D, S1800D-3DF

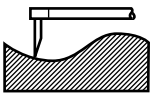
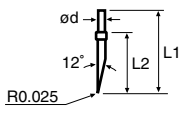
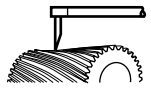
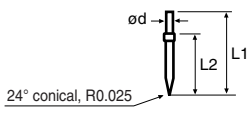
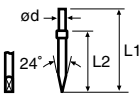
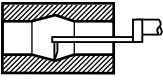
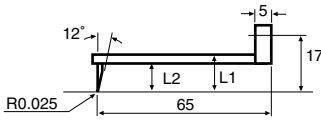
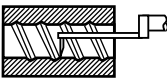
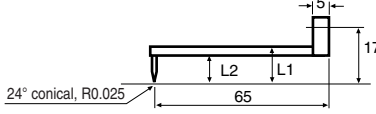
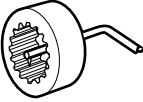
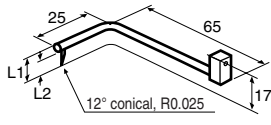
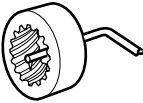
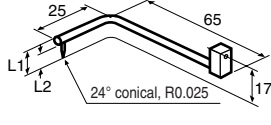
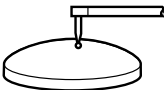
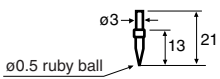
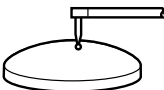
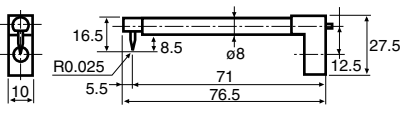
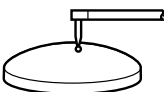
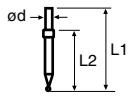
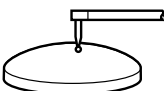
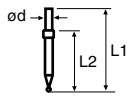
Measuring Application	Model	Outer Appearance	Applicable Stylus	Remarks
General purpose 	010 2800		DT45502 DT45505 DT45508	
Inner surface 	010 2801		DT45503 DT45506 DT45509	
Small holes 	010 2802*		DT45081 DT45092	
Deep grooves 	010 2804		DT45501 DT45504 DT45507	• Max. magnification: ×50 • 010 2744 pickup holder coupling required • Provided with auxiliary weight
Offset measurement 	010 2805		DT45502 DT45505 DT45508	• Max. magnification: ×100 • Offset: 50mm • Provided with auxiliary weight
	010 2806		DT45502 DT45505 DT45508	• Max. magnification: ×50 • Offset: 100mm • Provided with supplementary weight
	010 2807		DT45503 DT45506 DT45509	• Max. magnification: ×100 • Offset: 50mm
Long items 	010 2808		DT45501 DT45504 DT45507	• Max. magnification: ×10 • Lever movement range: 100mm • Sensitivity: 1/2 • Arc correction: 1/2 • Provided with supplementary weight • 010 2744 pickup holder coupling required
Long holes 	010 2810		DT45503 DT45506 DT45509	• Max. magnification: ×25 • Lever movement range: 100mm • Sensitivity: 1/2 • Arc correction: 1/2 • Provided with supplementary weight
Arm/stylus set 	010 2999			Styluses: DT45505, DT45508, DT45084, DT45086 Arms: 010 2802, 010 2805

* Indicates stylus/arm set (010 2999).

Contour Styluses

Applicable Models ■ C2600E ■ S2800E, S2800E-3DF

Stylus material: Cemented carbide

Measuring Application	Model	Outer Appearance	d	L1	L2	Remarks
General purpose 	DT45501		3	60	52	
	DT45502		3	34	26	
	DT45503		2	21	13	
General purpose 	DT45504		3	60	52	· Standard accessory
	DT45505*		3	34	26	
	DT45506		2	21	13	
Edge line 	DT45507		3	60	52	
	DT45508*		3	34	26	
	DT45509		2	21	13	
Small holes 	DT45510		---	12	9	· Measuring force: 10mN or less · Deflection: Approx. 1.5μm for 10mN
	DT45511		---	8	5	
	DT45512		---	4.5	1.5	
Small hole twist 	DT45513*		---	12	9	· Measuring force: 10mN or less · Deflection: Approx. 1.5μm for 10mN
	DT45514		---	8	5	
	DT45515*		---	4.5	1.5	
Ordinary offset 	DT45516		---	12	9	· Measuring force: 10mN or less · Deflection: Approx. 3μm for 10mN
	DT45517		---	8	5	
	DT45518		---	4.5	1.5	
Helix surface offset 	DT45519		---	12	9	· Measuring force: 10mN or less · Deflection: Approx. 3μm for 10mN
	DT45520		---	8	5	
	DT45521		---	4.5	1.5	
High precision 	DT45580		3	21	13	· ø0.5 ruby ball
High precision 	DT45583					· ø0.5 ruby ball · Integral with arm
High precision 	DT45522		3	60	52	· ø0.7 ruby ball
	DT45523		3	34	26	
	DT45524		2	21	13	
High precision 	DT45525		3	60	52	· ø1 ruby ball
	DT45526		3	34	26	
	DT45527		2	21	13	

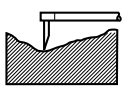
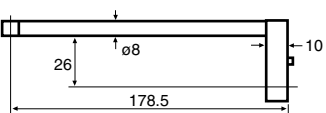
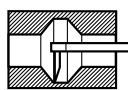
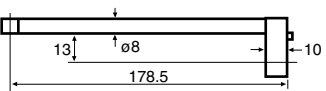
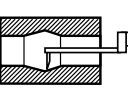
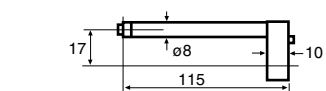
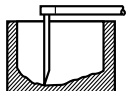
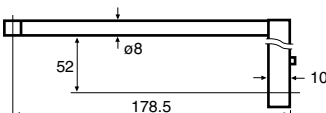
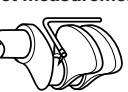
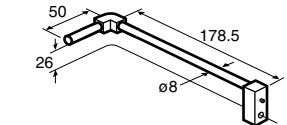
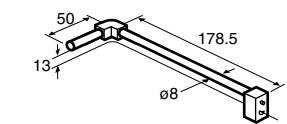
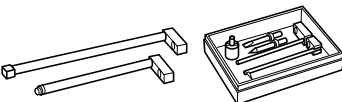
* Indicates stylus/arm set (010 2999).

Contour Arms

Applicable Models

■ C2600E

■ S2800E, S2800E-3DF

Measuring Application	Model	Outer Appearance	Applicable Stylus	Remarks
General purpose 	DT45528		DT45502 DT45505 DT45508	Standard configuration (with supplementary weight) • Deflection: Approx. 1.2μm for 10mN Approx. 3.7μm for 30mN
Inner surface 	DT45529		DT45503 DT45506 DT45509	(Provided with supplementary weight) • Deflection: Approx. 1.2μm for 10mN Approx. 3.7μm for 30mN
Small holes 	DT45530*		DT45510 DT45521	Stylus combination arm for measuring small holes (with supplementary weight)
Deep grooves 	DT45531		DT45501 DT45504 DT45507	• Measuring force: 10mN or less (with supplementary weight) • Deflection: Approx. 1.2μm for 10mN Approx. 3.7μm for 30mN
Offset measurement 	DT45532*		DT45502 DT45505 DT45508	• Measuring force: 10mN or less (with supplementary weight) • Deflection: Approx. 2.6μm for 10mN Approx. 7.8μm for 30mN
	DT45533		DT45503 DT45506 DT45509	• Measuring force: 10mN or less (with supplementary weight) • Deflection: Approx. 2.6μm for 10mN Approx. 7.8μm for 30mN
Arm stylus set	DT45500			• Styluses: DT45505, DT45508, DT45513, DT45515 • Arms: DT45530, DT45532

* Indicates stylus/arm set (DT45500).

Adjustment Devices

Applicable Models

■S480A

■S1400D, S1400D-3DF

■S3000A

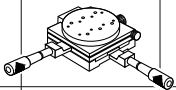
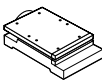
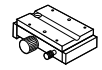
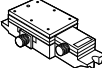
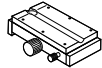
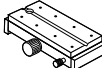
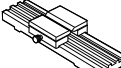
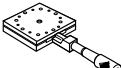
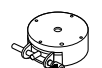
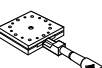
■S1800D, S1800D-3DF

■S2800E, S2800E-3DF

■C600D

■C1600D

■C2600E

Name	Model	Outer Appearance	Orthogonal Axis Adjustment (mm)			Swivel Adjustment		Tilting Adjustment		Table Size (mm)	Allowable Load (kg)	Remarks
			X	Y	Z	Fine	Rough	Fine	Rough			
Adjustment stand	E-AT-S01C		50	50		8°	360°			φ150	15 (6)	Min. reading increment: 10μm
Leveling adjustment stand	E-AT-S02A							±1.5°		80 × 110	15 (3)	
Adjustment stand	E-AT-S03A			±2.5		±2°				80 × 58	3 (0.9)	For E-RM-S75A
Adjustment stand	E-AT-S04A			±8		±3°				80 × 125	15 (8)	
Adjustment stand	E-AT-S05A			±3		±1°				120 × 58	3 (1.4)	For E-RM-S76A
Adjustment stand	E-AT-S36A			±3		±1°				200 × 120	5 (4.5)	For E-RM-S77A
X direction movement adjustment stand	E-AT-S08A		400							150 × 150	20 (25)	
3D fine adjustment stand	E-AT-S10A		55	55	28					75 × 40	1 (3.4)	Straightness: 0.03mm
1-axis precision fine adjustment stand	E-AT-S11B			50						125 × 150	20 (4.9)	Straightness: 3μm Min. reading value: 10μm
Swivel fine rotation stand	E-AT-S12A					±5°	360°			φ90	3 (0.58)	Min. reading value: 5'
1-axis ultra precision fine adjustment stand	E-AT-S13B			10 (Coarse movement 10μm Fine movement 0.5μm)						60 × 60	10 (0.7)	Straightness: 3μm Min. reading value: 0.5μm
Tilting stand	E-AT-S64B							±20°		60 × 120	10 (1)	Min. reading value: 5'
Universal stand	E-WJ-S03A						360°		±90°	φ110	3 (2.5)	X/Y direction adjustment
Column rotary spacer	E-CS-S31A*1				H : 100		360°			---	(6)	Inserted between table and column
Column spacer	E-CS-S32A*1				H : 200							Inserted between table and column
Drive unit spacer	E-CS-S33A*1			L : 70								Inserted between column and drive unit
Drive unit tilting device	E-CA-S24A*2								±15°	---		For contour measurements
Drive unit tilting device	E-CA-S32A*2								±5°	---	(5)	For roughness measurements

*1 Indicates item cannot be used with S3000A series.

