SURFTEST SJ-410 SERIES



Portable surface roughness tester evolution. Rich choice of options provide easier, smoother and more accurate measurements.



PRE 1387

Portable Surface Roughness Tester Evolves!

Backlight provided

environments.

2012/05/09

Ra

UTO ISO1997

A backlight improves usability in dim testing

0.5 mm/s λc 0.8

0.

Text display

410_{µm}

Enhanced power for making measurements on site

Colour-graphic LCD

The colour-graphic LCD with excellent visibility displays calculated results and assessed profiles even clearer. This is really useful for checking results without printing them out.

Touch screen for easier operations

The screen display can be switched between icon display and text display. Successfully realizes operability with utility and usability.



Easy to use and highly functional

This portable surface roughness tester is equipped with analysis functionality rivaling that of benchtop surface roughness testers.





Applicable standards

Complies with many industry standards

The Surftest SJ-410 complies with the following standards: DIN EN ISO, VDA, JIS, ANSI as well as customized settings.

J1\$1982	JI \$1994
J1 \$2001	1 S0 1997
ANSI	VDA
Free	





Multilingual support

The display interface supports 16 languages.

SelectLanguage 172					
日本語	English				
Deutsch	Français				
Italiano	Español				
Portugues	한국어				
繁體中文	中文				



SelectLanguage 272					
Cesky	Polski				
Magyar	Türkçe				
Svenska	Nederlands				

High accuracy measuring

A wide range, high-resolution detector

Measuring range / resolution 800 µm/0.0125 µm 80 μm/0.00125 μm 8 µm/0.000125 µm

High straightness drive unit

Straightness / traverse length 0.3 µm/25 mm (SJ-411) 0.5 µm/50 mm (SJ-412)

SJ-412



The Large Touch-screen, Colour-graphic LCD Ensures Both Intuitive Control and Advanced Operability

Interfaces

2.247 2.808 14.549

Mentile.

A variety of interfaces supplied as standard

The external device interfaces that come as standard include USB, RS-232C, SPC output and footswitch I/F.





Data storage

Memory card (optional) is supported

The measurement conditions and data can be stored in a memory card (optional) and recalled as required. This enables batch analysis and printout of data after on-site measurement.



- Measurement condition
 Internal memory: 10 sets
 Memory card: 500 sets
- •Measurement result Memory card: 1000 sets

Password protection

Access to functions can be restricted by a password

A pre-registered password can limit use of measurement conditions and other settings to the tester's administrator.





Carrying case

The unit is easily transported in a dedicated carrying case which includes holders for the accessories as well as the tester itself (standard accessory).



Sheet buttons

Single button measurements

A sturdy sheet-button panel with superior durability in any environment is provided. For repeat measurement of the same work, simply pressing the start switch can complete measurement, analysis and printout.

Printer

High-speed printer prints out measurement results on site

A high-quality, high-speed thermal printer prints out measurement results. It can also print a BAC curve or an ADC curve as well as calculated results and assessed profiles. These results and profiles are printed out in landscape format, just as they appear on the color-graphic LCD.



Enhanced Measuring Functions

Your choice of skidless or skidded measurement

• Skidless measurement

Skidless measurement is where surface features are measured relative to the drive unit reference surface. This measures waviness and finely stepped features accurately, in addition to surface roughness, but range is limited to the stylus travel available. The SJ-410 series supports a variety of surface feature measurements simply by replacing the stylus.



Measuring example of stepped features: Measured profile Skidless

• Skidded measurement

In skidded measurements, surface features are measured with reference to a skid following close behind the stylus. This cannot measure waviness and stepped features exactly but the range of movement within which measurement can be made is greater because the skid tracks the workpiece surface contour.



Powerful support for leveling

Patent registered in Japan, U.S.A.. Patent pending in Germany

Patent registered in Japan, U.S.A.. Patent pending in Germany

The height/tilt adjustment unit comes as standard for leveling the drive unit prior to making skidless measurements and, supported by guidance from the unique D.A.T. function, makes it easy to achieve highly accurate alignment.

• Height/tilt adjustment unit (standard accessory)



When the SJ-410 Series detector is mounted on the manual column stand*¹ for measurement, it can be combined with any of the optional products for easier leveling: leveling table*¹, 3-axis alignment table*¹ or tilt adjustment unit*¹.

*1: For details about optional products, see P6-7.



More measuring functions than expected from a compact tester

Usually, a spherical or cylindrical surface (R-surface) cannot be evaluated, but, by removing the radius with a filter, R-surface data is processed as if taken from a flat surface.





Previously measured data can be recalculated for use in other evaluations by changing the current standard, assessed profile and roughness parameters.

