



SHIMADZU AUTOGRAPH

AGS-X Series

Instruction Manual

Read the instruction manual thoroughly before you use the product. Keep this instruction manual for future reference. This page is intentionally left blank.

Before Using the System

Introduction

Read this instruction manual prior to operating the product.

Thank you for purchasing the AGS-X series AutoGraph testing machine.

This instruction manual includes guidelines for installing the system, precautions that should be followed when using the system, and a description of relevant accessories and optional parts.

Please read the instruction manual carefully before using the testing machine. Keep it stored safely in an accessible location for easy reference.

IMPORTANT

- Read this manual thoroughly before using the product and operate the product in accordance with the instructions in this manual.
- If the user or usage location changes, ensure that this Instruction Manual is always kept together with the product.
- If this manual or a product warning label is lost or damaged, immediately contact your Shimadzu representative to request a replacement.
- To ensure safe operation, read all Safety Instructions before using this product.
- To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, or re-installation (after the product is moved) is required.
- Contact your Shimadzu representative if product or peripheral disposal is required.

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- Any errors or omissions which may have occurred in this manual despite the utmost care taken in its production will be corrected as soon as possible, although not necessarily immediately after detection.

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Indications Used in This Manual

Dangers, Warnings, Cautions, and Notes are indicated using the following conventions:

Symbols	Description	
	Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.	
	Indicates an indirect or potential hazard which, if not avoided, could result in serious injury or death.	
CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor to moderate injury, fire, or equipment damage.	
0 NOTE	Emphasizes additional information that is provided to ensure the proper use of this product.	

<u>Autograph systems generate very large forces</u> used to measure the strength characteristics of materials or products.

In some situations it could cause <u>material damage</u> or <u>serious harm to humans</u> (such as injury or death).

Therefore, to ensure the system is used safely, please thoroughly understand and observe the following warnings.



Operating the system carelessly could result in serious injury or death. Keep hands, head and all other body parts away from the testing space when the crosshead is in motion.



Moving parts can produce dangerous forces corresponding to the system capacity. All operators should read the instruction manual thoroughly to ensure they operate the system correctly. Control access to the system to ensure only trained operators operate the system.



Do NOT open the shaft cover. Do NOT leave the shaft cover open while performing tests. To lubricate the ball screws, open the rubber cap on the side of the column cover and connect the grease gun to the grease nipple on the ball nut.



In the case of using the testing machine without protection cover, keep the face and body away from the test specimen during tests. When the specimen breaks, flying debris could injure eyes or other body parts. Always use a safety guard or other measure to provide protection from broken specimens.

MARNING

Do NOT operate the system in a manner that subjects the crosshead to loads when the load cell is removed and do not operate the system in a manner that does not transmit the load to the load cell. Doing so would cause overloading to be undetected, which could result in damage to the frame or jigs.



Never operate the crosshead without crosshead limit switches in place. Doing so could cause the crosshead to hit the jig and damage the frame, jig, or load cell.

(WARNING

Due to risk of electric shock, never touch inside the controller unit, located in the testing machine.



Due to risk of electric shock, injury, or fire, wiring, maintenance, and inspection work should be perform only by a person with specialized expertise.



To prevent electric shock, always ground power cables (100 Ω Max.).



If replacing fuses, contact your Shimadzu service representative.







If hoisting the system, use belts or equipment with a rated capacity at least twice the load. A belt could break, and injure workers.



If lifting the testing machine with a forklift, place protective blocking on the bottom of the crosshead and keep the height of left and right sides balanced. If the AGS-X unit is wobbly, it could cause injury to workers.



Lifting with a Forklift



Do NOT lift or hoist on the crossyoke. The yoke could break and cause the unit to fall, which could injure workers.



This system includes a built-in safety feature that stops jog or return movements if the load level applied to the load cell varies by more than a given amount.

This feature is one of the safety circuits, but for fast movements it cannot eliminate the risk of overshooting. Furthermore, for safety and operational convenience reasons, this feature will not stop motion in the unloading direction.

Therefore, this feature provides no guarantee that impacts and overloading will be prevented in the testing space.

Also, do NOT use this feature for positioning or other control purposes.

CAUTION

Load cell damage may be unavoidable for overshooting impacts occurring during rapid movements.

The crosshead upper and lower limits expected during a test must be set to proper values. If setting these limits is difficult, determine the setting range so that the gap between the crosshead top jig and the crossyoke and the gap between the crosshead bottom jig and the table jig are 20 mm or more.

! CAUTION



The crosshead moves quickly when returning to the home position. Therefore, keep hands away from moving parts. In addition, make sure the jigs do not hit any equipment in the surrounding area. If an error in testing machine movement occurs, immediately press the emergency stop button.

CAUTION

The load cell and the CAL cable have been calibrated as a pair before shipment. Be sure to use the CAL cable compatible with the load cell, because the CAL cable and load cell are combined as a pair. If an incompatible CAL cable is connected to the load cell, force measurement becomes abnormal, disabling proper over force detection.

CAUTION

Fractured surfaces of hard specimens can be sharp. Wear protective gear to prevent injury when handling broken specimens.

CAUTION

Continuous operation is limited to a maximum 10 hours. Keep this limitation when conducting long test.

! CAUTION

Cycle tests are subject to the following limitations.

- (1) Number of Cycles
- (2) Cycle Frequency

Max. 1000 cycles Max. 3 cycles per minute



The weight of 100N is adjusted to the mass of 10.206kg and it is equivalent to a force of 100N in acceleration-due-to-gravity 9.798 m/s2 in Kyoto.

Warning Labels on the Equipment



Warning Labels on the Equipment



Emergency (Power Failure) Measures

If a malfunction occurs, such as the crosshead not stopping, a burning odor being emitted, or a power failure, take the following actions.

Then inspect the system before using it again and, if necessary, contact your Shimadzu service representative.

Shutting OFF the Machine in an Emergency (Power Failure)

- 1) Press the emergency stop button.
- 2) Switch the AGS-X power OFF.
- 3) Disconnect the power cable from the back of the AGS-X unit.



Location of Emergency Stop Switch and Power Switch

Warranty

Thank you for purchasing the AGS-X series AutoGraph testing machine. Shimadzu provides the following warranty for this product.

- 1. Period Please contact your Shimadzu representative for information about the period of this warranty.
- 2. Description If a product/part failure occurs for reasons attributable to Shimadzu during the warranty period, Shimadzu will repair or replace the product/part free of charge. However, in the case of products which are usually available on the market only for a short time, such as personal computers and their peripherals/parts, Shimadzu may not be able to provide identical replacement products.
- 3. Exceptions: Failures caused by the following are excluded from the warranty, even if they occur during the warranty period.
 - 1) Improper product handling
 - 2) Repairs or modifications performed by parties other than Shimadzu or Shimadzu designated companies
 - Product use in combination with hardware or software other than that designated by Shimadzu
 - 4) Computer viruses leading to device failures and damage to data and software, including the product's basic software
 - 5) Power failures, including power outages and sudden voltage drops, leading to device failures and damage to data and software, including the product's basic software
 - 6) Turning OFF the product without following the proper shutdown procedure leading to device failures and damage to data and software, including the product's basic software
 - 7) Reasons unrelated to the product itself
 - 8) Product use in harsh environments, such as those subject to high temperatures or humidity levels, corrosive gases, or strong vibrations
 - 9) Fires, earthquakes, or any other act of nature, contamination by radioactive or hazardous substances, or any other force majeure event, including wars, riots, and crimes
 - 10) Product movement or transportation after installation
 - 11) Consumable items

Note: Recording media such as floppy disks and CD-ROMs are considered consumable items.

If there is a document such as a warranty provided with the product, or there is a separate contract agreed upon that includes warranty conditions, the provisions of those documents shall apply.

Separate warranty periods shall be stipulated for custom specification parts and system.

After-Sales Service and Availability of Replacement Parts

After-Services	If any problem occurs with this product, perform an inspection and take appropriate corrective action as described in this manual's troubleshooting section. If the problem persists, or the symptoms are not covered in the troubleshooting section, contact your Shimadzu representative.
Replacement Parts Availability	Replacement parts for this product will be available for a period of seven (7) years after the product is discontinued. Thereafter, such parts may cease to be available. Note, however, that the availability of parts not manufactured by Shimadzu shall be determined by the relevant manufacturers.

Installation

To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, or re-installation (after the product is moved) is required.

Action for Environment (WEEE)

To all users of Shimadzu equipment in the

European Union:

WEEE Mark



take-back.

Equipment marked with this symbol indicates that it was sold on or after 13th August 2005, which means it should not be disposed of with general household waste. Please note that our equipment is for industrial/professional use only.

Contact your Shimadzu service representative when the equipment has reached the end of its life. They will advise you regarding the equipment

With your co-operation we are aiming to reduce contamination from waste electronic and electrical equipment and preserve natural resource through re-use and recycling. Please do not hesitate to ask your Shimadzu office or Shimadzu distributor, if you require further information.

EMC Directive

This instrument is a class A product, designed not for use in residential environment. Accordingly, if using the instrument in residential environment, the user may be required to take adequate measures.

Regulatory Information

For Europe:		
The product complies with the requirement of the		
Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/EC		
Product Name	: Table-Top Type Universal Testing Instruments	
Model Name	: Autograph AGS-X Series	
	AGS-10kNX	
	AGS-5kNX	
	AGS-1kNX	
	AGS-500NX	
	AGS-100NX	
	AGS-50NX	
	AGS-20NX	
AGS-10NX		
	AGS-5NX	
	AGS-2NX	
	AGS-1NX	
Manufacturer	: SHIMADZU CORPORATION	
	Analytical & Measuring Instruments Division	
Address	: 1,NISHINOKYO-KUWABARACHO,	
	NAKAGYO-KU,KYOTO,604-8511, JAPAN	
Authorized Represent	ative : SHIMADZU EUROPA GmbH	
Address	: Albert-Hahn-Strasse 6-10, 47269	
	Duisburg, F.R. Germany	

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Chapter 1 Overview

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1.1 Introduction

AGS-X Features

- Operating Panel That Fits User Operating Style
 Users can select from three operating modes [Simple], [Normal], or [Advanced]. This
 allows a wide range of users, from first-time users to experienced operators, to operate the
 machine.
- Functional and Beautiful Design

The front of the system offers a wide open table area to allow laying out specimens and jigs in advance. Crosshead limits can be set easily with a single step.

• Higher Than Expected Performance

This is the first time to offer such high-end performance in a lower-end model, such as a guaranteed test force precision of $\pm 0.5\%$ (High-Precision Load Cell type) for indicated values between 1/1 and 1/500 of rated load cell capacity, testing speed range of 0.001 to 1,000 mm/min, and return speed of 1,500 mm/min.