*2 Indicates item cannot be used with S1500, S1900, C1700 and S3000A series.

Holders

Applicable Models

■ S480A

■ S1400D, S1400D-3DF

■ S3000A

■ S1800D, S1800D-3DF

■ S2800E, S2800E-3DF

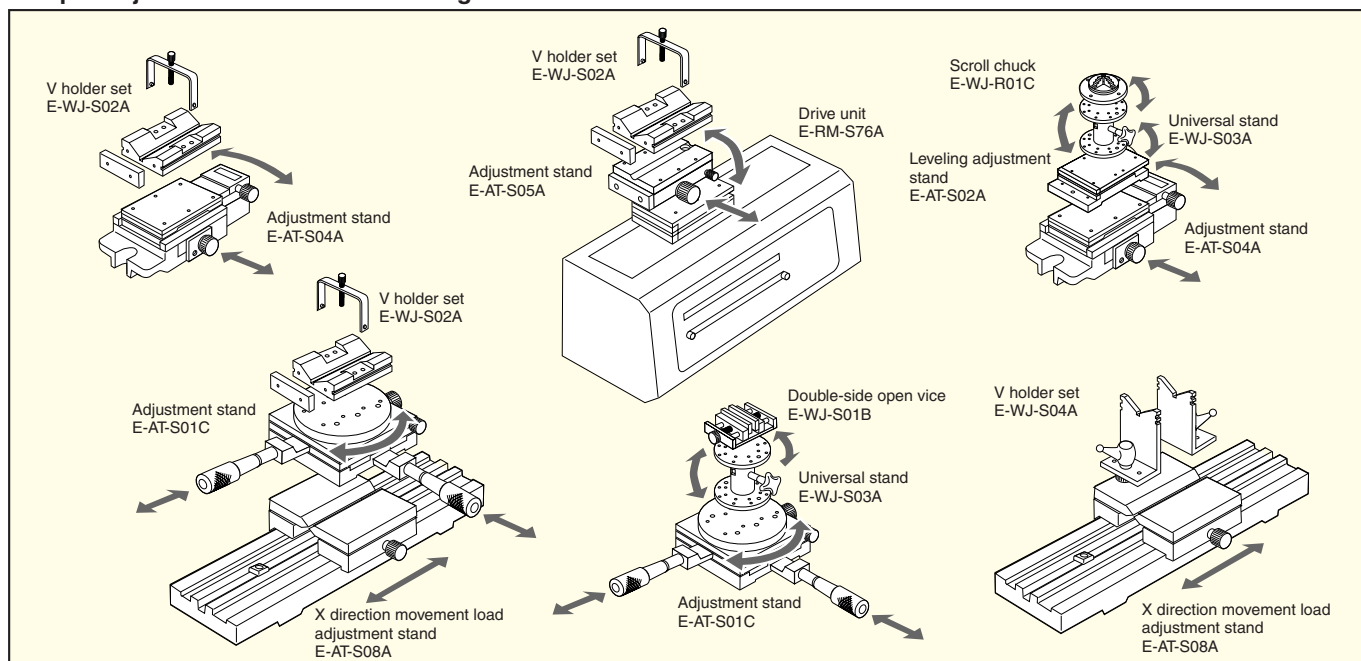
■ C600D

■ C1600D

■ C2600E

Name	Model	Outer Appearance	V Holder (mm)	Chucking (mm)	Vice (mm)	Clamp (mm)	Flat Surface (mm)	Allowable Load (kg) (net wt.)	Remarks
Double-side open vice	E-WJ-S01B				ID: 59 OD: 38 – 105			5 (0.8)	
V stand set	E-WJ-S02A		φ1 – 150					(1.5)	Provided with workpiece clamber
V stand holder set	E-WJ-S04A		φ12 – 150					(3)	Two pieces used just for T groove clamp
Compact stand	E-WJ-S05A		φ4 – 10					(0.4)	
Load plate	E-WJ-S06A						150 × 150 Angle plate	(1)	
Static electricity holding plate	E-WJ-S11A						80 × 130 Angle plate	(1.3)	Holding strength: 0.2kg (Ideal for paper, aluminum, film)
Scroll chuck	E-WJ-R01C			OD: φ2 – 75 ID: φ56 – 91				(1)	
Clamp set	JC-3					Height: 40 – 60		---	
Ceramic load plate	E-WJ-S252A						300 × 300 Angle plate	(5.3)	(Manufactured after receipt of order)
Ceramic load plate	E-WJ-S234A						500 × 500 Angle plate	(15)	(Manufactured after receipt of order)

Sample Adjustment Stand/Holder Configurations



Peripheral Devices

Applicable Models

■ S480A

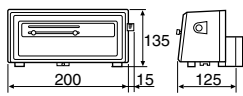
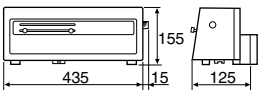
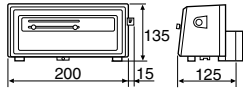
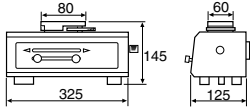
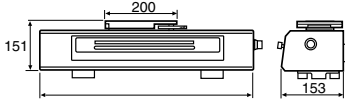
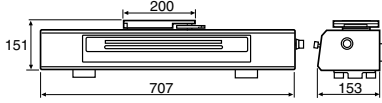
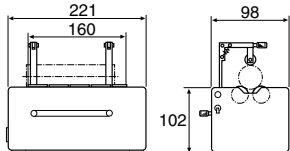
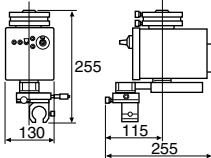
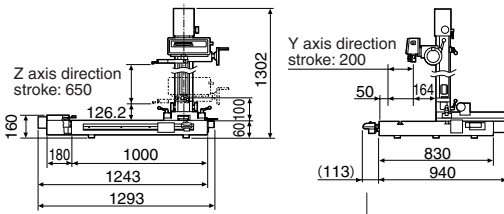
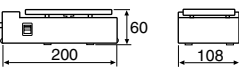
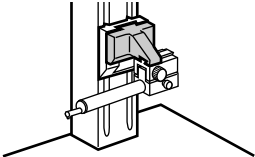
■ S1400D, S1400D-3DF

■ S2800E, S2800E-3DF

■ S1800D, S1800D-3DF

■ C2600E

■ C1600D

Name	Model	Outer Appearance	Specifications	Remarks
Pickup movement drive unit	E-RM-S72B		Drive distance: 100mm Drive speed: 0.03 – 6.0mm/s (8 speeds) Straightness accuracy: (0.05+1.5L/1000)μm	· Weight: Approx. 9 kg · S480A: E-RM-S71B (Specifications same as shown to left)
	E-RM-S74A		Drive distance: 200mm Drive speed: 0.03 – 6.0mm/s (8 speeds) Straightness accuracy: (0.05+1.5L/1000)μm	· Weight: Approx. 15 kg · S480A: E-RM-S73A (Specifications same as shown to left)
	E-RM-S141A		Drive distance: 100mm Drive speed: 0.003 – 6.0mm/s (11 speeds) Straightness accuracy: (0.05+1.5L/1000)μm	· Weight: Approx. 9 kg · S480A: E-RM-S78A (Specifications same as shown to left)
Workpiece movement drive unit	E-RM-S75A		Drive distance: 50mm Drive speed: 0.03 – 6.0mm/s (8 speeds) Straightness accuracy: (0.05+1.5L/1000)μm	· Weight: Approx. 15 kg · Load weight: 5 kg · Leveling range: ±1.5°
	E-RM-S76A		Drive distance: 150mm Drive speed: 0.03 – 6.0mm/s (8 speeds) Straightness accuracy: (0.05+1.5L/1000)μm	· Weight: Approx. 20 kg · Load weight: 5 kg · Leveling range: ±1°
	E-RM-S77A		Drive distance: 300mm Drive speed: 0.03 – 6.0mm/s (8 speeds) Straightness accuracy: (0.05+1.5L/1000)μm	· Weight: Approx. 32 kg · Load weight: 10 kg · Leveling range: ±0.8°
Outer periphery roughness drive unit	E-RM-S85A		Measuring OD: φ12 – 20mm, Length 30mm φ20 – 150mm, Length 30mm Peripheral speed: 0.3, 0.6, 1.5 mm/s	· Weight: Approx. 7 kg · Load weight: 5 kg
Round surface roughness drive unit	E-RM-S84A		Measuring radius: 0.25 – 40mm Drive speed: ±0.25μm (Arbitrary 180°) Peripheral speed: 0.3 mm/s (stepless)	
Column cross feed device	E-ST-S131A		Movement range X: 680 mm Y: 200 mm	· For measurement of large and heavy parts · Weight: Approx. 370 kg (Manufactured upon receipt of order)
Auto tilting table	E-AT-S72A			· Leveling range: ±2° · Load weight: 5 kg
Pickup holder stand	E-CA-S25A			· When workpiece movement drive unit is used · Weight: Approx. 1.5 kg