GO/NG judgement function

An "OK/NG" judgment symbol is displayed when limits are set for the roughness parameter. In case of "NG," the calculated result is highlighted. The calculated result can also be printed out.



	Calc.Result	
Ra Rg Rz	↑ 1.103 OK 1.427 ↓ 7.259	μm μm

The "OK" symbol means the measurement is within the limits set; "NG" means it is not, in which case an arrow points to either the upper or lower limit in the printout.

Narrow space measuring function

Patent pending in Japan

Surface roughness measurement requires a run-up distance before starting the measurement (or retrieving data). When the SJ-410 Series measures, its run-up distance is normally set to 0.5 mm. This distance, however, can be shortened to 0.15 mm using the narrow part measurement function (starting from the origin point of the drive unit). The function extends the possibility of measurement of narrow locations such as grooves in piston ring / O-ring mounts.



Real sampling

This function samples stylus displacement for a specified time without engaging detector traverse, which enables use as a simplified vibration meter or displacement gage incorporated in another system.



Assessing a single measurement result under two different evaluation conditions

A single measurement enables simultaneous analysis under two different evaluation conditions. A single measurement allows calculation of parameters and analysis of assessed profiles without the need for recalculation after saving data, contributing to higher work efficiency.



Arbitrary sampling length setting

This function allows a sampling length to be arbitrarily set in 0.01 mm increments (**SJ-411**: 0.1 mm to 25 mm, **SJ-412**: 0.1 mm to 50 mm). It also allows the **SJ-410** series to make both narrow and wide range measurements.

Simple contour analysis function

Point group data collected for surface roughness evaluation is used to perform simplified contour analysis (step, step height, area and coordinate variation). It assesses minute forms that cannot be assessed by a contour measurer.



Optional Accessories

Simple column stand

Can be adjusted to match the height of the item to be measured.







Options for simple column stand

Three new optional products are available to be attached to the manual column stand (No.178-039). You can choose the unit that suits your application. Or, you can also use the three products in any combination. Using the optional units makes SJ-411/412 more convenient and easier to use to ensure accurate measurements.

Auto-set unit* - 178-010

12.5 mm

12.5 mm

This unit enables the vertical (Z-axis) direction to be positioned automatically (auto-set function). A single button operation completes a series of operations from measurement, saving and auto-return (saving and auto-return can be switched on and off by operating the drive unit).



This unit is used for aligning the workpiece surface with the detector reference plane. It supports the DAT function to make the leveling of workpiece surfaces easier.



3-axis adjustment table: 178-047

Patent registered in Japan, U.S.A.. Patent pending in Germany

This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be leveled with this table.



DAT function for the optional leveling table

Patent registered in Japan, U.S.A.. Patent pending in Germany

The leveling table can be used to align the surface to be tested with the detector reference plane. The operator is guided through the procedure by screen prompts.



XY leveling tables

Order No.

Table dimensions

Inclination adjustment

X/Y-axis travel range

Dimensions (WxDxH)

Maximum load

angle Swiveling angle

Mass

Resolution

The table includes X- and Y-axes micrometer heads. This makes axis alignment much easier because the tilt adjustment center is the same as the rotation center of the table. (Code **No.178-042-1/178-043-1**)

178-042-1(mm)

178-052-1(inch)

with digital head

±12.5 mm

0.001 mm

262 × 233 × 83 mm

6.3 kg



178-043-1(mm

178-053-1(inch

130 × 100 mm

15 kg

±12.5 mm

0.01 mm

220 × 189 × 83 mm

6 kg

+1.5



178-049(mm

178-058(inch/mm

±12.5 mm

0.001 mm

262 × 233 × 55 mm

5 kg



13

T-groove dimensions



Precision vise

Application

Order No.	178-019
Clamping method	Sliding jaws
Jaw opening	36 mm
Jaw width	44 mm
Jaw depth	16 mm
Height	38 mm

Cylinder attachment

This block can be positioned on top of cylindrical objects to perform measurements.

No.12AAB358

Diameter: ø 15~60 mm Configuration:

- Cylindrical measurement block
- Auxiliary block
- Clamp *Drive unit not included.



Reference step specimen

Used to calibrate detector sensitivity. **No.178-611** Step nominal values: 2 µm /10 µm



Fits on the stand

Optional Accessories: Detectors / Styli











request, please contact any Mitutoyo office for more information. *2 : Used for calibration, a standard step gauge (No.178-611, option) is also required

Optional Accessories: For External Output

More advanced analysis can be performed by loading SJ-410 series measurement data to software program FORMTRACEPAK via a memory card (option) for processing back at base.



