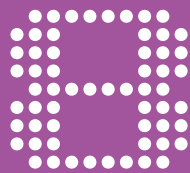


MEASURING INSTRUMENTS

Mitutoyo



MEASURING INSTRUMENTS



Measuring
Instruments

Form Measurement

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Optical Measurement

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Test Equipment

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**Coordinate Measuring
Machines**

p.179



Surftest SJ-210

SERIES 178 — Portable Surface Roughness Tester



NEW!



FEATURES

- 2.4" color LCD display includes backlighting and over-size fonts
- Display direction can be changed to be read vertically or horizontally right and left-handed
- Color tolerance judgments, evaluation curves and all data can be displayed
- Security management supports password protected function locks
- A micro-SD card supports high-volume portable data storage-up to 10,000 results can be stored
- Multiple output options include RS-232C and USB for maximum versatility

SPECIFICATIONS

	Model No.	SJ-210
	Order No. (inch / mm.)	178-561-01E
Detector	Minimum Range/ Resolution	1000µin/.08µin (25µm / 0.002 µm)
	Measured Profile	Primary profile (P), Roughness profile (R), DF profile, R-Motif
Display Unit	Evaluation Parameters	Ra, Rq, Rz, Ry, Rt, R3z, Rsk, Rku, Rc, RPa, RSm, Rmax*1 Rz1max, S, HSC, RzJIS*2, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rc, Rk, Rpk, Rvk, Mr 1, Mr2, A1, A2, Vo, Rpm, tp, Htp, R, Rx, AR
	Input / Output	USB, SPC, Printer output, RS-232C, Foot switch, MicroSD
	Standards	JIS'82, JIS'94, JIS'01, ISO, ANSI, VDA
	Measurement Result Display	Vertical, horizontal (invertible), curve, graph, value
	Built-in Battery (Ni-MH)	4hrs. for full charge (approx. 1000 measurements)



Printer : 178-421 MAP

Connecting Cable : 12AAL067

To denote your AC line voltage add the following suffixes (e.g.178421A).

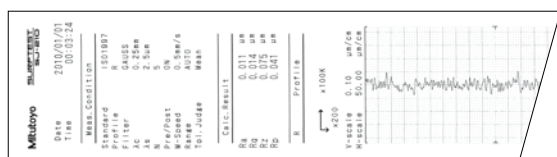
A for 120V, D for 230V

Unit configuration:

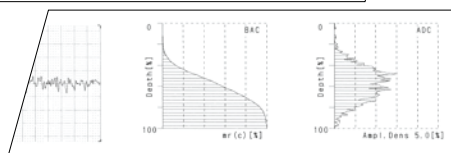
- ① Printer main unit
- ② Printer connecting cable
- ③ Printing paper 6-pack
- ④ Battery pack 1piece
- ⑤ Exclusive use AC adaptor (with AC power cord) 1piece



Example of the connection with SJ-210



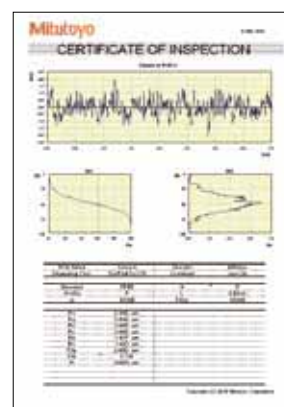
Example of the output by the printer



Simplified communication program for SURFTEST SJ series

The Surftest SJ-210 has a USB interface, enabling data to be transferred to spreadsheet or other software.

We also provide a program that lets you create inspection record tables using a Microsoft Excel* macro.





Surftest SJ-310

SERIES 178 — Portable Surface Roughness Tester



Surftest SJ-310

FEATURES

- Large color graphic LCD
- Multilingual support
- Complies with many industry standards
- Displays assessed profiles and graphical data
- User friendly, high-functionality display unit with integrated high-speed printer
- Measurement results can be displayed in several ways



1-parameter display: one parameter measurement result



Profile display: one parameter measurement result and the measured profile



4-parameter display: four parameter measurement results

SPECIFICATIONS

Model No.			SJ-310 (0.75mN type)	
Order No. (inch/mm)			178-571-01E	
Measuring range	X axis		16.0 mm (.63inch)	
	Detector	Range	360 μm (-200 μm ~ +160 μm) [14400 μinch (-7900 μinch to +6300 μinch)]	
		Range/ resolution		360 μm / 0.02 μm (14400 μinch / .8 μinch)
				100 μm / 0.006 μm (4000 μinch / .2 μinch)
				25 μm / 0.002 μm (1000 μinch / .08 μinch)
Measuring speed			In the measurement: 0.25mm/s (.01inch/s), 0.5mm/s (.02inch/s), 0.75mm/s (.03inch/s), In the return: 1mm/s (.04inch/s)	
Measuring force / Stylus tip		0.75mN / 2μmR 60°		
Skid force		400mN or less		
Standard		JIS'82 / JIS'94 / JIS'01 / ISO'97 / ANSI / VDA		
Measured profiles		Primary, Roughness, DF, R-Motif, W-Motif		
Parameters		Ra, Rc, Ry, Rz, Rq, Rt, Rmax*1, Rp, Rv, R3z, Rsk, Rku, Rc, RPl, Rsm, Rz1max*2, S, HSC, RzJIS*3, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, λa, λq, L0, Rpm, tp*4, Htp*4, R, Rx, AR, W, AW, Wx, Wte, Possible Customize		
Display languages		Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian Turkish, Swedish, Dutch		

Mitutoyo Surftest SJ-410

SERIES 178 — Portable Surface Roughness Tester



FEATURES

- Color-graphic LCD
 - Touch screen for easier operations
 - The display interface supports 16 languages.
 - Complies with many industry standards
 - A wide range, high-resolution detector
- Measuring range/ resolution
- 800μm/0.01μm
 - 80μm/0.001μm
 - 8μm/0.0001μm
- More measuring functions than expected from a compact tester
 - Narrow space measuring function (Patent pending in Japan)
 - Simple contour analysis function

SPECIFICATIONS

Model No.		SJ-411	SJ-412
Order No. (inch/mm)		178-581-01	178-583-01
Measuring range	X axis	25 mm (1 inch)	50 mm (2 inch)
	Z1 axis (detector unit)	800μm, 80μm, 8μm *Up to 2,400μm with an optional stylus	
Standard		JIS1982 / JIS1994 / JIS2001 / ISO1997 / ANSI / VDA	
Parameters		Ra, Rq, Rz, Ry, Rp, Rv, Rt, R3z, Rsk, Rku, Rc, RPC, RSm, Rmax*1, Rz1max*2, S, HSC, RzJIS*3, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Roc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, λa, λq, Lo, Rpm, tp*4, R, Rx, AR, W, AW, Wx, Wte, Possible Customize	



Surftest SJ-500, SV-2100

SERIES 178 — with Dedicated Control / Display Unit



FEATURES

- User-friendly display and simple operation Equipped with a highly visible color 7.5-inch TFT LCD, employing a color icon display and a touch panel achieves user-friendly display and simple operation.
- Easy positioning. A joy stick built in the dedicated control unit allows easy and quick positioning. Fine positioning of a small stylus, required for measuring the inner side of a small hole, can be easily made using the manual knob.
- Easy setting of measuring conditions for surface roughness. Equipped with simple input function allows inputs according to drawing instruction symbols of ISO/JIS roughness standards. Troublesome measuring condition settings can be easily input by directly selecting a drawing instruction symbol for surface roughness from the menu.

