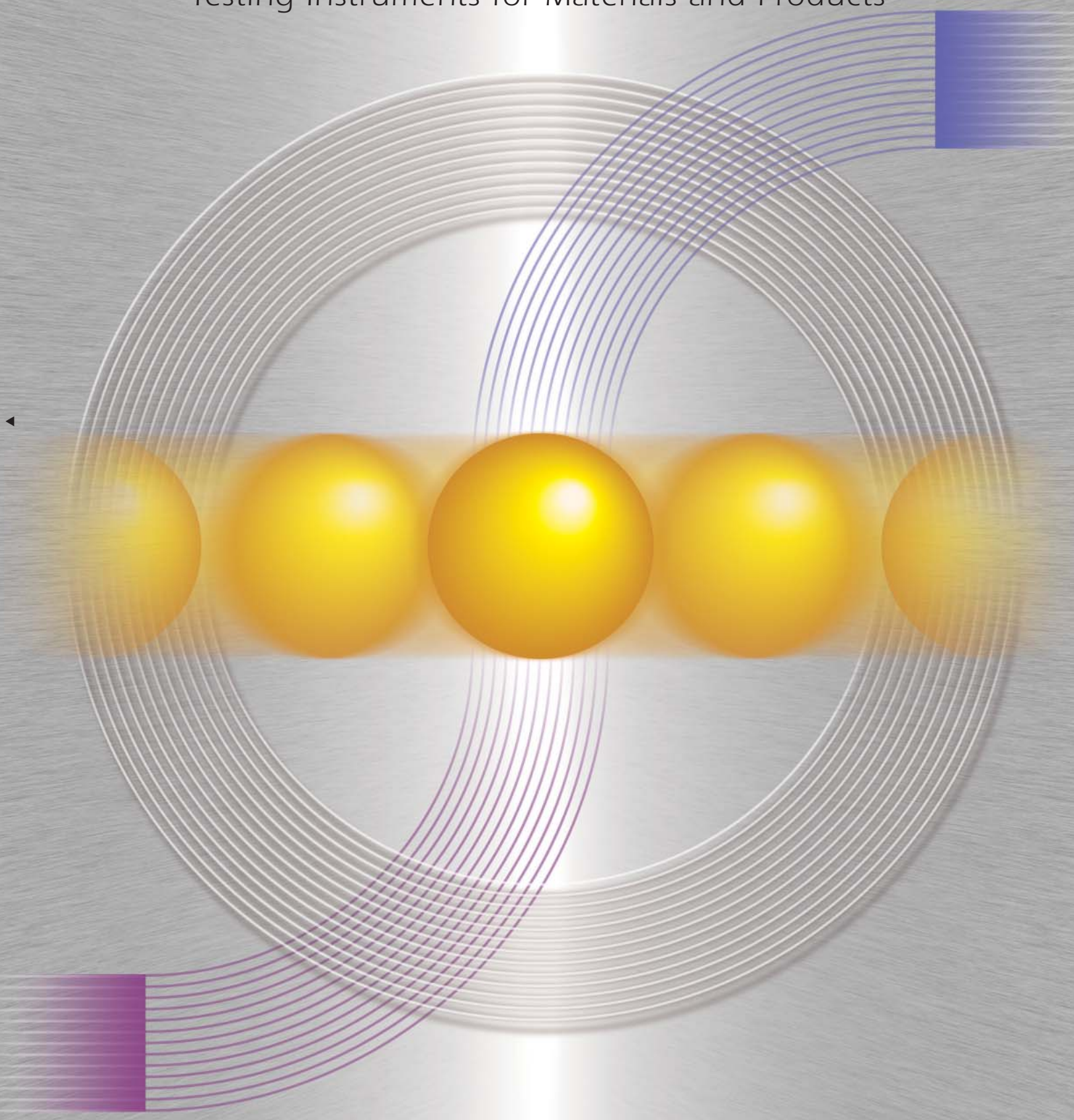


Shimadzu Universal Testers

Testing Instruments for Materials and Products



Strength tests to evaluate the strength of objects are conducted across a wide range of scales from fine particles and surface-mounted components in the nano-range to large steel and concrete specimens. The forces applied to the test specimens by the tester also cover a wide range from 2 mN to 1000 kN. Various types of strength test are conducted, including tensile, compression, bending, tearing, peeling, creep, and stress relaxation testing. The Shimadzu Universal Tester lineup is a range of powerful tools for every field of application that meet all customer requirements.

Basic Concepts

1 High-quality test data **JCSS**
(high-accuracy load cell, control accuracy)

2 Easy operation
(man-machine user interface, highly functional data-processing software)

3 High safety
(emergency stop buttons, anti-scatter covers, data backup functions)



INDEX

Electrical and Electronic Components, Pharmaceutical Products

MST-I Micro-Autograph Micro Strength Testers	6
EZGraph Tabletop Universal Tester	8~10
EZTest Tabletop Universal Tester	8~10
TRAPEZIUM2 Control and Data Processing Software for Testing Machines	12~15
ENT-150 Endurance Tester	17
Packages for the Electrical and Electronics Industries	22

Polymers, Plastics, Rubber, Films and Tapes

Autograph AG-IS Series Universal Testers	4~5
Autograph AGS-J Table-top Precision Universal Testing Machine	7
Semi-automatic Autograph System	16
TRAPEZIUM2 Control and Data Processing Software for Testing Machines	12~15
Automatic Plastics Tensile Tester	18
Automatic Plastics Bending Tester	18
Automatic Rubber Tensile Tester	19
Plastic Tensile Test System Packages	23
Rubber Tensile Test System Packages	23
System Packages for Film Tensile Testing in Thermostatic Chamber	23

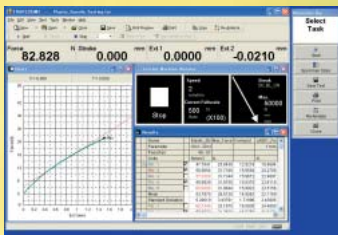
Automobile, Metals, Steel, Concrete

Autograph AG-IS Series Universal Testers	4~5
Autograph AGS-J Table-top Precision Universal Testing Machine	7
Semi-automatic Autograph System	16
TRAPEZIUM2 Control and Data Processing Software for Testing Machines	12~15
Spring Tester	11
Automatic Plastics Tensile Tester	18
Automatic Plastics Bending Tester	18
Automatic Rubber Tensile Tester	19
System Packages for Film Tensile Testing in Thermostatic Chamber	23

Micro Specimens

MST-I Micro-Autograph Micro Strength Testers	6
TRAPEZIUM2 Control and Data Processing Software for Testing Machines	12~15
MCT-W Series Micro Compression Testers	20~21

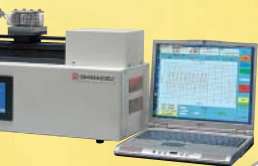
Automobiles



Steel and metals



Rubber



rs

<http://www1.shimadzu.com/product/test/>

1 AG-IS Series — The More You Use It, The Better It Gets

AG-IS Series Universal Testers

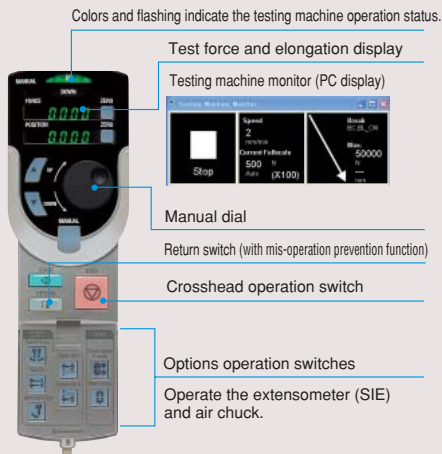
Features

- Controller with excellent operability and safety
- TRAPEZIUM2 software provides a sophisticated link to the test machine
- High-quality test data
- Comprehensive accessory range accommodating users' requirements
- Diverse system lineup



Controller with Excellent Operability and Safety (Select the right controller for your application.)

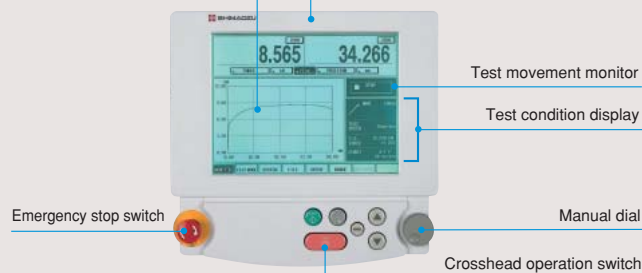
Smart Controller



Touch Panel Operation Unit

This unit enables setting of test conditions and testing without using a PC.

S-S curve display



Model	Test force range	Speed range
Tabletop	4mN to 50kN	0.0005 to 1000 mm/min. (500 mm/min. for models exceeding 250 kN)
Floor-mounted	4mN to 300kN	

High-quality Test Data

Rigid frame ensures long-term stability

● Compact, highly rigid frame

Detects rapid deformation behavior of materials and offers highly accurate test force measurements.

The guaranteed test force measurement accuracy is within $\pm 0.5\%$ up to 1/500 load-cell capacity (Note)

● World-standard test-force accuracy

- High-accuracy type: Measurement accuracy within $\pm 0.5\%$ of the specified test force

Conforms to the following standards:
 JIS B7721 Class 0.5, ISO7500/1 Class 0.5
 EN 10002-2 Grade 0.5, BS 1610 Class 0.5
 DIN 51221 Class 1, ASTM E4

- Standard type: Measurement accuracy within $\pm 1\%$ of the specified test force

Conforms to the following standards:
 JIS B7721 Class 1, ISO7500/1 Class 1
 EN 10002-2 Grade 1, BS 1610 Class 1
 DIN 51221 Class 1, ASTM E4

*Notes
 Up to 1/250 of the load cell capacity for 250 kN, 1 N, 2 N, and 5 N load cells.
 The $\pm 0.5\%$ accuracy guarantee applies to 1 kN to 300 kN load cells. Load cells below 1kN capacity are not included in this precision guarantee.

A wide range of test speeds allows testing of various materials

● Servomotor offers a wide range of speed control

The ultra-low-speed type provides a wide crosshead speed range from 0.00005 to 1000 mm/min. The standard type crosshead speed range is 0.0005 to 1000 mm/min. Tests are possible up to the maximum capacity across the entire speed range.

*Note
 The speed range for 250 kN and larger models is 0.0005 to 500 mm/min.

High-speed data sampling achieves true values

● 1.25 ms ultrahigh-speed sampling function

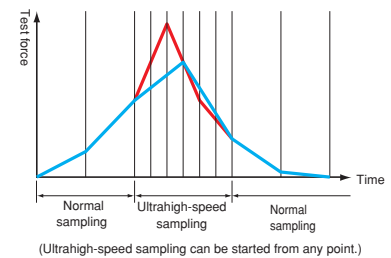
The ultrahigh-speed data sampling at 1.25 ms intervals during the test (for 25 seconds) allows highly accurate measurement of the test force in the elastic and fracture regions to detect any changes in the material.

This function is particularly effective for ceramics and highly rigid new materials.

The ultrahigh-speed sampling rate can be set to 1.25 ms or 5 ms. Even normal sampling (outside the ultrahigh-speed sampling region) is conducted at rapid 10 ms intervals.

Moreover, the sampling intervals for normal sampling can be set by test force and displacement, which are effective for relaxation and creep tests respectively. The time can be set in 50 ms intervals to 50 ms, 100 ms, or 150 ms, with 10 ms as the highest setting. The sampling interval can be set to any test force value in 1 N intervals or to a displacement value in 0.1 mm intervals.

*Note
 TRAPEZIUM2 is required for ultrahigh-speed sampling.



Comprehensive accessory range accommodating users' requirements

Devices are available for all specimen materials.

Grips

Adhesive strength test devices

Shear test devices

Burst test devices

Needle-insertion resistance test devices

Flow test devices

Friction coefficient measuring devices

Plastic support strength test devices

Deep drawability test devices

Nail withdrawal resistance test device for lumber

Lumber hardness test devices

Lumber cleavage test devices

Powder molding properties test devices

Environmental test devices

Displacement measuring devices

Test force measuring devices

Others

Grips and devices for testing actual objects

Pneumatic automatic grips

PWG series

The air motor opens and closes the grips to reduce testing times.



Kit No.
346-5385X-01

X	Capacity
8	250kN
7	100kN
6	50kN
5	20kN
3	5kN

Pneumatic capstan type grips

Specimens such as thread and cord are held by the capstan. The initial tensile force can be maintained.



Kit No.
346-5385Y-XX

Y	Capacity
2	5kN
1	1kN/500N
0	50N

Three-point bending test jig for Si die

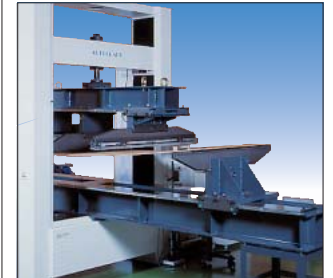
Max. capacity 500 N
Punch dimensions 0.3 mm tip radius x 20 mm
Support dimensions 0.3 mm tip radius x 20 mm
Span 1 to 20 mm
Conforms to SEMI G86-0303
*SEMI = Semiconductor Equipment and Materials International



Kit No. 346-53497-XX

Four-point bending test device for long-span lumber

Capacity 100 kN
Punch width 1320 mm
Punch separation 100 to 1350 mm
Support width 1320 mm
Support distance 100 to 4000 mm



Consult your Shimadzu representative for information on the four-point bending test device for long-span lumber.

Displacement measuring devices

Strain gauge type one-touch extensometer

The SSG-H series

Extensometers conform to JIS B7741 Class 0.5 and JIS K7161 (SSG 50-10SH only).

They can be attached or removed by a simple, one-touch operation.



Kit No. 346-53875-XX

Non-contact video extensometer

DVE series

Two cameras achieve a wide measuring range and high measuring accuracy.



Kit No.
346-5387Y-XX

Y	Model
8	DVE-101
9	DVE-201

Extensometer for soft materials

SES-1000

Permits the accurate measurement of large elongations.



Kit No. 346-53876-XX

Automatic extensometer

SIE-560S

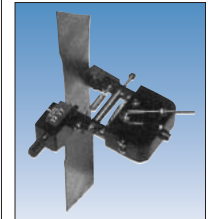
Combines an ultra-accurate strain-gauge sensor with an accurate electrical induction linear sensor.



Kit No. 346-53269-XX

Strain gauge type width sensor

Measures changes in the width of a specimen.



Kit No. 346-5387Y-XX

Y	Model
1	SG Series
2	SG-CA Series

Environmental test devices

Thermostatic chamber

TCE series

This compact chamber enables testing across a wide temperature range from -70 to +280°C.



Kit No. 346-53936-XX

Bellows-type long-stroke thermostatic chamber

Conforms to JIS K6263, ASTM D624, and ISO 6914 standards.



Kit No.
346-5393Y-XX

Y	Model
4	Model TCR
5	Model TCL

Thermostatic chamber torsion test device

Temperature range -60 to +250°C
Torsion capacity 300 Nm
Torsion speed 1 to 0.01rpm



Consult your Shimadzu representative for information on the thermostatic chamber torsion test device.

Thermostatic chamber tensile test device

This special test device passes the crosshead through the thermostatic chamber to assure a long effective stroke.



Consult your Shimadzu representative for information on the thermostatic chamber tensile test device.