1.2 AGS-X Unit Specifications

1. Basic Specifications

(1) Max Load Capacity¹

(2)	Load Cell Capacity	Select from 1 N,	2 N, 5 N, 10 N, 20 N,
		50 N, 100 N, 500) N, 1 kN, 5 kN, or 10 kN.
(3)	 Crosshead-to-Table Distance (max value, not including jigs) 		
	Standard Model	1200 mm	
	 250 mm Extended Height Model 	1450 mm	
	• 500 mm Extended Height Model	1700 mm	
(4)	Effective Specimen Width	425 mm	
(5)	Drive Motor	400 W AC Servo	Motor
(6)	Dimensions		
(-)	Standard Model	W653 × D520 × I	H1603 mm
	250 mm Extended Height Model	W653 × D520 × I	H1853 mm
	500 mm Extended Height Model	W653 × D520 × I	H2103 mm
(7)	Weight	11000 × 2020 × 1	
(')	Standard Model	About 85 kg	
	250 mm Extended Height Model	About 00 kg	
	500 mm Extended Height Model	About 95 kg	
(8)	Power Supply Voltage ²	Single phase 50	/60 Hz
(0)	Fower Supply voltage	300/120/220/240	V switchable
		Switch Setting	
		100 V	100/110 V
		120 V	115/120/125/127 V
		220 V	200/220/230 V
		240 V	240 V
$\langle \mathbf{O} \rangle$		4.011/4	
(9)	Power Supply Capacity	1.2 KVA	
(10) Power Consumption ³	300 W	
(11	Short Circuit Current Rating	1.5 kA	
(12)Ground	Type-D Ground (grounding resistance of
		max. 100 ohm)	
(13	Operating Environment		
	 Temperature⁴ 	5°C to 40°C	
	• Humidity ⁵	20% to 80%	
	Power Supply Voltage Fluctuations	Within $\pm 10\%$ of s	pecified value

10 kN

• Floor Vibration

Max 10 Hz frequency and 5 μ m amplitude

¹ This is the maximum load capacity for the AGS-X loading frame. If a load cell with a capacity less than 10 kN is used, the maximum load capacity is 150% of the rated load cell capacity.

² Requires a separate power supply for the computer.

 $^{^{3}\,}$ Equipped with automatic energy saver function.

 $^{^4\,}$ Keep temperature variations during tests within $\pm 2~^\circ C.$

⁵ With no condensation.

2. Functional Specifications

(1)	Crosshead Control	
	Control Parameters	stroke control, test force ⁶ control, stress control, and strain control ⁷
	 Position Control Resolution 	0.033 μm
	 Position Display Resolution 	1 μm
	 Crosshead Position Detection Precision 	Either $\pm 0.1\%$ of indicated value or 0.01 mm, whichever is larger.
	Cycle Period ⁸	Max. 3 cycles per minute.
	Continuous Cycle Count	Max. 1000 cycles
	 Continuous Operating Time 	Max. 10 hours
	 Specimen Break Detection 	Detected by combination of break sensitivity, break level, and peak break
		level.
(2)	Crosshead Action When Specimen Breaks Crosshead Speed	Select either [Stop] or [Return].
	 Testing Speed Range 	0.001 mm/min to 1000 mm/min
	 Testing Speed Precision 	Max ±0.1% ⁹
	Return Speed	1500 mm/min
	Crosshead Speed and Loading Frame Load	I Capacity
		Up to load cell capacity for all testing speeds.
(3)	Test Force Measurement	
	 1/500 Standard Precision Load Cell 	Max. \pm 1% of indicated value: Guaranteed to pass validation
		(within 1/1 to 1/500 of rated load cell capacity for load cell capacities from 1 N to 10 kN)
	 1/500 High-Precision Load Cell 	Max. ±0.5% of indicated value: Guaranteed to pass validation (within 1/1 to 1/500 of rated load cell
		capacity for load cell capacities from 1 N to 10 kN)
	Measurement Range	1 range (rangeless)
	Calibration	Automatic calibration using calibration cable
	 Zero-point Adjustment 	Digital adjustment

⁶ Equipped with real-time auto-tuning function.

 ⁷ Requires a separate extensioneter and TRAPEZIUM LITE X.

⁸ Consult with Shimadzu before exceeding the cycle frequency, continuous cycle count, and continuous operating time specified here.

⁹ Measured as distance crosshead moves within a given time, at steady state crosshead speed between 0.5 mm/min and 500 mm/min.

(4)	Test Force Display Desclution		
(4)	- Bangaa avaading 18% of load call rating		1/10000
	Ranges exceeding 18% of load cell fating Banges greater than 2.2% but not more the	an 199/ of load call rating	1/10000
	Ranges greater than 5.2%, but not more than	an 10% of load cell rating	1/50000
	Ranges greater than 0.56%, but not more than 0.56%, but not more than 0.56% or least of least call rating	Ian 3.2% of load cell failing	1/200000
(5)	• Ranges 0.56% of less of load cell falling		1/500000
(5)	e Number of Channels	2 abannala	
	Number of Channels Euli Seele Veltage		
	Full-Scale voltage		
	Max. Absolute Voltage	± 12 V DC	
		1/50000 of full acale	
	Display Resolution	Fither 10 5% of input voltage	a = 10 m
		whichover is larger	\pm or \pm 10 mV,
(6)	External Pulse Input ¹¹	whichever is larger.	
(0)	Number of Channels	2 channels	
	Pulse Format	2 channels 90-deg 2-phase pulse up/d	
	Max Pulse Rate		Swii puise
	Pulse Count Range ¹²	-21/7/836/8 to 21/7/836/	7 nulse counts
(7)	External Analog Voltage Output	2147400040 10 214740004	
(')	Number of Channels	2 channels	
	Full-Scale Voltage	+5 V DC	
	Output Resolution	16-bit	
	Voltage Precision	Fither +0.5% of output volta	ae or +10 mV
		whichever is larger.	go o: _: o,
	Output Rate	10 msec	
(8)	Data Sampling ¹³		
()	Sampling Data	Test force value, crosshead	position value.
		external analog voltage inpu	it value, or
		external pulse input value	
	Sampling Rate	1 msec	
	Communication Method	USB 2.0 full-speed compliar	nt
(9)	Method Files		
-	Number of Files	Linked to computer: 20 files	
		Independent in Controller: 2	0 files

Requires TRAPEZIUM LITE X to display results.
 Requires TRAPEZIUM LITE X to display results.

 ¹² Input pulse is quadrupled before being input to counter.

¹³ Data sampling requires TRAPEZIUM LITE X.

- (10) Specimen Fragment Containment Cover¹⁴
 - Containment Range
 - Interlock Function¹⁶
- (11) Safety and Protective Features
 - Stroke Limiter
 - Overload Limiter¹⁷
 - Contact Load
 - Load Cell Protection¹⁸
 - Emergency Stop Button
 - Alarm Monitor
 - Ball Screw Protective Cover

Prevents specimen fragment from scattering toward the front of the instrument¹⁵. Included

Located at upper and lower limits. Automatically stops test if indicated test force value reaches $\pm 102\%$ of rated load cell capacity. If a contact load is detected in jog or return operation modes, the movement is automatically stopped. Emergency-stops the servo motor if absolute test force value reaches $\pm 150\%$ of rated load cell capacity. Shuts OFF power to the servo amplifier. Records a history of alarms.

Provided

¹⁴ This cover is designed to keep specimen fragments from scattering, not to ensure operator safety. Models are also available without the specimen fragment containment cover.

¹⁵ Covers for preventing fragment scattering toward the rear are also available.

¹⁶ The interlock prevents the test from starting and the crosshead from returning when the specimen debris containment cover is open. The interlock is triggered by the bottom edge of the cover.

¹⁷ The software monitors the indicated test force value and shuts the servo motor OFF if overload is detected.

¹⁸ Hardware monitors the absolute test force value and shuts the servo motor OFF if an overload is detected. However, load cell damage may be unavoidable if an impact occurs when the crosshead is moving at a high speed.

Chapter 2 Part List/Specifications

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2.1 AGS-X Unit

1. Loading Frame



Product Name	P/N
Standard type	346-55900-01
+250 mm extended height type	346-55900-02
+500 mm extended height type	346-55900-03

2. Parts Provided With AGS-X Unit

(1) Power Cord

P/N 348-34063-01

P/N 072-60319-01



- (2) Fuse, 10 A P/N 072-02004-26
- (3) Fuse, 5 A P/N 072-02004-23 (4 pcs.)
 - <u>a</u>___
- (4) Rotation Bar 10 mm dia. \times 6 mm dia. P/N 344-21855
- (5) Clamp, DKN-10SP (5 pcs.)
- (6) Instruction Manual
 Japanese P/N 349-05467
 English (this document) P/N 349-05468
 Chinese (Simplified Chinese) P/N 349-05489
 (one of the above)

<u>É</u>



2.2 Peripheral Equipment

In addition to the AGS-X unit, peripheral equipment is also required to perform tests. Key peripherals are indicated below. (For more details, refer to the respective testing instrument catalogs for Shimadzu universal testing machine applications.)

1. Load Cell Set

Load Cell Set

(Set includes a load cell and calibration cable.)



< Standard Precision Load Cell>

Product Name (Load Cell Set)	10 kNSX	5 kNSX	1 kNSX	500 NSX
Rated Load Capacity	10 kN	5 kN	1 kN	500 N
P/N	346-55939-11	346-55939-10	346-55939-09	346-55939-08

Product Name (Load Cell Set)	100 NSX	50 NSX	20 NSX	10 NSX
Rated Load Capacity	100 N	50 N	20 N	10 N
P/N	346-55939-07	346-55939-06	346-55939-05	346-55939-04

Product Name (Load Cell Set)	5 NSX	2 NSX	1 NSX
Rated Load Capacity	5 N	2 N	1 N
P/N	346-55939-03	346-55939-02	346-55939-01

Load Cell Bolt

Load Cell Capacity	For 10 kN	For 5 kN to 500 N	For 100 N to 5 N	For 2 N and 1 N
P/N	345-06363-03	345-06363-04	345-09114	345-09114-02

2. Test Jigs

- (1) Tensile Test Jig
 - 1) Screw Type Flat Grips (1 set of upper and lower)



P/N	Capacity	Grip Face Type	Grip Face Opening	Size of Grip Face
346-52326-04	5 kN	File teeth	0 mm to 16 mm	$W60 \times L50 \text{ mm}$
346-52327-04	1 kN	File teeth	0 mm to 15 mm	$W50 \times L30 \text{ mm}$
346-52328-04	50 N	Flat	0 mm to 14 mm	$W35 \times L25 \text{ mm}$

2) Non-shift wedge type grips (1 set of upper and lower)



P/N	Capacity	Grip Face Type	Grip Face Opening	Size of Grip Face
346-52653-03	20 kN(10 kN)	File teeth for	0 mm to 7 mm	W25 v I 55 mm
346-52653-01	5 kN	flat specimens		W23 × L33 IIIII

Note: Only a few examples of grips are shown. Please order the jig best suited to the specific specimen type.