SPECIFICATIONS

Model No.	SJ-500	SJ-500	SJ-2100M4	SJ-2100M4
Order No. (mm)	178-532-01E	178-532-02E	178-636-01E	178-636-02E
Order No. (inch/mm)	178-533-01E	178-533-02E	178-637-01E	178-637-02E
Measuring force of detector	0.75mN	4mN	0.75mN	4mN
X-axis measuring range	50mm		100mm	
Vertical travel	-		350mm manual column	
Granite base size (WxD)	-		600 x 450mm	
Dimensions (main unit, WxDxH)	-		716 x 450 x 863mm	
Mass	6.7kg		144kg	



Model No.	SV-2100S4	SV-2100S4	SV-2100H4	SV-2100H4	SV-2100W4	SV-2100W4
Order No. (mm)	178-680-01E	178-680-02E	178-682-01E	178-682-02E	178-684-01E	178-684-02E
Order No. (inch/mm)	178-681-01E	178-681-02E	178-683-01E	178-683-02E	178-685-01E	178-685-02E
Measuring force of detector	0.75mN	4mN	0.75mN	4mN	0.75mN	4mN
X-axis measuring range	100mm		100mm		100mm	
Vertical travel	350mm power column		550mm power column		550mm power column	
Granite base size (WxD)	600 x 450mm		600 x 450mm		1000 x 450mm	
Dimensions (main unit, WxDxH)	766 x 482 x 966mm		766 x 482 x 1166mm		1166 x 482 x 1176mm	
Mass	144kg		154kg		224kg	



Surftest SV-3100

SERIES 178 — Surface Roughness Testers



FEATURES

- Mitutoyo's Surftest SV-3100 Series provide high-accuracy, high-level analysis, and multi-functionality in three dimensional analysis and measurement of fine contour, as well as the conventional type surface roughness measurement.
- SURFPAK-SV, a dedicated data-analyzing software is installed. This software allows data management in a consistent format, from the work site to the laboratory.
- Ceramic, which is known for its superb anti-abrasive property, is used as the X-axis drive unit guide. No lubrication of the guide is required.
- High-accuracy glass scales are built-in on X-axis (resolution: 0.05μm) and Z2-axis (column, resolution: 1μm) to insure high-accuracy positioning. The SV-3100 series manifest high-reliability especially in the horizontal roughness parameters (S, Sm), that require high-accuracy of the X-axis travel.
- Equipped with various functions such as: the "straightness compensation" function, which improves the linear accuracy of the X-axis; the "circular compensation" function for the vertical movement of the stylus; and the "stylus-tip diameter compensation" function.
- An easy-to-operate Control Box is provided. The Control Box independent of the main unit allows positioning, measurement start/stop, retracting, and other operations to be performed remotely. The Drive Unit up/down position and the X-axis traverse can be fine controlled manually.

SPECIFICATIONS

Model No.	SV-3100S4	SV-3100H4	SV-3100W4
Order No. (mm)	178-471-1E	178-472-1E	178-473-1E
Order No. (inch)	178-481-1E	178-482-1E	178-483-1E
Measuring force of detector	0.75mN	0.75mN	0.75mN
X-axis measuring range	100mm	100mm	100mm
Vertical travel	300mm power column	500mm power column	500mm manual column
Granite base size (WxD)	600 x 450mm	600 x 450mm	1000 x 450mm
Dimensions (main unit, WxDxH)	756 x 782 x 966mm	756 x 482 x 1166mm	1156 x 482 x 1176mm
Mass (main unit)	140kg	150kg	220kg

Model No.	SV-3100S8	SV-3100H8	SV-3100W8
Order No. (mm)	178-476-1E	178-477-1E	178-478-1E
Order No. (inch)	178-486-1E	178-487-1E	178-488-1E
Measuring force of detector	0.75mN	0.75mN	0.75mN
X-axis measuring range	200mm	200mm	200mm
Vertical travel	300mm power column	500mm power column	500mm manual column
Granite base size (WxD)	600 x 450mm	600 x 450mm	1000 x 450mm
Dimensions (main unit, WxDxH)	766 x 482 x 966mm	766 x 482 x 1166mm	1166 x 482 x 1176mm
Mass (main unit)	140kg	150kg	220kg

Models without X-axis inclination function

Form Measurement



Formtracer SV-C3200 / 4500

SERIES 525 — Surface Roughness / Contour Measuring System



SV-C3200S4



FEATURES

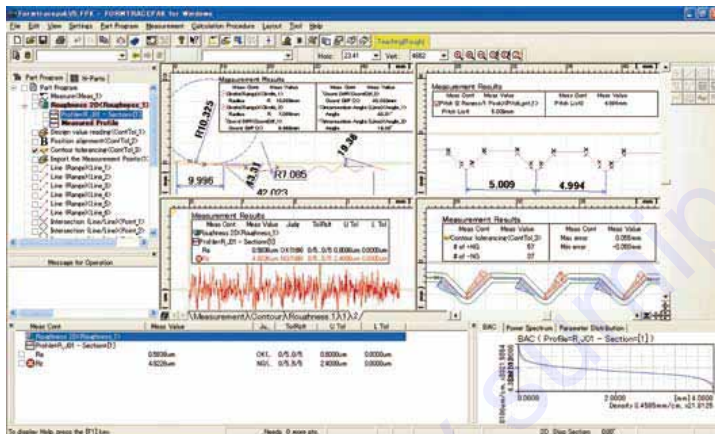
- Detector with new arm design
- One-touch arm attachment
- SV-C4100 (Conventional product)
- SV-C4500



Screw fixing

- Fast traverse improves measurement efficiency
- Auto stop feature assures safety even during high-speed movement

Contour Analysis Software: FORMTRACEPAK



Contour Measuring

- Contour analysis function
- Contour-tolerancing function as a standard feature
- Design value generation function
- Data combination function
- Simple pitch calculation function