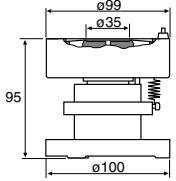
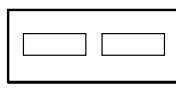
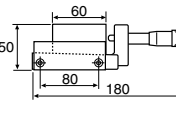
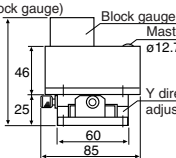
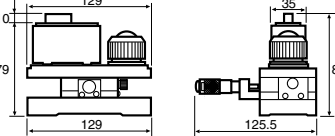
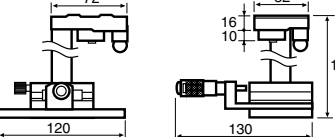
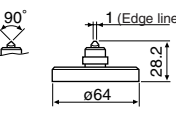
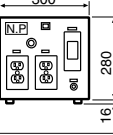
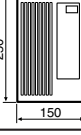
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Name	Model	Outer Appearance	Specifications	Remarks
Connecting rod for ultra long hole measurement	010 2736		Magnification: Up to 10,000 Min. inner dia.: Up to $\phi 25$ mm Max. depth: 650mm	• Used with large measuring stand • For measurement of ultra long holes (skid measurement) • Weight: Approx. 1.2 kg
Pickup holder coupling	010 2744		Coupling length: 30mm	• Used with 010 2804 contour profile arm • Weight: Approx. 0.25 kg
Pickup holder coupling	010 2745		Measuring length: Up to 131mm beneath drive unit	• Weight: Approx. 0.47 kg
Pickup right angle coupling/ connecting rod	010 2746		Measuring length: 142mm beneath detector holder	• Pickup vertical measurement using hole bottom stylus • Weight: Approx. 0.2 kg
Desktop vibration isolation stand	E-VS-S13A			• Dimensions: 510^W × 430^D × 640^Hmm • Load: 22 kg • For E-VS-S28A, E-VS-S38A
Desktop vibration isolation stand	E-VS-S57A/ (E-VS-S38A)		Vibration isolation: Pneumatic diaphragm spring Natural frequency: 1.5 – 3 Hz Load weight: 120 kg	• Dimensions: 600^W × 500^D × 55^Hmm • Air source: 350 – 700 kPa • Weight: 26 kg
	E-VS-S58A/ (E-VS-S28A)		Vibration isolation: Pneumatic diaphragm spring Natural frequency: 1.5 – 3 Hz Load weight: 120 kg	• Dimensions: 600^W × 500^D × 55^Hmm • Air source: Pump • Weight: 26 kg
Desktop vibration isolation stand	E-VS-S45A		Vibration isolation: Pneumatic diaphragm spring Natural frequency: 4 Hz Load weight: 300 kg	• Dimensions: 1000^W × 750^D × 143^Hmm • Air source: Pump • Weight: 80 kg
Vibration isolation stand	E-VS-R16A		Vibration isolation: Pneumatic diaphragm spring Natural frequency: V; 2Hz, H; 2.2Hz Load weight: 250 kg	• Dimensions: 980^W × 780^D × 700^Hmm • Air source: 350 – 700 kPa • Weight: 170 kg
	E-VS-S21A		Vibration isolation: Pneumatic diaphragm spring Natural frequency: V; 1.6Hz, H; 2Hz Load weight: 550 kg	• Dimensions: 1100^W × 850^D × 700^Hmm • Air source: 350 – 700 kPa • Weight: 340 kg

Dimensions in (parentheses) are for the E-VS-S21A.

Name	Model	Outer Appearance	Specifications	Remarks
System rack	E-DK-S24A			• Dimensions: $800^W \times 800^D \times 1070 - 1370^H$ mm • Load: 42 kg
	E-DK-S25A			• Dimensions: $1200^W \times 800^D \times 1070 - 1370^H$ mm
Side desk	E-DK-S10A			• Dimensions: $40^W \times 1070^D \times 700^H$ mm
High magnification dust cover	E-CV-S02A			• Used with desktop vibration isolation stand/ordinary stand for roughness measurement • Dimensions: $750^W \times 614^D \times 810^H$ mm • Weight: 8 kg
High magnification dust cover	E-CV-S03A			• Used with desktop vibration isolation stand/ordinary stand for contour profile measurement • Dimensions: $1000^W \times 629^D \times 810^H$ mm • Weight: 13 kg
Dust cover	E-CV-S25A			• Used with E-VS-S21A vibration isolation stand for large measuring stand • Dimensions: $1070^W \times 750^D \times 1050^H$ mm • Weight: 20 kg • Manufactured upon receipt of order
Measurement position verification unit	E-MA-S81A		Magnification: $\times 20$ Focal distance: 60mm	• Stand type
Measurement position verification unit	DM59014		Magnification: $\times 20$ Focal distance: 60mm	• Can be used with workpiece movement drive unit
Light	E-MA-S83A			• Suction fixing method • Surface unit is mounted on must be flat and free from holes, grooves, etc.
Light	E-MA-S84A			• Stand type
Black & white camera monitoring system	DM59102		Image sensor: Interline type CCD Effective pixels: 768×494	Configuration (1) Black & white camera (2) Black & white monitor (3) Power adapter (4) Microscope adapter (5) Connection cable (6) Instruction manual
Color camera monitoring system	DM59103		Image sensor: Interline type CCD Effective pixels: 768×494	Configuration (1) Color camera (2) Color monitor (3) Power adapter (4) Microscope adapter (5) Connection cable (6) Instruction manual

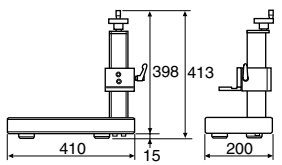
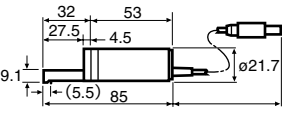
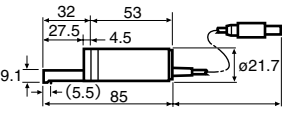
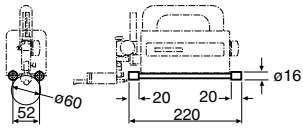
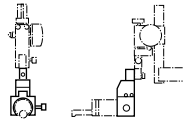
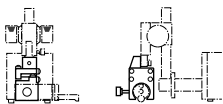
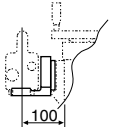
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Name	Model	Outer Appearance	Outer Appearance	Remarks
Tape tension jig	DT58526			For pickup movement drive unit (manufactured after receipt of order)
Standard piece	E-MC-S24B		Calibration surface: Approx. $3.1 \mu\text{mRa}$ Actual measured value denoted	For magnification calibration and checking stylus
Magnification calibrator	E-MC-50B		Narrow range accuracy: $0 - 10 \mu\text{m} \pm 0.1 \mu\text{m}$ Wide range accuracy: $0 - 400 \mu\text{m} \pm 0.1 \mu\text{m}$	For magnification calibration
Master ball calibration unit	E-MC-S34A			- For measurements with stylus pointing downward - For C1600D, C2600E
Master ball calibration unit	E-MC-S48A			- For measurements with stylus pointing downward - Standard accessory for S3000A
Master ball calibration unit	E-MC-S51A			- For measurements with stylus pointing downward - For C2600E, S3000A
Pitch gauge	E-MG-S02A		Pitch diameter: 7.9mm Pitch: 15mm	Dimensions: $144^W \times 38^D \times 49^H \text{mm}$
Stylus check master	E-MG-S24A		Tip radius: $0.1 \mu\text{m}$ or less Material: Knife edge diamond	
Power transformer box	E-TF-R25A		Input: 90V - 240V Output: 100V Capacity: 2.1 KVA	- Specify the input voltage - Dimensions: $300^W \times 350^D \times 350^H \text{mm}$ - Weight: 45 kg
Compact uninterrupted power supply	E-TF-S14A		Input: 100V Output: $100V \pm 2\%$ Capacity: 1 KVA	- Dimensions: $150^W \times 415^D \times 250^H \text{mm}$ - Weight: 22 kg