The Smaller, Thinner MST-I Supports Strength Evaluations at the mm and mN Level

MST-I Micro-Autograph Micro Strength Testers

Applications

- Solder-joint evaluation for chip components (shear and peeling)
- Solder-ball joint strength evaluation (tensile, compression, and shear)
- Bonding-wire joint strength and tensile strength evaluation

- Physical property evaluation for metal foils (tensile and bending)
- Connector pin insertion measurements (insertion and withdrawal)
- Single-fiber tensile strength evaluation (tensile)

Highly accurate displacement measurements

- Smooth and accurate loading is achieved by the 5-(type HR) or 20-(type HS) nanometer drive-train resolution in the specimen force direction.
- The high-accuracy linear sensor used to measure displacements in the force direction achieves a display to 20-nanometer resolution. The backlash-free mechanism ensures accurate testing.

Micro-test-force measurements

- Extensive load-cell lineup from 0.5 N to 2 kN guarantees $\pm 1\%$ accuracy from 2 mN.



Positioning of microspecimens

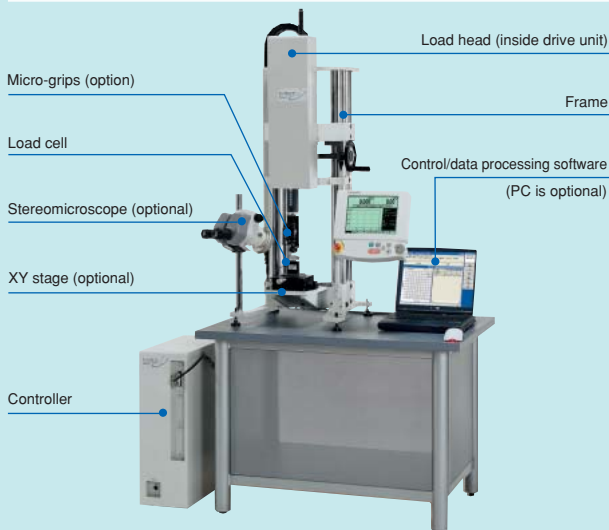
- The optional XY stage simplifies the positioning and observations of microspecimens.
- The specimen can be observed through a stereomicroscope for positioning.

Rigid frame

- A highly rigid frame (at least 45 kN/mm) is adopted to permit accurate displacement measurements of objects and microspecimens.

TRAPEZIUM2 data processing software

System Configuration



The desk shown was used for photography only. It is not a Shimadzu product.

Test force measuring range	2 mN to 2 kN
Speed range	0.0012 to 30 mm/min (0.0048 to 120 mm/min.)

Optional Accessories

Tensile Testing

● Grips

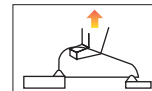


10 N micro-grips

Name	Specification	Comments
500 N compact, flat grips (Upper and lower grips, 1 set) Cat. No.346-51690-03	Max. test force: 500 N Clearance: 0 to 5 mm Grip width: 25 mm Grip length: 20 mm	For films, plastics, etc.
10 N micro-grips (Used in the test example) Cat. No.346-53492	Max. test force: 10 N Clearance: 0 to 0.3 mm Grip width: 1.5 mm Grip length: 1.5 mm	For bonding wires, single fibers, biosamples, etc. (20 to 200 mm dia., grip length 0.5 mm min.)
10 N micro-grips (with tweezers) Cat. No.346-53492-01	Max. test force: 10 N Clearance: 0 to 0.5 mm	Solder-ball tensile testing

* Only upper grip is micro-grips. Lower grip must be formed to match the specimen. Consult your Shimadzu representative.

● Wire-pull Jigs – for tensile testing of bonding wire



Name	Specification	Comments
20 N wire-pull jig Cat. No.347-57500	Max. test force: 20 N	Jig that hooks on to the center of the bonding wire

Compression Testing

● Truncated-cone indenter and indenter mounting adaptor for compression tests on solder bumps

Name	Specification	Comments
50 mm-dia. truncated-cone indenter Cat. No.340-47026-01	Tip diameter: 50 mm	For solder balls, micro-machines, etc.
500 mm-dia. truncated-cone indenter (Used in the test example) Cat. No.340-47026-02	Tip diameter: 500 mm	
Indenter adaptor (For mounting to a 5 N, or larger, load cell) Cat. No.347-57266	—	To mount load cell on top
Indenter adaptor (For mounting to a 0.5 N to 2 N load cell) Cat. No.347-57266-01	—	
Indenter adaptor Cat. No.347-57073	—	

Shear Testing

● Shear testing jig for IC chips

Name	Specification	Comments
50 N jig for IC chip shear testing Cat. No.346-54383	Max. test force: 50 N	Compatible board size: 30 x 30 mm max.



Common Jigs

● Fixing block – for fixing specimens from below

Name	Specification	Comments
Specimen fixing vise Cat. No.346-64251	—	Can be directly mounted on the XY stage
5 N specimen fixing jig Cat. No.346-53301	Fixes approx. 10 x 10 specimens	Mount on top of a bottom-mounted 0.5 N cell

● Heating plate – for heating specimens

Name	Specification	Comments
Heating plate 26 x 40 Cat. No.346-54511-02	Set temperature: (room temp. + 30°C) to 250°C Accuracy: within $\pm 2^\circ\text{C}$ of set temperature Method: PID temp. control	Can fix Si substrates (approx. 20 x 20 mm)
Heating plate 80 x 80 Cat. No.346-54540-01	Set temperature: (room temp. + 30°C) to 250°C Accuracy: within $\pm 5^\circ\text{C}$ of set temperature	

● XY stage for positioning specimens

Name	Specification	Comments
XY stage Cat. No.344-82861	Max. test force: ± 200 N Stroke: ± 12.5 mm (XY directions)	Manual positioning by micrometer

● Stereomicroscope – for specimen positioning and observation during testing

Name	Specification	Comments
Stereomicroscope (binocular type) Cat. No.346-53303	Magnification: x16 to x100 Illumination: LED (low heat-generating type)	With zoom function

● Vibration-proof mounting – for measuring micro-forces to 0.05 N

Cat. No.: P/N 339-81528
339-81524

● Special desk

Cat. No.: P/N 088-20092-01
339-81524-03

● Windproof case

Cat. No.: P/N 346-53387-01
346-54542

Lower Cat. Nos. apply to active vibration-proof mounting.

3

All Necessary Functions in One Compact, Easy-to-Use Package Autograph AGS-J Table-top Precision Universal Testing Machine

Highly accurate and reliable testing system

Forces are measured with a precision better than $\pm 1\%$ of indicated values, within the range from 1/1 to **1/250** of the rated force.

Simple operation

The simple operation panel makes operation easy.

The digital LED display can be set to display force or stress and elongation or strain.

Comprehensive functions offer high testing efficiency

- One-touch force zero adjustment
- One-touch zero positioning
- One-touch crosshead return to origin
- Convenient filing function for test conditions
- Automatic specimen break-point detection
- Fine adjustment of crosshead positioning
- Automatic force calibration

Extended Column Series

1100 mm: Standard column length
1350 mm: Standard column length + 250 mm
1600 mm: Standard column length + 500 mm



These models accommodate testing with longer strokes.

Reinforced Yoke Series



- Permits tensile testing in the downward direction.

Contact your Shimadzu representative for column extension of reinforced yoke series.

Simple operation panel ▼

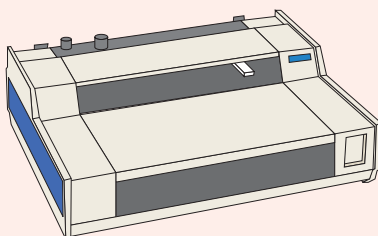


- Laptop computer and desk are options.
- The desk shown was used for photography only. It is not a Shimadzu product.

Test force measuring range	20 mN to 10 kN
Speed range	0.5 to 500 mm/min.

Analog recorder

There are two types of analog recorders: the X-T recorder that records load-time curves and the X-YT recorder that records load-time or load-displacement (elongation stroke) curves.



Name		
X-T recorder	AR-228	Cat. No.346-51735
X-YT recorder	AR-6122	Cat. No.346-51736

● Analog Recorder Specification

Name	X-T recorder	X-YT recorder
Effective recording width	X-axis (force): 250 mm 10, 15, 20, 30, 40, 60	X-axis (force), Y-axis (displacement): 250 mm each
Recording paper feedrate	mm/min., cm/min, mm/h, cm/h 23 steps/24 speeds	10, 20, 50, 100, 200 mm/min.
Pen travel time	X-axis: 1/3 s max.	X-axis: 1/3 s max.
Measuring range	X-axis: DC 0 to 5 V	X-axis: DC 0 to 5 V

EZ Graph and EZ Test Aid Strength Evaluations for Precision Electronic Component and Medical and Pharmaceutical Products

EZ Graph/EZ Test Tabletop Universal Testers

EZGraph

EZ Graph for Strength Evaluation of Precision Parts and Electronic Components

Applicable Tests

Film-peeling, PC board bending, chip bending, IC component shear strength, electronic component withdrawal, PC card insertion/withdrawal, LCD panel strength evaluation, and feeling tests.

High-rigidity, high-accuracy EZ Graph (with Smart Controller)

TRAPEZIUM2 data processing software for efficient testing

High-quality test data

High-speed data sampling achieves true values
1.25 ms ultrahigh-speed sampling function

Wide speed range handles testing of diverse products

Servomotor achieves wide speed-control range

System Configuration

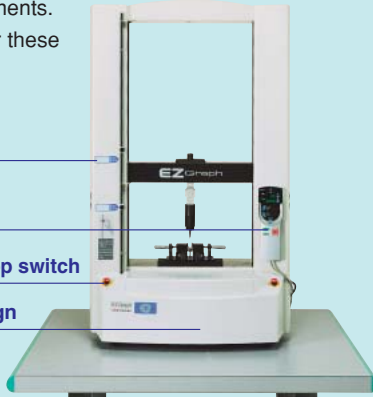
EZ Graph is recommended for the customer who wishes to control the test force and to conduct high- or low-speed testing with high-accuracy measurements. A PC is required for these tests.

Overstroke limit

Smart controller

Dual emergency stop switch

Space saving design



	Test force measuring range	Speed range
EZGraph	4mN~10kN	0.0005~1000mm/min

Smart Controller

Colors and flashing indicate the testing machine operation status.

Test force and elongation display

Testing machine monitor (PC display)

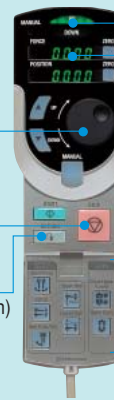


Manual dial

Crosshead operation switch

Return switch (with mis-operation prevention function)

Options operation switches Operate the air chuck.



EZTest

EZ Test Aides the Strength Evaluation of Medical and Pharmaceutical Products

Applicable Tests

Catheter strength evaluation, strength evaluation of pharmaceutical containers, injection needle insertion-force measurement, strength evaluation of transfusion pack seals, pill package strength evaluation, adhesive plaster and medical adhesive tape peeling tests.

Simple and Easy Operation

Comprehensive functions offer high testing efficiency

- One-touch force zero adjustment
- One-touch crosshead return to origin
- Convenient filing function for test conditions
- Automatic specimen break-point detection
- Fine adjustment of crosshead positioning
- Automatic force calibration

System Configuration

EZ Test is recommended for the customer who needs a tester that is easy to use for test forces up to 500 N and test speeds from 0.5 to 500 mm/min. on small specimens (0.5 to 600 mm/min. available as an option). The tester can operate alone; no PC is required.



Crosshead

Test force display

Crosshead travel display

Crosshead travel keys

Crosshead origin return key

Start test

Stop test

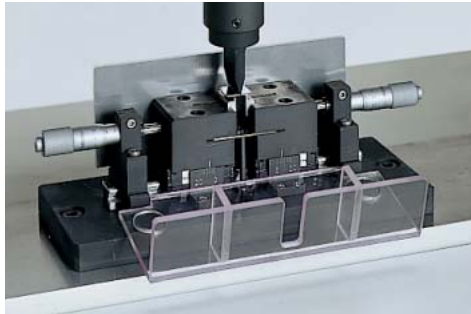
	Test force measuring range	Speed range
EZTest	0.1N~500N	0.5~500mm/min (~600mm/min)

EZGraph / EZTest

Test Jigs

Silicon chip (die) bending test jig

A 3-point bending test jig for silicon and other IC chips, based on the SEMI(Semiconductor Equipment and Materials International)standards.



Kit No. 346-53947-XX

PCB 45° peeling test jig

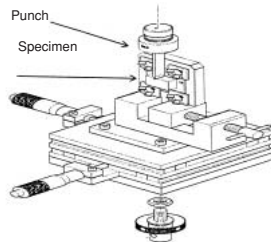
Used for peeling tests of electronic parts on printed circuit boards (PCBs). Use Cat. No. 346-52118-XX for boards larger than 100 x 100 mm.



Kit No. 346-52292-XX

Adhesion test jig for surface mounted components

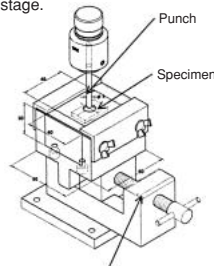
Jig for adhesion tests on surface mounted components, based on the JEITA(Japan Electronics and Information Technology Industries Association) standards. Specimens are positioned by the XY stage.



Kit No. 346-53948-XX

Peeling test jig for surface mounted components

Jig for peeling and push tests on surface mounted components, based on the JEITA(Japan Electronics and Information Technology Industries Association) standards. Specimens are positioned by the XY stage.



Kit No. 346-53949-XX

Electronic component shear testing jig

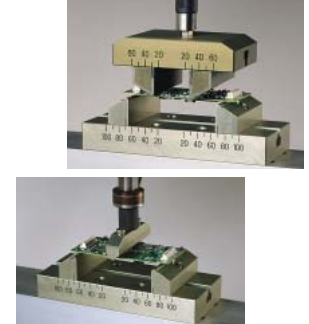
Jig for the shear testing of surface mounted components on PCBs. Specimens are positioned by the XY stage.



Part No. 346-53950-XX

Three-/four-point bending test jig for PCBs

Test jig for bending tests on blank PCBs and PCBs with surface-mounted components.



Part No. 346-53944-XX

PCB repeated bending test jig

Test jig for repeated bending tests on PCBs. Evaluates changes in resistance and other characteristics due to repeatedly applied forces.



Part No. 346-53931-XX

PC card insertion/withdrawal test jig

Test jig for repeated insertion and withdrawal tests on PC cards and adapters. Specimens are positioned by the XY stage.



Part No. 346-53927-XX

Keyboard pressing test jig

Test jig for repeated key input. Specimens are positioned by the XY stage.



Part No. 346-53925-XX

Key pressing test jig

Test jig for key pressing tests on mobile phones and keyboards.



Part No. 346-53926-XX

Three-point bending test jig for finished objects

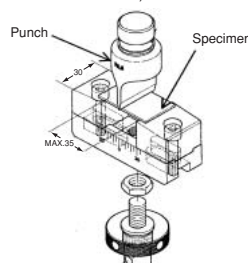
Test jig for bending tests on finished objects such as mobile phone housings.



Part No. 346-53945-XX

Surface mounted component test jig

Jig for bending tests on surface mounted components, based on the JEITA(Japan Electronics and Information Technology Industries Association) standards.



Kit No. 346-53946-XX

Strength evaluation of pharmaceutical containers

Upper compression plate, 100 mm dia.



Part No. 346-08095

Strength evaluation of adhesive force for dentures



Consult your Shimadzu representative.

Test Jigs

Medical package paper 180° peeling test



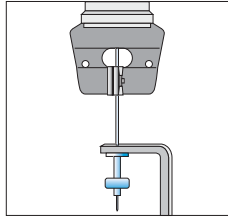
Compact, flat grips for tensile testing
Part No.346-51690-03

Medical adhesive plaster 180° peeling test



Tensile testing jig set
Part No.346-51690-03

Injection needle joint-strength test



Jig example
Upper jig Pneumatic automatic grip
Lower jig Injection needle fixing jig
The jig must be manufactured to suit the specimen. Consult your Shimadzu representative.