Digimatic mini processor DP-1VR

By connecting this printer to the Surftest SJ-410's digimatic output, you can print calculation results, perform a variety of statistical analyses, draw a histogram or D chart, and also perform complicated operations for X-R control charts.



No.264-504

To denote your AC line voltage add the following suffixes (e.g.264-504-5A). 5A for 120V, 5D for 230V, 5E for 230V (for UK), 5DC for 220V (for China), 5K for 220V (for Korea)

SJ-410 DP-1VR Connecting cable 1m: No.936937 2m: No.965014

Measurement Data Wireless Communication System U-WAVE

This unit allows you to remotely load Surftest SJ-410 calculation results (SPC output) into commercial spreadsheet software on a PC. You can essentially use a one-touch operation to enter the calculation results (values) into the cells in the spreadsheet software.



U-WAVE-R (Connects to the PC) No.02AZD810D



U-WAVE-T* (Connects to the SJ-410) No.02AZD880D *Requires the optional Surftest SJ-410 connection cable. No.02AZD790D

Contour / Roughness analysis software FORMTRACEPAK Simplified communication program for SURFTEST SJ series

The Surftest SJ-410 series has a USB interface, enabling data to be transferred to a spreadsheet or other software. We also provide a program that lets you create inspection record tables using a Excel® macro.

This program	can be downloaded	I free of charge	from the M	itutoyo we	bsite.
	http://w	ww.mitutoyo	o.eu		

	Required environment
• OS: Windows® XP (SP3) Windows Vista® Windows® 7	• Spreadsheet software: Excel® 2002 Excel® 2003 Excel® 2007 Excel® 2010

The optional USB cable is also required.

• USB cable for SJ-410 series No.12AAD510

Digimatic mini processor DP-1VR

This unit allows you to load Surftest SJ-410 calculation results (SPC output) into commercial spreadsheet software on a PC via a USB connector. You can essentially use a one-touch operation to enter the calculation results (values) into the cells in the spreadsheet software.





USB Input Tool Direct USB-ITN-D No.06ADV380D USB keyboard signal conversion type* IT-012U No.264-012-10 * Requires the optional Surftest SJ-410 connection cable. 1 m: No.936937 2 m: No.965014