Surface Texture • Contour Measuring Instruments


ACCURECH TOKYO SEIMITSU

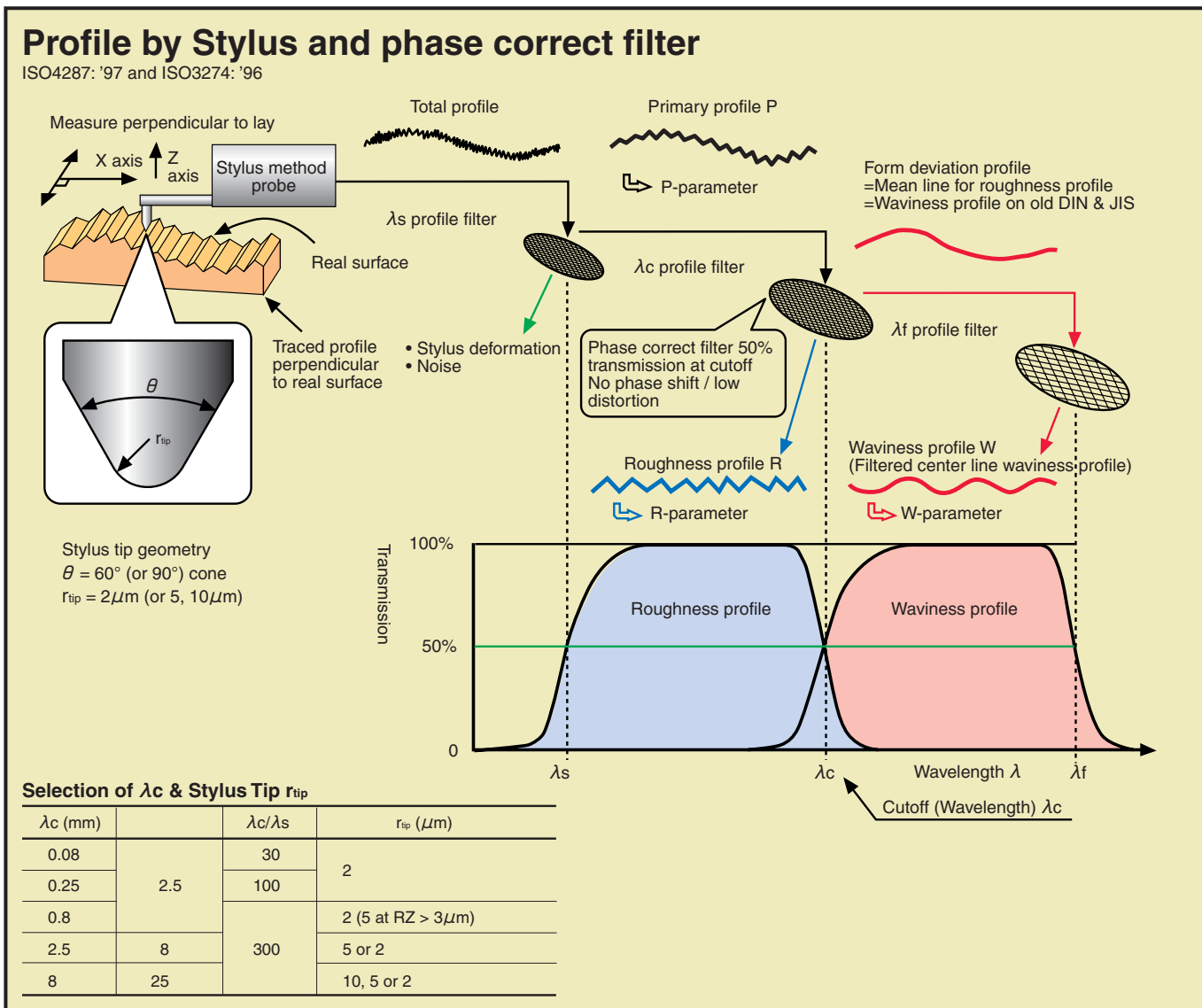
S130A Accessories

Name	Model	Outer Appearance	Specifications	Remarks
Compact measuring stand	E-ST-S130A			• Weight: Approx. 18 kg
Pickup	E-DT-SE18A		5 μ mR, 90° conical diamond, 4mN	
Pickup	E-DT-SE19A		2 μ mR, 60° conical diamond, 0.7mN	• Standard accessory
Touch pen	E-MA-S54A			
Charger	E-MA-S56A			• Dimensions: 80 ^w × 85 ^d × 45 ^h mm • Weight: Approx. 400 g • Charging time: 4 hours
Battery	E-MA-S61A			• Dimensions: 203 ^w × 58 ^d × 67 ^h mm • Weight: Approx. 1.2 kg
Carrying case	E-MA-S58A			• Dimensions: 800 ^w × 600 ^d × 400 ^h mm • Provided with casters
Roll foot	E-MA-S62A		Applicable OD: ϕ 60mm or more	• Only for skid type measurements • Drive unit is placed on outer diameter of roll to make measurements
Roll foot	E-MA-S63A		Applicable OD: ϕ 60mm or more	• Only for skid type measurements • Provided with drive unit spacer
Dust cover	E-MA-S64A			• For protection of amplification indicator from dust
Pickup holder for all orientations	E-DH-S107A			• Only for skid type measurements
Horizontal tracing pickup holder	E-DH-S17A			• Only for skid type measurements
Drive unit attachment	E-CA-S62A			• 50mm drive unit is mounted to manual column (E-CL-S26A)
RS-232C cable	E-SC-S288A		Compatible with 9-pin Windows PC connector	• When cable is connected

Consumables

Name	Model	Device Model	Applicable System	Remarks
PC card	E-MU-S50A		130A, 480A	• 15MB
Ceramic pen (red)	HC-503-RD		600D	• 5 pieces/box
Recording paper	E-CH-S21A		130A, 480A	• 10 rolls/box • Width: 58mm × 25m
		E-RC-S24A	E35A high speed printer	
Recording paper	E-CH-S25A	E-RC-S23A, E-RC-S25A	E35A compact printer, E35A compact printer II	• 10 rolls/box • Width: 58mm × 7m
Recording paper	E-CH-50A	E-RC-S01A/B	100B, 300B, 400B, 500B, 700B, 720B	• 10 rolls/box • Width: 50mm × 40m
			550A, 900A/B, 920A, 730A, 470A, 740A	
		E-RA-S01A	200B	
		E-RA-S03A	200C	
Recording paper	E-CH-S05B		570A, 590A, 750A, 790A	• 10 rolls/box • Width: 60mm × 40m
		E-RC-S09A	440A, 470A, 740A, 900B, 920B	
Recording paper	E-CH-S02A		110A, 350A, 550A, 470A	• 20 rolls/box
			730A, 740A, 920	
Recording paper	JIS No.121	E-RC-XY16	600B/C/D	• 100 sheets/leaflet • A3 leaflet
Recording paper	SP-319	E-RC-XY17	600B/C/D	• 10 rolls/box
Ink cartridge	IC1BK04	EM-900C/930C		• Black
	IC3CL04			• Color (3 colors in 1 cartridge)
Ink ribbon	E-IR-S01A		100A, 350A, 550A, 470A	
			730A, 740A, 920A	

Definition of Surface texture and Stylus instrument



Evaluation procedure of roughness

ISO4288: '96

- View the surface and decide whether profile is periodic or non-periodic.
- When the tolerance limit is specified, use the table shown on the left for condition.
- When the tolerance limit is not specified.
 - Estimate roughness and measure it in corresponding condition in the table.
 - Change condition according with above result and measure it again.
 - Repeat "3.2" if the result does not reached the condition.
 - When the result reaches the condition, it will be the final value. Check it in shorter sampling length at non-periodic and change it if it meets.
- Compare the result toward tolerance limit in accordance with following rule,

Upper limit - the 16% rule (Default)

Measure on the most critical surface. If not more than 16% of all value based on sampling length are exceed the limit, surface is acceptable.

- The first value does not exceed 70% of the limit.
 - The first three values do not exceed the limit.
 - Not more than one of the first six value exceed the limit.
 - Not more than two of the first twelve value exceed the limit.
- or when $\mu + \sigma$ does not exceed the limit, the result is acceptable.

Lower limit - the 16% rule (shown as L)

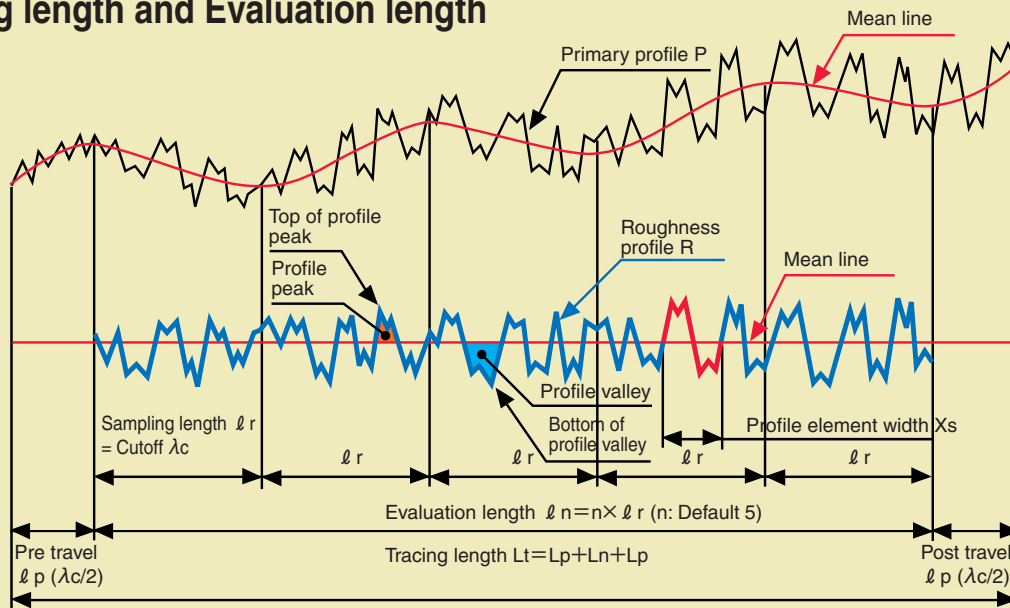
Measure the surface that can be expected the lowest roughness. If not more than 16% of all sampling length are less than the limit, or when $\mu - \sigma$ is not less than the limit, the result is acceptable.