Surface Roughness Measuring

- Surface Roughness analysis function
- Microscopic contour analysis function
- Simple input using drawing symbols
- Multiple-point measurement function
- Analysis function using multiple-point measurement
- Reference length dialog box
- Analysis condition modification with a preview function
- R-surface automatic measurement function

SPECIFICATIONS

Model		SV-C3200S4	SV-C3200W4	SV-C3200S8	SV-C3200H8	SV-C3200W8
		SV-C4500S4	SV-C4500W4	SV-C4500S8	SV-C4500H8	SV-C4500W8
Order No. (mm)		525-481E-1	525-483E-1	525-486E-1	525-487E-1	525-488E-1
		525-441E-1	525-443E-1	525-446E-1	525-447E-1	525-448E-1
Specifications for Surface Roughness Measurement						
Measuring range	X axis (drive unit)	100mm		200mm		
	Z1 axis (detector unit)	800μm / 80μm / 8μm				
Straightness		(0.05 + 0.001L)μm L = Drive length (mm)		0.5μm / 200mm		
Resolution	Z1 axis (detector unit)	0.01 μm (800 μm), 0.001 μm (80 μm), 0.0001 μm (8 μm)				
Measuring force		0.75mN or 4mN				
Stylus tip		60°, 2 μmR (Measuring force: 0.75mN) or 90°, 5 μmR (Measuring force: 4mN)				
Conformable standards		JIS1982/JIS1994/JIS2001/ISO1997/ANSI/VDA				
Parameters		Pa, Pq, Psk, Pku, Pp, Pv, Pz, Pt, Pc, PSm, PΔq, Pm (rC), Pmr, Pδc, Ra, Rq, Rsk, Rku, Rp, Rv, Rz, Rt, Rc, RSm, RΔq, Rm (rC), Rmr, Rδc, Wa, Wq, Wsk, Wku, Wp, Wv, Wz, Wt, Wc, WSm, WΔq, Wm (rC), Wmr, Wδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rx, AR, R, Wx, AW, W, Wte, Ry, RyDIN, RzDIN, R3y, R3z, S, HSC, Lo, Ir, Δa, λa, λq, Vo, Htp, NR, NCRX, CPM, SR, SAR, NW, SW, SAW				



Contracer CV-1000 / CV-2000

SERIES 218 — Contour Measuring Instruments



CV-1000N2 can be attached to the optional column stand.

CV-1000N2 with personal computer system and software

FEATURES

- The digital arc scale is equipped in the Z-axis detecting unit. This gives you a wider range of measurement with higher resolution. No more reliance on measurement magnifications.
- A data analysis system (personal computer system and software of Formpak-1000) is available.

SPECIFICATIONS

Model No.	CV-1000N2	CV-2000M4	CV-2000S4
Order No. (mm)	218-611E	218-631E	218-632E
Order No. (inch)	218-621E	218-641E	218-642E
X1-axis measuring range	50mm	100mm	100mm
Z1-axis measuring range	25mm	40mm	40mm
Z2-axis vertical travel	-	320mm	250mm

Mitutoyo Contracer CV-3200 / 4500 SERIES 218 — Contour Measuring Instruments



FEATURES

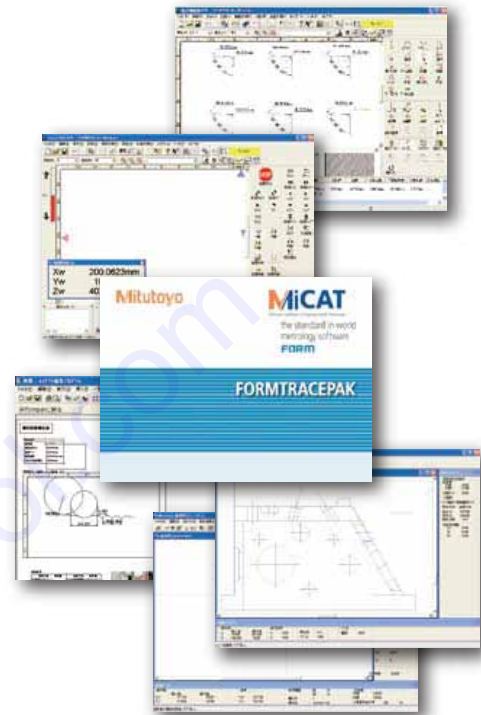
- Detector with new arm design
- One-touch arm attachment
CV-4100 (Conventional product) **CV-4500**



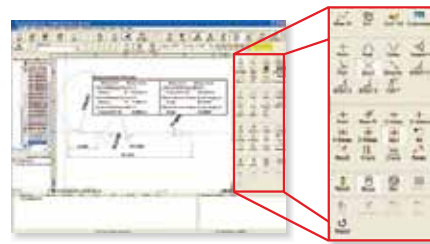
- Auto stop feature assures safety even during high-speed movement
- Hassle-free one-step calibration
- Best-in-class displacement accuracy

Contour Analysis Software: FORMTRACEPAK

- FORMTRACEPAK functions offer total support for measurement system control, surface roughness analysis, contour analysis, contour tolerancing, and inspection report creation.



- Contour Analysis



SPECIFICATIONS

Model		CV-3200S4	CV-3200H4	CV-3200W4	CV-3200S8	CV-3200H8	CV-3200W8
		CV-4500S4	CV-4500H4	CV-4500W4	CV-4500S8	CV-4500H8	CV-4500W8
Order No. (mm)		218-481E	218-482E	218-483E	218-486E	218-487E	218-488E
		218-441E	218-442E	218-443E	218-446E	218-447E	218-448E
Measuring range	X axis	100mm			200mm		
	Z1 axis (detector unit)	60mm (±30mm in horizontal situation)					
Z2 axis (column) travel range		300mm	500mm		300mm	500mm	
Detector (Z1 axis (detector unit))	Scale unit	Arc scale					
	Resolution	CV-3200series: 0.04μm, CV-4500series: 0.02μm					
	Stylus up/down motion	Arc movement					
	Measuring direction	Both pulling and pushing directions					
	Measuring face direction	CV-3200 series: Downward or upward CV-4500 series: Both upward and downward (direction switch from FORMTRACEPAK)					
	Measuring force	CV-3200 series: 30mN (by adjusting weight) CV-4500 series: 10, 20, 30, 40, 50mN (Setting measuring force FORMTRACEPAK)					
	Stylus traceable range	Ascent 77°, Descent 83° (with one-sided cut stylus: standard accessory)					



Roundtest RA-120 / 120P / 10

SERIES 211 — Roundness Measuring Instruments



MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world
metrology software
FORM

FEATURES

The Roundtest RA-120 / 120P are a compact, affordable, and simple-to-use device for measuring part geometry on the shop floor. It also provides such superb data analysis capabilities as required with laboratory roundness measuring instruments and has a $\pm 1000\mu\text{m}$ wide range detector and precision turn table with excellent rotation accuracy. The RA-120 is a dedicated processor based model which controls all operations via the control panel incorporated in the main unit.

