Surftest SJ-500/P, SV-2100

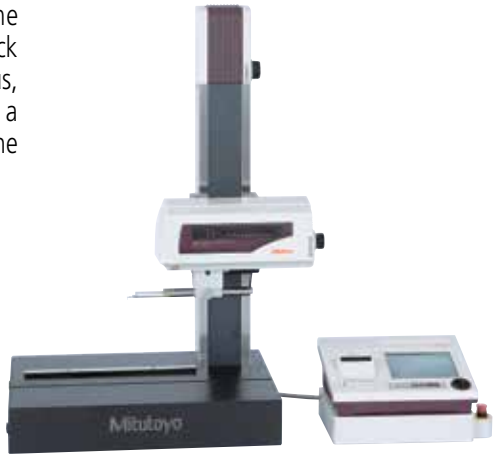
SERIES 178 — with Dedicated Control / PC System / Display Unit

High-precision and high-performance surface roughness tester with a dedicated control unit, achieving user-friendly display and simple operation.

FEATURES

- User-friendly display and simple operation equipped with a highly visible color 7.5-inch TFT LCD.
- 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, easily can be 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.

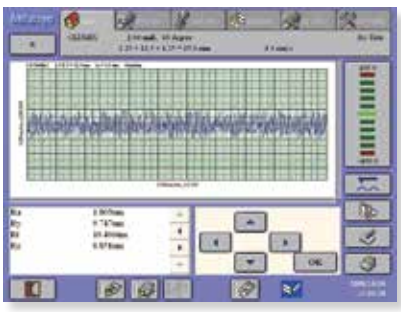
SJ-500



SV-2100S4

SJ-500P

SURFPAK-EZ: Easy-to-use task-focused software



Measurement and results display screen

User-friendly graphical display and button layout allows intuitive operation. Simplified fine-contour analysis provided as standard, including step, area, angle, and circle calculation.

Technical Data: SJ-500

X-axis (drive unit)
- Measuring range: 1.97" (50mm)
- Resolution: 1.97µin (0.05µm)
- Measurement method: Linear encoder
- Drive speed: 0 - .78"/s (0 - 20mm/s)
- Measuring speed: .00078 - .2"/s (0.02 - 5mm/s)
- Traversing direction: Backward
- Traverse linearity: 7.8µin/1.97" (0.2µm / 50mm)
- Positioning: ±1.5° (tilting, with DAT function)
  1.18" (30mm) (up/down)

Detector
- Resolution / Range: .4µin/32000µin, .04µin/3200µin, .004µin/320µin
  0.01µm (800µm), 0.001µm (80µm), 0.0001µm (8µm)
- Detecting method: Skidless / skid measurement
- Measuring force: 4mN (0.75mN) (low force type)
- Stylus tip: Diamond, 90° / 5µmR
  (60° / 2µmR: low force type)
- Skid radius of curvature: 1.57" (40mm)
- Detecting method: Differential inductance

Control unit
- Display: 7.5" color TFT with backlight
- Printer: Built-in thermal printer
- Magnification: Horizontal: X10 to X500,000, Auto
  Vertical: X0.5 to X10,000, Auto
- Drive unit control: Joystick operation with manual knob

Technical Data: SV-2100

X-axis (drive unit)
- Measuring range: 3.94" (100mm)
- Resolution: 1.97µin (0.05µm)
- Measurement method: Linear encoder
- Drive speed: 0 - 1.57"/s (0 - 40mm/s)
- Measuring speed: .00078 - .197"/s (0.02 - 5mm/s)
- Traversing direction: Pull
- Traverse linearity: 6µin/4" (0.15µm / 100mm)

Z2-axis (column)
- Type: Manual operation or power drive
- Vertical travel: 13.8" or 21.6" (350mm or 550mm*)
- Resolution*: 1µm
- Measurement method*: Rotary encoder
- Drive speed*: 0 - .78"/s (0 - 20mm/s)