(2) Compression Test Jig



ſ		Compressive Load Jig	Compression Plate	Compression Plate
		(set includes parts <i>a</i> and <i>b</i> above)	100 mm dia.	200 mm dia.
ſ	P/N	346-51531-03	343-08095	343-08224-17

Note: If the compression plate diameter is 200 mm or larger, use compression loading jig *b* above.

(3) Bending Test Jigs









С



Applicable Specimen	Applicable Standard	Punch Radius	Support Radius	Max. Capacity	P/N	Fig.
Plastics (max. specimen thickness 3 mm)	JIS K 6911 JIS K 7171 ISO 178	R5	R2	10/100 kN	346-52697-01/ 343-08171-03	а
Composite Materials (three-/four-point bending)	JIS K 7074 JIS K 6911	R3, R5	R3, R2	5 kN	343-05934-10	b
Metal Materials	-	R5	R15	100 kN	343-08096-01	d
Ceramics (three-/four-point bending)	JIS R 1601	R2.5	R2.5	5 kN	343-08892-08	с

Note: Separate compression load jigs are required.

3. Data Processing Equipment

- (1) Materials Testing Software
- TRAPEZIUM LITE X
- P/N 345-47801 (Japanese version) P/N 345-47802 (English version) P/N 345-47803 (Chinese version)



Note: Provide the computer separately.

(2) X-T Type Recorder (AR-228)



USB Cable Provided

3



(3) X-YT Type Recorder (AR-6122)

(4) Dataletty 551





4. Controller

(1) Jog Controller

P/N 346-55922



(2) Controller I/O Extension Box

P/N 346-55920-01



(3) Sensor I/O Extension Box

P/N 346-55920-02



5. Optional Rails

other items.

Cos SHIMADZU

P/N	Length (mm)	Qty
346-55918-01	STD	
346-55918-02	+250 mm	1 rail
346-55918-03	+500 mm	
346-55918-11	STD	
346-55918-12	+250 mm	2 rails
346-55918-13	+500 mm	
346-55918-21	STD	
346-55918-22	+250 mm	4 rails
346-55918-23	+500 mm	

Optional Rails

6. Test Force Calibration Jig

Force inspection jig to be attached to the tensile test jig Composition : Weight, Weight suspender, and Universal joint 1PC

There is also a method of using a loop-shaped inspection force meter in 10kN. Composition : Loop-shaped inspection force meter and Compression cage 1PC

These rails are used for attaching DVE non-contact extensometers, finger-tip switches, or



Loop-shaped inspection force

Compression cage

meter

Load Cell to be inspected	Force to be inspected	Weight or Loop-shaped inspection force meter	Part No.
5 N /10 N / 20 N	5 N	5 N Weight (× 1)	346-51040-18
50 N	50 N	50 N Weight (× 1)	346-51040-31
100 N / 1 kN	100 N	100 N Weight(× 1)	346-51040-17
5 kN	500 N	100 N Weight(× 1)	346-51040-32
10 kN	1 kN	100 N Weight(× 10)	346-51040-33
10 kN	5 kN	10 kN Loop-shaped inspection force meter (× 1)	346-51040-38



The weight of 100N is adjusted to the mass of 10.206kg and it is equivalent to a force of 100N in acceleration-due-to-gravity 9.798 m/s2 in Kyoto.

It is impossible to calibrate the actual load type test force in this weight.
7. Power Cables for Overseas

Rating	Length (mm)	Plug Shape	Safety Standard	Primary Regions	P/N
125 V AC 15 A	2.5 MT		UL/CSA/P SE	North America, Japan	348-34063-01
250 V AC 10 A	2.4 MT		GB	China	348-34063-02
250 V AC 10 A	2.4 MT	Powder-blue Green/ Yellow	VDE	Europe	348-34063-03

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Chapter 3 Basic Instructions

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3.	3 Connecting and Switching the Power ON/OFF 3-7	
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3.1 Name and Function of Each Part

1. Key Parts of the Loading Frame



Chapter 3 Basic Instructions

2. Power Inlet Panel





- (1) Power InletUsed to insert the power cord.
- (2) Power Switch

Press the "I" side to switch the power ON. Press the "O" side to switch the power OFF.

(3) Fuse Holder

Internal fuses are included to prevent overcurrent. The holder also includes the input power mode switch.

3. Operating Panel



Operating Panel

(1) VFD Display

Displays the test force or stroke.

- (2) Display Mode Button Switches the display between 1-line or 2-line display mode, or between the current, peak, or break point values.
- (3) Main Menu ButtonsSwitches between content displayed and operations.
- (4) Jog Buttons

Used to move the crosshead. When setting parameters, the Jog buttons are used to select parameters or increase/decrease values.

- (5) Zero Reset Buttons Resets test force or stroke values to zero.
- (6) [RETURN] Button

Used to move the crosshead quickly back to its home position. When setting parameters, this button serves as a cancel button.

- (7) [START] ButtonUsed to start tests. When setting parameters, it serves as a confirm/enter button.
- (8) [STOP] Button Stops the testing machine.

4. I/O Connector Panel



Right Side of Loading Frame

- [LOAD] (load cell connector)
 Used to connect the load cell calibration cable.
- (2) [SENSOR] (sensor I/O connector)
 This connector includes terminals for analog input/output and digital input. It is used to connect external extensioneters, analog recorders, or other sensors.
- (3) [USB] (USB function connector)
 Used to connect to the computer via a USB cable. Shimadzu's dedicated testing machine data processing software TRAPEZIUM Lite X (optional) is required.
- (4) [CONTROL] (controller I/O connector) This connector includes digital input/output terminals for a controller. It is used to connect optional equipment specialized for the AGS-X, such as the Jog controller (optional) or Dataletty (optional).

3.2 Installation Site Precautions

1. Installation Site Environment

- 1) Provide a table with ample load capacity to hold the total weight of the AGS-X unit, jigs, and other items.
- 2) Level the AGS-X unit after placing it in position. If using a specialized Shimadzu table, leveling screws are provided on the ends of the legs.
- Avoid using the system in locations with significant temperature variations. Keep the temperature within the +5°C to +40°C range and relatively constant during tests.
- Avoid using the system in locations with high humidity. Keep humidity within the 20% to 80% range, with no condensation.
- 5) Avoid using the system in dusty locations.
- 6) Avoid locations near sources of vibration. The allowable maximum is 10 Hz frequency and 0.5 μ m amplitude.
- Avoid locations near equipment that generate electromagnetic induction. Avoid locations near high frequency equipment, which can affect highly sensitive load cells, amplifiers, and other items included with the AGS-X unit.
- 8) Avoid locations with corrosive gases, steam, direct sunlight, or other conditions detrimental to functionality.

2. Power Supply Requirements

(1)	Power	Supply	Voltage
-----	-------	--------	---------

Single phase, 100/120/220/240 V AC switchable

U .	
Switch Setting	Nominal Voltages
100 V	100/110 V
120 V	115/120/125/127 V
220 V	200/220/230 V
240 V	240 V

- (2) Power Supply Frequency 50/60 Hz
- (3) Power Supply Capacity 1.2 kVA
- (4) Power Consumption 300 W
- (5) Short Circuit Current Rating 1.5 kA
- (6) Ground

Type-D or better ground. Please keep equipotential ground. (Grounding resistance of max. 100 ohm)

CAUTION

When connecting the main unit, optional device, and PC to separate power supplies, make sure that there is no potential difference between all the protective ground terminals. (AC / DC less than 10V)

3.3 Connecting and Switching the Power ON/OFF

1. Connecting the Power Supply





Be sure to reconfirm the power supply specifications indicated in 3.2.2 Power Supply Requirements.



The provided power cord is only for use within Japan. To use the system outside of Japan, confirm the applicable power supply voltage, then obtain a power cord that meets local regulations (optional).

Chapter 3 Basic Instructions

2. Switching the Power ON or OFF

- (1) Switching the power ON.
 - 1) The power switch is located on the left side of the AGS-X unit.





Power Switch is OFF

Power Switch is ON

2) The operation panel shows following informations.



- 3) After switching the power ON, the servo power automatically switches ON, provided both the emergency stop button and stroke limit switches are released. If the emergency stop button is depressed, release it by turning the operating portion of the button in the direction indicated by the arrow or by pulling it up.
- (2) Switching the Power OFFSwitch OFF the power switch, which is located on the left side of the AGS-X unit.

3.4 Attaching Load Cells

Replace or attach load cells according to the following procedure.

- 1) Switch the AGS-X power OFF.
- 2) Remove any jigs attached to the load cell.
- 3) Loosen the two fastener screws on the CAL cable connector on the right side of the AGS-X unit and remove the screws along with the CAL cable.



Fastener Screws (two)

- 4) Loosen the load cell fastener bolts using the rotation bar, then lift the load cell with one hand while removing the fastener bolts with the other hand.
- 5) Attach the desired load cell to the crosshead using the load cell fastener bolts, so that its cable comes out to the right side, as viewed from in front of the crosshead. Tighten the bolt with a torque is as follows.

Load Cell Capacity	Torque (N ⋅ m)	Load Cell Capacity	Torque (N ⋅ m)
1N	0.2	200N	2.2
2N	0.2	500N	4.5
5N	0.4	1kN	4.5
10N	0.4	2kN	22.5
20N	0.6	5kN	30
50N	0.6	10kN	30
100N	1.1		



- [ONE POINT ADVICE] -

When using the non-shift wedge-type grip, use a load cell rotation restricting plate to prevent load cell rotation.

1 Loosen the bolts fixing the rotation restricting plate.



- 2 Push the rotation restricting plate toward the load cell using the tip of a wrench or the like.
- 3 Tighten the bolts to fix the rotation restricting plate.
- 4 Follow the above steps 1 to 3 to push the other rotation restricting plate and tighten the bolts.

When changing the load cell capacity, make sure that the both rotation restricting plates are removed to outside to prevent ill –installation of load cell.

6) Insert the CAL cable, on the end of the load cell cable, into the load cell connector on the right side of the AGS-X unit and secure it with connector screws (two).



7) Switch the AGS-X power ON and wait about 15 minutes until the test force value stabilizes.

8) Electronically calibrate (E-CAL) the test force.