SPECIFICATIONS

Model No.			RA-120	RA-120P	RA-10
Order No. (mm) (with DAT function)			211-622E	211-626E	211-601E
Turntable	Rotational accuracy	Radial	(0.04 + 6H / 10000) μm H : Probing height(mm) JISB7451-1997		
		Axial	(0.04 + 6X / 10000) μm X : Probing radius(mm)		
	Rotation speed		6rpm		
	Effective table diameter		$\phi 150\text{mm}$		
	Centering range adjustment		$\pm 3\text{mm}$		-
	Leveling range adjustment		$\pm 1^\circ$		-
	Maximum probing diameter		$\phi 280\text{mm}$		$\phi 100\text{mm}$
	Maximum workpiece diameter		$\phi 440\text{mm}$		$\phi 320\text{mm}$
Vertical column (Z-axis)	Maximum turntable loading		25kg		10kg
	Vertical travel		280mm		117mm
	Maximum probing height		280mm		152mm
	Maximum probing depth		100mm		
Horizontal arm (X-axis)	Horizontal travel		165mm		-
Detector	Measuring range		$\pm 1000\mu\text{m}$		
	Measuring force		70 ~ 100mN		
	Standard stylus (12AAAB681)		Carbide ball, $\phi 1.6\text{mm}$ (.06")		



Roundtest RA-2200AS / DS / AH / DH

SERIES 211 — Roundness / Cylindricity Measuring System



RA-2200AS

+ vibration isolator with side table.

FEATURES

The RA-2200 provides high accuracy, high speed and high performance roundness measurement. The fully-automatic or DAT (Digital Adjustment Table) function aids manual workpiece centering and leveling, turning a once challenging task into something simple enough for even the untrained user and substantially reducing overall measurement time. The RA-2200 system comes with the ROUNDPAK, powerful data analysis software, with enhanced functionality and easy operation through the use of the mouse and icon selection.

SPECIFICATIONS

Model No.	RA-2200AS	RA-2200DS	RA-2200AH	RA-2200DH
Order No.*	mm	211-511E(mm)	211-513E(mm)	211-512E(mm)
	inch	-	211-514E(inch)	-
Effective table diameter	235mm	200mm	235mm	200mm
Centering/leveling adjustment**	A.A.T.	D.A.T.	A.A.T.	D.A.T.
Centering range	±3mm	±5mm	±3mm	±5mm
Column travel	300mm (standard column)		500mm (high column)	
Basic unit mass	180kg		200kg	

* ATT: Automatic Adjustment Table
DAT: Digital Adjustment Table



PJ-A3000

SERIES 302 — Profile Projectors



SPECIFICATIONS

Model No.	PJ-A3005R-50	PJ-A3005D-50	PJ-A3005R-50E	PJ-A3010F-100	PJ-A3010F-100E
Order No. (metric)	302-709E	302-704E	302-708E	302-703E	302-707E
Order No. (inch/metric)	302-719E	302-714E	302-718E	302-713E	-
XY stage travel range	50 x 50mm	50 x 50mm	50 x 50mm	100 x 100mm	100 x 100mm
Measurement method	Analog head	Rotary encoder	Rotary encoder	Linear encoder	Linear encoder
Floating function	-	-	-	X and Y axes	X and Y axes
XY stage table top size	152 x 152mm	152 x 152mm	152 x 152mm	250 x 250mm	250 x 250mm
XY stage effective area	82 x 82mm	82 x 82mm	82 x 82mm	142 x 142mm	142 x 142mm
Stage glass No.	380405	380405	380405	12BAE041	12BAE041
Swiveling function	-	-	-	-	-
Max workpiece loading	8kg	8kg	8kg	10kg	10kg
Remarks	w/o digital counter	-	w/o angle counter	-	w/o angle counter

Model No.	PJ-A3005F-150	PJ-A3005F-150E	PJ-A3010F-200	PJ-A3010F-200E	PJ-A3000
Order No. (metric)	302-702E	302-706E	302-701E	302-705E	302-700E
Order No. (inch/metric)	302-712E	-	302-711E	-	-
XY stage travel range	150 x 50mm	150 x 50mm	200 x 100mm	200 x 100mm	Fixed
Measurement method	Linear encoder	Linear encoder	Linear encoder	Linear encoder	-
Floating function	X and Y axes	X and Y axes	X and Y axes	X and Y axes	-
XY stage table top size	280 x 152mm	280 x 152mm	380 x 250mm	380 x 250mm	160 x 145mm
XY stage effective area	185 x 84mm	185 x 84mm	266 x 170mm	266 x 170mm	ø70mm
Stage glass No.	381349	381349	382762	382762	200673
Swiveling function	-	-	±3°	±3°	-
Max workpiece loading	10kg	10kg	15kg	15kg	8kg
Remarks	-	w/o angle counter	-	w/o angle counter	w/o angle counter

FEATURES

- The PJ-A3000 Series profile projectors are medium-size models that feature high versatility and easy operation.
- Easy-to-read digital XY counter is located near the projection screen to minimize eye movement.
- Digital readout protractor screen facilitates angle measurement.

Mitutoyo PJ-H30 SERIES 303 — Profile Projectors



FEATURES

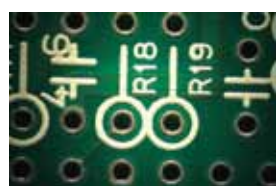
- Newly designed optical system with high NA lenses provide drastically brighter and clearer screen images during surface illumination.
- The three-lens mounting turret includes a 10X lens as standard. Four types of projection lenses (5X, 20X, 50X, 100X) are available.

