349-11981B
Aug. 2023

Precision Universal Testing Machines
AUTOGRAPH

# AGX™-V2 Series

# Instruction Manual

Read this manual thoroughly before you use the product.
Keep this manual for future reference.

This page is intentionally left blank.

# Introduction

## Read this Instruction Manual thoroughly before using the product.

Thank you for purchasing this product.

This manual explains about basic use of the product. For details of the use, refer to the separate reference manual. Read this manual and the reference manual carefully for correct use.

The following manuals are included with the product.

| Manual Name | Manual No. | Description |
|---|---|---|
| AGX-V2 Series Instruction Manual | 349-11981 | This manual. It explains about basic use. |
| AGX-V2 Series Reference Manual | 349-11986 | The manual explains about detailed use and is provided as a PDF file in the DVD-ROM. |
| Voice Control Device Instruction Manual | 349-13006 | The manual explains about detailed use of the voice control device. |
| Operation Controller Instrucetion Manual | 349-11595 | The manual explains about detailed use of the operation controller. (optional item) |

Keep the manuals for future reference.



Original version is approved in English.

## Important

- If the user or usage location changes, ensure that the manuals are always kept together with the product.
- If the 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" thoroughly before using the product.
- To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, re-installation (after the product is moved), or repair is required.

**Notice**

- Information in this manual is subject to change without notice and does not represent a commitment on the part of the vendor.
- 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.
- 
- Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.
  Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services, whether or not they are used with trademark symbol "TM" or "®".

# Indications Used in This Manual

Precaution symbols are indicated using the following conventions:

| Indication | Meaning |
|---|---|
| DANGER | Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death. |
| WARNING | Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or possibly death. |
| CAUTION | Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage. |
| NOTE | Emphasizes additional information that is provided to ensure the proper use of this product. |

The following symbols are used in this manual:

| Indication | Meaning |
|---|---|
| Prohibition | Indicates an action that must not be performed. |
| Instruction | Indicates an action that must be performed. |
| Hint | Indicates information provided to improve product performance. |
| Reference | Indicates the location of related reference information. |

# Safety Instructions

The material testing machine generates large force to measure mechanical strength of materials and products. Inappropriate handling may cause serious damage to users (injury or death) or property damage.
To ensure safe product operation, read these important safety instructions carefully before use and follow all precaution instructions given in this section.

## ■ Product Applications

### ⚠ WARNING


**Do NOT use the product for purposes other than those specified.**

- This product is the material testing machine.
- Using it for an unspecified purpose may result in an accident.
- This product (including accessories) is manufactured for measuring and industrial purposes, and not suitable for household usage.


**Safety regulations and standards**

For notifications on installation and safety controls, follow the necessary procedures in compliance with the laws and regulations applicable in the country where the product is used.

## ■ Installation Site

### ⚠ WARNING


**Do NOT install the product in a place where flammable or explosive gas or liquid exists.**

This product does not have explosion-proof structure. Therefore, installing it in such an area may result in a fire or explosion.


**Install the instrument in a location that satisfies the following conditions.**

Failing to do so may result in electric shock or fire.

- The room temperature is maintained between +5 and +40 °C, with minimal temperature variation during a day.
- Air currents from heating or air conditioning equipment are not directed onto the instrument.
- Ensure that instrument is not exposed to direct sunlight.
- There is no vibration.
- Humidity is maintained within 20 to 80 %.
- There is no condensation.
- The location conforming to the installation environment (IEC)
  Installation category II, Pollution degree: 2, Altitude: Up to 2000 m, Indoor

## ⚠ CAUTION


**Do NOT install the product in a place where corrosive gas, gas containing organic solvents/halide/siloxane groups, oil mist, or much debris/dust exists.**

Otherwise performance may not be maintained or the product life may become shorter than expected.


**Do NOT use the product in an environment where condensation may be caused on the product.**

Otherwise the product may become malfunctioned.


**Install the product in locations where it can be turned on and off easily.**

The product must be turned off immediately in an emergency.

## ■ Installation

## ⚠ WARNING


**To ensure safe operation, contact your Shimadzu representative if product installation, adjustment, or re-installation (after the product is moved) is required. And be sure to observe our installation manual to install and adjust the product.**

Installing, adjusting, or re-installing the product by yourself may cause an injury or equipment failure, or affect stable operation of the product.


**Be sure to ground the grounding terminal of the power supply cable.**

Failure to do so may result in an electric shock.