Chapter 3 Basic Instructions

3.5 Safety Systems

1. Crosshead Stroke Limit Switches

Once upper and lower mechanical crosshead limits are set, this feature force-stops the crosshead by shutting OFF the motor drive power if the crosshead exceeds those limits.



<Moving Up>

When the top of the limit actuator contacts the upper limit collar, the limit bar starts moving up along with the crosshead. Once it moves up about 2 mm, it triggers a sensor on the bottom of the front cover, which activates the Limit-ON status.

<Moving Down>

When the bottom of the limit actuator contacts the lower limit collar, the limit bar starts moving down along with the crosshead. Once it moves down about 2 mm, it triggers a sensor on the bottom of the front cover, which activates the Limit-ON status.

Releasing the Limit Bar

Squeeze the handle on the slide limit in contact with the limit actuator. When released, the limit bar returns to neutral position and the limit status is canceled.







The crosshead upper and lower limits expected during a test must be set to proper values. If setting these limits is difficult, determine the setting range so that the gap between the crosshead top jig and the crossyoke and the gap between the crosshead bottom jig and the table jig are 20 mm or more (to prevent a collision).







Limit collars must be attached with top and bottom oriented correctly. Attach the collar so that when the limit actuator presses against the limit collar, the collar presses against the limit bar.

2. Fragment Containment Cover



Simultaneously grip both handles, on the inside and outside. The cover stopper is released and the cover can be opened





3. Emergency Stop Button

Used to stop the crosshead movement in emergencies, the button locks in place when pressed.

To release the button, turn it in the direction indicated by arrows or pull it up.



4. Software Limits

An alarm can be triggered and the crosshead stopped when a measurement value exceeds a specified value during tests. Maximum and minimum limits can be specified independently for each sensor connected.



Sensor parameters for which software limits can be specified include stroke, test force, Analog 1, Analog 2, Digital 1, and Digital 2.

5. Safety Features

(1) Contact Load Function

If more than a given level in load fluctuations is sensed during return or jog movement operations the crosshead is stopped. If an unexpected accident should occur, such as a collision with a jig, this function increases safety by stopping the crosshead as early as possible.

Due to the following limitations, this function cannot ensure that collisions or overloading will not occur within the test space.

- The magnitude of the force detected (contact load) depends on the load cell capacity. Load cells with capacity 5 kN or greater: 1% of load cell capacity
 Load cells with capacity 1 kN or less: 10% of load cell capacity
- 2. Due to overshooting from a detection response between 0.5 and 1 second, danger cannot be eliminated.
- To improve safety and operating convenience when overloaded, movement in the unloading direction is not stopped. Differentiating between directions is determined by the UP START/DOWN START method setting. Detection is triggered when the load passes zero and a negative load increases.
- 4. The contact load function cannot be activated during about the first second after starting movement. Therefore, it is nonfunctional when moving a little at a time, such as when inching with jog operation. Also, it will not function for about 1 second even if a load is already applied.

<Activation of Safety Features>

A beep sound is emitted and the crosshead is stopped whenever a safety feature is activated. Also, alarm code 205 is displayed, which can be confirmed via the alarm menu.

(2) Overload Detection Feature

If a load is applied to a load cell that is greater than $\pm 150\%$ of its rating or ± 12 kN, the AGS-X unit hardware instantly shuts OFF the servo motor.

When this function is activated, only jog operations can be used to remove the load.

3.6 Jog Operations

JOG UP and JOG DOWN buttons move the crosshead as long as they are pressed. The crosshead stops when the button is released.

Pressing the [HIGH SPEED] button allows the jog speed to switch between two speeds (high and low).





Overload Detection Function



When the high-speed mode is selected, a beep sound is emitted and the LED on the [HIGH SPEED] button is illuminated. (In high-speed mode, if no operations are performed for more than a given amount of time, the mode automatically switches back to low-speed mode.)

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Chapter 4 Operating Panel

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4.2	Test Display Screen	4-3
4.3	Menu Screens	4-4
4.4	Method Menu Details	1 -10
4.5	System Menu Details	1-32

4.1 Introduction

The menus used to configure parameter settings are available in three levels - Simple, Normal, and Advanced. Operators can freely select the one best suited for their needs.



FORCE / STRESS STROKE REAL PEAK DISP, STROKE BREAK • TEST METHOD • FILE SYSTEM RETURN HIGH SPEED ß FINE ADJUST $\langle \! \rangle$ ENTER \bigcirc

Changing the Operation Mode

Operating Panel



4.2 Test Display Screen



Displays the test force and stroke during tests. It also indicates whether or not the computer is connected and file numbers as well.

The numeric display can be switched between 1-line and 2-line modes.



4.3 Menu Screens

1. Configuration of Menu Screens

Menu screens include submenu screens and parameter setting screens.

(1) Submenu Screens

<u>Submenu 1</u>

Test Mode

Submenu 2

Soft Limit Max.

(2) Parameter Setting Screen

Parameters Settings

>Test Mode	
Single	



2. Operating Submenus

Use the JOG UP and JOG DOWN buttons to make menu selections and the [START] (Enter) button or [RETURN] (Escape) button to switch between menu levels.





3. Setting Parameters

Setting values can be changed by pressing the [START] (Enter) button in the submenu position for the setting to be changed and moving the triangle symbol, which was located to the left of the parameter name, next to the setting value.



After changing the setting value, press the [START] (Enter) button to confirm the changed setting value and update the parameter. Press the [RETURN] (Escape) button to cancel the changes without updating the parameter setting.





4. Simple Mode Menus







6. Advanced Mode Menus



4.4 Method Menu Details

1. Test Mode

${\rm O}$ Setting the Test Mode

Sets whether to perform a single (simple) test or cycle (repeated) test.



• Cycle Performs a cycle test.

(CAUTION

Continuous operation is limited to a maximum 10 hours. Keep this limitation when conducting long test.



Cycle tests are subject to the following limitations.

- (1) Number of Cycles
- (2) Cycle Frequency

Max. 1000 cycles Max. 3 cycles per minute

$\ensuremath{\bigcirc}$ Setting Test Force Polarity and Test Starting Direction

Selects the loading direction (tension or compression) and crosshead movement direction.



[Setting Value]

- Tens./Up Tensile Test Force + Start UP (default setting)
- Comp./Down
 Compression Test Force + Start DOWN
- Tensile Test Force + Start DOWN
- Comp./Up
 Compression Test Force + Start UP







Switch the polarity according to the force direction indicated in the figure above, even if using specialized loading jigs. For example, the force applied to the load cell during compression tests using a compression cage is tension.



Always electronically calibrate (E-CAL) the test force amplifier whenever the test force polarity is switched.

2. Test Speed

○ Setting the Test Speed

The following sets the testing speed. Test speed can be changed during tests as well.

[Setting Procedure]



[Setting Value (1)]

- Stroke
- Performs tests at a constant stroke speed (default setting).
- Force/Stress Performs tests at a constant test force rate or stress rate.

[Setting Value (2)]

Specifies test speed.

· · · · ·		
Parameter	Default Value	Setting Range
Stroke	50 mm/min	0.001 mm/min to 1000 mm/min
Force	10% of FS /sec	0.001 to 999999 N/sec
Stress	10 N/mm ² /sec	0.001 to 999999 N mm ² /sec



If [Stroke] is selected for Setting Value (1), the crosshead is controlled to a constant speed. If [Force/Stress] is selected for Setting Value (1), switch between force or stress by selecting [System] - [Display Units]. If [Stress] is selected, the cross sectional area must be entered.

3. Automatic Control

○ Setting Initial Speed

Specifies the stroke speed immediately after starting the test.



[Setting Procedure]



[Setting Value]

Enters the initial speed for tests.

Parameter	Default Value	Setting Range
Initial Speed	1 mm/min	0.001 mm/min to 1000 mm/min

\odot Setting the Start Point (Test Force)

Specifies the test force to reach before starting automatic control.

[Setting Procedure]



[Setting Value]

Specifies the starting point for test force.

Parameter	Default Value	Setting Range
Start Point	1% of rating	0% to 100% of rating



This setting specifies the point (in terms of test force) where the initial constant crosshead speed switches over to automatic control.

4. Cross Sectional Area

\odot Setting the Cross Sectional Area

Specifies the cross sectional area of the specimen to allow determining stress.

[Setting Procedure]



[Setting Value]

Enters the cross sectional area of the specimen.

Parameter	Default Value	Setting Range
Cross Section Area	1 mm ²	0.1 mm ² to 9999 mm ²
5. Software Limits

O Enabling/Disabling Limits

Sets the ON/OFF setting for software limits.

[Setting Procedure]



[Setting Value (1)]

- Soft Limit Max. Sets the maximum value.
- Soft Limit Min. Sets the minimum value.

[Setting Value (2)]

 Stroke 	Specifies the maximum/minimum	stroke values
	•	

- Force Specifies the maximum/minimum test force.
- Analog 1 Specifies the maximum/minimum Analog Input 1 values. (only in Advanced mode)
- Analog 2 Specifies the maximum/minimum Analog Input 2 values. (only in Advanced mode)
- Digital 1 Specifies the maximum/minimum Digital Input 1 values. (only in Advanced mode)
- Digital 2 Specifies the maximum/minimum Digital Input 2 values. (only in Advanced mode)

[Setting Value (3)]

- ON Enables setting values.
- OFF Disables setting values. (default setting)

\odot Setting Limit Values

Enters threshold values for software limits.

[Setting Procedure]



[Setting Value]

Specifies threshold values for each parameter.

•	•	
Maximum Parameter Value	Default Value	Setting Range
Stroke	1250 mm	Min. Value to 999999 mm
Test Force	Rating	Min. value to positive rating value
Analog 1 and 2	$GL \times FS$	Min. Value to $GL \times FS$
Digital 1 and 2	$GL \times FS$	Min. Value to $GL \times FS$

Minimum Parameter Value	Default Value	Setting Range
Stroke	-1250 mm	-999999 mm to max. value
Test Force	-Rating	-Rating to max. value
Analog 1 and 2	$-GL \times FS$	-GL \times FS to max. value
Digital 1 and 2	$-GL \times FS$	-GL \times FS to max. value

6. GL/FS

○ Setting Gauge Length (GL)

Specifies the gauge length used to measure the proportion of elongation.

[Setting Procedure]



[Setting Value (1)]

Stroke

Specifies the gauge length for stroke.

- Analog1 Specifies the gauge length for Analog 1.
- Analog2 Specifies the gauge length for Analog 2.
- Digital1 Specifies the gauge length for Digital 1.
- Digital2 Specifies the gauge length for Digital 2.

[Setting Value (2)]

Enters gauge length (GL) value.