SPECIFICATIONS

Model No. (XY stage size)		505B	1010B	2010B	2017B	3017B
Order No.	PJ-H30E	303-701E	303-702E	303-703E	303-704E	303-705E
	PJ-H30A	303-711E	303-712E	303-713E	303-714E	303-715E
	PJ-H30B	303-721E	303-722E	303-723E	303-724E	303-725E
	PJ-H30C	303-741E	303-742E	303-743E	303-744E	303-745E
	PJ-H30D	303-731E	303-732E	303-733E	303-734E	303-735E
XY stage travel range		50 x 50mm	100 x 100mm	200 x 100mm	200 x 170mm	300 x 170mm
Accuracy (at 20°C)		(3+0.02L)μm, L = Measured length (mm)				
Measurement method		Linear encoder	Linear encoder	Linear encoder	Linear encoder	Linear encoder
Floating function		X and Y axes	X and Y axes	X and Y axes	X and Y axes	X and Y axes
XY stage table top size		300 x 240mm	300 x 240mm	350 x 280mm	410 x 342mm	510 x 342mm
XY stage effective area		180 x 150mm	180 x 150mm	250 x 150mm	270 x 240mm	370 x 240mm
Stage glass No.		380412	380412	382762	12BAD363	12BAD330
Swiveling function		±3°	±3°	±3°	±5°	±5°
Max workpiece loading		10kg	10kg	10kg	15kg	15kg
Remarks		E type: with fixed screen A type: with protractor screen B type: with protractor screen and built-in OPTOEYE edge sensor C type: with protractor screen and power focus D type: with protractor screen, built-in OPTOEYE edge sensor and Power focus				



Vertical illumination



Oblique illumination

Mitutoyo PV-5110 SERIES 304 — Profile Projectors



FEATURES

- Floor model that uses a downward illumination system.
- Digital readout protractor screen (including zero-setting, ABS/INC coordinate switching functions) for easy and error-free angle measurement.
- Angled screen allows projected images to be easily traced or compared with a template.
- The optional oblique surface illumination unit (172-418) provides clear and bright images, allowing easy inspection of non-reflection workpieces such as plastic parts or printed materials.

SPECIFICATIONS

Model No.	PV-5110
Order No.	304-909E
XY stage travel range	200 x 100mm
Floating function	X and Y axes
Measurement method	Linear encoder
XY stage table top size	380 x 250mm
XY stage effective area	266 x 170mm
Stage glass No.	382762
Swiveling function	±3°
Max workpiece loading	5kg
Remarks	-

Mitutoyo PH-3515F SERIES 172 — Profile Projectors



FEATURES

- Bench-top model that uses horizontal optical system.
- Suitable for thread pitch measurements—blurred or distorted images will not be produced when workpiece is angled.
- Digital angle measurement to 1' or 0.01° (PH-3515F).
- Heavy-duty workpiece table incorporates linear scales for fast, accurate measurement.

SPECIFICATIONS

Model No.	PH-3515F
Order No.	172-858E*
XY stage travel range	254 x 152mm
Measurement method	Linear encoder
Quick-release mechanism	X axis
XY stage table top size	450 x 146mm
Swiveling function	±10°
Max stage loading	45kg
Remarks	-

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, CED for CEE, CEE for BS, D for CEE, DC for CCC, E for BS, K for EK, No suffix is required for JIS/100V
Note) D and E are not compatible with CE

** To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for EK, No suffix is required for JIS/100V

Mitutoyo TM-500 SERIES 176 — Toolmaker's Microscopes



FEATURES

- Angle measurement is performed easily by turning the angle scale disc to align the cross-hair reticle with the workpiece image.
- Illumination intensity can be adjusted.

SPECIFICATIONS

Model No.	TM-505	TM-510
Order No.	176-811E	176-812E
XY stage travel range	50 x 50mm	100 x 50mm
Measurement method	Micrometer head (optional)	Micrometer head (optional)
Floating function	-	-
XY stage table top size	152 x 152mm	240 x 152mm
Effective area of table	96 x 96mm	154 x 96mm
Max. workpiece height	115mm	107mm
Max. workpiece weight	5kg	5kg
Remarks	-	-



Mitutoyo MF SERIES 176 — Measuring Microscopes



FEATURES

- Observation with a clear and flare-less erect image and a wide field of view
- Measuring accuracy that is the highest in its class (and conforms to JIS B 7153)
- ML series, high-NA objectives that are specially designed for the MF series (long working distance type)
- Illumination unit (reflected/transmitted) selectable from a high-intensity LED or halogen bulb (required)
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction
- Variety of standardized stages in sizes up to 400x200mm
- Quick-release mechanism useful for moving the stage quickly when measuring workpieces that are large in size or quantity
- Coarse/fine feed handles equipped as standard on both sides allow precise focus and observation measurement regardless of handedness
- High-magnification eyepiece observation up to 2000x
- Standard measuring microscope that has a wide variety of optional accessories including a Vision Unit and various digital CCD cameras

MF-B2017C
XY stage travel range: 200 x 170mm
(with optional binocular tube)

SPECIFICATIONS

Model No. (XY stage size)	505C	1010C	2010C	2017C	3017C	4020C
Order No.*	MF-A	176-661E*	176-662E*	176-663E*	176-664E*	176-665E*
	MF-B	176-681E*	176-682E*	176-683E*	176-684E*	176-685E*
XY stage travel range	50 x 50mm	100 x 100mm	200 x 100mm	200 x 170mm	300 x 170mm	400 x 200mm
Z-axis travel range	150mm	150mm	150mm	220mm	220mm	220mm
Focusing method	Manual focusing (coarse focusing: 30mm/rev., fine focusing: 0.2mm/rev.)					
Measurement method	Linear encoder (2-axis model: X / Y-axis, 3-axis model: X / Y / Z-axis)					
Resolution (switchable)	0.001mm / 0.0005mm / 0.0001mm / .0001" / .00005" / .00001"					
Measuring accuracy (at 20°C)	XY-axes: (2.2+0.02L)μm, L = Measuring length (mm) when not loaded, JIS B 7153					
Indication accuracy (at 20°C)	Z-axis: (5+0.04L)μm, L = Measuring length (mm)					
Floating function	X and Y axes with Quick-release mechanism					
XY stage top size	280 x 280mm	280 x 280mm	350 x 280mm	410 x 342mm	510 x 342mm	610 x 342mm
Effective glass size	180 x 180mm	180 x 180mm	250 x 150mm	270 x 240mm	370 x 240mm	440 x 240mm
Swiveling function	-	-	-	±5° (left)	±5° (left)	±3° (left)
Max. stage loading	10kg	10kg	10kg	20kg	20kg	15kg
Max. workpiece height	150mm	150mm	150mm	220mm	220mm	220mm

* The following suffixes to the order No. (e.g.: 176-661-10): -10 for English user's manual, 11 for Chinese user's manual, No suffix is Japanese user's manual

Selection of machine type

Machine type	MF-A	MF-B
Measurement system	X and Y-axis (2-axes type)	X, Y and Z-axis (3-axis type)

Illumination Unit

Applicable Illumination Unit	LED	Halogen
Order No.	176-345*	176-347*

* To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, C for Taiwan, D for CEE, DC for CCC, E for BS, K for EK, No suffix is required for JIS/100V

Mitutoyo HM-211 / 221 SERIES 810 — Micro Hardness Testing Machines



FEATURES

- The latest electromagnetic force motor used in the loading mechanism has enabled the test force to be freely selected (see test force specifications over the wide range of 0.4903mN (0.05gf) to 19810mN (2kgf). It is also possible to freely set the time for loading and load dwell time. Now your desire for absolute control over the indentation size in Vickers hardness testing can be satisfied. The HM-200 series always offers the test force most appropriate for the specimen material and shape.
- It is possible to perform not only the Vickers hardness test but also a fracture toughness test (IF test: JIS R 1607-1995) on ceramics.
- The objectives used enable a very comfortable working distance between the objective and the specimen surface. This greatly reduces the possibility of collision between the specimen and the objective during focusing operations. (e.g. 1.1mm for 50X objective)
- The contrast that is most appropriate for the magnification of the objective can be obtained by manipulating the variable aperture stop in the illumination unit. This makes the indentations clearly visible, leading less variation and reducing the chance of error when measuring the diagonal lengths.

