Table-Top Type Precision Universal Tester

Autograph AGS-X Series
Now more convenient to use

**NEW** Smarter Work Space
Everything you need in a standalone tester

- Open multi-table design  →  P. 06
- New one-touch stroke limiters + safety guard (option)  →  P. 07
- Main operation panel to call up test methods from the PC  →  P. 07
- Optional jog controller for convenient crosshead positional adjustments  →  P. 07

**NEW** Even the Complex Becomes Easy
Macros automate saving and transfer of test results and report printing

- TRAPEZIUM X software Quest for Convenience  →  P. 10
- TRAPEZIUM LITE X software Simple Software Enhances Productivity  →  P. 12

**NEW** Convincing Specifications
Top-end machine performance from a table-top tester

- Guaranteed test force range: ±0.5% indicated value (from 1/500 to 1/1 load cell rating)  →  P. 18
- Testing speed: 0.001 to 1,000 mm/minute  →  P. 18
- Return speed: 1,500 mm/minute  →  P. 18
- High-speed sampling: 1 msec  →  P. 18
One-Touch Stroke Limiters

Pinch and slide; release to lock. One-touch stroke limiters permit simple one-touch adjustment and firm locking of the crosshead stroke limit positions.

Crosshead

Achieves 1,500 mm/minute return speed, significantly reducing the time required to conduct repetitive testing. Example: Time to return a distance of 250 mm is reduced from 40 s to 12 s. This would save one hour when testing 120 specimens.

Multipurpose Tray

Large space in front of the instrument. Perfect for placing jigs, arranging specimens, or taking notes.

Emergency Stop Button

Reliably cuts off power to the servo amplifier, instantaneously stopping crosshead movement in the event of an emergency.
Safety Guard to Protect Against Flying Debris (option)

A vertically sliding safety guard is available as an option. Opens easily with one hand. When the safety guard is open, an interlock function disables testing and return movement.

Load Cell

Over the range from 1/500 to 1/1 of the load cell rating, a single load cell that guarantees test force accuracy to ±0.5% of the indicated value* covers an extensive testing range. The load cell rated value is stored in the calibration cable and automatically recognized when the cable is connected.

* For high-precision type.

Jog Controller (option)

Allows hand-held control of the crosshead position. The jog dial makes fine positioning a breeze.

Main Operation panel

Conduct testing by calling up the test methods from TRAPEZIUM LITE X software. Naturally, AGS-X can be used as a standalone tester to test specimens using test methods created with the tester itself.

New AGS-X functions provide great support for testing work.
Greater Ease-of-Operation

The heights of the multipurpose tray and table for jig mounting have been significantly lowered. Being a full 58 mm lower than on previous models, the multipurpose tray is at a comfortable working height. The open design of the multipurpose tray surface can accommodate a large number of test specimens and jigs.
Comprehensive Safety Measures (Option)

The optional safety guard can be opened and closed easily with one hand, and does not impair testing work. The one-touch stroke limiters make limit adjustments easy. The touch-load function automatically stops crosshead movement if trapped foreign matter is detected during jog operations.

Precision Position Adjustments (Option)

The optional jog controller permits fine adjustments of the crosshead position without taking your eyes off the test space.

Accessible Control

Testing can be conducted from the main operation panel on the tester. The operator does not need to move backwards and forwards between the tester and PC.
Simply Concentrate on the Test Work

There is no need to touch the mouse or keyboard. A close tie-up between the significantly improved functions of the AGS-X and the macros offered by the TRAPEZIUM LITE X software dramatically enhances the efficiency of repetitive testing operations.

**STEP 1** Preparations

- Simply press the PC POWER button to start the operating system, run TRAPEZIUM LITE X, and automatically bring up the home page. *Manual operation is also possible.*
- The load cell rating is recognized automatically when the power switch is turned on.* An electrical test force calibration must be conducted after the load cell temperature stabilizes.

**STEP 2** Select Methods

- From the AGS-X operation panel, call up test methods previously created and saved in the PC. *To conduct testing with no PC, select test methods created with the AGS-X unit itself.*
- When the test conditions are called up using the AGS-X operation panel, the PC automatically displays the window to start testing.
STEP 3

Start Test

Automatic Report Creation and Transfer

• Simply press the START button to start the test.

• When the test starts, the test force and stroke are displayed on the PC screen.

• When a test (sub-batch) is complete, the test results can be automatically saved and printed. (Alternatively, reports can be printed when required from the AGS-X operation panel.) The test data can also be automatically transmitted to the administrator’s PC.