*Only for power-drive type

Detector
- Resolution / Range : .4µin/32000µin, .04µin/3200µin, .004µin/320µin
  0.01µm / 800µm , 0.001µm / 80µm, 0.0001µm / 8µm
- Detecting method: Skidless / skid measurement
- Measuring force: 4mN or 0.75mN (low force type)
- Stylus tip: Diamond, 90° / 5µmR
  (60° / 2µmR: low force type)
- Skid radius of curvature: 1.57" (40mm)
- Detecting method: Differential inductance

Control unit
- Display: 7.5" color TFT with backlight
- Printer: Built-in thermal printer
- Magnification: Horizontal: X10 to X500,000, Auto
  Vertical: X0.5 to X10,000, Auto
- Drive unit control: Joystick operation with manual knob

Evaluation Capability

Cutoff length
ls: 0.25µm, 0.8µm, 2.5µm, 8µm, 25µm, 250µm, no filter
lc*: 0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm
lf: 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm, no filter

Sampling length (L)*
0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm, 80mm (SV-2100 only)

Data compensation functions
Parabola compensation, hyperbola compensation, ellipse compensation, R-plane (curved surface) compensation, conic compensation, tilt compensation

*Arbitrary length can be specified in the range from 0.02mm to 50mm.

12AAA876: High durable printer paper (5 Rolls/set)
270732: Standard type printer paper (5pcs.)
12AAA841: Compact Flash memory card (128 MB)

Surftest SJ-500/P, SV-2100

SERIES 178 — with Dedicated Control / PC System / Display Unit

SPECIFICATIONS

Model no.	SJ-500P	SJ-500	SV-2100M4	SV-2100S4	SV-2100H4	SV-2100W4
Type of Data processing	PC System	Dedicated Data Processor	Dedicated Data Processor			
Order No. (inch)	**178-531-02A**	**178-533-02A**	**178-637-01A**	**178-681-01A**	**178-683-01A**	**178-685-01A**
Measuring force of detector	4mN	4mN	0.75mN			
X-axis measuring range	2″ (50mm)		4″ (100mm)			
Vertical travel	Optional stand		13.8″ (350mm) manual column	13.8″ (350mm) power column	21.6″ (550mm) power column	
Granite base size (WxD)	Optional stand		23.6 x 17.7″ (600 x 450mm)			39.4 x 17.7″ (1000 x 450mm)
PC I/F Unit	13.7 x 10.4 x 3.4″ (350 x 263 x 86mm)	NA	NA	NA	NA	NA
Dimensions (main unit, WxDxH)	16.7 x 3.7 x 6.3″ (425 x 94 x 160mm)		28.2 x 17.7 x 34″ (716 x 450 x 863mm)	28.2 x 17.7 x 38″ (716 x 450 x 966mm)	28.2 x 17.7 x 46″ (716 x 450 x 1166mm)	44 x 17.7 x 46.3″ (1116 x 450 x 1176mm)
Main unit Mass	5.9 lbs. (2.7 kg)		308.6 lbs. (140 kg)	308.6 lbs. (140 kg)	330 lbs. (150 kg)	485 lbs (220 kg)
Assessed profiles	Dedicated data processor type: P (primary profile), R (roughness profile), WC, envelope residual profile, roughness motif, waviness motif PC system type: P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, E (envelope residual profile), roughness motif, waviness motif					
Evaluation parameters	Dedicated data processor type: Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Sm, S, Pc, mr (c),δc, mr, tp, Htp, Lo, lr, Ppi, HSC, Δa, Δq, Ku, Sk, Rpk, Rvk, Rk, Mr1, Mr2, A1, A2, Vo, λa, λq, R, AR, Rx, W, AW, Wx, Wte, (43 parameters), Customization PC system type: Pa, Pq, Psk, Pku, Pp, Pv, Pz, Pt, Pc, PSm, PΔq, Pmr (c), Pmr, Pδc, Ra, Rq, Rsk, Rku, Rp, Rv, Rz, Rt, Rc, RSm, RΔq, Rmr (c), Rmr, Rδc, Wa, Wq, Wsk, Wku, Wp, Wv, Wz, Wt, Wc, WSm, WΔq, Wmr (c), Wmr, Wδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Rx, AR, R, Wx, AW, W, Wte, Ry, RyDIN, RzDIN, R3y, R3z, S, HSC, Lo, lr, Δa, λa, λq, Vo, Htp, NR, NCRX, CPM, SR, SAR, NW, SW, SAW					
Analysis graphs	Dedicated data processor type: ADC, BAC, power spectrum graph PC system type: ADC, BAC Graph, power spectrum graph, auto-correlation graph, Walsh power spectrum graph, Walsh auto-correlation graph, slope distribution graph, local peak distribution graph, parameter distribution graph					
Curved surface compensation	Dedicated data processor type: Parabolic compensation, Hyperbolic compensation, Elliptical compensation, Circular compensation Conic compensation, Inclination (Entire, Arbitrary) PC system type: Parabolic compensation, Hyperbolic compensation, Elliptical compensation, Circular compensation, Conic compensation, Inclination (Entire, Arbitrary), Polynomial compensation					
Contour analysis	Dedicated data processor type: Area, Circle, Angle, Coordinate difference, Step, Inclination PC system type (SURFPAK-EZ): Area, Circle, Angle, Coordinate difference, Step, Inclination					
Filters	Dedicated data processor type: 2CR-75%, 2CRPC-75%, Gaussian, Robust-spline PC system type: 2CR-75%, 2CR-50%, 2CRPC-75%, 2CRPC-50%, Gaussian, Robust-spline					