Max value - the max rule (when "max" suffix is added)

The value is acceptable when none of value in entire surface is over the limit.

Sampling length and Evaluation length

ISO4287: '97



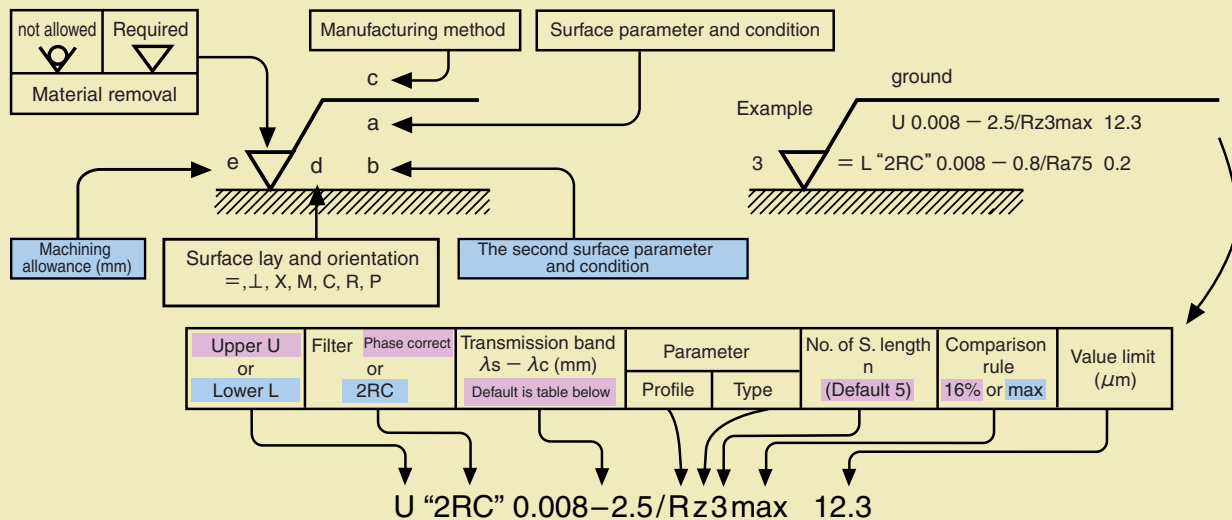
Indication of surface texture

ISO 1302: '02

Note.:

Default item (red) is not indicated.

Additional item (blue) is indicated if necessary.



Measuring condition: R-parameter

ISO4288: '96

Non-periodic profile				Periodic profile or RSm		Measuring Condition	
Ra,Rq,Rsk,Rku or RΔq		Rz,Rv,Rp,Rc, or Rt				Sampling length: ℓ r = CutOff λc (mm)	Evaluation length ℓ n (mm) = 5 × ℓ r
Ra (μm)		Rz (μm)		RSm (mm)			
Over>	Less≤	Over>	Less≤	Over>	Less≤		
0.006	0.02	0.025	0.1	0.013	0.04	0.08	0.4
0.02	0.1	0.1	0.5	0.04	0.13	0.25	1.25
0.1	2	0.5	10	0.13	0.4	0.8	4
2	10	10	50	0.4	1.3	2.5	12.5
10	80	50	200	1.3	4	8	40

Measuring condition : P-parameter

ISO4288: '96

Stylus radius	λ_s	λ_c	No. of $\ell_p = n$	S. length ℓ_p	E. length ℓ_n
2 μm	2.5 μm	-	1	Length of feature (Plane, Line)	Length of feature
5 μm	8 μm				
10 μm	25 μm				

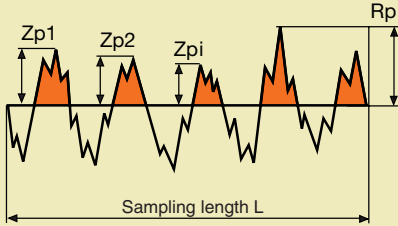
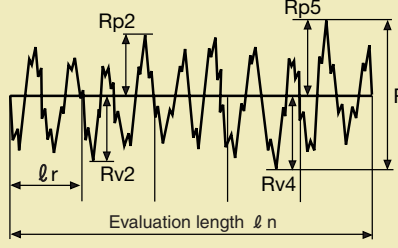
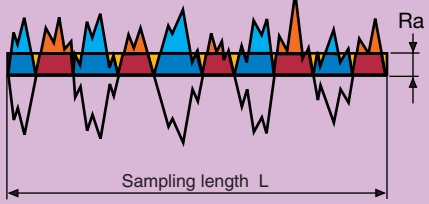
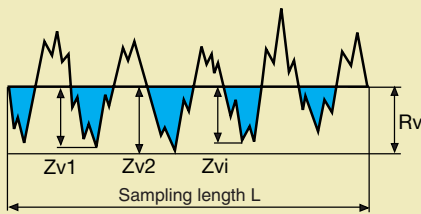
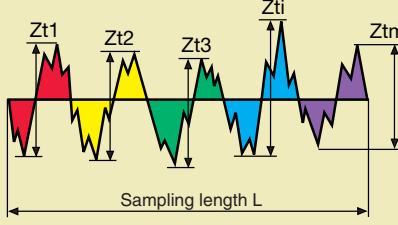
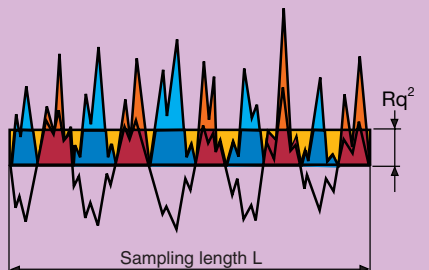
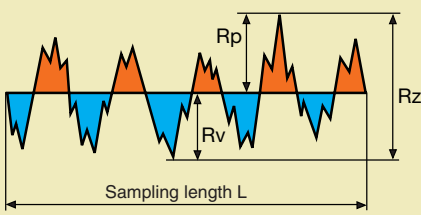
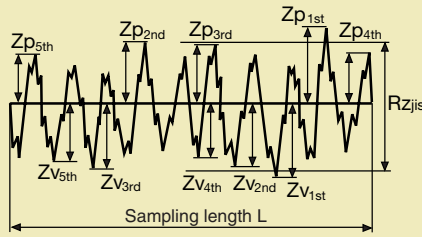
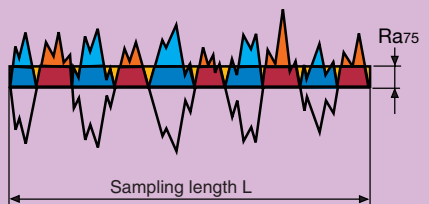
Measuring condition: W-parameter

ISO1302: '02

λ_c	λ_f	No. of $\ell_w = m$	S. length ℓ_w	E. length ℓ_n
λ_c (for roughness)	$n\lambda_c$ (n: specified)	m: specified	λ_f	$m\lambda_f$

Explanation of Surface Characteristics • Standards >>>

Basic surface texture parameters and curves

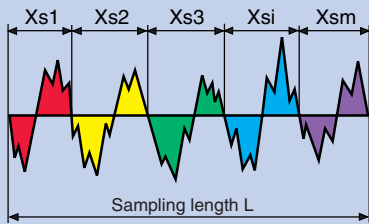
Amplitude parameters (peak and valley)		Amplitude average parameters
Rp Pp Wp } Maximum profile peak height The largest profile peak height Z_p within a sampling length. $R_p, P_p, W_p = \max (Z(x))$ 	Rt Pt Wt } Total height of profile ($P_t = R_{max}$ at JIS'82) Sum of height of the largest profile peak height R_p and the largest profile valley R_v within an evaluation length. $R_t, P_t, W_t = \max (R_{pi}) + \max (R_{vi})$ 	Ra Pa Wa } Arithmetical mean deviation Arithmetic mean of the absolute ordinate values $Z(x)$ within a sampling length. $R_a, P_a, W_a = \frac{1}{L} \int_0^L Z(x) dx$ 
Rv Pv Wv } Maximum profile valley depth The largest profile valley depth Z_p within a sampling length. $R_v, P_v, W_v = \min (Z(x))$ 	Rc Pc Wc } Mean height of profile elements Mean value of the profile element heights Z_t within a sampling length. $R_c, P_c, W_c = \frac{1}{m} \sum_{i=1}^m Z_{ti}$  Profile element: Profile peak & the adjacent valley	Rq Pq Wq } Root mean square deviation Root mean square value of the ordinate values $Z(x)$ within a sampling length. $R_q, P_q, W_q = \sqrt{\frac{1}{L} \int_0^L Z^2(x) dx}$ 
Rz Pz Wz } Maximum height of profile ($R_z = R_y$ at ISO4287 '84) Sum of height of the largest profile peak height R_p and the largest profile valley R_v within a sampling length. $R_z = R_p + R_v$  Different from R_z at old ISO, ANSI & JIS	Rzjis Ten point height of roughness profile (R_z at JIS'94) Sum of mean value of largest peak to the fifth largest peak and mean value of largest valley to the fifth largest valley within a sampling length. $R_{zjis} = \frac{1}{5} \sum_{j=1}^5 (Z_{pj} + Z_{vj})$  Annex of JIS only and confirm to JIS'94 Different from R_z at JIS'82	Ra75 Center line average (Old R_a, AA, CLA) Arithmetic mean of the absolute ordinate value $Z(x)$ in a sampling length of roughness profile with 2RC filter of 75% transmission. $R_{a75} = \frac{1}{\ell_n} \int_0^{\ell_n} Z(x) dx$  Annex of JIS only Same as R_a at old ISO, ANSI & DIN