* A network environment is required to transmit test data.
Quest for Convenience

Materials Testing Software
TRAPEZIUM X

Compatible with Windows 7

Intuitive Machine Operation

Perform high-efficiency, continuous testing because of fast data searches and one-touch method selection

• Start testing in just one step after frequently-used methods are recorded in the Quick Method List.
• Use a key word or date to quickly search for saved test results and Method files. Also, easily call up files using previews of reports and lists of settings.
• Complicated method settings can be entered using the Method Wizard, which provides an overview of the entire process.
• Setting entry guidance, linked to online help, is available in each window.
• Easy-to-understand illustrations are used in the [Testing], [Specimen] and [Data Processing] windows, greatly simplifying the entry of settings.

Visual wizard guidance ensures trouble-free entry of method settings

• Complicated method settings can be entered using the Method Wizard, which provides an overview of the entire process.
• Setting entry guidance, linked to online help, is available in each window.
• Easy-to-understand illustrations are used in the [Testing], [Specimen] and [Data Processing] windows, greatly simplifying the entry of settings.

Data processing settings (single software: plastic material)

1. General data processing items are prepared in advance. Simply press buttons on the figure to select settings.
2. Illustrations change according to the test mode and specimen material. Use a key word or date to quickly search for saved test results and Method files. Also, easily call up files using previews of reports and lists of settings.

Specimen quantity and size settings window

1. Illustrations are displayed for each specimen shape. A single glance shows which dimensions should be entered.
2. In addition to manual input, dimensions can also be set via [Excel batch reading] or [Automatic input via calipers].
3. Additional, non-dimensional information can also be entered for each specimen.
Receive Data Quickly

Speed, dimension, and report information can be entered quickly and directly from the main window using the [Quick Panel].

Advanced navigation system with learning functions

AG-X is equipped with a Navigation Bar that shows only the functions required for a selected situation. This allows you to efficiently perform continuous testing using simple, straightforward procedures and by pressing large, easy-to-read buttons. AG-X is also equipped with a “Learning function” that records user actions for each situation and adds frequently-used functions to the Navigation Bar. This means that the more you use the machine, the better the “fit” is to your unique operation style, effectively speeding up your workflow.

Functions include re-test, file synthesis, as well as specimen insertion, addition and order changes in any position.

• Re-test: A portion of a batch test can be retested, and the prior test results replaced.
• Extra lot tests: batches (lots) can be added, increasing the total number of tests.
• A variety of setting changes are possible before and after testing. Specimens can be inserted in any position or added to only a specific batch, and the specimen order can be changed after testing is completed.

Generate Detailed Reports

Richly expressive report creation includes free positioning of report elements and a wealth of web-compatible output functions.

• Report Designer allows flexible layout
  Create reports that include test data, charts, photographs and logos.
  Freely change report layout and element sizes.
  Use detailed settings for each element’s font, color and ruled lines.

• Reports can be output in PDF, Microsoft Word, Excel and HTML formats.
  Output reports created with Report Designer in a wide variety of useful formats.
  (Charts and tables with ruled lines cannot be output in Word and HTML.)
  After export, use your everyday software to customize the report.

Choose from Four Software Components to Fit Your Specific Application

TRAPEZIUM X includes four software components - Single, Cycle, Control and Texture. This allows you to purchase only the components that meet your specific testing needs. When multiple software components are purchased, easily switch between modes at a single touch, without starting up separate software.

- **Single software**
  Performs general single-direction testing.
  Examples include tensile, compression, bending and peeling tests.

- **Cycle software**
  Similar to endurance testing, this software is used for testing where force is repeatedly applied and then released.

- **Control software**
  Create any testing machine operation pattern. Perform foam rubber compression and holding cycle tests.

- **Texture software**
  Measures the features (texture) of foods and pharmaceuticals. Produce special data processing results, including mastication, jelly strength and adhesion.
Simple Screen Layout

Few buttons ensure easily navigated operations
One-touch test method selection
As the number of displayed buttons is restricted according to the login authority, the operator uses very simple screen displays for operations.
To start a test, simply select the test methods from a list.
For a clearer display, just the required information can be selected for display during testing, such as the maximum size graph or the test results.

Supports Industry Standards

Recording convenient test method files enables instant testing
Test method files for rubbers, plastics, and films that comply with JIS/ISO/ASTM standards are provided. The terminology and data processing items specified in the test standard are pre-registered in the respective test method file to permit smooth testing in compliance with the test standards.