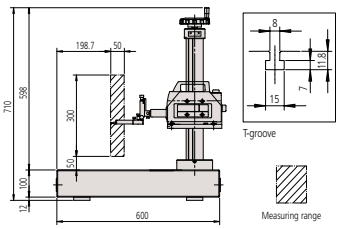
Manual column stand options: 178-085 and 178-089 (for SJ-500)

Suitable for desktop use in inspection rooms and such.

No.178-085* Does not include measuring unit
Vertical adjustment range: 11.8" (300mm)
Dimension (W × D × H): 23.6" x 17.7" x 28"
(600 × 450 × 710mm)
Weight: 242 lbs (110kg)

No.178-089* Does not include measuring unit
Vertical adjustment range: 9.8" (250mm)
Dimension (W × D × H): 15.7 x 9.8 x 2.4"
(400 × 250 × 60mm)
Weight: 44 lbs (20kg)

Dimensions of SJ-500 w/ manual column stand **178-085**



Unit: mm

Auto-leveling table: 178-081 (for SJ-500 / SV-2100M4), 178-083 (for SV-2100S4 / H4 / W4)

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

Inclination adjustment angle	±2°
Maximum load	15.4 lbs (7kg)
Table dimensions	5.12 x 3.94"(130x100mm)
Mass	7.7lbs (3.5kg)

Mitutoyo

Surftest SV-3200

SERIES 178 — Surface Roughness Testers

SV-3200L4 (with options)

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

*Shown with optional accessories.

SV-3200H4 with PC

The Surftest SV-3200 Series provide high-accuracy, high-level analysis and multi-functionality in measurement of surface roughness.

FEATURES

- Mitutoyo's Surftest SV-3200 Series provides 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.
- Peripheral devices such as the auto-leveling table are available to enhance operability and to enable automatic measurement.
- FORMTRACEPAK V5, 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: 1.97µin (0.05µm) and Z2-axis (column, resolution: 39.4µin (1µm) to ensure high-accuracy positioning.

The SV-3200 series manifest high-reliability especially in the horizontal roughness parameters (S, Sm), that require high-accuracy of the X-axis travel.

- When equipped with high accuracy Y-axis table and 3D surface analysis software MCubeMap, this offers CNC type capabilities usually performed on Extreme series machines.
- Various optional detector holders such as Crank Rotary type and Manual Rotary type make this versatile for many different applications.
- New optional Digital Automatic Tilt (DAT) function is best suited for workpieces that are too large for leveling tables.