Parameter	Default Value	Setting Range
Stroke	100 mm	0.001 mm to 9999 mm
Analog 1 and 2	50 mm	0.001 mm to 9999 mm
Digital 1 and 2	50 mm	0.001 mm to 9999 mm

○ Setting Full Scale (FS)

Specifies the full scale of elongation as a percent of the gauge length (GL).

[Setting Procedure]



[Setting Value (1)]

- Analog1 Specifies the full scale for Analog 1.
- Analog2 Specifies the full scale for Analog 2.
- Digital1 Specifies the full scale for Digital 1.
- Digital2 Specifies the full scale for Digital 2.

[Setting Value (2)]

Enters the full scale (FS) value.

Parameter	Default Value	Setting Range
Analog 1 and 2	50%	0.01% to 10000%
Digital 1 and 2	50%	0.01% to 10000%



There is no full scale value setting for stroke.

7. Extension Origin Starting Point

O Setting the Extension Origin Starting Point

If the origin starting point is specified for extension, then displacement is measured by assuming extension is zero when the test force reaches the extension origin starting point.

[Setting Procedure]



[Setting Value]

Enters the test force value for the extension origin start point.

Parameter Default Value	Sotting Pango
	Setting Kange
Start Point 0N Zero	o to positive rating value

8. Maximum Point / Minimum Point

O Setting Maximum and Minimum Points

Specifies the target position for controlling single or cycle tests.

[Setting Procedure]



[Setting Value (1)]

- Stroke
- Specifies the maximum/minimum points for stroke.
- Force/Stress Specifies the maximum/minimum points for test force and stress.

[Setting Value (2)]

Specifies the maximum and minimum points for each parameter.

Parameter	Default Value	Setting Range
Stroke	10 mm	-999999 mm to 999999 mm
Test Force	1 N	-rating to +rating
Stress	1 MPa	-999999 MPa to 999999 MPa

0		-21
7.78	NOTE	
	TIOTE	14
the second s		-

Specifies only the maximum point for single test, but both maximum and minimum points for cycle tests.

9. Maximum Action / Minimum Action

$\ensuremath{\bigcirc}$ Setting Maximum and Minimum Action

Specifies the crosshead action when it reaches a maximum or minimum point.

[Setting Procedure]



[Setting Value]

<Single Test>

• Stop	The crosshead is stopped after it reaches the maximum point. (default setting)
• Return	The crosshead returns quickly to its origin point after reaching the maximum point.
<cycle test=""></cycle>	
 Manual 	After reaching the maximum point, the crosshead is held in place until the [START] button is pressed.
Return	The crosshead returns quickly to its origin point after reaching the maximum point.

C NOTE
If the maximum point action is set to [Return], then the crosshead will automatically return
quickly to its origin position after reaching the maximum point.

\bigcirc Setting the Hold Period

Specifies how long to hold the crosshead when it reaches a maximum or minimum point.

[Setting Procedure]



[Setting Value]

Parameter	Default Value	Setting Range
Hold Time	0 sec	0 sec to 99999 sec

\odot Setting the Hold Sensor

Specifies which input to keep constant during hold mode.

[Setting Procedure]



[Setting Value]

- Stroke Holds the stroke value constant. (default setting)
- Force/Stress

Holds the test force or stress value constant.



10. Cycle Count

○ Setting the Cycle Count

Specifies how many times to repeat cycle tests.

[Setting Procedure]



[Setting Value]

Enters the cycle count.

Parameter	Default Value	Setting Range
Cycle Count	1	0 to 9999



○ Full-Count Action

Specifies the action to take when the test cycle count reaches the cycle count setting.

[Setting Procedure]



[Setting Value]

• Stop

Crosshead is stopped after reaching cycle count setting. (default setting)

• Break Keeps moving the crosshead in the starting direction after reaching cycle count setting, until the breakpoint is detected. (only in Advanced mode)

11. Break Detection

O Setting the Start Position for Break Detection

Specifies the test force value to reach before starting specimen break detection.

[Setting Procedure]



[Setting Value]

Enters the test force value to reach before starting specimen break detection.

Parameter	Default Value	Setting Range
Start	7% of rating	0.035% to 7% of rating

O Setting the Action After Break Detection

Specifies the crosshead action after detecting a break.

[Setting Procedure]



[Setting Value]

- Stop
- Return

Crosshead is stopped after detecting break. (default setting) The crosshead returns quickly to its origin point after detecting break.

O Switching Breakpoint Sensitivity Function ON or OFF

Switches the breakpoint sensitivity function ON/OFF.



[Setting Value]

• ON

- Enables breakpoint sensitivity function. (default setting).
- OFF Disables breakpoint sensitivity function.

O Setting Breakpoint Sensitivity

Specifies breakpoint sensitivity.



[Setting Value]

Enters the breakpoint sensitivity value.

Parameter	Default Value	Setting Range
Sensitivity	10% of rating	0.005% to 1000% of rating



The breakpoint sensitivity function determines the breakpoint at the point where the test force slope decreases more than a specified value.

O Switching Breakpoint Force Level Function ON or OFF

Switches the breakpoint force level function ON/OFF.



- OFF
- Disables breakpoint level function. (only in Normal or Advanced modes)

modes

$\ensuremath{\bigcirc}$ Setting the Breakpoint Level Value

Specifies the breakpoint level.



Enters the breakpoint level value. (fixed at 1/1000 of load cell rating in simple menu mode)

Parameter	Default Value	Setting Range
Level	5% of rating	0% to 5% of rating



The breakpoint level function determines the breakpoint at the point where the test force extends beyond the setting value.

O Switching Breakpoint Peak Level Function ON or OFF

Switches the breakpoint peak level function ON/OFF.



[Setting Value]

• ON

Enables breakpoint peak level function. (default setting)

Disables breakpoint peak level function.

• OFF

O Setting the Breakpoint Peak Level Value

Specifies the breakpoint peak level.



[Setting Value]

Enters the breakpoint peak level.

Parameter	Default Value	Setting Range
Peak Level	90%	0.1% to 99.9%



The breakpoint peak level function determines the breakpoint at the point where the test force extends a specified percent beyond the maximum test force setting value.

12. Printing Instructions

O Specifying Print Message to Display

When the system is used with TRAPEZIUM LITE X, this specifies whether or not to display a print message on the operating panel after finishing tests.

[Setting Procedure]



[Setting Value]

- Yes Displays a print message.
- No Does not display a print message. (default setting)



This requires the optional TRAPEZIUM LITE X material testing software.

C NOTE
When the print function is enabled, the following message is displayed after finishing tests.
Print? > Yes
 Selecting [Yes] enables printing. Selecting [No] disables printing.

4.5 System Menu Details

1. Calibration

○ Calibrating Test Force

Electronically calibrates (E-CAL) the test force. Calibrating the test force with E-CAL uses precision resistors built into the calibration cable to apply a simulated load on the load cell and calibrate the test force amplifier

[Setting Procedure]



[Setting Value]

Force

Electronically calibrates (E-CAL) the test force.



Wait at least 15 minutes after switching the load cell power ON, before calibrating test force by E-CAL.



Calibrate the test force by E-CAL with the load cell in the unloaded state.

O Calibrating Analog Inputs

Calibrates the zero and span values for Analog Inputs 1 and 2.

[Setting Procedure]



[Setting Value (1)]

- Analog1 Calibrates Analog Input 1.
- Analog2 Calibrates Analog Input 2.

[Setting Value (2)]

- Zero
- Sets to use zero volts for analog input.
- Span Sets to use the full scale voltage for analog inputs.
- Reset Resets zero and span adjustment results to initial status.

2. Inspection

O Displaying Inspection Values

Displays test force and measured sensor input values.

[Setting Procedure]



[Setting Value]

- Force Displays measured test force values.
- Analog1 Displays measured Analog Input 1 values.
- Analog2 Displays measured Analog Input 2 values.
- Digital1 Displays measured Digital Input 1 values.
- Digital2 Displays measured Digital Input 2 values.

3. Jog Speed

\odot Setting the Jog Speed

Sets the speed of crosshead movement during jog operations.

[Setting Procedure]



[Setting Value (1)]

- Low Speed Sets the low-speed jog speed.
- High Speed Sets the high-speed jog speed.

[Setting Value (2)]

- Low Speed Enters the low-speed jog speed.
- High Speed Enters the high-speed jog speed.

U	0 1 7 0 1	
Parameter	Default Value	Setting Range
Low-Speed	1 mm/min	0.001 mm/min to high speed value
High-Speed	500 mm/min	low speed value to 1000 mm/min

4. Preload

○ Setting the Loading Speed

Sets the speed of crosshead movement during preloading.





[Setting Value]

Enters the crosshead speed.

Parameter	Default Value	Setting Range
Loading Speed	10 mm/min	0.001 mm/min to 1000 mm/min

O Setting Movement Targets

Specifies the target test force after preloading is complete.





[Setting Value]

Enters the target test force.

Parameter	Default Value	Setting Range
Target	0.002% of rating	0.002% of rating to 100% of rating value



This setting is used to apply a preload to specimens before testing or to remove slack from specimens.

5. Analog Output

○ Setting Analog Outputs

Specifies analog output port settings.

[Setting Procedure]



[Setting Value (1)]

• CH. 1

Specifies port settings for Analog Output 1.

• CH. 2 Specifies port settings for Analog Output 2.

[Setting Value (2)]

- Force Outputs the test force value. (CH. 1 default setting)
- Stroke Outputs the stroke value. (CH. 2 default setting)
- Analog1 Outputs the Analog Input 1 value. (CH. 2 only)
- Analog2 Outputs the Analog Input 2 value. (CH. 2 only)
- Digital1 Outputs the Digital Input 1 value. (CH. 2 only)
- Digital2 Outputs the Digital Input 2 value. (CH. 2 only)
- +5 V Outputs +5 volts.
- -5 V Outputs -5 volts.
- 0 V Outputs zero volts.

[Setting Value (3)]

Enters the full scale value.



Outputs the full scale value specified for Setting Value (3) as 5 V.

6. Digital Inputs

\odot Setting the Pulse Form

Specifies the pulse form for digital pulse inputs.

[Setting Procedure]



[Setting Value (1)]

• CH. 1

Specifies the pulse form for Digital Input 1.

- CH. 2 Specifies the pulse form for Digital Input 2.
- [Setting Value (2)]
 - A/B Phase Specifies a 90-degree 2-phase pulse. (default setting)
 - UP/DOWN Specifies an up-pulse/down-pulse method.



Enabling an optional automatic extensometer (SIE) automatically specifies the CH. 1 setting.

$\ensuremath{\bigcirc}$ Setting the Pulse Rate

Specifies the extension length per pulse.