Unit: mm



*The dimensions in parentheses indicate those for SJ-412



Specifications

Order No. mm 178-580-01 178-580-02 178-583-01 178-583-02 Measuing ange Z-asis (decora unit) 178-581-01 178-581-02 178-583-01 178-583-02 Measuing ange Z-asis (decora unit) 178-581-02 178-583-01 178-583-02 Measuing ange Z-asis (decora unit) 0.01 µm (800 µm range) / 0.001 µm (800 µm range) / 0	Model No.		SJ-411		SJ-412					
Order No. Inth/mm 178-581-01 178-581-02 178-583-01 178-583-02 Measuring ange Zeads 25 mm (1 mch) 80 µm 80 µm 8 µm 100 µm 12 µmh) Measuring ange Zeads (detector unit) 00 µm 80 µm range/ 0.4 µmh 3200 µmh 32 µm 70 µm 80 µm range/ 0.4 µmh 3200 µmh 3200 µmh 3200 µmh 3200 µmh 3200 µmh 320 µmh 320µ	o L mm		178-58	30-01	178-58	0-02	178-582	-01	178-582-02	
Messuring range X-axis S0 mm (2 incl) S0 mm (2 incl) Image: 21-axis (detector unit) * Up to 2.000 µm, 60 µm, 60 µm, 7 µm S0 mm (2 incl) Image: 21-axis (detector unit) * Up to 2.000 µm (200 µm range) / 0.0001 µm (200 µm range) S0 µm (2 incl) Image: 20-0000 µm (2 incl) 0.01 µm (200 µm range) / 0.0001 µm (200 µm range) S0 yr 5 µm (200 µm rd) Image: 20-0000 µm (2 incl) 507 2 µm (80 µm range) / 0.0001 µm (2 incl) S0 yr 5 µm (200 µm rd) Image: 20-0000 µm (2 incl) 507 2 µm (80 µm range) / 0.0001 µm (2 incl) S0 yr 5 µm (200 µm rd) Image: 20-000 µm (2 incl) 507 2 µm (80 µm range) / 0.0001 µm (2 incl) S0 yr 5 µm (2 0 µm (2 incl) Image: 20-000 µm (2 incl) 500 µm / 2 µm (8 µm range) / 0.0001 µm (2 incl) S0 µm / 2 µm (8 µm range) / 0.0001 µm (2 µm rd) Image: 20-000 µm / 2 µm (2 µm rd) µm / 1 µm /	Order No.	inch/mm	178-58	31-01	178-58	1-02	178-583	-01	178-583-02	
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Measuring principle Does Does Does Does Does Does Does Does	range	Z1-axis (detector unit)	800 µm, 80 µm, 8 µm						x - 7	
Retolution 0.01 µm (800 µm range) / 0.001 µm (80 µm range) / 0.004 µm (1300 µm ch) Detector Stylus 1p 6072 µm (800 µm ch) 9072 µm (800 µm ch) </td <td></td> <td>Measuring principle</td> <td></td> <td></td> <td>00</td> <td>Differential</td> <td>inductance</td> <td></td> <td></td>		Measuring principle			00	Differential	inductance			
Hestudion Output profile (2000 ginch) (200 ginch)		Desclution		0.01 µm	(800 µm range)	/ 0.001 µm (8	0 µm range) / 0.00	01 µm (8 µm	range)	
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Drive unit: Xaxis Diversities Diversities Brand marks 0.3 unit / 25 mm (2000; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04; 0.08; 0.01; 0.04		Measuring method		0		1 0 mm/s (0 (02 0 04 inch/s	.)	
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Standards JIS1982/JIS1994/JIS201/JIS1994/JIS201/JIS1994/JIS201 Parameters Ra, Rg, Rz, Ry, RD, RV, Rt, Zz, RS, RK, Ruc, RZ, RK, RU, CR, RZ, RV, LG, RZ, RY, LHC, RZ, RY, LL, RY, RY, RY, RY, RY, RY, RY, RY, RY, RY	adjustment unit	Tilt adjustment				± 1	.5°			
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Messure profiles Primary, Roughness, DF, Filtered waviness curve, R-Motif, W-Motif Graph analysis BAC and ADC curve Data compression Parabola / Hyperbola / Ellipse / Circle / Conix / Titing, Compensation off Filter CR, PC75, Gaussian filter Cut-off length A. A. 0.08, 0.25, 0.8, 25, 8.0, 25, 0.0m Sample length 0.08, 0.25, 0.8, 25, 8.0, 25, 0.0m Number of sampling lengths xl, x2, x3, x4, x5, x6, x7, x8, v9, x0, x1, x12, x13, x14, x15, x16, x17, x18, x19, x20 Arbitrary length 0.1-25 mm 0.1-50 mm Customization Desired parameters can be selected for calculation and display Simple contour analysis function Stepring parameters can be selected for calculation and display Statistical processing Static measurement (max.3 parameters) soppositie. Static processing for MAX, MIN, AVERAGE, Statistical processing Static measurement (max.3 parameters) is parate is possible. Static processing for rack sampling length / Printing function Measurement conditions / Calculation results / COX / Cervitommation (To za, 3c) Statistical processing Static measurement (max.1 parate) / Static processing for MAX, MIN, AVERAGE, Statistical processing Static measurement (max.1 parate) / Static processing for	Parameters		Ra, Rq, R: Roc, Ri	z, Ry, Rp, Rv, Rt, R c, Rpk, Rvk, Mr1, I	3z, Rsk, Rku, Rc, Rl VIr2, A1, A2, Vo, λ	Pc, RSm, Rmax* a, λq, Lo, Rpm,	¹ , Rz1max* ² , S, HSC, R tp* ⁴ , Htp* ⁴ , R, Rx, AR	zJIS* ³ , Rppi, R , W, AW, Wx, V	∆a, R∆q, Rlr, Rmr, Rmr(c), Wte, Possible Customize	
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Cut-off length X_ 0.08, 0.25, 0.8, 2.5, 8.0 mm Sample length 0.08, 0.25, 0.8, 2.5, 8.0, 250 mm 0.08, 0.25, 0.8, 2.5, 8.0, 250 mm Number of sampling lengths x1, x2, x3, x4, x5, x6, x7, x8, x9, x0, x1, x12, x13, x14, x15, x16, x17, x18, x19, x20 Arbitrary length 0.1-25 mm 0.1-50 mm Customization Desired parameters can be selected for calculation and display Simple contour analysis function Step, step volume, dimensions, coordinate difference DAT function Heals sampling studies to adjust leveling during skilless measurement Real sampling function Statistical processing Statistical processing Static measurement (max. 3 parameters) is possible. Static processing for MAX, MIN, AVERAGE, statistical processing for MAX, MIN, AVERAGE, statistical processing Statistical processing Statistical and eviation, instogram and pass rate is possible. G/V.Ng judgement** Max rule / 16 % rule / Average rule / Standard deviation (rule, 2, a, 32) Printing function Measurement conditions / Calculation results for Calculation results for each sampling length / Ming Julagaes Traditional Chinese, Simplified Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch Internal memory card (option): Sto0 measurement (statistic atata, 10000 text data, 500 statistic data, 1020 text data, 500 s	Filter		2CR, PC75, Gaussian filter							
Attended X** 2.5, 80, 25 pm (100, 320, 1000 µmch) Number of sampling lengths 0.8, 0.25, 0.8, 2.5, 0.8, 2.5, 0.m Number of sampling lengths x1, x2, x3, x4, x5, x6, x7, x8, x9, x10, x11, x12, x13, x14, x15, x16, x17, x18, x19, x20 Arbitrary length 0.1-25 mm 0.1-50 mm Simple contour analysis function Desired parameters can be selected for calculation and display Statistical processing Statistical processing Statistical processing for MAX, MIN, AVERAGE, statistical processing for MAX, MIN, AVERAGE, statistical processing Statistical processing Statistical processing Statistical processing for MAX, MIN, AVERAGE, statistical processing for MAX, MIN, AV	Cut-off length	$\frac{\lambda_c}{\lambda_c}$				0.08, 0.25, 0.8	3, 2.5, 8.0 mm			
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Bod No Judgement** Max hulp 1% % fulle / New fulle / Standard devalution (16, 26, 36) Functions Storage functions Measurement conditions / Calculation results / GO / NG judgement result / Calculation results / GO / NG judgement / News / Ne		Statistical processing			standard de	viation, histogra	am and pass rate is p	ossible	· · ·	
Functions Storage functions Constructions Constand constructins Constand constructions		GO/ NG judgement**		IV	10 m a a a a min a a	e / Average rul	e / Standard deviatio	n (1 0 , 2 0 , 3 0 ,)	
Printing function Measurement convel /BAC / ADC / Environmental setting information Display languages Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch Storage Internal memory: Measurement convel /BAC / ADC / Environmental setting information Storage Memory card (option): 500 measurement condition, 10000 measuring data, 10000 text data, 500 statistic data, 1 backup of machine setting, the last ten traces (Trace 10) Power supply External I/O USB I/F, Digimatic output, RS-232C I/F, External SW I/F Power consumption Two-way power supply: battery (rechargeable Ni-MH battery) and AC adapter Charging time: about 4 hours (may vary due to ambient temperature) Power consumption Endurance: about 1500 measurements (differs slightly due to use conditions / environment) Size (WxDxH) Display unit 275x198x109 mm (10.83x4.29x7.80 inch) Mass Height adjustment unit 130.9x63x99 mm (5.16x2.48x3.90 inch) Display unit 1.7 kg Mass Display unit 0.6 kg Drive unit 0.6 kg 0.64 kg Drive unit 0.6 kg 0.64 kg Drive unit 0.6 kg 0.64 kg Drive unit	Functions	storage functions	Moscuror	mont conditions /	TU measuring	conditions can	be stored in internal	memory	or each campling length /	
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12BAL402 Touch-screen protection sheet 12AAN041 Carrying case Quick reference manual, Warranty	Standard accessorie	s	270732	Printing naper	sspecimen	12BAG834	Touch nen	Stran for stylu	in participation manual	
		ce manual, Warranty								