Technical Data

X-axis
- Measuring range: 4" or 8" (100mm or 200mm)
- Resolution: 1.97µin (0.05µm)
- Measurement method: Linear encoder
- Drive speed: 0 - 3.1"/s (0 - 80mm/s)
- Measuring speed: .00078 - .78"/s (0.2 - 20mm/s)**
- Traversing direction: Backward
- Traverse linearity: 4": (2+L)µin (0.05+0.001L)µm*
  8": 20µin / 8"(0.5µm/200mm)

Z2-axis (column)
- Vertical travel: 12", 20"or 27.6" (300mm, 500mm or 700mm) power drive
- Resolution: 39.4µin (1µm)
- Measurement method: ABSOLUTE linear encoder
- Drive speed: 0 - 1.2"/s (0 - 30mm/s)

Detector
- Range / resolution: 32000 µin / .4 µin, 3200µin / .04µin, 320 µin / .004µin (up to 96000 µin with an optional stylus) {(800µm / 0.01µm, 80µm / 0.001µm, 8µm / 0.0001µm) (up to 2400µm with an optional stylus)}
- Detecting method: Skidless / skid measurement
- Measuring force: 0.75mN (low force type)
- Stylus tip: Diamond, 60°/2µmR (low-force type)
- Skid radius of curvature: 1.57" (40mm)
- Detecting method: Differential inductance

Base size (W x H): 23.6 x 17.7" (600 x 450mm) or 39.4 x 17.7" (1000 x 450mm)

Base material: Granite

*L = Measured length inch (mm)
**Recommended speed: under 5mm/s
If using higher speed, stylus tip may be chipped and/or accuracy may be worse, depending on surface condition.

Evaluation Capability: FORMTRACEPAK V5

Assessed profiles
P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, envelope residual profile, roughness motif, waviness motif

Evaluation parameters
Ra, Rq, Rz, Ry, Rz(JIS), Ry(DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, R3z, R3zi, R3y, S, Pc (Ppi), Sm, HSC, mr, δc, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δa, Δq, λa, λq, Sk, Ku, Lo, Lr, A1, A2
Roughness motif parameters: Rx, R, AR, SR, SAR, NR, NCRX, CPM
Waviness motif parameters: Wte, Wx, W, AW SW, SAW, NW

Analysis graphs
ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart

Digital filter 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian-50%

Cutoff length*
λc: .001, .003, .01, .03, .1, .3, 1"
(0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm)
fl: .001, .003, .01, .03, .1, .3, 1"
(0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm)
fh: .001, .003, .01, .03, .1, .3, 1"
(0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm)

Sampling length (L)*.001, .003, .01, .03, .1, .3, 1"
(0.025mm, 0.08mm, 0.25mm, 0.8mm, 2.5mm, 8mm, 25mm)

Data compensation functions
Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, quadric curve automatic compensation, polynomial compensation, polynomial automatic compensation

*Arbitrary length can be specified in the range from .001" (0.025mm) to the maximum traverse length.

Surftest SV-3200

SERIES 178 — Surface Roughness Testers

SPECIFICATIONS

Models without X-axis inclination function

Model No.	SV-3200S4	SV-3200H4	SV-3200W4	SV-3200L4
Order No. (inch)	**178-424-11A**	**178-425-11A**	**178-426-11A**	**178-464-11A**
Order No. (inch)	**178-444-11A**	**178-445-11A**	**178-446-11A**	**178-484-11A**
Measuring force of detector	0.75mN	0.75mN	0.75mN	0.75mN
X-axis measuring range	4" (100mm)	4" (100mm)	4" (100mm)	4" (100mm)
Vertical travel	12" (300mm) power column	20" (500mm) power column	20" (500mm) power column	27.6" (700mm) power column
Granite base size (WxD)	23.6 x 17.7" (600 x 450mm)	23.6 x 17.7" (600 x 450mm)	39.4 x 17.7" (1000 x 450mm)	39.4 x 17.7" (1000 x 450mm)
Dimensions (main unit, WxDxH)	29.8 x 19.0 x 38.0" (756 x 482 x 966mm)	29.8 x 19.0 x 45.9" (756 x 482 x 1166mm)	45.5 x 19.0 x 46.3" (1156 x 482 x 1176mm)	45.5 x 19.0 x 56.5" (1156 x 482 x 1436mm)
Mass (main unit)	308 lbs (140kg)	330 lbs (150kg)	485 lbs (220kg)	595 lbs (270kg)