[Setting Procedure]



[Setting Value (1)]

- CH. 1 Specifies the pulse rate for Digital Input 1.
- CH. 2 Specifies the pulse rate for Digital Input 2.

[Setting Value (2)]

Enters the extension length per pulse.

Parameter	Default Value	Setting Range
Pulse Rate	0.001 mm/p	0.00001 mm/p to 100 mm/p



If the pulse form is A/B phase, the system multiplies the pulse count by four internally. If a rotary encoder or other such device is attached, multiple the pulse rate by four.

7. Filter Style

O Setting Filter Characteristics

Specifies the digital filter characteristics used for test force, analog inputs, and digital inputs.

[Setting Procedure]



[Setting Value]

High Speed

eed Uses a filter suited to the sampling rate. (default setting)

• High Accuracy Uses a filter with a narrow pass-band to reduce fluctuations in measurement values.



The TRAPEZIUM LITE X materials testing software automatically switches the digital filter pass-band width according to the specified sampling rate.



Selecting [High Accuracy] reduces the variability in measurement values, but slows the response.

8. Controller Input/Output

○ Input Settings

Allocates bits for the parallel input port.

[Setting Procedure]



[Setting Value (1)]

Selects bit numbers for the parallel input port.

[Setting Value (2)]

- Stop Stops the test or return action.
- Start Starts tests.
- Jog Up Jogs the crosshead upward.
- Jog Down Jogs the crosshead downward.
- Return Returns the crosshead quickly to origin.
- Interlock Enables external input for crosshead action interlock.



○ Output Settings

Allocates bits for the parallel output port.

[Setting Procedure]



[Setting Value (1)]

Selects bit numbers for the parallel output port.

[Setting Value (2)]

- Ready Indicates the AGS-X unit has finished startup and is ready to operate.
- Servo Servo is ON.
- Alarm An error has occurred in the AGS-X unit.
- Stop Crosshead is stopping.
- Testing Testing is in progress.
- Return
 Crosshead is returning quickly.
- Jog Crosshead is moving by jog operations.
- C.H.Moving Crosshead is in motion.



Setting Value (2) allows selecting the output logic.

- If (L) is selected Output transistor is ON.
- If (H) is selected Output transistor is OFF.



If an optional item is selected, bits are automatically allocated according to the optional item, for both control input and control output.

9. Setup

$\ensuremath{\bigcirc}$ Setting the Language

Specifies the interface language displayed.



[Setting Value]

- Japanese Displays text in Japanese.
- English Displays text in English. (default setting)

○ Operation Mode

Specifies the submenu operation mode.





Depending on the type of operation mode, some submenus cannot be selected and some parameters cannot be changed.

○ Setting Units

Sets the unit system used for measurements.





[Setting Value]

- SI Specifies the use of SI unit system.(default setting)
- kgf-m Specifies the use of the gravitational metric system.
- lbf-in Specifies the use of English unit system.

O Setting Display Units

Specifies the units to use for the display screen.



[Setting Value (1)]

- Force/Stress Specifies the display units for test force and stress.
- Stroke Specifies the display units for stroke.
- Analog1 Specifies the display units for Analog Input 1.
- Analog2 Specifies the display units for Analog Input 2.
- Digital1 Specifies the display units for Digital Input 1.
- Digital2 Specifies the display units for Digital Input 2.

[Setting Value (2)]

Selects the display units.

○ Specifying Power Saver Settings

Specifies the delay time before moving to power saver mode.

[Setting Procedure]



[Setting Value]

Enters the waiting time.

Parameter	Default Value	Setting Range
Power Saver Settings	0 min	0 min to 99999 min



The power saver mode reduces the following power requirements.

Display becomes dark.

- Display Unit
- Servo Motor Servo is switched OFF.

10. Maintenance

○ Clearing Settings

Restores all parameters recorded in the AGS-X unit to initial setting values.

[Setting Procedure]



[Setting Value]

- Yes Starts initialization.
- No Does not initialize.



Even if the system is reinitialized, it does not clear load cell information recorded in the calibration cable.

\odot Displaying the ROM Version

Displays the microcomputer program version.

[Setting Procedure]





The microcomputer program version also appears when the system is started up.

\odot Displaying the FPGA Version

Displays the FPGA firmware version.

[Setting Procedure]



[Setting Value (1)]

Displays the firmware version for FPGA used for measurement.

[Setting Value (2)]

Displays the firmware version for FPGA used for control.

○ Inputting Keycodes

Changes internal parameters.

[Setting Procedure]



[Setting Value (1)]

Enter the number for the keycode to be changed.

[Setting Value (2)]

Enter the data for the keycode to be changed.

11. Optional Devices

O Registering Optional Devices

Registers optional equipment to be used.

[Setting Procedure]



[Setting Value (1)]

- Jog Controller
- Air Chuck
- Marker Control
- SIE
- ProtectionCover

Switches the SIE automatic extensioneter ON/OFF.

nCover Switches the fragment containment cover ON/OFF. Switches the controller I/O extension box ON/OFF.

Switches the jog controller ON/OFF.

Switches the air chuck coupler ON/OFF.

Switches the marker controller ON/OFF.

- Extension Box Switches the controller I/O extension box ON/
- Control In/Out Switches the external controller ON/OFF.

[Setting Value (2)]

- ON
- OFF
- Enables the selected option.
- Disables the selected option.



The system must be restarted after changing the ON/OFF setting for optional devices.

Chapter 5 Performing Tensile Tests

CONTENTS

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5.2 Attaching a Tensile Test Jig	5-2
5.3 Setting Crosshead Stroke Limits	5-4
5.4 Specifying Test Methods	5-5
5.5 Attaching Specimens	5-7
5.6 Starting Tests	5-8
5.7 Testing the Next Specimen	5-11

5.1 Introduction

The following uses an example of performing a tensile test at constant stroke speed to describe how to perform a tensile test.

5.2 Attaching a Tensile Test Jig

1. Attaching the Upper Grip



2 NOTE
The grip shown above is typical, but attach other grips as appropriate for the respective configuration.
2. Attaching the Lower Grip



The grip shown above is typical, but attach other grips as appropriate for the resp configuration.	ective

5.3 Setting Crosshead Stroke Limits

To prevent the crosshead (or attached load cells or jigs) from colliding with anything, secure upper and lower limit collars at respective crosshead upper and lower movement limits. For tensile tests, use the tensile stroke length as a reference to keep any extra cushion to a minimum at both upper and lower limits.





The crosshead upper and lower limits expected during a test must be set to proper values. If setting these limits is difficult, determine the setting range so that the gap between the crosshead top jig and the crossyoke and the gap between the crosshead bottom jig and the table jig are 25 mm or more.



After securing upper and lower limit collars, hold the collars and move the limit bar up and down to confirm that there is no slippage.

5.4 Specifying Test Methods

1. Setting Test Force Polarity and Test Starting Direction

On the [METHODS] menu, set [Pol./Start] to [Tens./Up].



2. Setting the Test Speed

Set test speed by selecting [Test Speed] on the [METHOD] menu.





3. Specifying Break Detection Settings

Set breakpoint sensitivity by enabling [Break Setup] on the [METHOD] menu and setting [Sens. Value].





Break point is detected by a combination of break sensitivity, break level, and peak break level. For more details, see 4.4.11 Break Detection.

5.5 Attaching Specimens





Make sure the specimen does not hit the lower grip during jog operations.



Eliminate any initial test forces that occurred when the lower grips were tightened.

5.6 Starting Tests

1. Pre-Test Confirmation

Chapter 5 Performing Tensile Tests

2. Eliminate Any Initial Test Forces



(2) Close the fragment containment cover.

Chapter 5 Performing Tensile Tests

2. Starting the Test

FORCE / STRESS STROKE

• TEST

(1) Press the [START] button.

(2) For safety reasons, reconfirmation message appears before starting. If prepared, press the [START] button again.

To stop the test before it is finished, press the [STOP] button.



If the test method is not appropriate, the system will not move. Reconfirm parameters. If an alarm is displayed, confirm the alarm description and eliminate the cause.

--- ZERO ------

STROKE

SYSTEM

FORCE

ß

STOP \bigcirc

• FILE

REAL PEAK BREAK

DISP.

METHOD

HIGH SPEED

FINE ADJUST

1 CAUTION

3. Ending the Test





Specimen fragment can have very sharp edges. Be careful not to cut your hands or fingers. Wearing gloves is recommended.



The crosshead moves quickly when returning. Therefore, do NOT look away from the testing machine until the crosshead finishes returning.

4. Confirming Test Results



Each time the [DISP.] button is pressed, the data display mode changes in the sequence indicated below.

→○ Real Value	\rightarrow \bigcirc Peak Value \rightarrow \bigcirc Break Value —
O[REAL] Value:	Displays the current real-time
	value
O[PEAK] Value:	Displays the maximum test force
	data
O[BREAK] Value:	Displays the breakpoint data



The most recent test data is displayed. However, once the next test is performed or the power is switched OFF, that test data is lost.



If a horizontal line is displayed, it indicates there is no test data.

5.7 Testing the Next Specimen

Use the same procedure to attach and test the next specimen.



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Chapter 6 Performing Compression and Bending Tests

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6.2	Attaching Compression and Bending Test Jigs	6-2
6.3	Setting Crosshead Stroke Limits	6-4
6.4	Specifying Test Methods	6-5
6.5	Attaching Specimens	6-7
6.6	Performing the Test	6-7

6.1 Introduction

The following uses an example of performing a compression or bending test at constant stroke speed to describe how to perform those respective tests.

6.2 Attaching Compression and Bending Test Jigs

1. Attaching Compression Test Jigs	
	—— (1) Screw in the compression loading jig.
Set Bolt	(2) Temporarily loosen the set bolt, then insert the upper compression plate.
Upper Co Lower Co	ompression Plate
Jig Attachment Surface	(3) Insert the boss on the lower compression plate into the jig

(4) With upper and lower compression plates pressed closely together, tighten the set bolt.



Screw the compression loading jig in until the top of the loading jig contacts the bottom of the load cell.



Tighten the set bolt on the compression loading jig when the top of the compression plate is in contact with the compression loading jig.

2. Attaching Bending Test Jigs



! CAUTION

Screw the compression loading jig in until the top of the loading jig contacts the bottom of the load cell.

CAUTION

Tighten the set bolt on the compression loading jig when the top of the bending punch is in contact with the compression loading jig.

6.3 Setting Crosshead Stroke Limits

To prevent the crosshead (or attached load cells or jigs) from colliding with anything, secure upper and lower limit collars (hardware for setting limits) at respective crosshead upper and lower movement limits.