SPECIFICATIONS

Model No.	HM-211	HM-221
Order No.	810-400E, 810-403E	810-405E, 810-408E
Test force range	98.07mN to 980.7mN (9.807mN increments), 980.7mN to 9807mN (98.07mN increments)	0.4903mN, 0.9807mN to 9.807mN (0.9807mN increments), 9.807mN to 98.07mN (9.807mN increments), 98.07mN to 19610mN (98.07mN increments)
Test force control	Force generation by electromagnetic and automatic control (load, dwell, unload)	
Control unit	Touch screen type (except for 810-403, 810-408)	
Video monitor	-	-
Indenter/objective turret	Motor driven and manual operation	Motor driven and manual operation
No. of indenter mount	2	2
No. of objective mount	4 (10X and 50X are standard accessory)	4 (10X, 50X and 100X are standard accessory)



HM-101 / 102 / 103 / 112 / 113

SERIES 810 — Micro Hardness Testing Machines



HM-101
Economical manual type



HM-102
Economical digital type



HM-103
The TV monitor removes fatigue in visual measurement, reducing detecting errors.



HM-112
Digital display of measurement results and a statistical calculation function.



HM-113
Reduce individual differences in visual measurement with the TV monitor. The statistical calculation function reduces operation time.

FEATURES

- A wide range of test force from 4.903x10⁻³N to 19.61N is available for measuring a various type of specimens. The load duration can be set in 1sec increments between 5 and 99sec*. The minimum reading of indentation is 0.01μm*. It allows small indentations to be measured with high precision.

*HM-112, HM-113

SPECIFICATIONS

Model No.	HM-101	HM-102	HM-103	HM-112	HM-113
Order No.	810-124E	810-125E	810-959E	810-126E	810-969E
Test force range	98.07, 245.2, 490.3, 980.7, 1961, 2942, 4903, 9807mN				
Test force setting	By dial	By dial	By dial	By dial	By dial
Control unit	-	Durable sheet switch type		Touch screen type	
Video monitor	-	-	9" B/W	-	9" B/W
Indenter/objective turret	Manual type	Manual type	Manual type	Manual type	Manual type
No. of indenter mount	1	1	1	1	1
No. of objective mount	1 (observation), 1 (measurement)	2 (measurement)	2 (measurement)	2 (measurement)	2 (measurement)



AVK-CO, HV-112 / 113 / 114 / 115

SERIES 810 — Vickers Hardness Testing Machines



FEATURES

- A wide range of test force from 1.961N to 490.3N* is available for measuring a various type of specimens. The load duration can be set in 1sec increments between 5 and 99sec. The minimum reading of indentation is 0.1μm. It allows small indentations to be measured with high precision.

Function: Control unit

- Back-lit LCD graphic display for Indentation size (D1 and D2), Hardness value and scale, Number of measurement point Test conditions (HV / HK indenter type, test force, load duration), GO / ±NG tolerance judgment, Cylindrical and spherical surface compensation and offset
- Remote control of power turret
- Conversion to other hardness scales
- Statistical processing

SPECIFICATIONS

Model No.	AVK-CO	HV-112	HV-113	HV-114	HV-115
Order No.	810-160E	810-163E	810-981E	810-165E	810-985E
Test force range	9.807, 49.03, 98.07, 196.1, 294.2, 490.3N	1.961, 2.942, 4.903, 9.807, 24.51, 49.03, 98.07, 196.1N		9.807, 19.61, 29.42, 49.03, 98.07, 196.1, 294.2, 490.3N	
Test force setting	By dial	By dial	By dial	By dial	By dial
Control unit	-	Touch screen type			
Video monitor	-	-	9" B/W	-	9" B/W
Indenter/objective turret	Manual operation	Motor driven	Motor driven	Motor driven	Motor driven
No. of indenter mount	1	1	1	1	1
No. of objective mount	1 (measurement)	2 (measurement)	2 (measurement)	2 (measurement)	2 (measurement)





HR-521 / 522 / 523

SERIES 810 — Rockwell Type Hardness Testing Machines



FEATURES

- Multiple test force generation for Rockwell, Rockwell Superficial and Brinell hardness.
- Dolphin-nose indenter arm for easy reach of interior (min. $\phi 40\text{mm}/\phi 22\text{mm}^*$) and exterior surfaces.
*When using an optional diamond indenter (19BAA292).
- Real time electronic test force control for accurate loading. This perfectly eliminates load force overshooting.
- Indenter escape function for continuous testing at fixed table position. This eliminates instability caused by the table retraction.
- Auto-stop elevation table and automatic preliminary test force loading to provide stable test force generation.

SPECIFICATIONS

Model No.	HR-521	HR-522	HR-523
Order No.	810-202E	810-203E	810-204E
Preliminary test force	29.42N, 98.07N	29.42N, 98.07N	29.42N, 98.07N
Test force	Rockwell superficial: 147.1, 294.2, 441.3N Rockwell: 588.4, 980.7, 1471N Brinell: 1839N	Rockwell superficial: 147.1, 294.2, 441.3N Rockwell: 588.4, 980.7, 1471N Brinell: 61.29, 98.07, 153.2, 245.2, 294.2, 306.4, 612.9, 980.7, 1226, 1839N	
Test force setting	By control unit	By control unit	By control unit
Stage elevation	Manual	Manual	Power drive
Control unit	Touch screen type	Touch screen type	Touch screen type



HR-200 / 300 / 400

SERIES 963 — Rockwell Hardness Testing Machines



HR-210MR

Rockwell hardness testing machine



HR-320MS

Dual type (Rockwell/Rockwell superficial) hardness testing machine



HR-430MS

Twin type (Rockwell/Rockwell superficial combined use) hardness test equipment

FEATURES

- The newly designed frame provides maximum clearance for positioning the workpiece. A flat table is all that is needed for mounting these testing machines.
- Simple to operate
With analogue type (HR-110MR, HR-210MR), the gauge presetting operation is unnecessary by the adoption of an automatic presetting dial gauge.
- HR-110MR does not require a power source, and is considered to be environmental friendly.
- The digital type (HR-430MR and HR-430MS), with the adoption of the automatic steering wheel brake & the automatic load sequence, with only simple handling test possibility.
- The digital type (HR-320MS, HR-430MR and HR-430MS) has digimatic output and our Digimatic Mini-Processor (DP-1VR) to print and input tools (USB-ITN-E) to connect to a PC and use for data transfer.
- Brinell hardness tests can be performed by using the following optional accessories: a Brinell indenter, a weight set and a measurement microscope.