Spacing parameters

RSm
PSm
WSm } Mean width of the profile elements
(RSm = Sm at ISO4287 '84)

Mean value of the profile element width X_s within a sampling length.

$$RSm, PSm, WSm = \frac{1}{m} \sum_{i=1}^m X_{si}$$

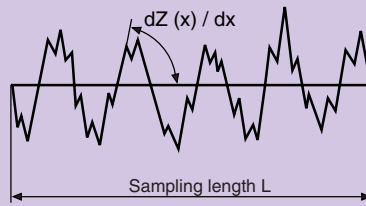


Hybrid parameters

RΔq
PΔq
WΔq } Root mean square slope

Root mean square value of the ordinate slopes dZ/dX within a sampling length.

$$\left. \begin{matrix} R\Delta q \\ P\Delta q \\ W\Delta q \end{matrix} \right\} = \sqrt{\frac{1}{L} \int_0^L \left(\frac{d}{dx} Z(x) \right)^2 dx}$$

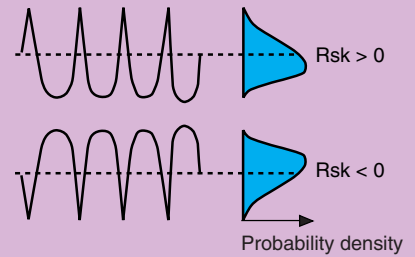


Height characteristic average parameters

Rsk
Psk
Wsk } Skewness

Quotient of mean cube value of the ordinate values $Z(x)$ and cube Pq , Rq , Wq respectively, within a sampling length.

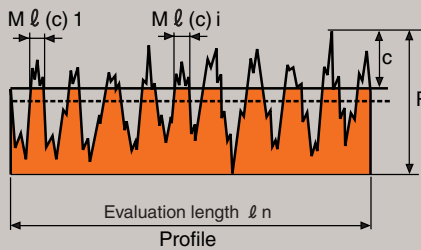
$$Rsk = \frac{1}{Rq^3} \left(\frac{1}{\ell} \int_0^{\ell} Z^3(x) dx \right)$$



Parameter from bearing ratio curve and profile height amplitude curve

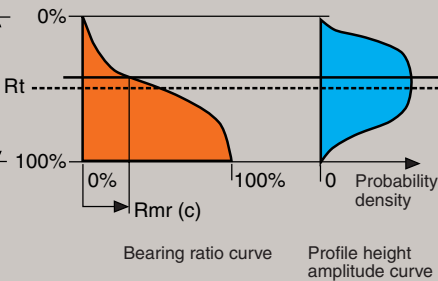
Material ratio curve of the profile
(Abbott Firestone curve)

Curve representing the material ratio of the profile as a functional of level c .



Profile height amplitude curve

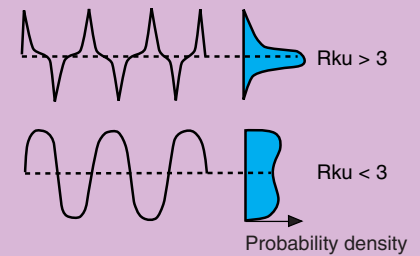
Sample probability density function of ordinate $Z(x)$ within an evaluation length.



Rku
Pku
Wku } Kurtosis of profile

Quotient of mean quartic of the ordinate values $Z(x)$ and 4th power of Pq , Rq , Wq respectively, within a sampling length.

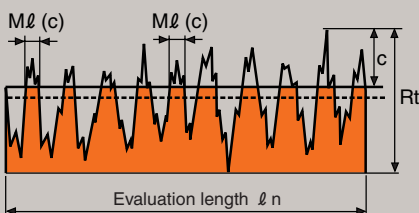
$$Rku = \frac{1}{Rq^4} \left(\frac{1}{\ell} \int_0^{\ell} Z^4(x) dx \right)$$



Rmr(c)
Pmr(c)
Wmr(c) } Material ratio of profile
(Rmr(c) = ex-tp)

Ratio of the material length of the profile elements $MI(c)$ at a given level c to the evaluation length.

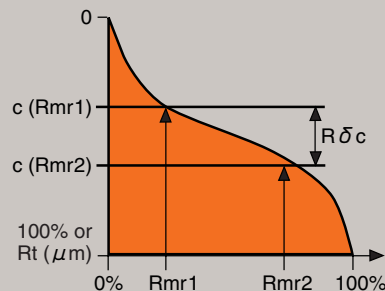
$$Rmr(c) = \frac{100}{\ell n} \sum_{i=1}^m MI(c)_i (\%)$$



Rδc
Pδc
Wδc } Profile section height difference

Vertical distance between two section levels of given material ratio.

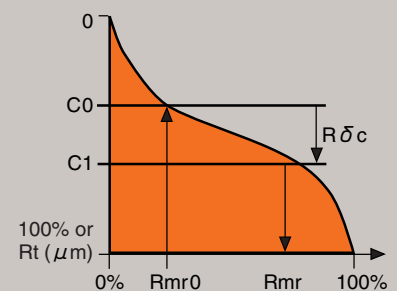
$$R\delta c = c(Rmr1) - c(Rmr2); Rmr1 < Rmr2$$



Rmr
Pmr
Wmr } Relative material ratio

Material ratio determined at a profile section level $R\delta c$, related to a reference c_0 .

$$Rmr = Rmr(c_1) \\ C_1 = C_0 - R\delta c, C_0 = C(Rmr0)$$



Explanation of Surface Characteristics • Standards >>>

Expanded surface texture parameters and curves

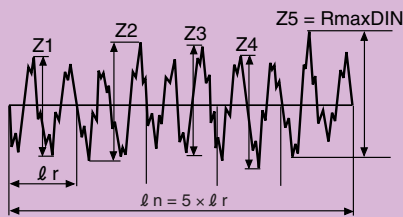
Confirm to ISO4287: '96, ISO12085: '96
& ISO13565-1: '96 / -2: '96 / -3: '98

Traditional local parameters

RmaxDIN Maximum peak to valley height
RzDIN Average peak to valley height

Zi is the maximum Peak to valley height of a sampling length ℓr .
RmaxDIN is the maximum Zi of 5 adjoining sampling length ℓr in an evaluation length ℓn .
RzDIN is arithmetic mean of 5 Zi.

$$RzDIN = \frac{1}{n} \sum_{i=1}^n Zi$$



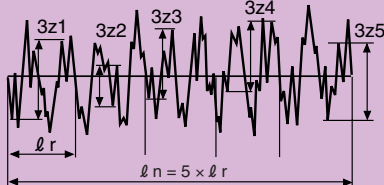
German old standard DIN4768/1: '90

R3z Base roughness depth

3Zi is the height of the 3rd height peak from the 3rd depth valley in a sampling length ℓr .

R3z is arithmetic mean of 3Zi's of 5 sampling lengths in an evaluation length ℓn .

$$R3z = \frac{1}{n} \sum_{i=1}^n 3zi$$

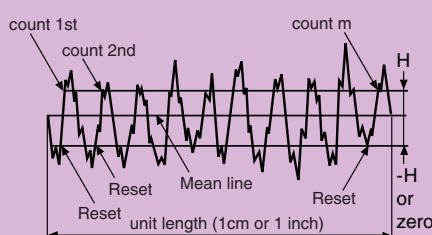


Pc Peak density /cm: ASME B46.1: '95

PPI Peaks per inch: SAEJ911

HSC High spot count

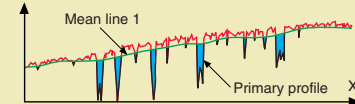
Pc is the number of peaks counted when a profile intersects a lower boundary line -H and an upper line +H per unit length 1 cm.
PPI shows Pc in 1 inch (25.4mm) unit length.
HSC shows the number of peaks when the lower boundary level is equal to zero.



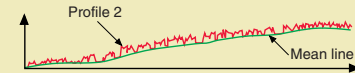
Parameters of surfaces having stratified functional properties ISO13565's

Filtering process of ISO13565-1: '96

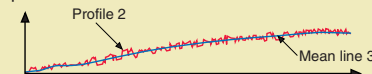
Calculate mean line 1 from a primary profile with phase correct filter.



Calculate profile 2 with cutting valley lower than mean line 1.



Calculate mean line 3 from profile 2 with phase correct filter.



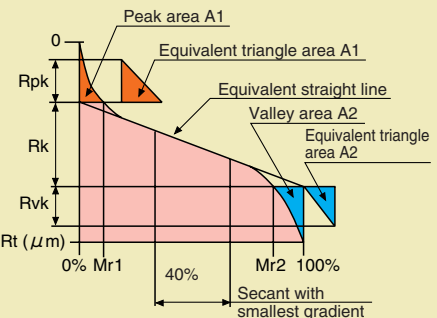
Calculate roughness profile 4 by taking mean line 3 off from a primary profile.