For compression tests, use the compression stroke length as a reference to keep any extra allowance to a minimum at both upper and lower limits.





Set the limit range so that jigs on the crosshead could never contact the crossyoke or jigs on the table when the crosshead moves up or down.



After securing upper and lower limit hardware, hold the collars and move the limit bar up and down to confirm it there is no slippage.

6.4 Specifying Test Methods

1. Setting Test Force Polarity and Test Starting Direction

On the [METHODS] menu, set [Pol./Start] to [Comp./Down].



2. Setting the Test Speed

Set test speed by selecting [Test Speed] on the [METHOD] menu.





For specimens with unknown rigidity, set the test speed adequately slow enough to prevent sudden increases in test force.

3. Specifying Break Detection Settings

Set breakpoint sensitivity by enabling [Break Setup] on the [METHOD] menu and setting [Sens. Value].



4. Setting Software Limits

Software limits are set for stroke in case the break is not automatically detected. They are set by selecting [Soft Limit] on the [METHOD] menu.





6.5 Attaching Specimens





Make sure the bending punch does not contact the specimen.

6.6 Performing the Test

Perform tests according to the same guidelines provided for tensile tests (see 5.6 Starting Tests).

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Chapter 7 Method Files

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7.2 File Operations	7-2
7.3 Computer File Operations	7-3

7.1 Introduction

20 method files can be created in the AGS-X unit. Creating method files in advance allows recalling those files later for tests. When a computer is connected, files can be loaded from the computer as well.

7.2 File Operations

1. Reading Files

On the [FILE] menu, select the desired file to be read from [Internal Files]. This displays the file number, test type, and test speed.



2. Deleting Files

On the [FILE] menu, select the desired file to be deleted from [Internal Files].



3. Saving Files

To save a file, select an unassigned method file number from [Internal Files] on the [FILE] menu.





7.3 Computer File Operations

When a computer is connected, the files on the Quick Method List can be browsed.



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Chapter 8 Control Input/Output

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8.1	Introduction	8-2
8.2	Registering Optional Devices	8-3

8.1 Introduction

The AGS-X allows connecting various optional devices via the [CONTROL] I/O connector. Using the optional control I/O extension box allows using multiple optional devices simultaneously.

(1) Jog Controller

This remote control unit includes a jog dial for moving the crosshead with jog operations. Connect To: [CONTROL] I/O connector on the AGS-X unit or <u>Port 1 connector</u> on the extension box.

(2) Air Chuck Link

Allows starting tests via an air chuck controller.

Connect To: [CONTROL] I/O connector on the AGS-X unit or **Port 2 connecto**r on the extension box.

(3) Marker Controller

Allows marking specific measurement values within measurement values. Connect To: [CONTROL] I/O connector on the AGS-X unit or <u>Port 3 connector</u> on the

extension box.

(4) Control Input / Output

Allows controlling testing machine via control I/O port.

Connect To: [CONTROL] I/O connector on the AGS-X unit or **Port 4 connector** on the extension box.

(5) Dataletty

Allows printing measurement results from a Dataletty (mini printer) unit.

Connect To: [CONTROL] I/O connector on the AGS-X unit or <u>Any connectors</u> on the extension box.



[CONTROL] I/O Connector



Control I/O Extension Box



If using the control I/O extension box, optional devices must be connected via certain connectors depending on the type of optional unit. Make sure it is not connected incorrectly.

8.2 Registering Optional Devices

Register optional devices by selecting [Option Devices] on the [SYSTEM] menu.



Be sure to set OFF any optional devices not being used.



Switching optional device settings ON or OFF requires switching the AGS-X power OFF and back ON again.

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Chapter 9 Sensor Input/Output

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9.4 Digital Inputs	 9-5
9.5 Sensor I/O Extension Box (optional)	 9-6
9.6 Analog Recorder	 9-7

9.1 Introduction

The AGS-X allows connecting analog voltage inputs or outputs or digital pulse signal inputs via the [SENSOR] I/O connector. This allows connecting data loggers, external extensometers, linear encoders, or other such devices.

(1) Analog Input	
Number of Channels:	2
Input Voltage Range:	± 5 V or ± 10 V (selected via parameter settings)
(2) Analog Output	
Number of Channels:	2
Output Voltage Range:	± 5 V or ± 10 V (selected via parameter settings)
Output Content:	Test force values or stroke values
(3) Digital Inputs	
Number of Channels:	2
Pulse Type:	90-deg 2-phase pulse or UP/DOWN pulse (selected via
	parameter settings)
Signal Electrical Specifications	: 0 V to 5 V TTL level or open collector output
(4) Linear Encoder Power Supply	
Voltage:	5 V DC
Current:	100 mA Max.
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
LOAD	SENSOR USB CONTROL

 $\frac{LOAD}{CONNECTOR} \xrightarrow{VSB} CONTROL}{CONTROL}$ 

#### 9.2 Analog Inputs

This is used to connect devices such as external extensometers with an analog voltage output format. Configure wiring according to the connection example. Applicable connectors are indicated below.



Connection Example



Do NOT apply more than  $\pm$ 12 V to analog input terminals VIN1 or VIN2. Doing so could damage the input circuit.



Use shielded wire for wiring and always connect the shield to the connector shell.

#### 9.3 Analog Outputs

This is used to connect devices such as external data loggers, which have an analog voltage input format. Configure wiring according to the connection example. Applicable connectors are indicated below.



**Connection Example** 

! CAUTION

Do NOT short analog output terminals VOUT1 or VOUT2 to AGND or ground. Doing so could damage the output circuit.



Use shielded wire for wiring and always connect the shield to the connector shell.

#### 9.4 Digital Inputs

This is used to connect devices such as linear encoders, which have a digital pulse output. Configure wiring according to the connection example. Applicable connectors are indicated below.



**Connection Example** 



Do NOT apply less than zero or more than 5 volts to pulse input terminals DIN1A, DIN1B, DIN2A, or DIN2B. Doing so could damage the input circuit.



Use shielded wire for wiring and always connect the shield to the connector shell.

#### Chapter 9 Sensor Input/Output

#### 9.5 Sensor I/O Extension Box (optional)

Using the optional sensor I/O extension box allows using BNC connectors for analog inputs and outputs.

Connected to AGS-X [SENSOR] I/O Connector



**BNC Connector Configuration** 

! CAUTION

Do NOT apply more than  $\pm$ 12 V to analog input terminals VIN1 or VIN2. Doing so could damage the input circuit.



Do NOT short analog output terminals VOUT1 or VOUT2 to AGND or ground. Doing so could damage the output circuit.

#### 9.6 Analog Recorder



Analog data recorders can be connected via the [SENSOR] I/O connector.



Do NOT connect analog recorder output terminals to each other or short them to ground. Doing so could damage the output circuit. This page is intentionally left blank.

# Chapter 10 Maintenance and Inspection

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10.2	Inspection of Safety Equipment	10-2

#### **10.1 Periodic Inspections**

Shimadzu offers periodic inspection services to ensure the testing machine functions reliably for a long time. To ensure traceability, it is recommended that the testing machine be inspected and serviced about once a year.

This service is performed on-site by Shimadzu trained service engineers using documents provided by Shimadzu.

Shimadzu also offers validation services according to official standards as well. For more information, contact your Shimadzu sales or service representative.

Shimadzu cannot warrant products repaired, adjusted, or otherwise serviced by a company other than Shimadzu or its designated agents.

#### 10.2 Inspection of Safety Equipment

If the system does not function properly during the following inspection procedures, contact Shimadzu or its service representative. Shimadzu cannot warrant products repaired, adjusted, or otherwise serviced by a company other than Shimadzu or its designated agents.

#### 1. Emergency Stop Button

- 1) While pressing a jog button to move the crosshead, press the emergency stop button.
- 2) The crosshead should stop and not restart, even if the jog button is held down.
- 3) Reset the emergency stop button by turning the moveable portion in the direction indicated by arrows.

#### 2. Crosshead Stroke Limit Switches

- 1) While pressing a jog button to move the crosshead, push up on the upper slide limit and hold it there.
- 2) The crosshead should stop and not restart, even if the jog button is held down.
- 3) Stop pushing up on the upper slide limit and let the limit bar move freely. In this state, press a jog button to confirm that the crosshead can be moved.
- 4) While pressing a jog button to move the crosshead, push down on the lower slide limit and hold it there.
- 5) The crosshead should stop and not restart, even if the jog button is held down.
- 6) Stop pushing down on the lower slide limit and let the limit bar move freely. In this state, press a jog button to confirm that the crosshead can be moved.

This completes the inspection procedure. A diagram of the limit switch activation points is shown on the next page.


The combined distance of (A) and (B) is about 4 mm. Since there is a return error of about 1 mm for the free position, each value is between 1 mm and 3 mm. If (A) or (B) is too small, vibration during testing could accidentally trigger the limit switch.

If the return error exceeds the rated value, contact your service representative.

- Confirm that limits can be released by squeezing the slide limit handle.
- Without releasing the slide limit, grip the body of the slide limit and try to pull the slide limit upward. Confirm that the slide limit does not slip with respect to the limit bar.
- Similarly, try to push the lower slide limit downward to confirm that the slide limit does not slip with respect to the limit bar.

If a slide limit slips, contact your service representative.

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# **Chapter 11 Troubleshooting**

## CONTENTS

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11.2	Alarm Display	11-2
11.3	Other Problems	11-6
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#### 11.1 Introduction

Malfunctions are in general not predictable, but in many cases, what is thought to be a malfunction is often an operating error. This section includes such cases, so before deciding that the system has malfunctioned, confirm that none of the given situations are similar. For problems that do not fit any of the examples below, contact your Shimadzu sales or service representative. Note that Shimadzu cannot warrant products repaired, adjusted, or otherwise serviced by a company other than Shimadzu or its designated agents.

#### 11.2 Alarm Display

#### 1. Alarm Display

If an alarm occurs in the AGS-X unit, an alarm sound is emitted and the alarm screen flashes. To cancel the alarm, eliminate the cause and press the [STOP] button.





If a computer is connected, alarms cannot be canceled via the operating panel. To cancel the alarm, click the [Reset] button displayed on the computer screen.

## 2. Alarm Code List

Alarm Code	1	Alarm Display	EMG Switch O	n
Description	The emergency s	stop button is pre	ssed.	
Corrective Measures	After confirming emergency stop arrows or pull it u	safety, release button, turn the p.	the emergency s movable portion i	top button. To release the in the direction indicated by

Alarm Code	2	Alarm Display	Cross-Head Limit	
Description	Crosshead limit was activated.			
Corrective	Temporarily loosen the crosshead limit collar and move the limit bar back to its			
Measures	freed position. Use jog operations to move the crosshead to a safe position.			