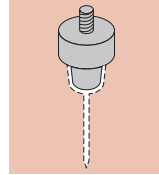
Syringe injection force test



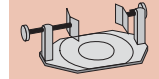
Reference Upper jig 20 mm dia.
Part No.346-51687-08
Lower jig
Part No.346-51687-12

Syringe mounting jig/fixing block

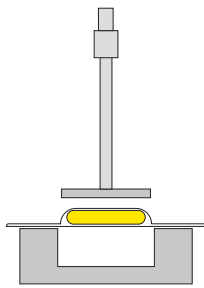
Syringe mounting jig
Part No.346-5169-03



Fixing block
Part No.346-51819-01



Pill extrusion test



Pill extrusion test jig set
Part No.346-53549

Lipstick crushing test



Upper jig Compressive elasticity
Part No.346-51687-08
Lower jig Lipstick test jig
Part No.346-52022
Bending centers for JIS bending tests
Part No.346-51687-08

Lipstick bending test



Upper jig Toothed push rod B
Part No.346-51814-02
Lower jig Lipstick test jig
Part No.346-52022
Bending centers for JIS bending tests
Part No.346-51818-01

Strength test jig for cream containers



Reference Upper jig 20 mm dia.
Part No.346-51687-10
Lower jig
Part No.346-51687-12

Other jigs are available for various applications. Consult your Shimadzu representative.

Individual Jig Components

Requires an adapter (346-52280-01 for *1, 346-52281-02 for *2 and 346-52295-01 for *3).

 Upper compression plate 346-51687-11	 Lower compression plate 346-51687-12	 Compressive elasticity test jig 346-51687-XX
 Toothed push rod B 346-51814-02	 Toothed push rod C 346-51815-02	 Cutting-force test jig using razor blades 346-51817-01
 Rotary drum (peeling test jig) 346-07949-02	 Bending centers, JIS bending test jig 346-51818-01	 Fixing block 346-51819-01
 Penetration test jig 346-51813-XX	 Penetration elasticity test jig 346-51687-XX	 Toothed push rod A 346-52258-02
 Cutting force/shear force test jig 346-51817-01	 Injection needle fixing jig 346-51688-02	 AGS jig mounting adapter 346-51692-XX
 LeoTec jig conversion adapter 346-51820-01	 Adhesion test jig 346-51820-02	 Adhesion test jig 346-52252-XX

 Stress relaxation test jig 346-52256-XX	 Penetration test jig 346-51813-XX	 Penetration elasticity test jig 346-52255-04
 Cutting force/shear force test jig 346-51817-02	 Cutting force 346-51816-02	 Gelatin 346-52255-04
 Sampler 346-52267-01	 Breaking stress 346-52274-01	 Lipstick horizontal holder 346-52022-XX
 Penetration/shear force test jig 346-52253-XX	 Penetration test jig 346-52254-01	 Cutting stress test jig 346-52268-01
 Pan 346-52255-XX	 Push rod 346-52257-01	 Push rod 346-52258-01
 Beaker fixing block 346-51819-02	 Viscosity block 346-52275-02	 Breaking test 346-51818-02

Applied Jigs

 Retort pouch piercing block 346-52271-01	 Retort pouch piercing rod 347-52778	 Peeling test (cell) jig 346-52289-01
 Friction coefficient measuring jig 346-52272-01		 Toothbrush test jig set 346-52291-01

Mounting Adapters

 Lower jig 346-52281-01	 Upper jig 347-52280-01	 Lower jig 346-52281-02
 AGS jig adapter 346-51692-01		
 AGS jig adapter 346-51692-02		

5

Shimadzu's Spring Evaluation Tester - Outstanding Reliability and Stability TEOS

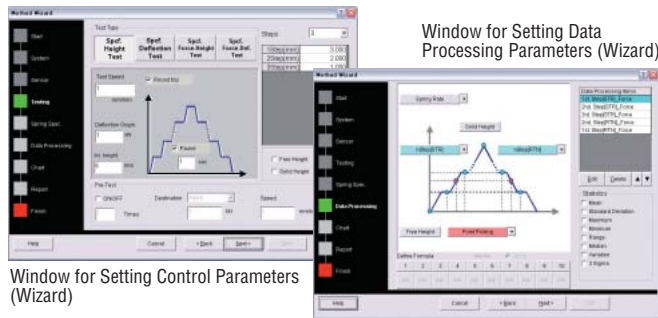
TEOS is a new system that combines a dedicated spring testing machine, ideal for evaluating compression coil springs, tension coil springs or conical springs, with powerful specialized software designed to reduce testing times. A wide variety of data required for spring testing can be measured, such as measuring test force, height, and deflection using 1, 2, 3 or up to 10 steps, or free height, initial tension, solid height, or spring constant. Also, a sliding debris containment cover is provided as standard equipment that allows performing tests safely.



Features

Reduces testing times with TRAPEZIUM TEOS software, newly developed specifically for testing springs!

The software is packed with features that allow reducing the time required before starting and after finishing tests, such as a quick setting panel where testing parameters can be entered directly via the test execution screen, in the same manner as using a control panel, a navigation bar that displays the highest priority operation icons for the current situation, or features that automatically save results or transfer results via a LAN connection. This software employs the latest Windows XP compliant user interface.



Calculates true values using preload and deflection correction features!

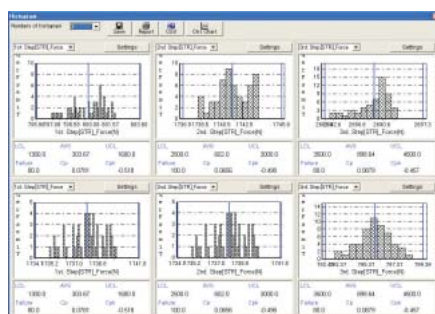
Because even slight deflections can be measured accurately, true values are output using features such as preload control and automatic deflection correction for deflections of the testing machine and jigs.

Uses specialized jigs to obtain reproducible data!

If the parallelism of compression plates is poor during compression testing, then results can change depending on where the test specimen is positioned. However, the parallelism of TEOS systems is calibrated during installation and can be readjusted after installation, upon request (for a fee), to keep the system in top condition.

Provides complete control of processes with pass/fail and multiple histogram displays!

To be capable of 100 percent inspection of parts, which is common for springs, the system includes a feature that can quickly determine the pass/fail status of data. It is also able to create histograms (simultaneously displays six types) and X-Bar/R control charts from this data.



Histogram Display Capable of Simultaneously Displaying Six Types

A system designed specifically for testing springs



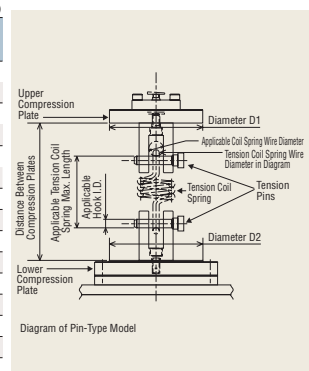
Example of Testing Conical Springs TEOS-5KN, Example of Testing Compression Coil Springs TEOS-5KN, Example of Testing Tension Coil Springs TEOS-5KN

List of Compatible Sizes

Only certain spring sizes are compatible with each capacity model. Please check compatibility with the table below. Upper and lower compression plates include a threaded hole for mounting tension hooks (or pins).

Compression Coil Springs and Conical Springs						Units (mm)
Capacity	Spring Coil O.D.	Spring Coil Height	Upper Compression Plate Diameter D1	Lower Compression Plate Diameter D2	Distance Between Compression Plates	
1N	20 or less	510 or less	20		0 - 510	
2N						
5N						
10N						
20N						
50N	60 or less	500 or less	60	60	0 - 500	
100N						
200N						
500N						
1kN						
2kN	150 or less	430 or less	150	150	0 - 430	
5kN						
10kN	200 or less		200	200		
20kN						
50kN	250 or less	880 or less	250	250	0 - 880	

Tension Springs				Units (mm)
Capacity	Model	Applicable Hook (Pin) I.D.	Applicable Tension Coil Spring Wire Diameter	Applicable Tension Coil Spring Max. Length
1N	Hook Type	0.6 or more	Max 2	1 - 470
2N				2 - 450
5N				
10N				
20N				
50N	Pin Type	2 or more	Max 4	4 - 440
100N				11 - 470
200N				14 - 450
500N				22 - 430
1kN				26 - 350
2kN	10 or more	Max 22	40 - 340	
5kN	14 or more	Max 24	54 - 320	
10kN	18 or more	Max 30	68 - 300	
20kN	25 or more	Max 38	85 - 270	
50kN	35 or more	Max 50	115 - 660	



Provides a Sophisticated Link to the Test Machine TRAPEZIUM2 Control and Data Processing Software for Testing Machines

TRAPEZIUM 2 Compatible with Windows 2000/XP

Through its visual wizard settings and the industry's first operation navigation system, the Windows XP-based TRAPEZIUM2 software allows various testing operations from simple test control to complicated control patterns created by the user.

Data obtained from tests can be processed according to various standards.

TRAPEZIUM2 offers flexible operations including re-testing and re-analysis and allows the intelligent navigation of many advanced functions, such as network transmission of measurement data and screen customization.

Compatible with All Testing Machines

TRAPEZIUM2 is compatible with all materials testing machines. Use it with your current testing machine. The specifications depend on the connected testing machine.

Testing machine	Shortest sampling interval (high-speed)	Comments
AG-IS/AG-I/EZ Graph/MST-I/I Refresh	10 ms (1.25 ms)	
AG-J/AGS-H/EZ Test	50 ms	
AG-G/AGS-G/G Refresh	50 ms (5 ms)	Options may be required on the testing machine.
Older models, other manufacturers' testing machines (Note 1)	50 ms	Requires dedicated A/D board

Note 1: Output voltage and connector shapes must be checked for other manufacturers' testing machines.

Navigation

Easy Testing Using the Navigation System

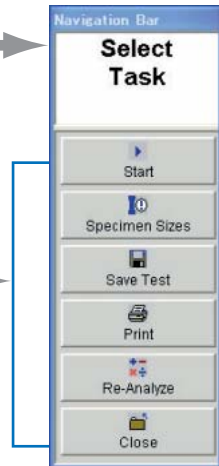
The Navigation Bar selectively displays the functions needed for the current operation.

Continuous tests can be efficiently conducted by simply clicking the large buttons.

The optional voice function allows TRAPEZIUM2 operation by responding to voice prompts from the PC.

Operating instructions are displayed in the message window.

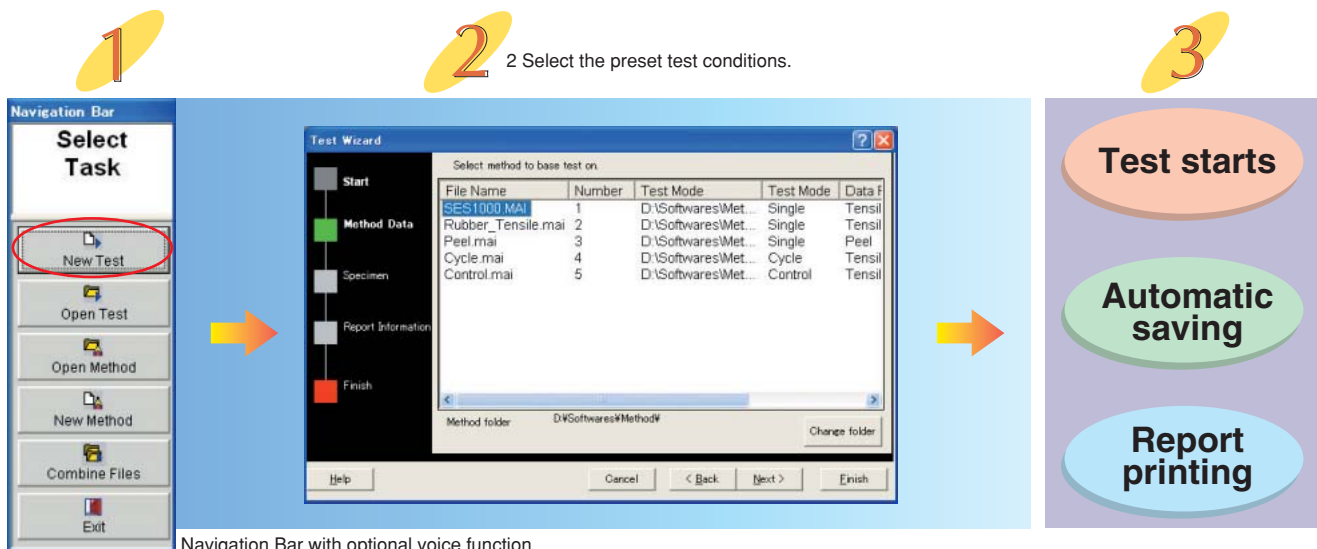
The displayed buttons change in response to the test status. The buttons are displayed in order of relevance. Most operations can be conducted by clicking these buttons.



Navigation Bar

Efficient Continuous Testing Begins in Three Steps

- Testing can be started in three steps after the software is booted up.
- No software operation is required during continuous testing.
- Test results are saved automatically.



Testing

Powerful Sampling Functions

- 6-channel input and display
- Sampling intervals can be set in units of time, test force, or displacement.
- Test force automatic calibration function
Test force calibration can be conducted by a single operation.

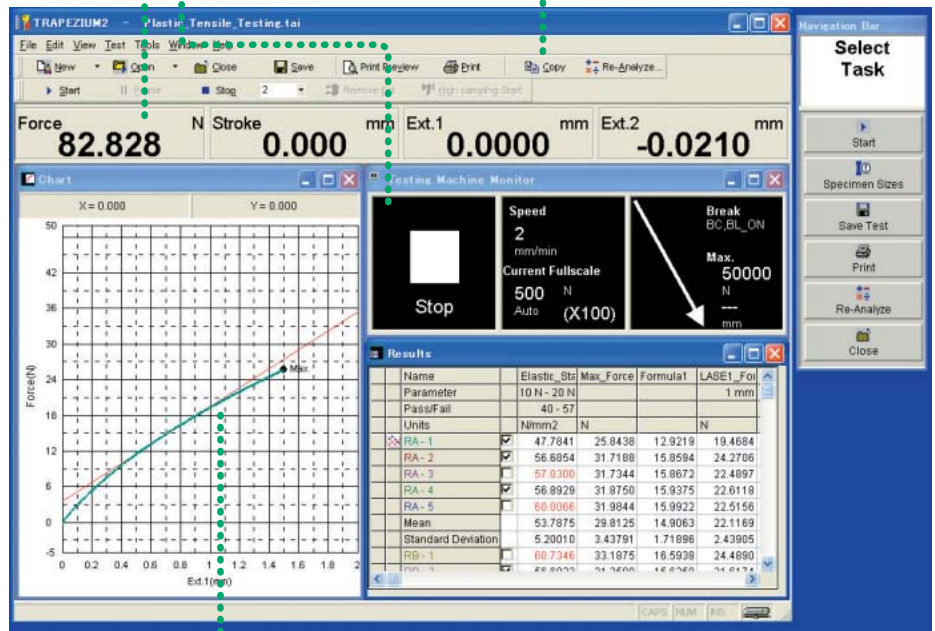
The high-performance built-in controller allows various control patterns.