Measuring conditions of ISO13565-1

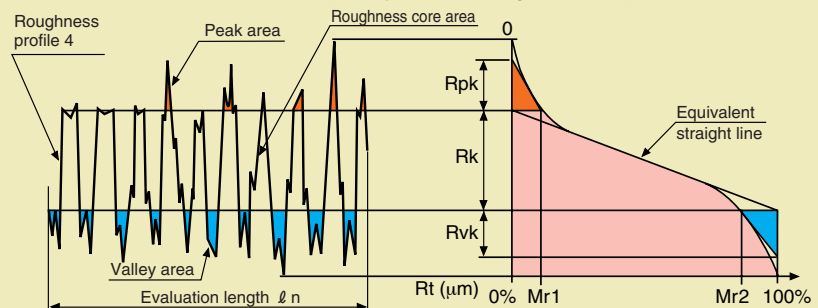
Cutoff value λc	Evaluation length ℓn
0.8 mm	4 mm
2.5 mm	12.5 mm

40% length secant of smallest gradient separate the material ratio curve into core area & projected areas.
Calculate Rpk & Rvk with equivalent triangles of projected areas.



Height characterization using the linear material ratio curve ISO13565-2: '96

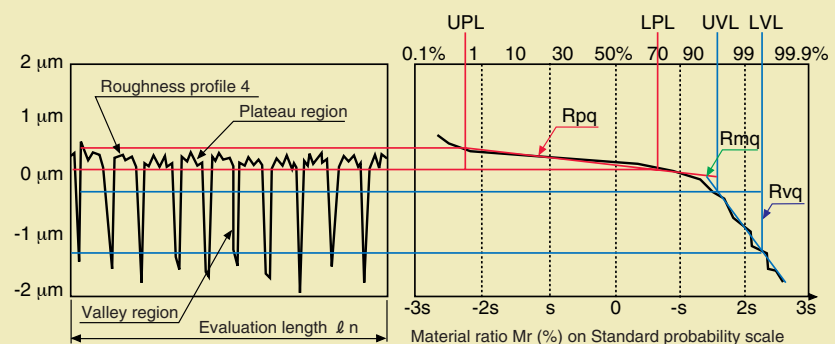
Rk core roughness depth : Depth of the roughness core profile
Rpk reduced peak height : Average height of protruding peaks above roughness core profile.
Rvk reduced valley depths : Average depth of valleys projecting through roughness core profile.
Mr1 material portion 1 : Level in %, determined for the intersection line which separates the protruding peaks from the roughness core profile.
Mr2 material portion 2 : Level in %, determined for the intersection line which separates the deep valleys from the roughness core profile.



Height characterization using the material probability curve of ISO13565-3

Draw a material ratio curve on normal probability paper from the roughness profile 4 (primary profile) of an evaluation length.
Separate the material probability curve to 2 area, upper plateau area and lower valley area.

Rpq (Ppq) parameter: slope of a linear regression performed through the plateau region.
Rvq (Pvq) parameter: slope of a linear regression performed through the valley region.
Rmq (Pmq) parameter: relative material ratio at the plateau to valley intersection.



Motif parameters of ISO12085: '96

Motif

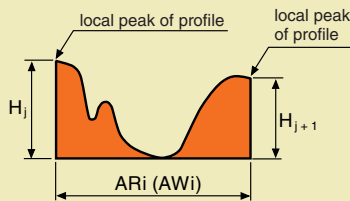
A portion of the primary profile between the highest points of two local peaks of the profile, which are not necessarily adjacent.

Motif depths H_j & H_{j+1}

Depth measured perpendicular to the general direction of the primary profile.

Motif length A_{ri} or A_{wi}

Length measured parallel to the general direction of the profile.



Measuring condition

Default A=0.5mm, B=2.5mm, $\ell n=16$ mm

A (mm)	B (mm)	ℓn (mm)	λs (μm)
0.02	0.1	0.64	2.5
0.1	0.5	3.2	2.5
0.5	2.5	16	8
2.5	12.5	80	25

Indication of ISO1302: '02

Roughness motif

$$\sqrt{\lambda s - A / \ell n / R \text{ parameter} \quad \text{limit value}}$$

Waviness motif

$$\sqrt{A - B / \ell n / W \text{ parameter} \quad \text{limit value}}$$

(default value need not to be indicated)

Roughness motif: Motif derived by using the ideal operator with limit value A.

Limit value A: Maximum length of roughness motif to separate waviness motif.

Upper envelope line of the primary profile (Waviness profile): Straight lines joining the highest points of peaks of the primary profile, after conventional discrimination of peaks.

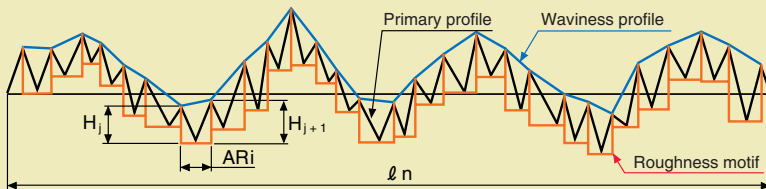
AR: Mean spacing of roughness motifs: The arithmetical mean value of the lengths A_{ri} of roughness motifs, within the evaluation length, i.e.

$$AR = \frac{1}{n} \sum_{i=1}^n A_{ri} \quad (n: \text{Total number of roughness motifs})$$

R: Mean depth of roughness motifs: The arithmetical mean value of the depths H_j of roughness motifs, within the evaluation length, i.e.

$$R = \frac{1}{m} \sum_{j=1}^m H_j \quad m = 2n$$

Rx: Maximum depth of roughness motifs: The maximum value of the depths H_j of roughness motifs, within the evaluation length.



Waviness motif: Motif derived on upper envelope line by using ideal operator with limit value B

Limit value B: Maximum length of waviness motif

AW: Mean spacing of waviness motifs: The arithmetical mean value of the lengths A_{wi} of waviness motifs, within the evaluation length, i.e.

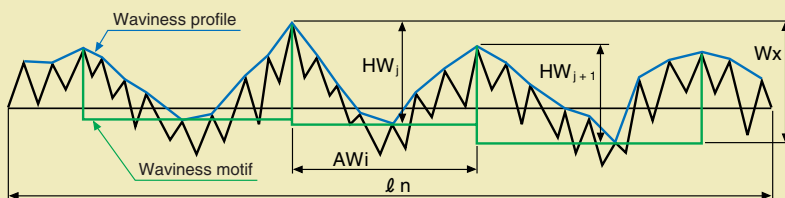
$$AW = \frac{1}{n} \sum_{i=1}^n A_{wi} \quad (n: \text{Total number of waviness motifs})$$

W: mean depth of waviness motifs: The arithmetical mean value of the depths HW_j of waviness motifs, within the evaluation length, i.e.

$$W = \frac{1}{m} \sum_{j=1}^m HW_j \quad m = 2n$$

Wx: Maximum depth of waviness: The largest depth HW_j , within the evaluation length.

Wte: Total depth of waviness: Distance between the highest point and the lowest point of waviness profile.

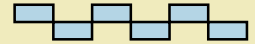


Hint of surface texture measurement

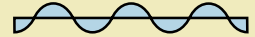
Roughness parameter conversion

The parameter ratio Ra/Rz (R_{max} , R_y)=0.25 is applicable only to triangle profile. Actual profiles have different parameter ratios according to the form of profile.

Rectangle: $Ra/Rz=0.5$



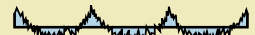
Sinusoidal: $Ra/Rz=0.32$



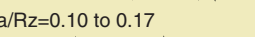
Triangle: $Ra/Rz=0.25$



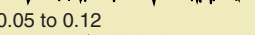
Lathed, Milled: $Ra/Rz=0.16$ to 0.26



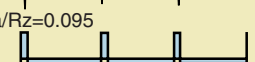
Ground, Sand blasted: $Ra/Rz=0.10$ to 0.17



Honing, Lapped: $Ra/Rz=0.05$ to 0.12

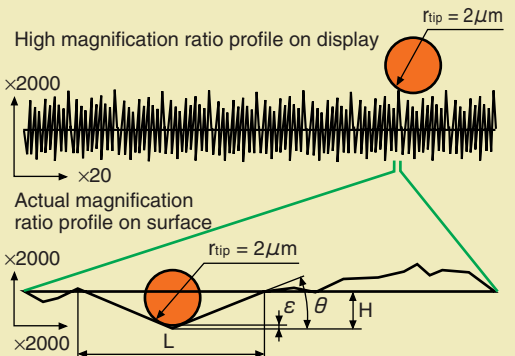


Pulse (Duty ratio 5%): $Ra/Rz=0.095$



Display aspect ratio & Stylus fall depth in valley

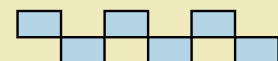
Roughness profile usually displayed as much magnified height deviations than wavelength. Displayed valley looks sharp but actually wide. Stylus can contact to bottom of valley. Depth error ε with stylus unable to contact on triangle valley is; $\varepsilon = r_{tip} (1/\cos\theta - 1)$ $\theta < 15^\circ$, or $H/L=0.1-0.01$ on machined surface.



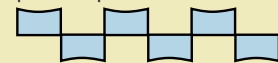
Profile distortion with cutoff

Roughness profile will have bigger profile distortion & smaller amplitude when cutoff λc is short.