Model No.	SV-3200S8	SV-3200H8	SV-3200W8	SV-3200L8
Order No. (inch)	**178-427-11A**	**178-428-11A**	**178-429-11A**	**178-465-11A**
Order No. (inch)	**178-447-11A**	**178-448-11A**	**178-449-11A**	**178-485-11A**
Measuring force of detector	0.75mN	0.75mN	0.75mN	0.75mN
X-axis measuring range	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)
Vertical travel	12" (300mm) power column	20"(500mm) power column	20" (500mm) power column	27.6" (700mm) power column
Granite base size (WxD)	23.6 x 17.7" (600 x 450mm)	23.6 x 17.7" (600 x 450mm)	39.4 x 17.7"(1000 x 450mm)	39.4 x 17.7"(1000 x 450mm)
Dimensions (main unit, WxDxH)	30.2 x 19.0 x 38.0" (766 x 482 x 966mm)	30.2 x 19.0 x 45.9" (766 x 482 x 1166mm)	45.9 x 19.0 x 46.3" (1166 x 482 x 1176mm)	45.5 x 19.0 x 56.5" (1156 x 482 x 1436mm)
Mass (main unit)	308 lbs (140kg)	330 lbs (150kg)	485 lbs (220kg)	595 lbs (270kg)

Optional Accessories

178-602-1: Reference Specimen (Supports ISO)

178-611: Reference Step Specimen (2µm, 10µm)
178-612: Reference Step Specimen (2µm, 10µm, 79µin, 394µin)
178-610: Step gage (1µm, 2µm, 5µm, 10µm)
178-047: Three-axis adjustment table (including 998291 precision V-block.)
178-016: Leveling table
178-042-1: Digimatic XY leveling table (25 x 25mm)
178-052-1: Digimatic XY leveling table (1 x 1")
178-043-1: XY leveling table (25 x 25mm)
178-053-1: XY leveling table (1 x 1")
178-019: Precision vise*
998291: Precision V-block*
181-902-10: V-block set with clamp (Max. workpiece dia.: 25mm)
181-901-10: V-block set with clamp (Max. workpiece dia.: 1")

(See page J-22/23.) Detectors, styli, and nosepieces
*Use with an XY leveling table

Optional Accessories

A wide range of peripherals are available to support various challenging measurement needs.

Y-axis Table
178-097 for multiple workpiece measurement
178-096 for 3D measurement
*Not a measuring axis, only for positioning.

3D-Auto Leveling Table
178-077
*Used together with **178-096**

Digital Advanced Tilting Unit
178-040
*Contact Sales Rep for details. Recommend to be installed in manufacturer's facility.

(See page J-25 for more accessories.)

178-071 (S-3000)
Standard Detector Holder

178-075 (S-3000CR)
Crank Rotary Type Detector Holder

178-074 (S-3000C)
Crank Type Detector Holder

178-076 (S-3000MR)
Manual Rotary Type Detector Holder

Mitutoyo

Surftest Extreme SV-3000CNC

SERIES 178 — CNC Surface Measuring Instruments

FEATURES

- High-accuracy CNC surface roughness measuring instrument allows surface roughness measurement in both axes.
- Each axes has the maximum drive speed of 200 mm/s, which permits high-speed positioning that may result in a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models with the α-axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the drive unit.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces, etc., through positioning in the Y-axis direction.
- Using optional rotary table θ1 and θ2 designed to use with the CNC models enables it to expand the CNC measurement application range.
- Inclined plane measurements is possible through 2-axis simultaneous control in the X- and Y-axis directions.
- Since the detector unit incorporates an anti-collision safety device, the detector unit will automatically stop even if its main body collides with a workpiece or fixture.
- Supplied with an easy-to-operate Remote Box. The user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the data processing/analysis section is via USB.