- Automatic test force and strain control (AG-IS, AG-I, EZ Graph, MST-I, AG-G, AGS-G)
The controller offers test-force control, including constant test-force rate and constant test force, and strain control, including constant strain rate and constant strain.
- Break-point detection
When specimen failure is automatically detected, the testing machine stops automatically and the crosshead returns to its original position.
- Auto/Full-auto Test-force Range Switching Function
Full-auto: (AG-IS, AG-I, EZ Graph, MST-I)
Auto: (AG-G, AGS-G)
The test-force range is automatically switched to always maintain the optimal test-force range.
- Specimen protection function (AG-IS, EZ Graph, MST-I)
Automatically eliminates the force applied to the specimen to prevent specimen damage before testing.

- During the test, the tester status is displayed by colors and icons. Set parameters such as the speed and break point can be checked at a glance. (AG-IS MS and EZGraph)

Display style can be set freely.

- The "User Style Registration" function allows for setting and registering user-defined screen layout.
- The sizes of the sensor and toolbar can be adjusted to three different levels.
- A user-defined toolbar can be created to display frequently used functions only.

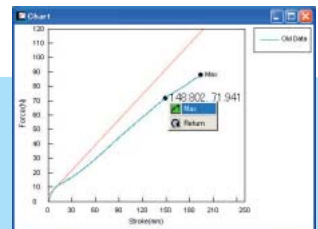
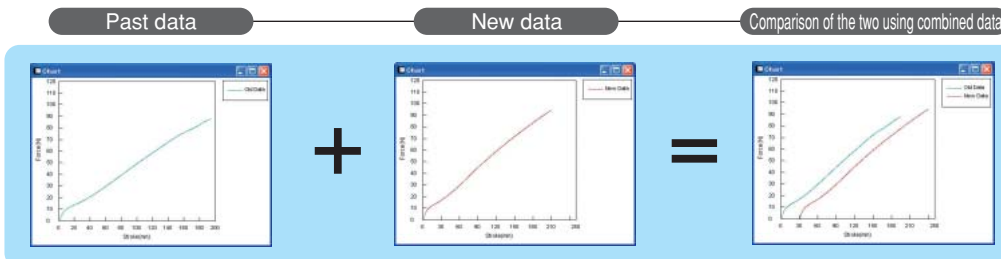


Analyzing

Packed with convenient functions that allow any type of data analysis you need.

- "Re-tests" and "Extra Lot Tests" can be conducted by a simple, one-touch operation to automatically replace incorrect results with correct data.
- The "Re-Analyze" function allows for re-analysis, analysis of different items, and changing names.
- The "Combine Files" function allows easy comparison of old and new data.

- The "Point Picking" function allows for easy confirmation of values on the graph. Also, the data processing results can be changed on the graph.



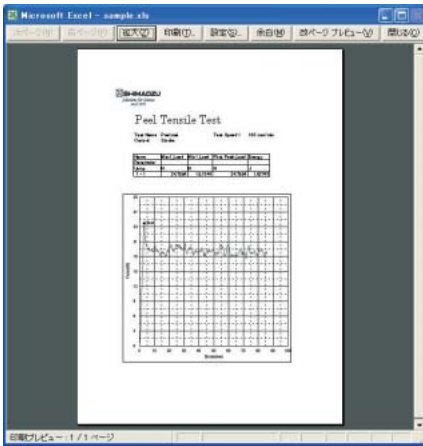
Output

Compatible with the broadband era

Reports can be automatically transmitted via e-mail, LAN and FTP.

User-defined report style

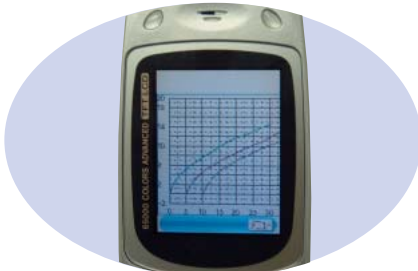
- Various types of information can be easily added to reports.
- The "**Custom Report Function**" allows the creation of reports in user-defined formats, including logos.



Mail transmission to mobile phones

(or PCs in remote locations)

Graphs and test results can be monitored from remote locations.



Example of e-mail display

Output of test results as PDF files

Reports can be output as PDF files. The PDF files can be sent by e-mail for printing at any location, even where no testing machine is available.

Compatible with commercial software

Test results and graphs can be output in CSV format or cut and pasted to spreadsheets and word-processing software.

Part Numbers

TRAPEZIUM 2 (with special RS-232C cable)

Software type	Part No.	Part No.
Single software		345-47307-01
Cycle software		345-47307-02
Control software		345-47307-03
Set		345-47307

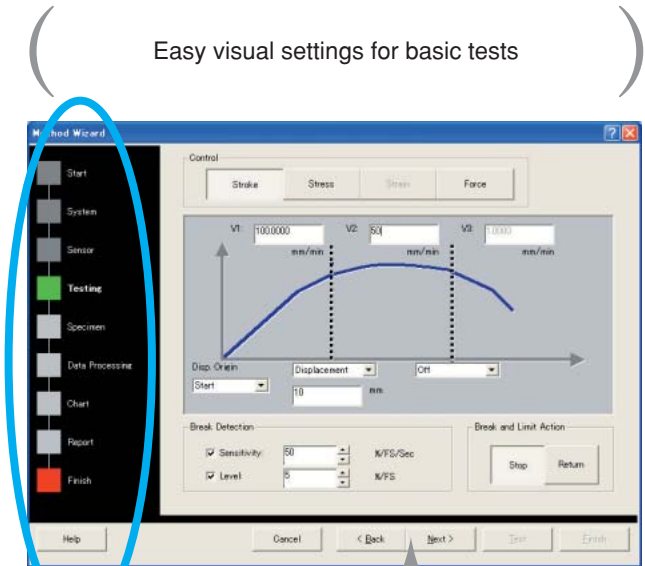
• For AG-IS, AG-I, MST-I, AGS-J, AGS-H, EZ Graph, EZ Test.

Visual Wizard

Visual and easy wizard system

Test parameters can be set easily by displaying the control pattern and data processing items as images.

Setting the Test Control



Easy visual settings for basic tests

Step-by-step settings using the [Back] and [Next] buttons.

Make the settings while observing the overall test flow. Click on the desired item to immediately display the relevant screen.

Setting the Data Processing Items

Various data processing results can be automatically determined after the test is finished.

(General processing items are preset. Select the desired items by simply clicking buttons on the image.)

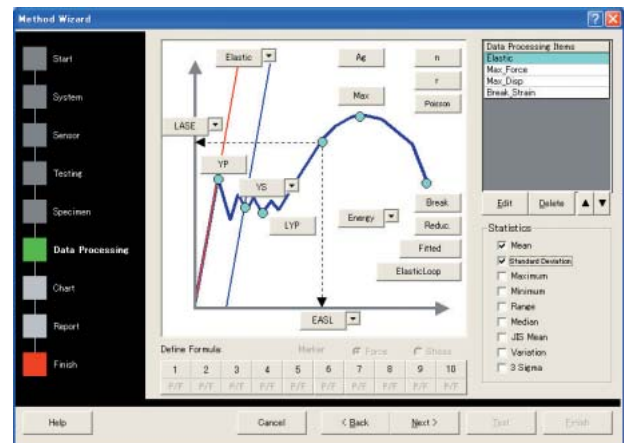
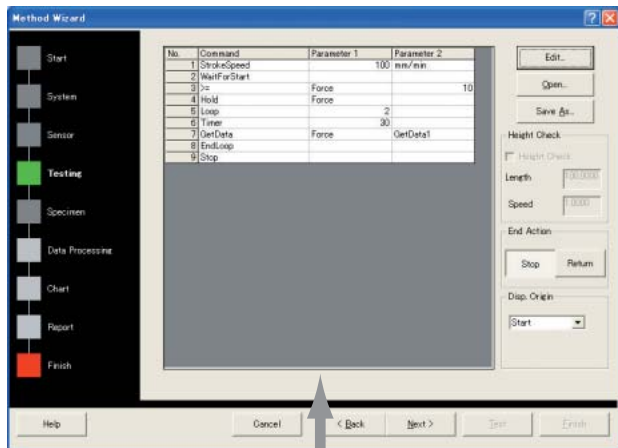


Image when a plastic specimen is selected.

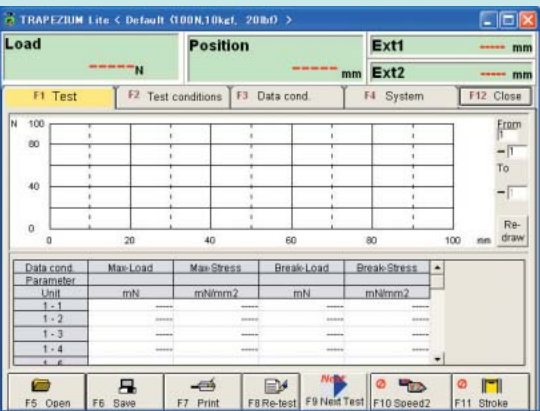
(Customize the control with the **control software** to operate the testing machine as required for creep tests and other complicated tests.)



User-defined test control patterns can be created by describing the control process step-by-step. Functions such as "Automatic measurement of the specimen height" permit testing that conforms to various standards around the world.

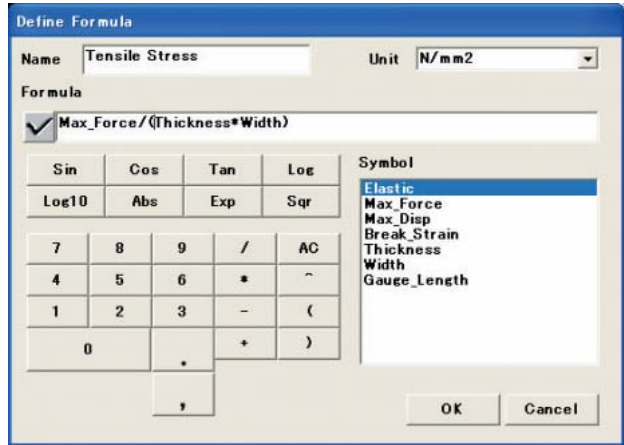
For users conducting simple operations

TRAPEZIUM Lite is recommended to customers who repeat the same tests using simple operations. TRAPEZIUM Lite features automatic saving of test results and four simple screen configurations: Test, Test parameters, Data processing parameters, and System.



● For AG-IS, AG-I, AGS-J, AGS-H, EZ Graph, EZ Test.

(User-defined data processing items can be easily created using the "User-defined formula" function.)



Semi-automatic Autograph System

Enhanced test efficiency

Low-cost system configuration

General-purpose system that can be used as a manual testing machine by replacing jigs

Reliable results ensured by automatic elimination of deflection and initial test force

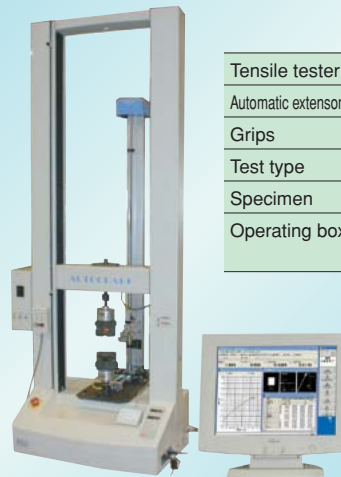
Special control box simplifies operations (open/close grips, start test, etc.)

Tensile tests with Autograph require several settings and operations by an experienced operation for each test, including: mounting the specimen; elimination of deflection due to specimen mounting; elimination of initial test force due to specimen mounting; and attaching the extensometer.

The semi-automatic Autograph allows operations such as tightening the grips and attaching the extensometer using the control box buttons, which simplifies the operations and enhances testing efficiency. This system reduces installation costs and, by replacing the jigs, it can be used as a manual tester for compression and bending testing.

A variety of semi-automatic systems are available, including tensile testing systems for plastics, film, rubber, and metals, and peeling test systems.

Buttons to open/close grips, attach the extensometer, and start testing.



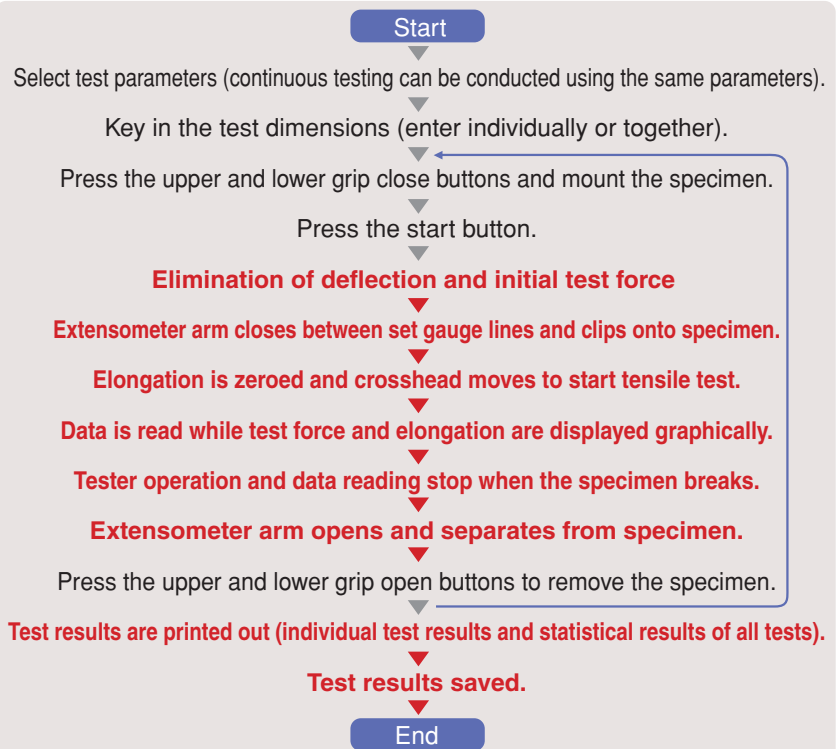
Tensile tester	AG-IS Series, AGS-J Series
Automatic extensometer	Automatic SES, SIE, AEH
Grips	Flat, pneumatic grips; hydraulic, wedge-type grips
Test type	Tensile
Specimen	Plastics, film, rubber, metals, fibers
Operating box	Open/close grips, attach the extensometer, start/stop testing

System example with AGS-J + automatic SES + pneumatic grips

Flow Chart for Semi-automatic Tensile Testing

The flow chart to the right shows the flow of tensile testing. The operations shown in red are automatic operations.

If an electronic Vernier caliper and multiplexer set is used for key entry of the test dimensions, the mean value and maximum or minimum value of multiple points (up to 6) can be entered into the PC as the width or thickness of a specimen simply by pressing a button on the electronic Vernier caliper.



Shimadzu's New Solution to More Accurate and Efficient Endurance Testing

ENT-150 Endurance Tester

Simultaneous endurance testing and insertion/withdrawal force measurement

Switch to low speed and accurately measure the insertion/withdrawal force at any time during high-speed endurance testing over up to 200,000 cycles.

Dedicated software achieves superb ease-of-operation (Type I)

Accurate measurements over a broad speed range

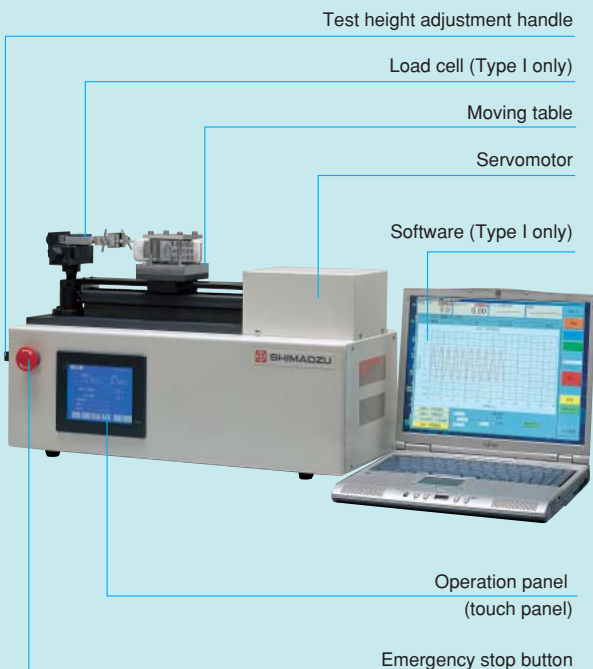
- High resolution of 1/20,000 of load cell capacity permits accurate insertion/withdrawal force measurements.
- Endurance testing over 10,000 cycles at 50 mm/s can be completed in about 3 hours (at 25 mm stroke).
- Highly accurate $\pm 20 \mu\text{m}$ positioning ensures stability until testing is complete.