* The test method files supplied on the installation CD may not conform to the latest standards. Test results obtained using these test method files are not guaranteed.
Quick Method List Makes Testing Easy

No mouse or keyboard required
Register often-used test methods to the Quick Method List to start testing instantly. The registered test methods can be directly selected or edited at the AGS-X tester, making testing easy even for users who find using a PC troublesome.

Macros Enhance Work Efficiency

Just set up the test and start testing. All tedious operations have been automated.
The sequence of operations frequently conducted after testing can be fully automated. Functions for coordinating with the AGS-X permit saving of test data and report generation and printing without touching a PC.

Statistical Process Control Functions

Effectively utilize daily test results.
Test results can be extracted and compiled over a fixed period to create histograms and XBar-R control charts. Statistics can be compiled on daily test results by date, by specimen, or by batch, and the statistical results displayed on screen. Text can be added to statistical information for printing or output to a pdf file.
Extension Measurements on Soft Plastics and Rubber

Example: Combination with SES-1000 Extensometer for soft specimens

Offers easy and highly accurate measurements of gauge length elongation on highly elastic specimens. Ideal for long-stroke testing of plastics and rubber. Using pneumatic flat grips facilitates specimen loading and unloading to further improve testing efficiency.

Equipment Configuration

1. Tester Main Unit (Standard precision) AGS-1kNX STD kit
2. Extensometer for Soft Specimens SES-1000
3. Pneumatic Flat Grips PFG-1kNA kit
**Grips**

For hard specimens
Non-shift Wedge Type Grips
MWG Series

Wedge action generates a large holding force from a small clamping force. The most popular type of grip.

For low-slip specimens
Screw Type Flat Grips
SCG Series

Preset the position of one grip face according to the thickness or diameter of the specimen, and subsequently load and unload specimens by operating the other grip face only.

For large numbers of tests
Pneumatic Flat Grips
PFG Series

Grip faces open and close by foot valve or foot switch operation. These grips can be interlocked with the tester (option). Maintain a constant clamping force, even if the specimen thickness decreases.

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**Extensometer**

For large numbers of tests
Automatic Extensometer
SIE Series

Automatic gauge position detection, gauge length setting, and arm clamping and unclamping to specimen.

* Requires TRAPEZIUM LITE X (option).

For all specimen materials
Digital Video Type Non-Contact Extensometer
TRView X

 Conducts gauge length elongation measurements on specimens, based on CCD camera images. Accurate elongation measurements over an extensive range.

For hard specimens
Strain Gauge Type One-touch Extensometer
SSG-H Series

Lightweight, compact extensometer that can be attached or removed by a simple, one-touch operation.

* Requires external amplifier (option).

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**Replace Jigs for Compression or Bending Testing**

**Compression plate**

Compression Test

Fixed Type Compression Plate
General-purpose type with fixed upper and lower compression plates.

Spherical Seat Type Compression Plate
Upper compression plate has a spherical seat to apply a more uniform test force across the specimen surface.

**Bending Jig**

Three-Point Bending Test for Plastic

Three-Point Bending Test Jig for Plastic
Three-point bending test jig for plastics conforming to JIS, ISO, and ASTM standards. Replace the support set to accommodate different test specimen thickness standards.
Testing in Controlled Environments

Example: Combination with TCE-300 Compact Type Thermostatic Chamber.

Enables testing across a temperature range from −70°C to +280°C. Allows testing in reproducible operating environments. Using the pull rod (extension connector rod included in the in-chamber tensile kit) allows the grips to be located inside the thermostatic chamber.

Equipment Configuration

1. Tester Main Unit (Standard precision) AGS-1kNX STD Kit*
2. Compact Type Thermostatic Chamber TCE-N300
3. Screw Type Flat Grips SCG-5kNA
4. In-Chamber Tensile Kit For AGS1kN to 100N

* Consult your Shimadzu representative if you wish to use the safety guard and thermostatic chamber together.
For frequent low-temperature testing

Refrigerator Type Thermostatic Chamber
TCR Series

Temperature Range
-35 °C to +250 °C (TCR1)
-60 °C to +250 °C (TCR2)

Ideal for frequent low-temperature testing, as the temperature is reduced using a refrigerator. Models TCR-1 and TCR-2 accommodate different temperature ranges.

Heating: Heater  Cooling: Refrigerator

For testing over a wide temperature range

Gas Jet Type Thermostatic Chamber
TCL, TCH Series

Temperature Range
-180 °C to +320 °C (TCL-N)
-70 °C to +320 °C (TCL-C)
+50 °C to +320 °C (TCH)

Liquid nitrogen or carbon dioxide is injected to lower the temperature. Offers colder testing environments than the refrigerator type.