- 100 V model Type-D (100 Ω or less)
- 200 V model Type-D (100 Ω or less)
- 400 V model Type-C (10 Ω or less)


**Use a power supply cable specified by us or supplied with the product.**

Failure to do so may result in an electric shock or fire. And a power supply cable specified by us or supplied with the product must not be used with other equipment. The product (including accessories) is for measurement and industrial use and unsuitable for home use.

## ⚠ CAUTION

Instruction

**Be aware of gaps around the instrument during installation.**

If your fingers get caught, it may result in an injury.

Instruction

**When adjusting the angle or direction of the operation controller, be careful not to allow the operation controller to fall off from the stand arm.**

The operation controller will drop and may cause injury or equipment failure.

NOTE

- After adjusting the height or angle of the operation controller, be sure to tighten its handle to fix the operation controller.
- Contact your Shimadzu representative for wiring the power supply cable.
- Power supply capacities specified in "7.1 Basic Specifications" are the figures in the stationary state.
- Use a surge protection breaker in the power supply system against inrush current that runs when the power is turned on.
- A power supply voltage outside the range of the rated value ± 10 % may cause malfunction or damage to parts.
- Provide a stabilized power supply if large variation occurs in the power supply voltage.

## ■ Operation

## ⚠ DANGER

Prohibition

**Do NOT place your hand, head or any other body part in the test space while the crosshead is operating.**

Being caught by the instrument may result in serious injury or death.

Prohibition

**Do NOT open the ball screw protection cover. Do NOT move the crosshead with the ball screw protection cover opened.**

Otherwise a body part may be caught by the rotating ball screw.

Instruction

**Operators must read the instruction manual thoroughly for correct use. And manage so that a person other than those who have been trained about how to operate cannot use the product.**

A dangerous level of force is generated at the moving part according to the capacity of the product. Wrong use may result in serious injury or death.

## ⚠ WARNING


**Never touch a high voltage part of the controller inside the instrument.**

Failure to do so may result in an electric shock.

---


**Do not place jigs on the rear cover.**

If you put your body into the test space, your body may get caught in the jig and get injured.

---


**If your instrument does not have a protection cover, keep face or other body parts away from a specimen during a test.**

Fragments of a fractured specimen may scatter and damage your eyes and body. Wear protective glasses and install a cover if a fractured specimen may scatter.

---


**Always operate the power breaker from the rear side of the instrument. Never reach through the testing space to operate the power breaker.**

Operating the power breaker when body or extemities are in the testing space may cause injury from crushing.

---


**If the instrument emits abnormal odor or noise, immediately stop using the instrument, press the emergency stop switch, and disconnect the power supply cable.**

Serious failure may occur or injury may occur due to misuse or unexpected operation of this instrument.

## ⚠ CAUTION


**Do not use the crosshead upper and lower limit switches as a condition to stop a test.**

A jig may hit and damage the frame, another jig or the load cell, which may result in injury of an operator.

---


**Keep hands away from the moving part since the crosshead moves rapidly during return or offset based on the registered distance between jigs. Be careful to prevent jigs from interfering with nearby objects.**

A hand of an operator may be caught, resulting in injury, or nearby objects may be damaged. Immediately press the emergency stop button if the instrument movement is abnormal.

---


**Specify the estimated movable range of the crosshead correctly with the crosshead upper and lower limit switches.**

A jig may hit and damage the frame, another jig or the load cell, which may result in injury of an operator.

- Specify the range that can prevent the jig on the crosshead from interfering with the yoke or the jig on the table when the crosshead moves up or down.
- If you have any difficulty in limiting the range, at least specify the range by keeping 20 mm or more clearance between the grips.
- After fixing the crosshead upper and lower limit switches, try to move them up or down to check for slippage.

---


**The crosshead limit switches stop within 5 mm from the set positions. Set the positions of the crosshead limit switches to a position 5 mm away from the position where you desire to stop the crosshead limit switches.**

Otherwise the jigs may interfere with each other.

---


**A test jig heavier than 10 kg should be carried very carefully not to drop. A jig heavier than 20 kg should be carried by a person who has been trained about transportation of heavy goods. Use a crane as necessary.**

Otherwise, an operator may get injured if a jig falls.

---


**If the lock nut is loosened excessively, the grip may fall. Be careful not to lower by 5 mm or more.**

Otherwise, an operator may get injured if a jig falls.

---


**For safety, wear protective gloves, safety shoes, cap or helmet, and protective glasses, when replacing jigs, installing or removing the specimen.**

- There is a risk of the jigs pinching your fingers and causing injury.
- There is a risk of your hand slipping when applying force, causing injury to your fingers.
- There is a risk of an operator being injured if a jig falls.
- There is a risk of your fingers getting injured from contact with the fractured surface of the specimen.