Extended functions cover a range of test parameters

- Walk away from the system during a long test. The remote monitoring function (installed as standard) e-mails the test status and results to a mobile phone or PC.
- The optional thermostatic chamber permits environmental testing.
- An optional microscope can be attached for the observation and improved handling of minute specimens.
- Compatible with the optional Multiple Test System for simultaneous analysis of multiple specimens.

System Configuration ENT-150 Type I

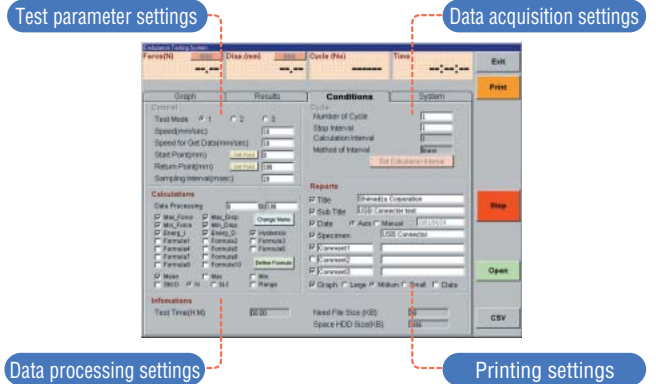
(Specimen fixing jig and PC are options.)



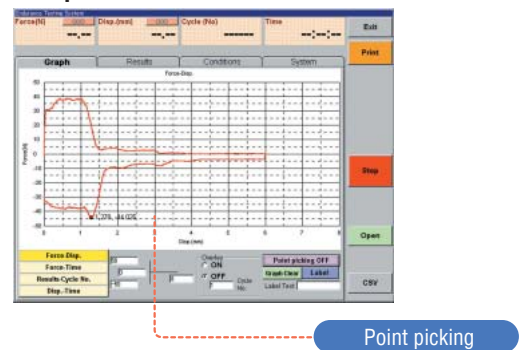
	Test force measuring range	Speed range	Maximum cycles
ENT-150	0.1~500N	0.1~50mm/sec	200,000

Screen Examples

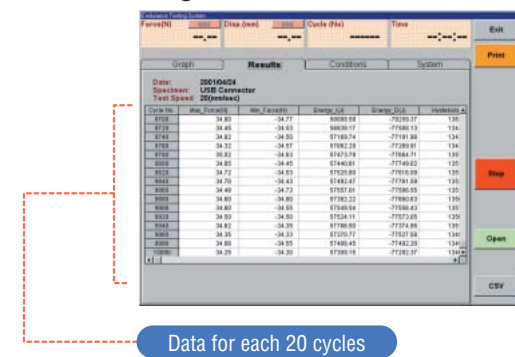
Parameter Setting Screen



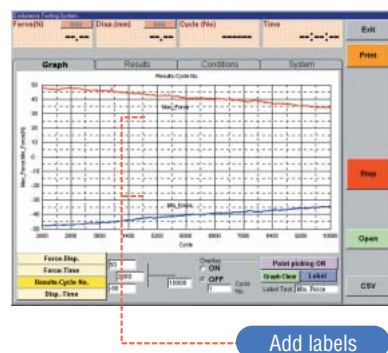
Test Force – Displacement Screen



Data Processing Results Screen



Data Processing Results – Cycles Curve Screen



9 Continuous Tensile and Bending Measurements on up to 150 Plastic Specimens

Automatic Plastics Tester

Fully automatic measurements of the tensile characteristics (Automatic Tensile Tester) and bending characteristics (Automatic Bending Tester) of plastics.

Conforms to JIS K7161 and ISO 527.
Conforms to JIS K7171, ISO 178, and ASTM (D790).

Easy to operate using Windows XP-based software with extensive re-calculation functions

Color touchpanel unit for easy operation

Manual mode permits operation as a manual tester

Remote monitoring functions

Handles emergency testing

The halt function allows interrupt testing or additional specimens. The optional barcodes permit specimens to be added, deleted, or changed, without stopping testing.

Safety

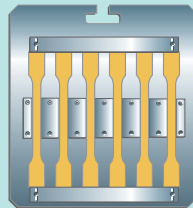
Failsafe functions operate to safely stop the system if an abnormality occurs during unmanned operation. Details about the operation can be checked from the operating status and error details displayed on the PC screen and operation panel.

Test Flow



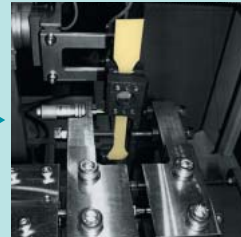
Register test information in the PC.

(Not necessary if the optional barcodes are used.)



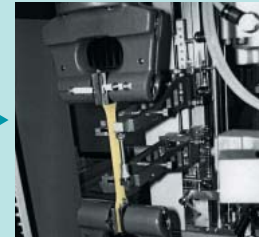
Load the specimens (1 to 12 per lot)

Set one lot of specimens in the pallet. (Use two consecutive pallets if the lot contains more than six specimens.)



Measure width and thickness

Tensile tester:
width 3 points; thickness 9 points
Bending tester:
width 1 point; thickness 3 points



Start test

Tensile or bending test

Repeat for all specimens

Automatic extensometer

(supplied with automatic tensile tester)

- The high-accuracy extensometer conforms to JIS K 7161 and ISO 527.

Deflectometer (automatic bending tester)

- Available as an option for the automatic bending tester.

Automatic Dimension Gauge

- ± 5 m high-accuracy, maintenance-free magnescale dimension gauge

Dedicated software with comprehensive functions

- Conforms to JIS standards
- Automatic graph scale switching
- Comprehensive arithmetic functions
- Print graphs and results in the reports
- Re-calculation functions
- Graph zoom and point picking functions
- CSV format data conversion

Specimen storage device

- Select the compact magazine or pallet-type *1 (that prevents incorrect loading) specimen storage device.
*1 Pallet type: Pat. No. 2011343
The pallet-type specimen storage device permits testing while automatically reading test information using barcodes. (Barcode function is an option.)



Automatic Bending Tester for Plastics

Offers the following features, in addition to the Automatic Bending Tester features.

Compact design

Conforms to JIS K7171, ISO 178, and ASTM (D790).

Specimen positioning mechanism



10

All Functions for the Quality Control of Rubber — from Specimen Transport to Recovery and Data Processing — Condensed in One Compact Package Automatic Rubber Tensile Tester

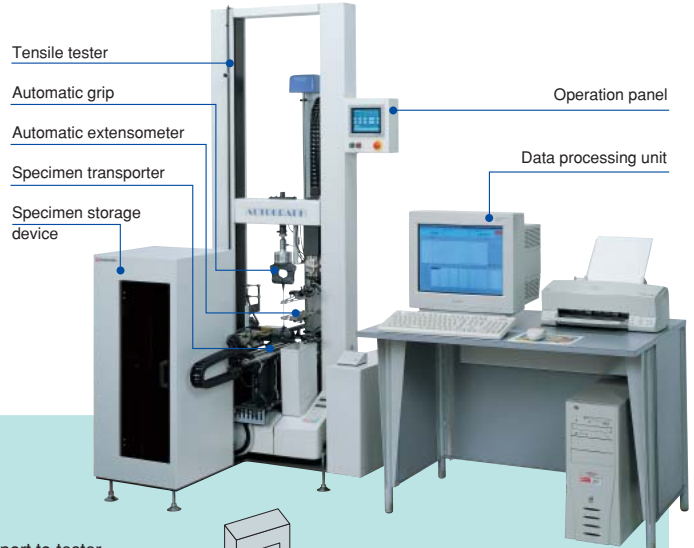
All equipment selected for reliability. System based on the durable Shimadzu Autograph.

The Autograph testing machine with its rigid, two-column construction withstands long-term continuous operation.

Eccentric roller-type air chuck stops the specimen slipping during testing. (Patent pending)

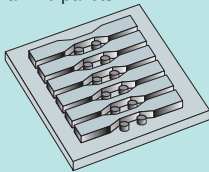
Automatic correction for sag after chucking the specimen (Pat. No. 2014255)

Rapid return to origin after specimen failure (up to 2000 mm/min.)

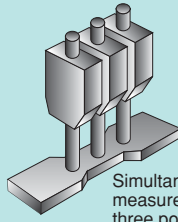


Test Flow

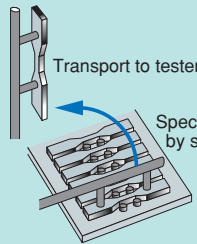
6 specimens/pallet
Max. 20 pallets



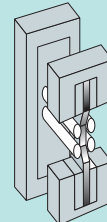
Pallet-type specimen storage device



Specimen thickness measurement device
Conforms to JIS K 6250.



Specimen transporter
Secure transportation by vacuum pads



Tester and automatic extensometer

Specimen recovery unit
Full recovery by individual upper and lower transport fingers

Pallet-type specimen storage device allows interrupt testing in emergencies
Barcodes further enhance efficiency

Each pallet can accept up to six specimens. The pallet-type specimen storage device can accept up to 120 specimens by increasing the number of pallets (up to 20). (Pat. No. 2011343)

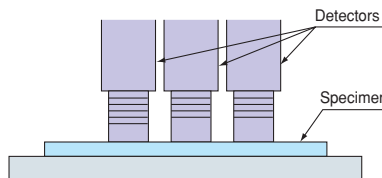
The optional barcodes allow automatic reading of test information during testing. Can also handle bursting tests (optional).

Specimen storage

6 specimens/pallet → 120 specimens/20 pallets

Accurate specimen thickness measurements conforming to JIS standards
Simultaneous measurements at three positions for greater efficiency

Simultaneous measurements at three positions eliminate errors due to moving the detector or specimen, and reduce the measurement time.



Data processing software for Windows XP conforming to JIS K 6250 and K 6251.
Optionally conforming to JIS K 6252 (tear strength tests).

Contact extensometer handles extensions to 1000%

Simple system that requires no gauge line marks. No danger of gauge line displacement even at large displacements.

The reduced-weight detector heads lightly contact the specimen to accurately track gauge-line elongation without interfering with the test.



Compression Strength Evaluation of Micro-materials

Permits the compression evaluation of individual 1 μ m-diameter microparticles

Micro Compression Testers MCT-W Series

Evaluates the compression strength of micro-materials

- Micro components
- Ceramic particles
- Fine metal powders

- Plastic powders
- Pigments
- Food ingredient powders

- Pharmaceutical microcapsules
- Microfibers

Micro-scale compression displacement measurements

Two instrument types are available to evaluate the compression characteristics of micromaterials: one with a measuring range up to 100 mm at 0.01 mm resolution and another with a measuring range up to 10 mm at 0.001 mm resolution.

Wide load range

Instruments types with a maximum test force of 4900 mN and 1960 mN are available for the compression testing of micro-materials.

High-accuracy measurements

Conducts measurements with a test force accuracy of -1% of the set test force or indicated test force, whichever is larger.

Specimen size measurement functions provided as standard

A standard function of the instrument determines the specimen dimensions, such as geometric mean diameter and length, from an image taken from above.

Length measurement from images on the PC monitor and saving images (option)

The Length-measuring Kit (color or monochrome) permits length measurements from top-view specimen images displayed on the PC monitor. These images can be saved as digital data.

Display images during compression (option)

Side-view images of specimens under compression can be displayed. (Requires the optional Side-view Kit.)

Resistance measurements of specimens during compression (option)

The optional Resistance Measurement Kit can be used to evaluate the relationship between the compression characteristics and resistance values.

Testing in high-temperature environments (optional system)

The high-temperature system permits testing in high-temperature environments (50 to 250°C).



High-temperature Micro Compression Test System

This system permits micro compression testing in high-temperature environments.

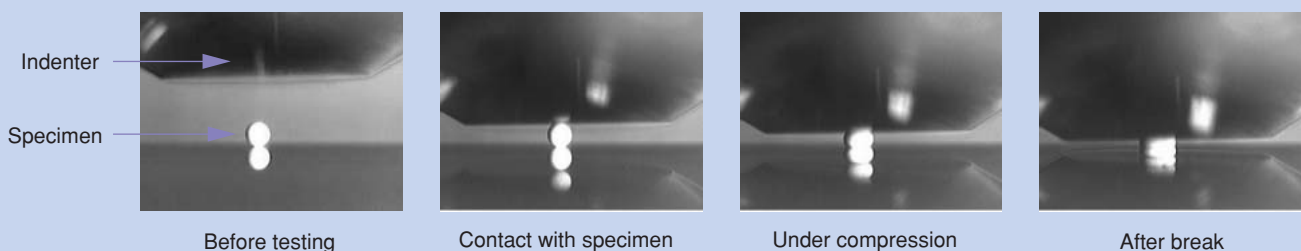
System Configuration

- | | |
|--|-------|
| 1) Heater unit | 1 set |
| 2) Temperature controller and recorder | 1 set |
- The high-temperature system can be added to an MCT-W Series instrument (500/501/200/201).



Image Observation during Compression

The optional Side-view Kit displays images during compression.

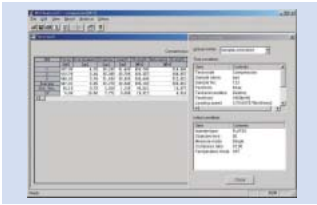


This example shows an approx. 80 μ m specimen particle and an indenter with a 500 μ m flat surface. One single particle is compressed. The other visible particles are reflections of the particle on the upper and lower compression plates.

Comprehensive Analysis Functions Aid in Evaluating Compression Characteristics (Examples of data)

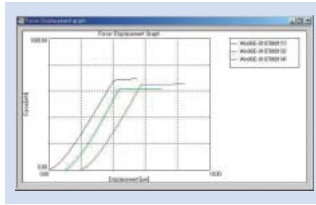
Test force-displacement-strength display

Displays the results (test force, displacement, strength) of each test, the mean values, and the test parameters.



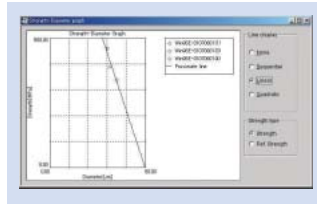
Superimposed test force-displacement curves

For comparison of the test force-displacement curves from each test, multiple curves can be simultaneously displayed to reveal differences in deformation characteristics at a glance. Each curve can be drawn from the same origin.



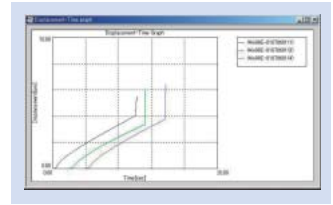
Strength-particle size curves

Graphically displays the relationship between particle size and strength.



Displacement-time curves

Information can be acquired on the specimen's resistance to deformation during deformation after the indenter reaches the specimen surface.