*1: Only for VDA/ANSI/JIS'82 standards. *2: Only for ISO'97 standard. *3: Only for JIS'01 standard.

*5: Only for ANS standard.
*5: λs may not be switchable depending on standard selected.
*6: Standard deviation only can be selected in ANSI.16% rule cannot be selected in VDA.

*7: Either No.178-396 or No.178-397 is supplied as a standard accessory depending on the Order No. of the main unit for SJ-410 Series. *8: The standard stylus (No.12AAC731 or No.12AAB403), which is compatible with the detector supplied,

is a standard accessory. To denote your AC line voltage add the following suffixes (e.g. **178-570-01A**). A for 120V, C for 100V, D for 230V, E for 230V (for UK), DC for 220V (for China), K for 220V (for Korea)

• Printer paper (5 rolls)

- Durable printer paper (5 rolls) • Touch-screen protector sheet (10 sheets)
- Memory card (2GB) *
- Connecting cable (for RS-232C)

No.270732 No.12AAA876 No.12AAN040 No.12AAL069 No.12AAA882

Optional accessories, consumables, and others for SJ-410

* micro SD card (with a conversion adapter to SD card)

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Mitutoyo Europe GmbH Borsigstraße 8–10 41469 Neuss Germany T +49 (0) 2137 - 102-0 F +49 (0) 2137 - 102-351 info@mitutoyo.eu www.mitutoyo.eu