SPECIFICATIONS

Model No.	HR-210MR	HR-320MS	HR-430MS
Code No.	963-220	963-231	963-241
Type of hardness test	Rockwell		
	-	Rockwell superficial	
Standard	JIS B 7726 ISO6508-2 (ASTM E18)		
Display	Analog	Digital	
Minimum reading	0.5HR graduation	0.1HR graduation	
Preliminary test force (handling support)	Automatic pre-setting dial gauge	Loading navigator indication	Automatic steering wheel brake
Preliminary test force setting	-	Dial switching	
Total test force setting	Weight change		Dial switching
Total test force control	Motor drive Button start		Motor drive Automatic start
Test force duration	Fixed 3-5.5s or manual		3-60s setting or manual operation
Maximum specimen height	180mm (100mm if cover is attached)		
Maximum specimen depth	165mm (from indenter axis to the frame)		
Faction	-	Success or failure decision function	
	-	Offset revision function	
	-	Hardness conversion function	
Data output	-	Digimatic (SPC), RS-232C	
Power supply	AC100-240V, 1.2A		
Dimensions	Approximately 235(W) x 512(D) x 780(H)mm	Approximately 235(W) x 516(D) x 780(H) mm	
Mass	Approximately 47 kg		Approximately 50 kg

Mitutoyo Hardmatic HH-411 SERIES 810 — Impact Type Hardness Testing Unit



FEATURES

HH-411 is a rebound type portable hardness tester for metal with a compact body and high operability. It allows anyone to perform hardness testing easily at the touch of a key, so it can be used widely on various components in the field.

SPECIFICATIONS

Model	HH-411	
Order No.	810-298 (ASTM)	810-299-02 (JIS)
Impactor	Impact hammer with integrated detector and carbide-ball tip (D type: conforming to ASTM A 956)	
Display unit	7-segment LCD	
Display range	Leeb: 1-999HL Resolution 1 HL Vickers: 43-950HV Resolution 1 HV Brinell: 20-894HB Resolution 1 HB Rockwell C: 19.3-68.2HRC Resolution 0.1 HRC Rockwell B: 13.5-101.7HRB Resolution 0.1 HRB Shore: 13.2-99.3HS Resolution 0.1 HS Tensile strength: 499-1996MPa Resolution 1 MPa (Display range depends on conversion table.)	
Functions	Auto Angle Compensation Function, Offset function OK/NG judgment function, Conversion function Data storage function: 1800 data entries Statistical analysis (Average, Maximum, Minimum, Dispersion) Auto sleep function, Impact counter display function	

Mitutoyo Hardmatic HH-300 SERIES 811 — Durometers for Rubber and Plastics Hardness Testing



FEATURES

Digital / Dial Durometers are suitable for testing the nature of the following materials — natural rubber, neoprene, polyesters, P.V.C., leather, Thiokol, nitrile rubber, wax, vinyl, cellulose acetates, glass polystyrene, etc.



SPECIFICATIONS

Model No.	Digital	HH-336	HH-336-01	HH-332	HH-338	HH-338-01	HH-334
	Dial	HH-335	HH-335-01	HH-331	HH-337	HH-337-01	HH-333
Order No.	Digital	811-336	811-336-01	811-332	881-338	811-338-01	811-334
	Dial	811-335	811-335-01	811-331	881-337	811-337-01	811-333
Scale		Shore A			Shore D		
Applications		Natural rubber, soft elastomers, etc.			Hard elastomers, plastics, hard rubber, ebonite, etc.		
Resolution		0.5 (digital) or 1 (dial)			0.5 (digital) or 1 (dial)		
Range		HA: 10 - 90			HD: 20 - 90		
Standards	ASTM D 2240						
	ISO 868						
	ISO 7619						
	DIN 53 505	-			-		
	JIS K 6253						
	JIS K 7215						
Pressure foot		44 x 18mm	ø18mm		44 x 18mm	ø18mm	
Spring force (mN)		550+75H (Hardness reading: 10-90)			444.5H (Hardness reading: 20-90)		
Indenter		Blunt taper (Tip diameter: 0.79mm)			Sharp point (Tip curvature: 0.1±0.01mm)		
Tip angle		35°±0.25°			30°±0.5°		
Indenter diameter		1.25mm					
Indenter protrusion		2.5mm					
Functions		Digital: Data hold, Zero -setting, SPC output, Power ON/OFF (Power supply: SR44 x 1pc.) Analog Durometer: Peak retaining hand					
Type		Compact		Long-leg	Compact		Long-leg
Dimensions (WxDxH)	Digital	60 x 28.5 x 151mm		60 x 28.5 x 193mm	60 x 28.5 x 151mm		60 x 28.5 x 193mm
	Dial	56 x 33.5 x 144mm		56 x 33.5 x 186mm	56 x 33.5 x 144mm		56 x 33.5 x 186mm
Mass	Digital	290g		310g	290g		310g
	Dial	300g		320g	300g		320g



Mitutoyo Quick Scope SERIES 359 — CNC / Manual Vision Measuring System



FEATURES

- Surface, contour and fiber-optic ring light illumination options allow users to configure the QS lighting to meet a variety of measurement needs.
- Powerful, Windows® based QSPAK software is easy to use and offers a wide spectrum of measuring and analysis capabilities.
- Functions include zoom, auto-focus, measurement playback, one-click edge detection, graphic display, 48 different macros, and a pattern matching function for several common part features.
- X,Y stage can be controlled by mouse or through the optional multi-function control box.