SV-3000CNC w/ PC system and software
PC stand is not included, isolation stand is optional

SPECIFICATIONS

Model No.	SV-3000CNC		SV-3000CNC	
Order No. (100V - 120V)	**178-508-13**	**178-528-13**	**178-509-13**	**178-529-13**
X1-axis measuring range	8" (200mm)	8" (200mm)	8" (200mm)	8" (200mm)
Z2-axis vertical travel	12" (300mm)	20" (500mm)	12" (300mm)	20" (500mm)
Y-axis table unit	Installed	Installed	Installed	Installed
α-axis unit	—	—	Installed	Installed

Technical Data: SV-3000CNC

X1-axis
- Measuring range: 8" (200mm)
- Resolution: 1.97µin (0.05µm)
- Measurement method: Reflective-type linear encoder
- Drive speed: 7.87"/s (200mm/s) (CNC, max.)
  0 - 2.0"/s (0 - 50mm/s) (joystick)
- Measuring speed: .00078 - .078"/s (0.02 - 2mm/s)
- Traversing direction: Backward
- Traverse linearity: 20 µin/8" (0.5µm/200mm)

α-axis**
- Inclination angle: -45° to +10°
- Resolution: 0.000225°
- Rotating speed: 1rpm

Z2-axis (column)
- Vertical travel: 12" (300mm) 20"*(500mm)
- Resolution: 1.97µin (0.05µm)
- Measurement method: Reflective-type linear encoder
- Drive speed: 7.87"/s (200mm/s) (max., CNC)
  0 - 2.4"/s (0 - 60mm/s) (joystick)
- Base size (W x H): 29.5 x 23.6" (750 x 600mm)
- Base material: Granite

Detector
- Range / resolution: 32000 µin / .4 µin, 3200µin / .04µin,
  320 µin / .004µin
  (up to 96,000 µin with an optional stylus)
  {(800µm / 0.01µm, 80µm / 0.001µm,
  8µm / 0.0001µm)
  (up to 2400µm with an optional stylus)}
- Measuring force: 4mN (0.75mN) (low-force type)
- Stylus tip: Diamond, 90°/5µmR
  (60°/2µmR: low-force type)

Dimension (W x D x H): 31.5 x 24.4 x 39.4"
(800 x 620 x 1000mm)
31.5 x 24.4 x 47.2"
(800 x 620 x 1200mm)*

Mass 529 lbs (240kg) 551lbs (250kg)*
*High-column model

Y-axis table unit**
- Measuring range: 8" (200mm)
- Minimum reading : 1.97µin (0.05µm)
- Scale unit: Reflective-type Linear Encoder
- Drive speed: 7.87"/s (200mm/s) (max., CNC)
  0 - 2.4"/s (0 - 60mm/s) (joystick)

Maximum loading capacity: 44 lbs (20kg)
Traverse linearity 20µin/8" (0.5µm/200mm)
Linear displacement accuracy (at 20°C):
± (80+2L/4)µin {± (2+2L/100) µm}
L: Dimension between two measured points (mm)
- Table size: 7.87 x 7.87" (200 x 200mm)
- Dimensions (W x D x H): 12.6 x 25.4 x 4.1"
  (320 x 646 x 105mm)
- Mass: 77 lbs (35kg)

**Y-axis table included only as a factory installed option.

Optional Accessories

Vibration isolation stand
Vibration isolation mechanism: Diaphragm air spring
- Natural frequency : 2.5 - 3.5Hz
- Damping mechanism: Orifice
- Leveling mechanism: Automatic control with mechanical valves
- Air supply pressure: 0.4MPa

Allowable loading capacity: 772 lbs (350kg)
- Dimensions (W x D x H): 39.4 x 35.2 x 28.1"
  (1000 x 895 x 715mm)
- Mass: 617 lbs (280kg)