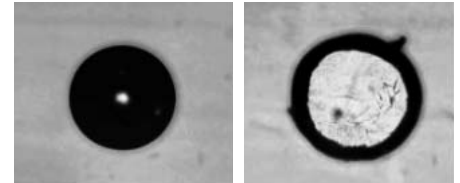
Test a Variety of Materials

(Select the test items appropriate for the aim of the test.)

Compression Test

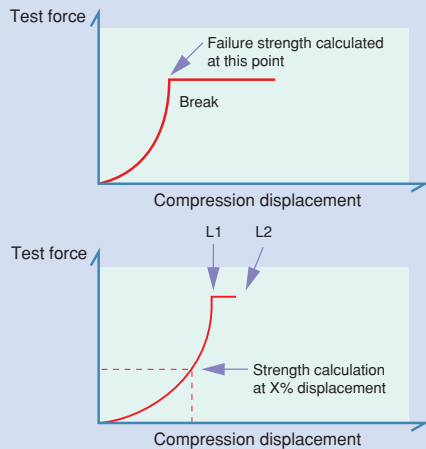
If the specimen shape is selected as particle or fiber, the load is applied up to the set test force. The test determines the bursting strength if the specimen fails (bursts) or the strength at a designated deformation if the specimen does not fail.

If another specimen shape is selected, the test ends after the load is applied up to the set test force.



Before test

After test



Break Strength

The displayed bursting strength (st) is calculated from the break test force and particle size.

Alternately, the displayed X% strength (reference strength: sx) is calculated from the particle size and the test force at X% deformation of the specimen diameter.

For particles $St(Sx)=2.8P/(\pi \times d \times d)$

For fibers $St(Sx)=2P/(\pi \times L \times d)$

Where, d is the particle size or the fiber diameter (mm)
L is the fiber length

Rate of Change

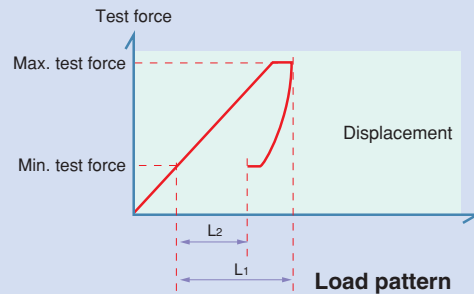
The displayed rate of change is calculated from the displacement (L1) at the start of test force retainment and the displacement (L2) at the end of test force retainment.

For particles or fibers: rate of change $Cp = (L2 - L1)/d \times 100$

For other specimens change $Dp = L2 - L1$

Loading/Unloading Test

This test applies a load up to the maximum test force and then removes the load down to the minimum test force.



For particles or fibers

Compressibility $Cr = L1/d \times 100$

Recovery $Rr = (L1-L2)/d \times 100$

Cyclic Test

This test repeatedly loads and unloads the specimen up to 250 times to evaluate the specimen characteristics when subjected to repeated loads.

The compressibility and recovery are determined for each cycle, as in the loading/unloading test.

Special Accessories

Length-measuring Kit (color or monochrome)

Length-measuring Kit, Color
Part No. 347-23103-02

Length-measuring Kit, Monochrome
Part No. 347-23103-01

Positioning of the test specimen is simplified as the indenter size can be displayed on the PC monitor with the specimen image. Length measurements can be conducted from the images and the images can be saved. Maximum magnification is 2400 times (50x objective lens with 17-inch monitor).

Required PC Specification

Use with a PC recommended by Shimadzu.



Side-view Kit (color or monochrome)

Side-view Kit, Color
Part No. 347-23113-02

Side-view Kit, Monochrome
Part No. 347-23113-01

This kit displays the specimen status during compression. Images are displayed on the PC monitor and the images at specified times can be saved.

Maximum magnification is 480 times (with 17-inch monitor).

Required PC Specification

Use with a PC recommended by Shimadzu.



Resistance Measurement Kit

Part No. 347-23105

Micrometer head with digital display

Part No. 081-02704-11

Windproof case

Part No. 344-82948-03 (large), 344-82948-02 (small)

Flat indenter (500, 200, 100, 20 μm)

Part No. 340-47026-XX

Triangular pyramid indenter (115° tip angle)

Part No. 340-47013

Objective lens (100, 40, 20 time magnification)

100 x magnification objective lens Part No. 344-88977
40 x magnification, extra-long working distance type Part No. 347-88300-01

Diamond lower pressure plate

Part No. 340-47050

Si Chip Three-point Bending Test System Package Package No. 346-54631-XX

This system measures the bending strength of Si chips after dicing.



Specifications

Maximum test force	500 N
Punch and support tip dimensions (radius x width)	0.3 mm x 22 mm
Span between supports	1 to 20 mm
Sampling interval	1.25 ms
Applicable standard	SEMI G86-0303

System Configuration

1. EZGraph 500 N
2. Compression jigs
3. Three-point bending test jig for Si chips
4. TRAPEZIUM2 Single (high-speed sampling version)

Printed Circuit Board 90° Shear Test System Package Package No. 346-54632-XX

This system evaluates the joint strength of IC chips mounted on a printed circuit board by shearing the components from the board.



Specifications

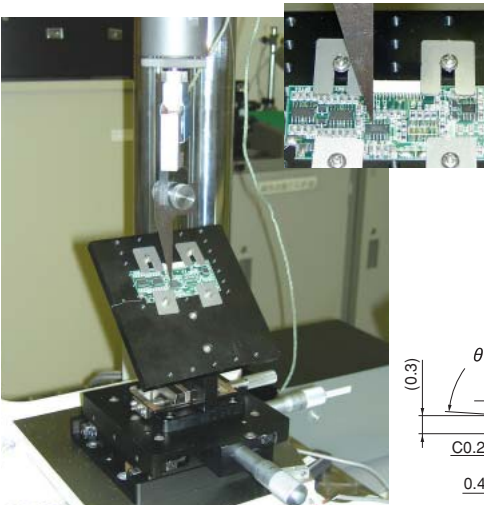
Maximum test force	200 N
Applicable board dimensions (W) x (L)	50 x 50 to 250 x 300 mm
XY stage travel	12.5 mm
Punch dimensions (W) x (L)	10 x 10 mm

System Configuration

1. EZGraph 200 N
2. Compression jigs
3. Electronic component shear testing jig
4. XY stage
4. TRAPEZIUM2 Single

Printed Circuit Board 45° Peeling Test System Package Package No. 346-54633-XX

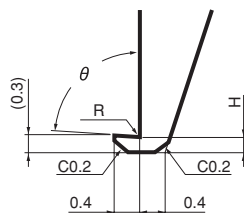
This system measures the adhesion strength of IC chips mounted on a printed circuit board by hooking a jig onto one leg of the IC chip. The hook shape differs according to the maximum test load and the applicable standard for the specimen.



Specifications

Maximum test force	8N	5N	20N
Hook thickness (mm) t	0.3	0.18	0.36
Hook height (mm) H	0.26	0.26	0.52
Hook angle θ	84°	84°	75°
Applicable board dimensions (W) x (L)	40 x 40 to 100 x 100 mm		
XY stage travel	± 12.5 mm		
Applicable standard	JIS Z3198-6	—	

Note) Refer to the table above to select the hook for the PCB 45° peeling test jig.



t = thickness

System Configuration

1. EZGraph 200 N (20 N)
2. Tension joint
3. PCB 45° peeling test jig
4. Hook
5. XY stage
6. TRAPEZIUM2 Single

Plastic and Rubber Tensile Test System Packages

Plastic Tensile Test System Package Package No. 346-54634-XX

Plastic tensile test methods are prescribed in JIS K 7161 and JIS K 7162. Shimadzu plastic tensile test systems easily and accurately conduct these tests according to these standards.

- Modulus of elasticity measurements according to ISO 527/JIS K 7161
- Simultaneous modulus of elasticity and elongation at break point measurements on a single specimen
- Automatically operate (open/close) the SIE automatic extensometer from a PC

System Configuration

Name	Plastic Tensile Test System
Tester	AG-10kNIS, + 250 mm extended column
Max. capacity	10 kN (Accuracy $\pm 1\%$ of indicated values, within the range from 1/1 to 1/250 of the rated force)
Grips	10 kN flat, pneumatic grips Grip faces: 20 mm W x 50 mm L, specimen thickness: 0 to 10 mm
Stroke	450 mm max.
Applicable specimens	JIS K 7162 1A, 1B (115 mm grip clearance)
Extensometer	SIE-560S; accuracy within 0.5% indicated value or ± 1 mm, whichever is larger Applicable specimen thickness (1 to 4 mm), edge grip force 0 to 7 N Gauge length 50 mm, measuring range 510 mm
Data processing	TRAPEZIUM2 Single Modulus of elasticity, yield stress, tensile strength, elongation at breaking point, intermediate modulus (5 points)



Rubber Tensile Test System Package Package No. 346-54635-XX

Rubber tensile test methods are prescribed in JIS K 6251. Shimadzu rubber tensile test systems easily and accurately conduct these tests according to this standard.

- Accurate measurement up to 1000% elongation
- Easy mounting of the specimen and extensometer arm (clip type)

System Configuration

Name	Rubber Tensile Test System
Tester	AGS-1kNJ, + 250 mm extended column
Max. capacity	1 kN (Accuracy $\pm 1\%$ of indicated values, within the range from 1/1 to 1/250 of the rated force)
Grips	1 kN Pantagraph2 type Grip faces: 26 mm W x 35 mm L, specimen thickness: 0 to 6 mm
Stroke	1000 mm max.
Applicable specimens	Dumbbell 1, 2, 3, 4, 5, 6
Extensometer	SIE-1000; accuracy: ± 0.2 mm < measuring range (20 mm) < $\pm 1\%$ F.S.
Measuring range	100%, 200%, 1000% measuring range at 20, 25, 40 mm gauge length
Data processing	TRAPEZIUM2 Single Tensile strength, elongation at breaking point, intermediate modulus (5 points)



Film Tensile Test System Package Package No. 346-54636-XX

Film and sheet tensile test methods are prescribed in JIS K 7127. Shimadzu film tensile test systems easily and accurately conduct these tests according to this standard.

This package offers accurate film tensile test measurements in a controlled (heated) environment. A package is also available for testing under constant-temperature/constant-humidity conditions.

- Easy testing according to JIS K 7127
- Non-contact extensometer measures film elongation
- The pull-down type tester (with fixed load cell) eliminates jig inertia effects to conduct accurate low-capacity testing.
- A non-contact extensometer is used even in a controlled-temperature environment

System Configuration

Name	Film Tensile Test System
Tester	AG-50NIS with reinforced yoke (for tensile test in downward direction)
Max. capacity	50 N (Accuracy $\pm 1\%$ of indicated values, within the range from 1/1 to 1/250 of the rated force)
Grip clearance	0 to 300 mm
Stroke	130 mm
Grips	50 N flat, pneumatic grips Grip faces: 35 mm W x 25 mm L, specimen thickness: 0 to 6 mm
Applicable specimens	Shapes shown in JIS K 7162
Extensometer	DVE-201S; ± 3 mm absolute accuracy (± 6 mm inside chamber) Non-contact type with gauge line stickers applied to specimen
Measuring range	600% at 25 mm gauge length
Temperature-controlled chamber	-35°C to $+250^{\circ}\text{C}$ TCR-1 temperature-controlled chamber with freezer function
Data processing	TRAPEZIUM2 Single Modulus of elasticity, yield stress, tensile strength, elongation at breaking point, intermediate modulus (5 points)



Specifications Autograph (See Part No. Tables on page 26 and 27.)

Model name	EZTest	MST-I typeHR	MST-I typeHS	EZGraph	AG-IS (tabletop)	AG-ISD (tabletop)	AG
Max. test capacity	500N(112 lbf)	2kN(450 lbf)		10kN(2250 lbf)		20kN/50kN (4500 lbf/11250 lbf)	20kN/50
Test force measuring range (by replacing load cell)	0.1~500N	2mN~2kN		4mN~10kN		4mN~ 20kN/50kN	4mN
Test force accuracy	±1.0% of indicated value to 1/50 load cell rated capacity	±1.0% of indicated value to 1/250 load cell rated capacity				Standard: ±1.0% of indicated value to 1/250 Standard/wide range: ±1.0% of indicated value to 1/500 High-accuracy: ±0.5% of indicated value to 1/250 High-accuracy/wide range: ±0.5% of indicated value to 1/500	
Test force measuring magnification	Range-less	X1, 2, 5, 10, 20, 50, 100 (7 ranges)					
Test force correction	Automatic correction (tensile or compression)	Automatic correction (tensile or compression) (Class 1 tensile/compression correction)			(Select from Class 1 tensile/compression		
Crosshead—table clearance	500 mm max.	±60mm(120mm)		650 mm max.	1150 mm max.	1060mm max.	
Test speed	0.5~500mm/min	0.0012~30mm/min	0.0048~120mm/min	0.0005~1000mm/min(0.00005 to 1000 mm/min also			
Max. return speed	500mm/min	30mm/min	120mm/min	1000mm/min			
Speed accuracy	±0.5% or ±0.05 mm/min., whichever is larger	±0.1 % (in 0.5 to 500 mm/min range)					
Crosshead speed and permissible test force	500 N for all speeds	2 kN for all speeds		10 kN for all speeds		20/50 kN for	
Effective test width	60 mm (rear clearance)	—		420mm		450mm	
Displacement display resolution (μm)	10	0.02		1			
Displacement accuracy	±1.0% of the indicated value (±0.01 mm for indicated value up to 10 mm.)	±0.2 mm up to 5 mm ±0.5 mm over 5 mm		±0.1% of the indicated value (±0.01			
Crosshead control	Single test control (unidirectional tensile/ compression testing) Manual control	Single test control (unidirectional tensile/compression testing), cycle * Cycle test control permits test cycles, stroke cycles, displacement					
Standard functions	Crosshead auto-stop and auto-return using automatic specimen failure detection Crosshead position fine adjustment Test parameter files Crosshead speed settings Display functions: select either load display or stress display Peak load and displacement values and break point Displacement load, analog values: each 0 to 5 V full- scale (for external recorder) RS-232C port (for data processing software)	Automatic test force and strain control, test force auto zero, Test force auto Crosshead auto-stop and auto-return using automatic specimen failure detection Auto/full-auto test force range switching, Crosshead position fine adjustment Test parameter files, Crosshead speed settings Display functions: select either load display or stress display, Peak load and External analog output 2 channels, External analog input 2 channels Internal amps 3 ports (one is used for the test force amp.), Cycle number and Automatic extensometer (option) operation functions, RS-232C port (for data AG-IS Type MS and EZ Graph Air chuck interlock unit (optional) operation functions, Automatic extensometer AG-IS Type MS and MST-1 PEAK and BREAK value display Test parameters internal memory file (15 files) Touch panel switching between Japanese and English, S-S curve display					
Frame rigidity	—	45 kN/mm		42 kN/mm		120 kN/mm	
Dimensions (mm) W x D x H	380x400x720	Tester: 450x450xmax1400 Controller: 200x430x600 Operation unit: 275x50x260		680x510x1140	680x515x1615	Tester: 845x500x1625 Controller: 200x430x600	
Weight (kg)	25kg	Tester: 120kg Controller: 20kg Operation unit: 2kg		95kg	100kg	Tester: 280kg Controller: 20kg	
Installation conditions	Temperature: 5 to 40°C Humidity: 20 to 80% (no condensation) Power supply fluctuations: within ±10%	Temperature: 5 to 36°C Humidity: 20 to 70% (no condensation) Power supply fluctuations: within ±10% Vibrations: 10 mGal up to 40 Hz frequency (Provide anti-vibration mounts for locations with high vibration forces or on reclaimed land that do not meet the conditions above.) Wind: Use a windproof case when testing up to 5 mN.		Temperature: Humidity: Power supply fluctuations: Vibrations: Amplitude: D-type grounding			
*1 Required power supply	Single-phase 100/110-120/220- 230/240V(switchable), 200 VA	Single-phase 100V/600VA		Single-phase 100-110/115-130/220-230/240V (switchable) 600VA(400VA)		Single-phase 200 VA 4kVA(1.5kVA)	Three 4

*1: The machine should be connected to an electrical ground.