Heating: Heater  Cooling: Liquid nitrogen or CO2 injection

For testing under constant temperature and humidity conditions

Refrigerator Type Environmental Temperature and Humidity Chamber

Temperature Range
+20 °C to 60 °C
(-40 °C to 250 °C with no humidity control)

Humidity Range
40% to 95%

Optimal chamber for testing materials with mechanical properties sensitive to temperature and humidity effects, such as fibers, paper, or films.

Temperature regulation: Automatic control by heater and refrigerator

Adhesive Force and Friction Force Measurements

Grips

For adhesive tape peeling tests
Adhesive Tape Peeling Test Device

The sample table slides in synchronization with the upper grip movement to maintain a 90° peeling angle. Peeling test jig compliant with JIS Z0237 and JIS Z1528.

Grips

For adhesion testing of rubber
Rubber Adhesive Strength Test Device

Conducts adhesion tests on rubber adhered to two parallel metal plates. Adhesion test jig compliant with JIS K6256, JIS K6250, and ASTM D429.

Grips

For coefficient of friction measurements on plastics and films
Friction Modulus Test Device

For measurements of the coefficient of sliding friction between identical plastics or films or between different materials across the continuous range from static friction to dynamic friction. Two versions: compliant with JISK7312 / ASTM 1894 and compliant with JIS K7125 / ISO 8295.

Jigs for Specific Specimen Shapes

Grips

For testing cord specimens
Pneumatic Capstan Type Grips for Yarn

These grips grip a yarn or cord specimen from the capstan (winch). The pneumatic operation allows application of an initial test force.

Grips

For dedicated tensile testing of O-rings

1 kN Roller Type Grips

The O-ring is hooked onto rollers, which rotate during tensile testing. Conforms to JIS K6251, JISK7312, ISO 37, and ASTM D412 test standards.

Table-Top Type Precision Universal Tester

Autograph AGS-X Series
# Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>AGS-1N/2N/5NX</th>
<th>AGS-10N/20N/50NX</th>
<th>AGS-100NX</th>
<th>AGS-500NX</th>
<th>AGS-1kNX</th>
<th>AGS-5kNX</th>
<th>AGS-10kNX</th>
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<tr>
<td>Capacity</td>
<td>1N</td>
<td>2N</td>
<td>5N</td>
<td>10N</td>
<td>20N</td>
<td>50N</td>
<td>100N</td>
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</table>

## Loading Method
- Direct high-precision constant speed strain control method via non-backlash ball screw drive

## Force Measurement
- **High-Precision Type**
  - Within ±0.5% indicated test force (at 1/500 to 1 load cell rating)
  - Conforms to EN 10002-2 Grade 0.5, ISO 7500-1 Class 0.5, BS 1610 Class 0.5, and ASTM E4, JIS 8772 Class 0.5. *1
- **Standard-Precision Type**
  - Within ±1% indicated test force (at 1/500 to 1 load cell rating)
  - Conforms to EN 10002-2 Grade 1, ISO 7500-1 Class 1, BS 1610 Class 1, and ASTM E4, JIS 8772 Class 1. *1

## Calibration
- Automatic test force calibration: select tensile, compression, or tensile and compression

## Crosshead
- **Speed Range**
  - 0.001 to 1000 mm/min (stepless)
- **Max. Return Speed**
  - 1500 mm/min
- **Crosshead Speed Accuracy** *2
  - ±0.1%
- **Crosshead Speed and Permitted Test Force**
  - To load cell capacity across entire speed range

## Effective Test Width
- 425mm

## Crosshead – Table Distance (Tensile stroke) *3

<table>
<thead>
<tr>
<th></th>
<th>1N</th>
<th>2N</th>
<th>5N</th>
<th>10N</th>
<th>20N</th>
<th>50N</th>
<th>100N</th>
<th>500N</th>
<th>1kN</th>
<th>5kN</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>965mm, SCG</td>
<td>940mm, SCG</td>
<td>935mm, SCG</td>
<td>930mm, SCG</td>
<td>780mm, MWG</td>
<td>1885mm, SCG</td>
<td>760mm, MWG</td>
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</table>

## Crosshead – Table Distance (Compression stroke) *3

<table>
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<tr>
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<th>2N</th>
<th>5N</th>
<th>10N</th>
<th>20N</th>
<th>50N</th>
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</table>