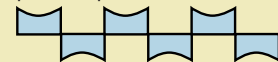
Primary profile P



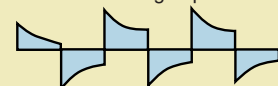
Roughness profile R phase correct λc 0.8mm



Roughness profile R phase correct λc 0.25mm



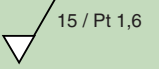
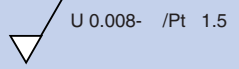
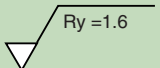
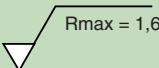
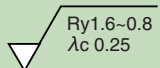
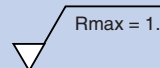
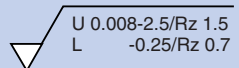
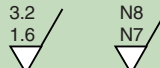
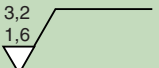
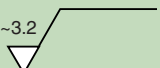
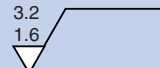
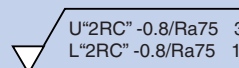
Roughness profile with 2RC filter λc 0.25mm have big distortion according to phase shift.



Explanation of Surface Characteristics • Standards >>>

Comparison of national standards of surface texture measurement

ID. of national standard country		JIS B0601-'82 JIS B0031-'82	ANSI B46.1-'85	NF E05-015('84) NF E05-016('78) NF E05-017('72)	ISO468-'82 ISO4287/1-'84 ISO4288-'85 ISO1302-'78
Specification		former Japan	former U.S.A.	former France	former ISO
Primary profile P	Profile format	Analog signal without filtering	Analog signal with low pass filtering	Analog signal without filtering	Analog signal without filtering
	Evaluation length	1 sampling length 0.25, 0.8, 2.5, 8, & 25	—	not defined	—
P profile parameter	Maximum height	R _{max} (S indication)	—	P _t	—
	Ten point height	R _z (Z indication)	—	—	—
	Other P parameters	—	—	P _p , P _a , (T _p) _c , R, AR, Kr, W, W' _{max} , W' _t , AW, Kw	—
	Motif parameters	—	—	—	—
	Indication of maximum height < 1.5μm		—	P _t 0.8 - 0.6 	—
Roughness profile R	Unit of height	μm	μm or μin.	μm	μm
	Unit of length	mm	mm or in.	mm	mm
	Filter	2RC	2RC	2RC	2RC
	Long cutoff	λ _c	λ _B	λ _c	λ _c
	Short cutoff	—	cutoff value 2.5μm	—	—
	Sampling length	L=3 × λ _c or over	L:1.3-5mm @ λ _B 0.25 L:2.4-8mm @ λ _B 0.8 L:5-15mm @ λ _B 2.5	ℓ	ℓ
	Evaluation length	TL=L=3 × λ _c or over	—	L = n × ℓ	ℓ n = n × ℓ
R profile Height parameter	Maximum height	—	Peak-to-Valley Height (R _{max} , R _y)	R _y	R _y
	Maximum peak to valley height	—	—	R _{max}	R _y max
	Ten point height	—	(R _z)	R _z	R _z
	Average peak to valley height	—	—	—	R _y 5
	Other peak height parameters	—	(R _p)	R _p	R _p , R _p max, R _p 5, R _m , R _c
ℓ r & λ _c for peak height parameter	0.25mm	R _{max} , R _z ≤ 0.8μm	—	not defined	0,1 < R _z , R _y ≤ 0,5μm
	0.8mm	0.8 < R _{max} , R _z ≤ 6.3μm	—	not defined	0,5 < R _z , R _y ≤ 10μm
	2.5mm	6.3 < R _{max} , R _z ≤ 25μm	—	not defined	10 < R _z , R _y ≤ 50μm
Indication of Maximum height in case of R _z < 1.5μm		—	—	R _{mac} 1.6 	 R _y = 1.6
R profile averaging parameter	Arithmetic average	R _a (a indication)	R _a	R _a	R _a
	root mean square	—	(R _q)	R _q	R _q
	Skewness, kurtosis	—	(Skewness, Kurtosis)	Sk, Ek	Sk
ℓ r & λ _c for R _a on non-periodic profile	0.25mm	optional	0.0063 < S _m ≤ 0.05μm	not defined	0,02 < R _a ≤ 0,1μm
	0.8mm	R _a ≤ 12.5μm	0.02 < S _m ≤ 0.16μm	not defined	0,1 < R _a ≤ 2μm
	2.5mm	12.5 < R _a ≤ 100μm	0.063 < S _m ≤ 0.5μm	not defined	2 < R _a ≤ 10μm
Indication of R _a in case of 1.5 < R _a < 3.1μm				R _a 1.6 - 3.2 	 
R profile other parameter	Mean spacing	—	Roughness spacing	S _m	S _m
	RMS slope	—	—	Δq	Δq
	material ratio	—	(tp)	—	tp
	Other parameters	—	(Peak count P _c)	S, Δa, λ _a , λ _q	S, Δa, λ _a , λ _q , Lo, D
Comparison rule of measured value with tolerance limits	Average	average value of all sampling lengths	average value of all sampling lengths	not defined	—
	16% rule	—	—	not defined	16% rule default
	Maximum rule	—	—	not defined	Max rule for parameter with suffix "max"

BS1134 part 1-'88 BS1134 part 2-'90	DIN4768-'90 DIN4771-'77 DIN4775-'82 DIN4776-'90 DIN4777-'90	JIS B0601-'94 JIS B0031-'94	ASME B46.1-'95	ISO4287:'97 (JIS B0601:'01) ISO4288:'96 (JIS B0633:'01) ISO12085:'96 (JIS B0631:'00) ISO13565's, (JIS B0671's) ISO1302:'02 EU, U.K. & Japan
former U.K.	former Germany	former Japan	U.S.A.	
Analog signal without filtering	Digital data without filtering	Digital data without filtering	Digital data with λ_s filter	Digital data with λ_s filter
—	0,5, 1,5, 5, 15 & 50mm	—	—	= 1 sampling length = Length of the measured feature
—	Pt	—	—	Pt, Pz(=Pt)
—	—	—	—	—
—	—	—	—	Pp, Pv, Pc, Pa, Pq, Psk, Pku, PSm, PΔq, Pmr(c), Pδc, Pmr, Ppq, Pvq, Pmq
—	—	—	—	R, AR, Rx, W, AW, Wx, Wte
—		—	—	
μm (μin)	μm	μm	μm (or $\mu\text{in.}$)	μm
mm (inch)	mm	mm	mm (or in.)	mm
2RC	Phase correct	Phase correct	Phase correct (or 2RC)	Phase correct
λ_B	λ_C	λ_C	λ_C	λ_C
—	—	—	λ_S	λ_S
ℓ_r	ℓ_C	ℓ_r	Cutoff length : ℓ	ℓ_r
$\ell_e = 5 \times \ell_r$	$5 \times \ell_C$	$\ell_e = 5 \times \ell_r$	$L = 5 \times \ell$	$\ell_e = 5 \times \ell_r$ Calculate for each sampling length ℓ_r
—	Rt	Maximum height Ry in 1 ℓ_r	Rt	Maximum height Rz in 1 ℓ_r or total height Rt in 1 ℓ_e
Ry	Maximum two point height Rmax	—	Rmax	Rz max
Rz	—	Ten point height Rz	—	—
—	Ten point height Rz	Maximum height Ry	Rz	Average method Rz
—	—	—	Rp, Rpm, Rv	Rp, Rv, Rc
$0,1 < Rz \leq 0,5\mu\text{m}$	$0,1 < Rz \leq 0,5\mu\text{m}$	$0,1 < Rz, Ry \leq 0,5\mu\text{m}$	$0,02 < Ra \leq 0,1\mu\text{m}$	$0,1 < Rz \leq 0,5\mu\text{m}$
$0,5 < Rz \leq 10\mu\text{m}$	$0,5 < Rz \leq 10\mu\text{m}$	$0,5 < Rz, Ry \leq 10\mu\text{m}$	$0,1 < Ra \leq 2\mu\text{m}$	$0,5 < Rz \leq 10\mu\text{m}$
$10 < Rz \leq 50\mu\text{m}$	$10 < Rz \leq 50\mu\text{m}$	$10 < Rz, Ry \leq 50\mu\text{m}$	$2 < Ra \leq 10\mu\text{m}$	$10 < Rz \leq 50\mu\text{m}$
				
Ra	Ra	Ra	Ra	Ra
—	—	—	Rq	Rq
—	—	—	Rsk, Rku	Rsk, Rku
$0,02 < Ra \leq 0,1\mu\text{m}$	$0,02 < Ra \leq 0,1\mu\text{m}$	$0,02 < Ra \leq 0,1\mu\text{m}$	$0,02 < Ra \leq 0,1\mu\text{m}$	$0,02 < Ra \leq 0,1\mu\text{m}$
$0,1 < Ra \leq 2\mu\text{m}$	$0,1 < Ra \leq 2\mu\text{m}$	$0,1 < Ra \leq 2\mu\text{m}$	$0,1 < Ra \leq 2\mu\text{m}$	$0,1 < Ra \leq 2\mu\text{m}$
$2 < Ra \leq 10\mu\text{m}$	$2 < Ra \leq 10\mu\text{m}$	$2 < Ra \leq 10\mu\text{m}$	$2 < Ra \leq 10\mu\text{m}$	$2 < Ra \leq 10\mu\text{m}$
 N8 N7				
Sm	—	Sm	Sm	RSm
—	—	—	Δq	RΔq
tp	—	tp	tp	Rmr(c)
S	—	S	Htp, Δa, SAE Peak PPI, Peak density Pc	Rδc, Rmr, Rpk, Rvk, Rk, Mr1, Mr2, Rpq, Rvq, Rmq
—	—	average value of all sampling lengths	not defined	average value of all sampling lengths
16% rule	16% rule for Ra, Rz	—	not defined	16% rule default
Max rule for parameter with suffix "max"	Max rule for Rmax	—	not defined	Max rule for parameter with suffix "max"