-20kN/50kNIS		AG-100kNIS	AG-250kNIS	AG-300kNIS	AGS-J	ENT-150 TYPE I	ENT-150 TYPE II
kN(4500 lbf/11250 lbf)		100kN(22500 lbf)	250kN(56250 lbf)	300kN(67500 lbf)	10kN(2250 lbf)	500N	
~20kN/50kN		4mN~100kN	4mN~250kN	4mN~300kN	20mN~10kN	0.1N~500N	No load cell connection
load cell rated capacity		Standard: ±1.0% of indicated value to 1/250 load cell rated capacity High-accuracy: ±0.5% of indicated value to 1/250 load cell rated capacity		±1.0% of indicated value to 1/250 load cell rated capacity		±1.0% of indicated value to 1/50 load cell rated capacity	
load cell rated capacity						—	
load cell rated capacity							
load cell rated capacity							
					Range-less	x1,10 (2 ranges)	—
Automatic correction (tensile or compression) correction; Class 0.5 tensile correction, compression correction, tensile/compression correction)					Automatic correction (tensile or compression)	Manual correction (compression)	—
1045 mm max.	1250 mm max.	1440 mm max.		1100 mm max.	150 mm max.		
available)		0.0005~500mm/min(0.00005 to 500 mm/min also available)		0.5~500mm/min	0.1~50mm/sec		
1100mm/min		550mm/min		500mm/min	—		
					±0.5% or ±0.025 mm/min., whichever is larger	±1.0%	
all speeds	100 kN for all speeds	250 kN for all speeds	0.0005~250mm/min: 300kN 250~500mm/min: 250kN	10 kN for all speeds	500 N for all speeds	—	
575mm				420mm	40 to 60 mm from table surface (with fine adjustment function)		
					—	—	
mm for indicated value up to 10 mm.)					Within ±1.0% of the indicated value	±0.02mm	
test control, manual control cycles, and combinations thereof.					Single test control (unidirectional tensile/compression testing) Cycle test control (repeated tensile/compression testing) Manual control	Cycle test control (repeated tensile/compression testing)	
calibration					Crosshead auto-stop and auto-return using automatic specimen failure detection Crosshead position fine adjustment Test parameter files, Crosshead speed settings		
displacement values and break point					Display functions: select either load display or stress display Peak load and displacement values and break point		
stress value display processing software)					Load/analog output: each 0 to 5 V full-scale (for external recorder)		
(option for AG-IS) operation functions					RS-232C port (for data processing software)		
175 kN/mm	300 kN/mm	400 kN/mm		—	—		
1170x750x 1912	1170x750x 2162	1170x750x2412		660x520x1580	610x250x400		
500kg	800kg	900kg		80kg	40kg		
5 to 40°C 20 to 80% within ±10% up to 10 Hz frequency 5 mm max.					Temperature: 5 to 40°C Humidity: 20 to 80% (no condensation) Power supply fluctuations: within ±10% Vibrations: up to 10 Hz frequency Amplitude: 5 mm max.		
-phase 200-230V kVA(1.2kVA)	Three-phase 200-230V 6kVA(1.6kVA)	Three-phase 200-230V 7.5kVA(2.0kVA)		Single-phase 100/110-120/220-240V (switchable) 600 VA	Single-phase 100 V, 300 VA		

Specifications Automatic Plastics Tester

Model name	Automatic Rubber Tensile Standard Test System	Tensile Test Machine	Bending Test Machine (compact type)
Applicable specimen	JIS K 6251 No. 3 & No.5 JIS K 6252 crescent and angle type (optional)	JIS K 7162 1A,1B ISO 527 1A,1B	JIS K 7171 standard specimen ISO 178 standard specimen
Part No.	346-54639-XX	346-54637-XX	346-54638-XX
Jigs	1 kN pneumatic, eccentric roller-type grips (Patent pending) Width: 40 mm Clearance: 0 to 6 mm	10 kN flat, pneumatic grips	Punch tip radius: 5 mm Support tip radius: 5 mm (Support tip radius 2 mm up to 3 mm specimen thickness. Supports replaced manually.)
Number of stored specimens	120 max. Specimens/pallet: 6 Max. stored pallets: 20	Pallet-type: 6 specimens/pallet x 20 pallets Magazine-type: 150 specimens (4 mm-thick specimens)	
Extensometer type	Contact type		—
Gauge length (tensile), span (bending)	20 mm/25 mm, manually selected	50 mm (but can handle other gauge lengths)	48 mm to 102 mm, manually selected
Measuring range	100%, 200%, 500%, 1000% at each gauge length	560 mm to gauge length	—
Elongation measurement accuracy	±1% at full-scale measuring range	0.2 mm or less measured value: ±1 µm max. 0.2 to 1 mm: ±2 µm max. 1 to 2 mm: ±0.2% of indicated values Above 2 mm: ±1% of indicated values	—
Thickness measurement method	Batch measurement by linear gauge		Magnescape
Thickness measurement points	3 positions along specimen	Width: 3 points, Thickness: 9 or 3 points	Width: 1 point, Thickness: 3 points
Indenter	3 mm dia. flat surface Force: 16 g (conforms to JIS K 6250)	6 mm dia. flat surface	
Thickness measurement accuracy	Within ±0.01 mm	±5 µm max.	
Recovery method	Specimens fall into recovery box		
Max. load capacity	1kN	10kN	5kN
Test force accuracy	±0.5% of indicated values at 1/250 of the max. load capacity, or above		
Test force measuring range	Range-less	x1, 2, 5, 10, 20, 50, 100 (7 ranges)	
Stroke	850 mm max.	550 mm max.	50 mm max.
Test speed (mm/min)	Set any speed from 5 to 500 mm/min. (5 mm pitch)	0.0005~1000mm/min	
Max. return speed	2000mm/min	1100mm/min	
Speed accuracy	±0.5% or ±0.025 mm/min., whichever is larger	±0.1 % (in 0.5 to 500 mm/min range)	
Sequence control method	Programmable sequencer		
Safety functions	Stroke-end limiter, overstroke limiter, emergency stop button, interlocks on moving parts		
Standard functions	Automatic sag correction (Pat. No. 2014255)		—
Safety functions Standard functions	Supplied functions (conforms to JIS 6250, 6251) 1) Intermediate stress (3 points), max. stress, elongation at break point, thickness, tearing strength (optional) 2) Average, standard deviation, median, range, former JIS average (weighted average) of above values 3) Automatic saving, automatic printing, ASCII conversion and saving of test results (allows data management by MS Excel)	Supplied functions (conforms to JIS K 7161, ISO 527) 1) Modulus of elasticity, yield stress, max. stress, elongation at break point, intermediate stress, intermediate elongation, nominal tensile strain 2) Average, standard deviation and other statistical calculations of above values * Determines 95% confidence interval 3) Automatic saving, automatic printing, ASCII conversion and saving of test results (allows data management by MS Excel)	Supplied functions (conforms to JIS K 7171, ISO 178) 1) Modulus of elasticity, yield stress, max. stress, elongation at break point, intermediate stress, intermediate displacement 2) Average, standard deviation and other statistical calculations of above values * Determines 95% confidence interval 3) Automatic saving, automatic printing, ASCII conversion and saving of test results (allows data management by MS Excel)
Dimensions (mm) W x D x H	900x1400x2000	1450x1800x2000	675x700x1860
Weight (kg)	Approx. 300 kg	Approx. 400 kg	Approx. 200 kg
Required power supply *1	Single-phase 100 V, approx. 1.5 kVA	Single-phase 100 V, approx. 2.5 kVA	Single-phase 100 V, approx. 2.5 kVA
Air supply	Dry, clean air, pressure 0.5 to 7 MPa, 100 L/min. flowrate		

*1: The machine should be connected to an electrical ground.

Part Number Tables

EZ Test Set		MST-I Capacities and Kit Numbers			EZ Graph Capacities and Kit Numbers		AG-IS (table-top) Capacities and Kit Numbers				AG-IS (floor)							
Capacity	Part No.	346-5450X-XX			Capacity	Part No.	Kit No. (AG-IS + load cell set + upper/lower joints)				Kit No.							
500N	346-51991-01	Model <input type="checkbox"/> 0: HR <input type="checkbox"/> 2: HS	Capacity		1N	346-54308	■MS 346-541XX-X1		■MO 346-538XX-X1		■MS 346-541XX-X1							
200N	346-51991-09		Top-mounted load cell	Bottom-mounted load cell	Capacity	2N	346-54307	Capacity <input type="checkbox"/> Measured test force class and guaranteed range	Capacity <input type="checkbox"/> Measured test force class and guaranteed range	Capacity <input type="checkbox"/> Measured test force class and guaranteed range	Capacity <input type="checkbox"/> Measured test force class and guaranteed range	Capacity <input type="checkbox"/> Measured test force class and guaranteed range						
100N	346-51991-02		01	51	0.5N	5N	346-54306						50	1N	0	Class 1 1/250	62	20kN
50N	346-51991-03		02	52	1N	10N	346-54305						51	2N	1	Class 1 1/500	63	50kN
10N	346-51991-05		03	53	2N	20N	346-54304						52	5N	2	Class 0.5 1/250	64	100kN
5N	346-51991-06		04	54	5N	50N	346-54303						53	10N	3	Class 0.5 1/500	65	250kN
2N	346-51991-07		05	55	10N	100N	346-54302						54	25N				
1N	346-51991-08		06	56	25N	200N	346-54301	55	50N									
			07	57	50N	500N	346-54299	56	100N									
			08	58	100N	1kN	346-54298	57	500N	Example Capacity: 5 kN; measured test force class: Class 1; guaranteed range: 1/250 396-54159-01		Example Capacity: 50 kN; measured test force class: 1/500 346-54163-31 For 300 kN capacity, Part						
			09	59	200N	5kN	346-54297	58	1kN									
			10	60	500N	10kN	346-54296	59	5kN									
			11	61	1kN			60	10kN									
		12	62	2kN														

Specifications

Model name		Part No.
Load unit	Test force measuring range	
	Loading method	
	Test force accuracy	
	Test force resolution	
Displacement measurement unit	Method	
	Measuring range (mm)	
	Min. measurement increment (mm)	
	Linearity	
Optical monitor	Total magnification	
	Objective lens	
	Eyepiece	
	Illumination method	
	Illumination lamp	
	Light path	
Optical head	Collimation method	
	Detector	
	Effective measurement range (mm)	
	Min. increment	
Indenter	Upper indenter	
	Lower pressure plate	
Specimen stage	Vertical positioning stage	
	Area	
	Horizontal positioning stage	
	Positioning accuracy	
Test parameters	Test mode	
	Specimen shape	
	Specimen name/number	
	Number of test cycles	
	Comments	
	Data processing items	
Installation conditions	Size (mm) (W x D x H)	
	Weight	
	Temperature	
	Humidity	
	Vibration	
Required power supply		

Micro Compression Testers MCT-W Series

MCT-W500	MCT-W501	MCT-W200	MCT-W201
344-04189-01	344-04189-02	344-04189-03	344-04189-04
9.8~4903mN		9.8~1961mN	
Electromagnetic force			
±1% of the indicated test force or 0.1 mN, whichever is larger			
5 μN (tests to 49 mN)		2 μN (tests to 19 mN)	
Differential transformer			
0~100	0~10	0~100	0~10
0.01	0.001	0.01	0.001
Within ±2% of full scale			
Approx. x100, x500 (x200, x400, x1000 with option)			
x10, x50 (x20, x40, x100 with option)			
x10			
Epi-illumination			
Halogen 20 W/6 V			
Switch between observation and photography			
Individual collimation on both sides (direct link between encoder and knob)			
Optical encoder			
Approx. 200 (with x50 objective lens)			
0.1μm			
Type: flat indenter, 50 mm diameter (500, 200, 100, and 20 mm flat or triangular pyramid indenters available as options) Material: diamond Weight: 2.1 g ± 0.02 g			
SKS flat plate (diamond pressure plate available as an option)			
Approx. 60 mm			
Approx. 130 mm (W) x 130 mm (D)			
25 mm in both X and Y directions Min. increment: 0.01 mm (0.001 mm with option)			
Within ±0.5 mm			
Compression test, load/unload test, cyclic test			
Particle, fiber, other			
Max. 16 alphanumeric characteristics			
Max. 1000			
Max. 32 alphanumeric characteristics			
Compression strength calculation, Display test parameters and results, Display test force and displacement data, Display test force – displacement curves, Display test force – displacement identification values, Display strength – particle size curves, Display displacement – time curves, Display strength – parameter curves			
Tester: 355 x 525 x 650, Controller: 420 x 370 x 160			
Tester: approx. 45 kg, Controller: approx. 13 kg			
Recommended temperature: 22°C ± 1°C, Operating temperature range: 10 to 35°C, Temperature fluctuations during operation: within ±1°C			
80% max. (no condensation)			
20 mGal max. (vertical and horizontal)			
AC 100 V ± 10 V, 800 W			

Specifications TEOS

Model name	TEOS-1N ~ 10kN	TEOS-20kN ~ 50kN
Load Capacity	1, 2, 5, 10, 20, 50, 100, 200, 500N 1, 2, 5, 10kN (13 models)	20kN, 50kN (2 models)
Loading Method	Direct high-precision constant strain rate control using backlashless precision ball screw drive	
Test Force Measurement Precision	Within ±0.5% of indicated test force (Given a 1/1 to 1/50 range of rated capacity of load cell)	
Crosshead Speed Range	0.0005 ~ 1000 (mm/min)	
Return Speed	1000 (mm/min)	1100 (mm/min)
Crosshead Speed Precision	±0.1% (Given a 0.5 to 500 mm/min range)	
Crosshead Speed and Allowable Load	Maximum capacity at any speed	
Maximum Length of Tension Coil Springs	Refer to Tension Springs in the list of compatible sizes	
Distance Between Compression Plates	Refer to Compression Coil Springs and Conical Springs in the list of compatible sizes	
Sampling Speed	10, 50, 100, 150, 200...600,000msec	
Frame Rigidity	Approx. 42 kN/mm	Approx. 120 kN/mm
Debris Containment Cover	Front side upper and lower slide type (280 mm cover height)	Front side upper and lower slide type (690 mm cover height)
Dimensions (mm)	680 x 510 x 1115 (loading unit and measurement controller)	845 x 500 x 1625 (loading unit)
Width, Depth and Height	80 x 50 x 250 (smart controller)	200 x 430 x 600 (measurement controller) 80 x 50 x 250 (smart controller)
Weight (without jigs)	95kg	280 kg (loading unit) 20 kg (measurement controller)
Power Supply Requirements	Single-phase, 100-110/115-130/220-230/240V (switchable) 600VA (Provide power for PC separately) Power Consumption 500VA,	Single-phase 200V 4 kVA (Provide power for PC separately) Power Consumption 1.5 kVA,
The machine should be connected to an electrical ground.		