Alarm Code	10	Alarm Display	Servo Off
Description	Crosshead movement was attempted with the servo OFF.		
Corrective Measures	Confirm whether the emergency stop button or a crosshead limit is active.		

Alarm Code	11	Alarm Display	Servo ALM
Description	An error has occ	urred in the servo	amplifier.
Corrective Measures	The servo motor dropped. Switch seconds. If this does not re your Shimadzu re	could be overload the AGS-X power esolve the probler epresentative.	ed or the power supply voltage may have OFF and switch it ON again after about 10 n, there may be a hardware failure. Contact

Alarm Code	12	Alarm Display	USB-Func (PC) Err.	
Description	An error occurred during USB communications with the computer.			
Corrective	Switch the AGS-X power OFF, then switch it ON again after about 10 seconds.			
Measures	Also close and re	start the materials	s testing software on the computer.	

Alarm Code	16	Alarm Display	Inter Lock ALM	
Description	The interlock for	The interlock for the fragment containment cover was activated.		
Corrective Measures	If this alarm occu The fragment of cover when state opened and close started. If this alarm occu The fragment the containment	rred when starting containment cover arting a test. Also, osed after finishing rred during a test containment cover nt cover during test	g a test is open. Close the fragment containment the fragment containment cover must be g one test before the next test can be er was opened during the test. Do not open sts.	

Alarm Code	18	Alarm Display	PC Call Err.	
Description	An error has occurred in the computer link function.			
Corrective	Switch the AGS-X power OFF, then switch it ON again after about 10 seconds.			
Measures	Also close and restart the materials testing software on the computer.			

Alarm Code	20	Alarm Display	Over Rating ALM	
Description	Test force has exceeded +102% of rated load cell capacity.			
Corrective	Use load cells within their rated capacity. Jig weight should be within ±20% of			
Measures	the load cell rating and zero the test force with the jig attached.			

## Chapter 11 Troubleshooting

Alarm Code	21	Alarm Display	Under Rating ALM	
Description	Test force has exceeded -102% of rated load cell capacity.			
Corrective	Use load cells within their rated capacity. Jig weight should be within $\pm 20\%$ of			
Measures	the load cell rating and zero the test force with the jig attached.			

Alarm Code	22	Alarm Display	Soft Limit ALM	
Description	A software limit was triggered.			
Corrective	Confirm the software limit settings and whether they are enabled or disabled. If			
Measures	the settings are set properly, then use the system within the setting limits.			

Alarm Code	23	Alarm Display	Out of Control
Description	Stroke speed ex required automat	ceeded 500 mm/ ic control paramet	min during automatic control mode, or the er was determined incorrectly.
Corrective Measures	Confirm whether initial speed is to system to stop th	the specimen wa o high, a sudden e test. Reduce the	as attached properly to the jig. Also, if the increase in test force can cause the control e initial speed.

Alarm Code	24	Alarm Display	Touch Load ALM
Description	The contact load	function was activ	ated.
Corrective	An obstruction w	as detected while	the crosshead is being returned or is in jog
Measures	operations. Do no	ot touch the load c	ell or jig during return or jog operations.

Alarm Code	30	Alarm Display	CalCable Err. (Read)
Description	Failed to read da	ta from the calibra	tion cable.
Corrective Measures	Confirm whether Also, switch the seconds.	the calibration cal AGS-X power O	ble is connected correctly to the AGS-X unit. FF and switch it ON again after about 10

Alarm Code	31	Alarm Display	CalCable Err. (Write)
Description	Failed to save da	ta to the calibratio	n cable.
Corrective Measures	Confirm whether Also, switch the seconds.	the calibration cal AGS-X power O	ble is connected correctly to the AGS-X unit. FF and switch it ON again after about 10

Alarm Code	33	Alarm Display	AutoZero Err.	
Description	Auto-zero of test	force or sensor in	out failed.	
Corrective Measures	Confirm whether correctly to the auto-zeroed diffe of full scale. If it e	the load cell call AGS-X unit. The rs depending on t exceeds this range	ble and sensor range within he sensor type, decrease the s	input cables are connected which sensor data can be but generally is within $\pm 20\%$ sensor input.

Alarm Code	34	Alarm Display	F-CAL Err.
Description	Calibration of me	asured test force	ailed.
Corrective Measures	Confirm whether confirm whether cable. Confirm w the error continu Contact your Shin	the load directi the correct load thether there was les after repeated madzu service rep	on (tension/compression) is correct. Also, cell capacity is registered in the calibration an error in the F-CAL procedure as well. If d attempts, it could be a hardware failure. presentative.

Alarm Code	35	Alarm Display	E-CAL Make Err.	
		/		
Description	Creation of electr	onic test force cal	ibration signal failed.	
	¥			
Corrective	The load cell mu	ist be unloaded w	when the E-CAL signal is created. Eliminate	
Conective	any loads, then try again. Also, confirm whether the correct load cell capacity is			
INIEdSUIES	registered in the	calibration cable.		

Alarm Code	36	Alarm Display	E-CAL Err.
Description	Electronic calibra	tion of test force fa	ailed.
Corrective Measures	The load cell mus again. Also, F-C after repeated at service represent	st be unloaded to AL must already l tempts, it could be tative.	perform E-CAL. Eliminate any loads, then try be completed as well. If the error continues a hardware failure. Contact your Shimadzu

Alarm Code	37	Alarm Display	Linearizing Err.
Description	Creation of nonlir	near correction fac	tor failed.
Corrective Measures	Confirm whether confirm whether cable. Confirm w well.	the load directi the correct load the ther there was	on (tension/compression) is correct. Also, cell capacity is registered in the calibration an error in the linearization procedure as

Alarm Code	38	Alarm Display	Calibration Err.
Description	Calibration of ana	alog input failed.	
Corrective Measures	If the alarm occur Confirm wheth If the alarm occur Confirm wheth	rred during zero-a er zero volts is ap rred during span-a er 5 V or 10 V is a	djustment plied to the analog input terminal. adjustment pplied to the analog input terminal.

Alarm Code	39	Alarm Display	E-CAL NonExe. ALM
Description	Attempted to sta after connecting	rt test without per calibration cable.	forming E-CAL after switching power ON or
Corrective Measures	Perform E-CAL.		

Alarm Code	60	Alarm Display	Parameter Err. (1)	
Description	The method used	The method used for the single test or cycle test is incorrect.		
Corrective	Confirm the test speed and test direction			
Measures		speed and lest diff		

Alarm Code	61	Alarm Display	Parameter Err. (2)	
Description	The test method incorrect.	d for test force	control, strain control,	or stroke control is
Corrective Measures	Confirm automati	ic control parame	ters.	

Alarm Code	63	Alarm Display	C.H. Return Err.
Description	Crosshead return direction or test f	n was attempted vorce polarity.	without resetting position after changing test
Corrective Measures	Reset the positio	n whenever the te	st direction or test force polarity is changed.

Chapter 11 Troubleshooting

Alarm Code	70	Alarm Display	DataLety Err.
Description	Dataletty system	does not enter rea	ady mode.
Corrective Measures	Confirm whether	the Dataletty unit	is online.

Alarm Code	9999	Alarm Display	System Err.
Description	An error other that	an those above oc	curred.
Corrective Measures	Switch the AGS- If the error contin Contact your Shi	X power OFF, the nues after repeate madzu service rep	n switch it ON again after about 10 seconds. ed attempts, it could be a hardware failure. presentative.



In addition to system errors, if an error code other than indicated above is displayed, there may be a hardware failure. Contact your Shimadzu service representative.

#### 11.3 Other Problems

This section describes examples of problems that do not result in an alarm message.

## 1. Power Supply Problems

Problem	Cannot switch the instrument power ON.
Corrective Measures	Confirm whether a circuit breaker has tripped on the power supply panel. Confirm whether the power cord is disconnected. Confirm whether the input voltage mode switch is set properly. Confirm whether a fuse has failed. If replacing fuses, contact your Shimadzu service representative.

Problem	Fuses fail frequently.		
	Confirm whether the input voltage mode switch is set properly.		
	Confirm whether the fuses current rating is correct.		
Corrective	$(100 \text{ V}/120 \text{ V} \rightarrow 10 \text{ A}, 220 \text{ V}/240 \text{ V} \rightarrow 5 \text{ A})$		
Measures	Confirm whether a time-delayed type of fuse is being used. (A "fast-acting" fuse cannot be used.)		
	If replacing fuses, contact your Shimadzu service representative.		

Problem	A ground fault circuit interrupter was tripped on the power supply panel.
Corrective	There may be an electrical leak within the AGS-X unit. Immediately stop using
Measures	the system and contact your Shimadzu service representative.

### 2. Servo Motor Problems

Problem	Motor does not turn.
	Confirm whether the emergency stop button is ON.
Corrective	Confirm whether a stroke limit was triggered.
Measures	The motor will not turn while the testing machine is starting up. Wait until it
	finishes startup.

Problem	A servo error occurred during testing.
Corrective Measures	The motor may be overloaded. Confirm whether the testing machine operating limits have been exceeded. (Max 10 hours continuous operation, max 1000 cycles, or max cycle rate of 3 cycles per minute)

Problem	A servo error occurred during jog operations.
Corrective Measures	The motor may be overloaded. Confirm there are no obstructions caught between the crosshead and table. Also confirm that nothing is wrapped around the ball screw threads.

## 3. Operating Panel Problems

Problem	Some buttons don't work.
Corrective Measures	The types of buttons that can be operated is restricted during tests or while connected to a computer. Try again after the test is finished or after disconnecting the computer. Also, errors cannot be canceled from the AGS-X unit when a computer is connected. Cancel errors via the computer.

Problem	None of the buttons work.
Corrective	No buttons function while the AGS-X unit is starting up. Wait until it finishes
Measures	startup.

Problem	The test force display indicates "".
Corrective	The load cell is not being recognized. Temporarily switch the power OFF and confirm that the calibration cable is connected properly, then switch the power ON again.
Measures	If the display is in [PEAK] value or [BREAK] value mode, values are displayed only after tests are finished.

## 4. Optional Device Problems

Problem	An optional device is not functioning.
Corrective Measures	Confirm whether the presence of the optional device was registered correctly. Also, some optional devices require restarting the testing machine. Switch the AGS-X power OFF and switch it ON again after about 10 seconds.



If any unusual odor or sound is emitted from the AGS-X unit, immediately stop using the system and press the emergency stop button, then disconnect the power cord.

#### 11.4 Resetting the System

Resetting restores all AGS-X settings to factory settings.







Even if the system is reinitialized, it does not clear load cell information recorded in the calibration cable.