SPECIFICATIONS

Model No.		QS200	QS250	QS200Z	QS250Z
Range	X-axis	200mm	200mm	200mm	200mm
	Y-axis	200mm	250mm	200mm	250mm
	Z-axis	100mm	100mm	100mm	100mm
Resolution		0.5μm			
Length standard		Reflective linear encoder			
Measuring accuracy (at 20°C)*		XY: (2.5+6L/1000)μm, Z: (5+6L/1000)μm			
Magnification	Objective	2.5X, 1X, 5X	2.5X, 1X, 5X	0.5X - 3.5X zoom	0.5X - 3.5X zoom
	On monitor	105X (at 2.5X)	105X (at 2.5X)	21X - 147X	21X - 147X
Image detecting unit		High-resolution 1/3" color CCD camera			
Illuminations		Surface: co-axial light, fiber-optic ring light Contour: stage light			
Table glass size		269 x 261mm	269 x 311mm	269 x 261mm	269 x 311mm
Max. workpiece height		110mm	110mm	110mm	110mm
Max. workpiece weight		10kg	10kg	10kg	10kg
Dimensions (W x D x H), Mass		465 x 815 x 663mm, 76kg			

*When using 2.5X objective or the zoom lens in 2.5X magnification
(Magnification on monitor: 105X), L = Measuring length (mm)

Mitutoyo QV Apex / Hyper QV SERIES 363 — CNC Vision Measuring System



QV Apex302PRO

FEATURES

- QV series standard model ranging in size from compact to large.
- The PRO machine is equipped with RGB color LED illumination, a programmable power turret (PPT) and a programmable ring light (PRL) as standard. The laser auto focus (LAF) option is also available.
- The lineup, including the PRO2 zooming machine and PRO3 with a color CCD, can satisfy a wide range of needs.
- The traverse speed in the X and Y axes reaches 400 mm/second in the QV-APEX404/606. This greatly contributes to throughput improvement, particularly for workpieces that involve a large range of travel.

SPECIFICATIONS

Model No.		QV Apex302PRO QV Apex302PRO2 QV Apex302PRO3 Hyper QV302PRO	QV Apex404PRO QV Apex404PRO2 QV Apex404PRO3 Hyper QV404PRO	QV Apex606PRO QV Apex606PRO2 QV Apex606PRO3 Hyper QV606PRO
Range	X-axis	300mm	400mm	600mm
	Y-axis	200mm	400mm	650mm
	Z-axis	200mm	250mm	250mm
Resolution		0.1μm [0.02μm]		
High-sensitivity CCD camera		B&W (PRO3 model: color)		
Accuracy*	E1XY	(1.5+3L/1000)μm [(0.8+2L/1000)μm]		
	E1Z	(1.5+4L/1000)μm [(1.5+2L/1000)μm] [PRO2 model: (4.0+5L/1000)μm]		
	E2XY	(2+4L/1000)μm [(1.4+3L/1000)μm] [PRO2 model: (2.5+4L/1000)μm]		
Illumination (PRL: Programmable Ring Light)	Surface	LED, RGB (PRO2 and PRO3 models: Halogen)		
	Contour	LED, white (PRO2 and PRO3 models: Halogen)		
	PRL	LED, RGB (PRO2 and PRO3 models: Halogen)		
Magnification change system		Programmable power turret (PRO2 model: Programmable power zoom lens)		
Max. drive speed	X/Y-axis	300mm/s [200mm/s]	400mm/s [200mm/s]	400mm/s [200mm/s]
	Z-axis	300mm/s [200mm/s]	300mm/s [200mm/s]	300mm/s [200mm/s]
Stage glass size		399 x 271mm	493 x 551mm	697 x 758mm
Max workpiece height		200mm	250mm	250mm
Max. stage loading		20kg [15kg]	40kg [30kg]	50kg [40kg]
Dimensions(W x D x H)**		859 x 951 x 1609mm	1027 x 1407 x 1778mm	1309 x 1985 x 1794mm
Mass**		360kg	579kg	1450kg

* The measuring accuracy is defined at the following conditions, Programmable power turret: 1X, Objective set: 2.5X, L = Dimension between two arbitrary points (mm)
In PRO2, the zoom magnification is 3X.

** Including machine stand

Coordinate Measuring Machines

Mitutoyo Crysta-Plus M433 / M500 Series

SERIES 196 - Manual - Floating Type CMM



FEATURES

- Smooth operation due to high-precision air bearings and lightweight moving members.
- Continuous fine feed over the entire measuring range.

SPECIFICATIONS

Model No.		Crysta-Plus M443	Crysta-Plus M544	Crysta-Plus M574
Range	X-axis	400mm	500mm	500mm
	Y-axis	400mm	400mm	700mm
	Z-axis	300mm	400mm	
Resolution		0.5μm		
Accuracy*	E	(3.0+4.0L/1000)μm	(3.5+4.0L/1000)μm	
	R	4.0μm		
Work table	Material	Granite		
	Size	624 x 805mm	764 x 875mm	764 x 1175mm
	Tapped insert	M8 x 1.25mm		
Workpiece	Max. height	480mm	595mm	
	Max. loading	180kg		
Mass (main unit)		360kg	450kg	575kg

Mitutoyo Crysta-Apex S Series

SERIES 191 - Standard CNC CMM



FEATURES

- Designed and constructed using all Mitutoyo's experience in CNC CMM technology, CRYSTA-Apex S and Crysta-Apex C feature lightweight materials and an innovative machine structure, providing high motion stability, high accuracy, and affordability. The temperature correction function (16°C to 26°C) can yield accurate measurements even on the shop floor. In addition to point-to-point measurement, the MPP-310Q and Metris Laser probes provide a contact/non-contact scanning function.

SPECIFICATIONS

Model No.		Crysta-Apex S544	Crysta-Apex S574	Crysta-Apex S776	Crysta-Apex S7106	Crysta-Apex S9106 (Crysta-Apex S9108)	Crysta-Apex S9166 (Crysta-Apex S9168)	Crysta-Apex S9206 (Crysta-Apex S9208)
Range	X-axis	505mm	505mm	705mm	705mm	905mm	905mm	905mm
	Y-axis	405mm	705mm	705mm	1005mm	1005mm	1605mm	2005mm
	Z-axis	405mm	405mm	605mm	605mm	605mm(805mm)	605mm(805mm)	605mm(805mm)
Resolution		0.1μm						
Accuracy*	MPEE	(1.7+3L/1000)μm, (1.7+4L/1000)μm**						
	MPEP	1.7μm						
	MPETHP	2.3μm						
Work table	Material	Granite						
	Size	638 x 860mm	638 x 1160mm	880 x 1420mm	880 x 1720mm	1080 x 1720mm	1080 x 2320mm	1080 x 2720mm
	Tapped insert	M8 x 1.25mm						
Workpiece	Max. height	545mm	545mm	800mm	800mm	800mm(1000mm)		
	Max. loading	180kg	180kg	800kg	1000kg	1200kg	1500kg	1800kg
Mass (main unit)		515kg	625kg	1675kg	1951kg	2231kg(2261kg)	2868kg(2898kg)	3912kg(3942kg)

* The machine is equipped with the temperature compensation system.

According to ISO 10360-2 methods when using the SP25M probe system with a ø4 x 50mm stylus. L: Measuring length (mm)

** Guaranteed accuracy temperature range: 16°C - 26°C.