mounted) Capacities and Kit Numbers	AG-20/50kNISD (tabletop) Capacities and Kit Numbers	AGS-J Kit	ENT-150		TEOS																																																																																																																																																					
			TYPE I	TYPE II	P/N	Part name	Guaranteed Precision Range (Class 0.5)																																																																																																																																																			
(AG-IS + load cell set + upper/lower joints)	Kit No. (AG-IS + load cell set + upper/lower joints)	Capacity Part No.	346-52664-XX	346-52664-02	346-54700-71	TEOS-1N (0.2 lbf)	20 - 1000mN																																																																																																																																																			
<p>Measured test force class and guaranteed range</p> <p>MO 346-5380X-X1</p> <table border="1"> <tr><td>0</td><td>Class 1</td><td>1/250</td><td>3</td><td>20kN</td><td>0</td><td>Class 1</td><td>1/250</td></tr> <tr><td>1</td><td>Class 1</td><td>1/500</td><td>2</td><td>50kN</td><td>1</td><td>Class 1</td><td>1/500</td></tr> <tr><td>2</td><td>Class 0.5</td><td>1/250</td><td>1</td><td>100kN</td><td>2</td><td>Class 0.5</td><td>1/250</td></tr> <tr><td>3</td><td>Class 0.5</td><td>1/500</td><td>0</td><td>250kN</td><td>3</td><td>Class 0.5</td><td>1/500</td></tr> </table> <p>Example Capacity: 50 kN; measured test force class: Class 0.5; guaranteed range: 1/500 346-53802-31 For 300 kN capacity, Part No. is 346-53799-XX</p>	0	Class 1	1/250	3	20kN	0	Class 1	1/250	1	Class 1	1/500	2	50kN	1	Class 1	1/500	2	Class 0.5	1/250	1	100kN	2	Class 0.5	1/250	3	Class 0.5	1/500	0	250kN	3	Class 0.5	1/500	<p>MS 346-541XX-X1</p> <table border="1"> <tr><td>66</td><td>50kN</td><td>0</td><td>Class 1</td><td>1/250</td></tr> <tr><td>67</td><td>20kN</td><td>1</td><td>Class 1</td><td>1/500</td></tr> <tr><td></td><td></td><td>2</td><td>Class 0.5</td><td>1/250</td></tr> <tr><td></td><td></td><td>3</td><td>Class 0.5</td><td>1/500</td></tr> </table> <p>MS 346-541XX-X1</p> <table border="1"> <tr><td>68</td><td>50kN</td><td>0</td><td>Class 1</td><td>1/250</td></tr> <tr><td>69</td><td>20kN</td><td>1</td><td>Class 1</td><td>1/500</td></tr> <tr><td></td><td></td><td>2</td><td>Class 0.5</td><td>1/250</td></tr> <tr><td></td><td></td><td>3</td><td>Class 0.5</td><td>1/500</td></tr> </table>	66	50kN	0	Class 1	1/250	67	20kN	1	Class 1	1/500			2	Class 0.5	1/250			3	Class 0.5	1/500	68	50kN	0	Class 1	1/250	69	20kN	1	Class 1	1/500			2	Class 0.5	1/250			3	Class 0.5	1/500	<table border="1"> <tr><td>10kNJ</td><td>346-53813-01</td></tr> <tr><td>5kNJ</td><td>346-53814-01</td></tr> <tr><td>1kNJ</td><td>346-53815-01</td></tr> <tr><td>500NJ</td><td>346-53816-01</td></tr> <tr><td>100NJ</td><td>346-53817-01</td></tr> <tr><td>50NJ</td><td>346-53818-01</td></tr> <tr><td>20NJ</td><td>346-53819-01</td></tr> <tr><td>10NJ</td><td>346-53820-01</td></tr> <tr><td>5NJ</td><td>346-53821-01</td></tr> <tr><td>2NJ</td><td>346-53822-01</td></tr> <tr><td>1NJ</td><td>346-53823-01</td></tr> </table>	10kNJ	346-53813-01	5kNJ	346-53814-01	1kNJ	346-53815-01	500NJ	346-53816-01	100NJ	346-53817-01	50NJ	346-53818-01	20NJ	346-53819-01	10NJ	346-53820-01	5NJ	346-53821-01	2NJ	346-53822-01	1NJ	346-53823-01	<table border="1"> <tr><td>500N</td><td>346-52770-01</td></tr> <tr><td>250N</td><td>346-52770-02</td></tr> <tr><td>100N</td><td>346-52770-03</td></tr> <tr><td>50N</td><td>346-52770-04</td></tr> <tr><td>25N</td><td>346-52770-05</td></tr> <tr><td>10N</td><td>346-52770-06</td></tr> <tr><td>5N</td><td>346-52770-07</td></tr> </table>	500N	346-52770-01	250N	346-52770-02	100N	346-52770-03	50N	346-52770-04	25N	346-52770-05	10N	346-52770-06	5N	346-52770-07	<table border="1"> <tr><td>346-54700-72</td><td>TEOS-2N (0.4 lbf)</td><td>40 - 2000mN</td></tr> <tr><td>346-54700-73</td><td>TEOS-5N (1 lbf)</td><td>0.1 - 5N</td></tr> <tr><td>346-54700-74</td><td>TEOS-10N (2 lbf)</td><td>0.2 - 10N</td></tr> <tr><td>346-54700-75</td><td>TEOS-20N (4 lbf)</td><td>0.4 - 20N</td></tr> <tr><td>346-54700-76</td><td>TEOS-50N (10 lbf)</td><td>1 - 50N</td></tr> <tr><td>346-54700-77</td><td>TEOS-100N (20 lbf)</td><td>2 - 100N</td></tr> <tr><td>346-54700-78</td><td>TEOS-200N (40 lbf)</td><td>4 - 200N</td></tr> <tr><td>346-54700-79</td><td>TEOS-500N (100 lbf)</td><td>10 - 500N</td></tr> <tr><td>346-54701-71</td><td>TEOS-1kN (200 lbf)</td><td>20 - 1000N</td></tr> <tr><td>346-54701-72</td><td>TEOS-2kN (400 lbf)</td><td>40 - 2000N</td></tr> <tr><td>346-54701-73</td><td>TEOS-5kN (1 kip)</td><td>0.1 - 5kN</td></tr> <tr><td>346-54701-74</td><td>TEOS-10kN (2 kip)</td><td>0.2 - 10kN</td></tr> <tr><td>346-54702-71</td><td>TEOS-20kN (4 kip)</td><td>0.4 - 20kN</td></tr> <tr><td>346-54702-72</td><td>TEOS-50kN (10 kip)</td><td>1 - 50kN</td></tr> </table>	346-54700-72	TEOS-2N (0.4 lbf)	40 - 2000mN	346-54700-73	TEOS-5N (1 lbf)	0.1 - 5N	346-54700-74	TEOS-10N (2 lbf)	0.2 - 10N	346-54700-75	TEOS-20N (4 lbf)	0.4 - 20N	346-54700-76	TEOS-50N (10 lbf)	1 - 50N	346-54700-77	TEOS-100N (20 lbf)	2 - 100N	346-54700-78	TEOS-200N (40 lbf)	4 - 200N	346-54700-79	TEOS-500N (100 lbf)	10 - 500N	346-54701-71	TEOS-1kN (200 lbf)	20 - 1000N	346-54701-72	TEOS-2kN (400 lbf)	40 - 2000N	346-54701-73	TEOS-5kN (1 kip)	0.1 - 5kN	346-54701-74	TEOS-10kN (2 kip)	0.2 - 10kN	346-54702-71	TEOS-20kN (4 kip)	0.4 - 20kN	346-54702-72	TEOS-50kN (10 kip)	1 - 50kN
0	Class 1	1/250	3	20kN	0	Class 1	1/250																																																																																																																																																			
1	Class 1	1/500	2	50kN	1	Class 1	1/500																																																																																																																																																			
2	Class 0.5	1/250	1	100kN	2	Class 0.5	1/250																																																																																																																																																			
3	Class 0.5	1/500	0	250kN	3	Class 0.5	1/500																																																																																																																																																			
66	50kN	0	Class 1	1/250																																																																																																																																																						
67	20kN	1	Class 1	1/500																																																																																																																																																						
		2	Class 0.5	1/250																																																																																																																																																						
		3	Class 0.5	1/500																																																																																																																																																						
68	50kN	0	Class 1	1/250																																																																																																																																																						
69	20kN	1	Class 1	1/500																																																																																																																																																						
		2	Class 0.5	1/250																																																																																																																																																						
		3	Class 0.5	1/500																																																																																																																																																						
10kNJ	346-53813-01																																																																																																																																																									
5kNJ	346-53814-01																																																																																																																																																									
1kNJ	346-53815-01																																																																																																																																																									
500NJ	346-53816-01																																																																																																																																																									
100NJ	346-53817-01																																																																																																																																																									
50NJ	346-53818-01																																																																																																																																																									
20NJ	346-53819-01																																																																																																																																																									
10NJ	346-53820-01																																																																																																																																																									
5NJ	346-53821-01																																																																																																																																																									
2NJ	346-53822-01																																																																																																																																																									
1NJ	346-53823-01																																																																																																																																																									
500N	346-52770-01																																																																																																																																																									
250N	346-52770-02																																																																																																																																																									
100N	346-52770-03																																																																																																																																																									
50N	346-52770-04																																																																																																																																																									
25N	346-52770-05																																																																																																																																																									
10N	346-52770-06																																																																																																																																																									
5N	346-52770-07																																																																																																																																																									
346-54700-72	TEOS-2N (0.4 lbf)	40 - 2000mN																																																																																																																																																								
346-54700-73	TEOS-5N (1 lbf)	0.1 - 5N																																																																																																																																																								
346-54700-74	TEOS-10N (2 lbf)	0.2 - 10N																																																																																																																																																								
346-54700-75	TEOS-20N (4 lbf)	0.4 - 20N																																																																																																																																																								
346-54700-76	TEOS-50N (10 lbf)	1 - 50N																																																																																																																																																								
346-54700-77	TEOS-100N (20 lbf)	2 - 100N																																																																																																																																																								
346-54700-78	TEOS-200N (40 lbf)	4 - 200N																																																																																																																																																								
346-54700-79	TEOS-500N (100 lbf)	10 - 500N																																																																																																																																																								
346-54701-71	TEOS-1kN (200 lbf)	20 - 1000N																																																																																																																																																								
346-54701-72	TEOS-2kN (400 lbf)	40 - 2000N																																																																																																																																																								
346-54701-73	TEOS-5kN (1 kip)	0.1 - 5kN																																																																																																																																																								
346-54701-74	TEOS-10kN (2 kip)	0.2 - 10kN																																																																																																																																																								
346-54702-71	TEOS-20kN (4 kip)	0.4 - 20kN																																																																																																																																																								
346-54702-72	TEOS-50kN (10 kip)	1 - 50kN																																																																																																																																																								

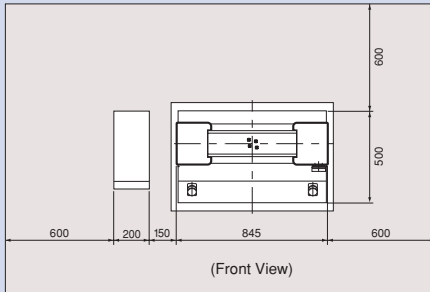
External Dimensions and Installed Space

AG-IS Autograph and EZ Graph Compact Tabletop Tester

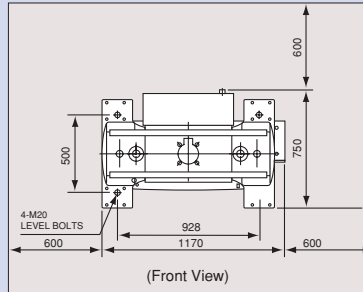
(The space around the tester is required for maintenance.)

MS

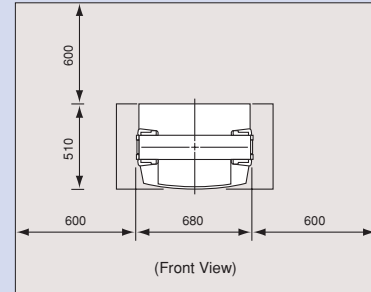
AG-20/50kNISD



AG-20kNIS to 300kNIS

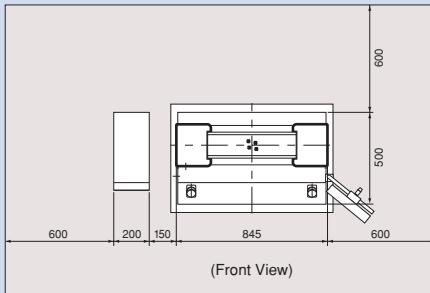


AG-1NIS to 10kNIS
EZGraph

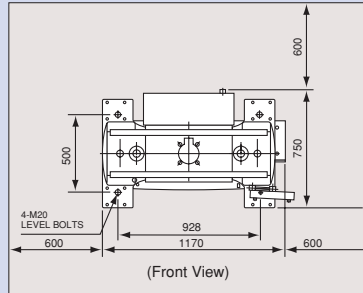


MO

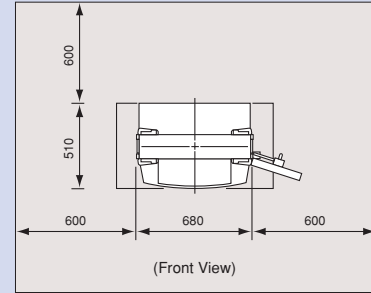
AG-20/50kNISD



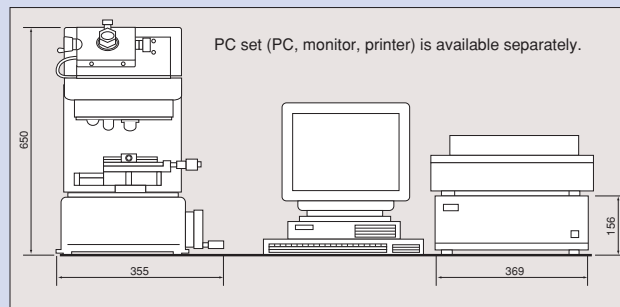
AG-20kNIS to 300kNIS



AG-1NIS to 10kNIS



Micro Compression Tester MCT-W



Units: mm



SHIMADZU CORPORATION. International Marketing Division

3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan Phone: 81(3)3219-5639 Fax: 81(3)3219-5710
Cable Add.: SHIMADZU TOKYO

SHIMADZU SCIENTIFIC INSTRUMENTS, INC.

7102 Riverwood Drive, Columbia, Maryland 21046, U.S.A.
Phone: 1(410)381-1227 Fax: 1(410)381-1222 Toll Free: 1(800)477-1227

SHIMADZU DEUTSCHLAND GmbH

Albert-Hahn-Strasse 6-10, D-47269 Duisburg, F.R. Germany Phone: 49(203)7687-0 Fax: 49(203)766625

SHIMADZU (ASIA PACIFIC) PTE LTD.

16 Science Park Drive #01-01 Singapore Science Park, Singapore 118227, Republic of Singapore
Phone: 65-6778 6280 Fax: 65-6779 2935

SHIMADZU SCIENTIFIC INSTRUMENTS (OCEANIA) PTY. LTD.

Units F, 10-16 South Street Rydalmere N.S.W. 2116, Australia
Phone: 61(2)9684-4200 Fax: 61(2)9684-4055

SHIMADZU DO BRASIL COM RCIO LTDA.

Avenida Marquês de S. Vicente, 1771. Barra Funda CEP: 01139-003 - S. Paulo-SP, Brasil
Phone: (55)11-3611-1688 Fax: (55)11-3611-2209

SHIMADZU (HONG KONG) LIMITED

Suite 1028 Ocean Center, Harbour City, Tsim Sha Tsui, Kowloon HONG KONG
Phone: (852)2375-4979 Fax: (852)2199-7438

Overseas Offices

Istanbul, Beijing, Shanghai, Guangzhou, Shenyang, Chengdu, Moscow

URL <http://www.shimadzu.com>



JQA-0376