## Crosshead Position Detection
- **Measurement Method**
  - Optical encoder
- **Display Method**
  - Digital display (display resolution: 0.001 mm)
- **Positional Accuracy**
  - ±0.1% indicated value or ±0.01 mm, whichever is larger

## Sampling Speed
- 1 ms max. *4

## Test Method Files
- 40 files (PC link: 20 files, standalone controller: 20 files)

## Standard Functions
- Automatic reading of load cell characteristic values
- Test force display function, Stress display function- Stroke display function
- Position display function
- External analog output (2 channels)
- External analog input (2 channels) *4
- External digital input (2 channels) *4
- Analog recorder (option) output
- Dataletty (option) output *5
- Automatic test force / stress control (Autotuning)
- Automatic strain control (Autotuning) *4
- Test force auto-zeroing
- Test force auto-calibration
- Break detection, auto-return
- Load cell overload detection
- Touch-load detection function

## Accessories
- **Load Cell (with CAL cable)**
  - 1N
  - 2N
  - 5N
  - 10N
  - 20N
  - 50N
  - 100N
  - 500N
  - 1kN
  - 5kN
  - 10kN
- **Others**
  - Power cable (2.5 m), power fuse, turning rod, cable clamps, instruction manual

## Dimensions and Weight
- **Standard type**
  - 653 mm (W) × 520 mm (D) × 1603 mm (H), Approx. 85 kg
  - 250 mm extension type: 653 mm (W) × 520 mm (D) × 1853 mm (H), Approx. 90 kg
  - 500 mm extension type: 653 mm (W) × 520 mm (D) × 2103 mm (H), Approx. 95 kg

## Power Requirements
- Single phase 100/120/220/240 V AC (switching type) 50/60 Hz 1.2 kVA
- Supply voltage fluctuations within ±10% of the set value. D-class (100 Ω max.) grounding resistance.

## Power Consumption
- 300W

## Operating Environment
- Temperature: 5 °C to 40 °C
- Humidity: 20% to 80% (no condensation)
- Floor vibrations: frequency 10 Hz max., amplitude 5 μm max.

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*1 Official certification after installation is recommended to comply with EN 10002-2, ISO 7500-1, and ASTM E4 standards, JIS 87721.

*2 Crosshead speed accuracy is calculated from the crosshead travel within a prescribed time at a constant speed between 0.5 mm/minute and 500 mm/minute.

*3 The tensile stroke is the effective stroke when SCG (screw type flat grips) or MWG (non-shift wedge type grips) are mounted.

*4 TRAPEZIUM LITE X is needed for these functions.

*5 Dataletty (option) and TRAPEZIUM X / TRAPEZIUM LITE X can not be used together.

Note: Values stated in this catalog are based on measurements conducted according to separately defined inspection standards.

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## TRAPEZIUM LITE X PC Requirements

<table>
<thead>
<tr>
<th>OS</th>
<th>Windows 7, Windows Vista® Business or Windows XP® Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor Resolution</td>
<td>1024 × 768 min.</td>
</tr>
<tr>
<td>CD/DVD Drive</td>
<td>CD-ROM drive</td>
</tr>
<tr>
<td>USB Port</td>
<td>USB 2.0/1.1</td>
</tr>
</tbody>
</table>

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*18
Options

Jog Controller
The jog dial allows manual positioning of the crosshead.

Control I/O Expansion Box
Expands the number of control I/O ports to four ports. Multiple options can be simultaneously connected to the control I/O ports.

Sensor I/O Expansion Box
Expands the number of sensor I/O ports to two ports. Multiple options can be simultaneously connected to the sensor I/O ports. BNC cables can be connected to the analog I/O ports (2 ports each).

Dataletty 5S1
Test results printer. Main printed items:
* Test force and stroke values at maximum force
* Stroke values at breaking point

Analog Recorder
X-T recorder
Plots test force – time curves.
X-Y/T recorder
Plots test force – stroke curve.

Power Cable
EU specification (VDE standard)
Chinese specification (GB standard)
Japanese, N. American specification (UL, CSA, PSE standards)
is supplied as standard.

Other options are also available. For details, refer to the separate catalog (Shimadzu Autograph Optional Accessories).

Expanded Tester Series

Reinforced Yoke Specification
Permits tensile testing in the download direction.

Extended Column Specification
+250mm
+500mm
For testing with a longer test stroke.

Installation Space (Top View)

*Special-purpose desk (option) (Unit: mm)