---


**Wear protective gloves when touching a fractured specimen.**

Touching sharp fractured surface of a specimen may result in injury.

## ⚠ CAUTION

Instruction

**The crosshead moves rapidly during return or offset based on the registered distance between jigs. Be sure to check the arrow direction displayed on the controller before starting the return movement.**

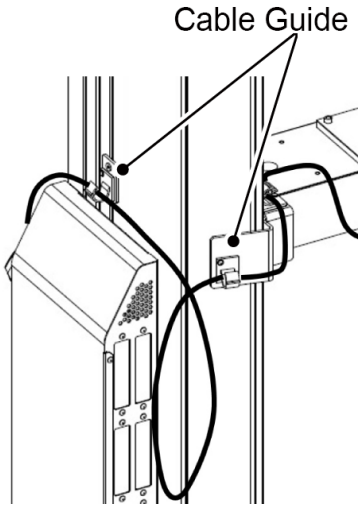
Otherwise an operator may touch the crosshead and get injured.

Instruction

**For the standard model, wide model, and separately installed controller model, fix the load cell cable to the cable guides on the rear of the crosshead and the side of the pole.**

**Check that the cable length is sufficient for reaching within the crosshead travel range.**

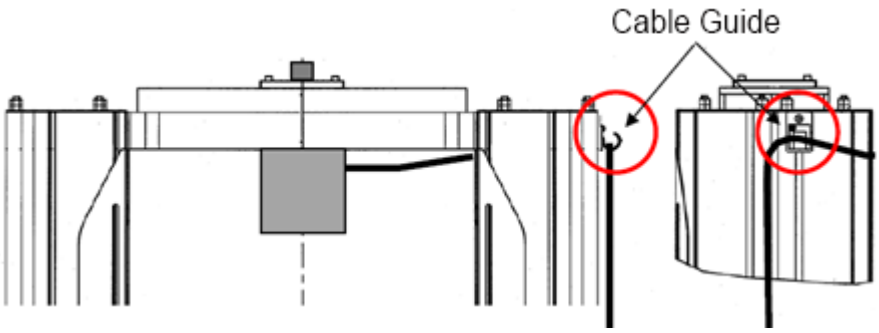
Failing to do so may cause an equipment failure.




Instruction

**For the reinforced yoke model, fix the load cell cable at a position away from the crosshead travel range so that the cable does not get caught in the crosshead.**

Failing to do so may cause an equipment failure.



NOTE

- Make sure that the mass of the jig is no more than 20 % of the load cell capacity rating.
- Continuous operation of this product is limited to less than ten hours. Do not exceed the limitation.
- There are use restrictions for cycle test.

  Reference "7.3 Use Restrictions and Installation Environment" P.126
- Before replacing a load cell, turn off the power or disconnect the CAL connector from the smart controller or operation controller according to the specified procedure.
  Connecting/disconnecting the CAL connector during ECAL or other data communication may corrupt calibration data.
- Tighten the supplied bolt until the load cell is secured to the crosshead without looseness. Otherwise test force may not be measured correctly.
- Do not remove or loosen the locating plate for load cell on the top surface of the crosshead. Otherwise, a correct position of the load cell cannot be set.
- A load cell and CAL connector are calibrated as a set before shipment. Be sure to use a set of a CAL connector and load cell that are included in the same package. Connecting any CAL connector other than the supplied one will cause an abnormal test force preventing the load cell from properly detecting overload.
- Tests cannot be performed after the load cell is replaced/attached unless E-CAL is executed.
- Do not perform operation that may apply load to the crosshead while a load cell is not attached or cannot receive transmitted load.
  Doing so may damage the frame or jig.
- To make the initial setting of distance between jigs, measure accurate values at the time of setting.
  If inaccurate values are input, the jigs may interfere with each other.
- If the jigs have been changed, be sure to make the initial setting of distance between jigs.
  Otherwise the jigs may interfere with each other.
- Be careful to prevent water from entering inside of the instrument since the instrument may be damaged.
- The instrument has a "TouchLoad function" that forces the crosshead to stop when a given level of fluctuations in load applied to the load cell is sensed in the jog operation or during return.
  The function that is enabled by one of the protection circuits may not completely prevent danger due to overshooting in high-speed operation. In addition, it does not stop movement in the unloading direction to ensure safety and operational convenience.
  The function does not guarantee prevention of collision or overloading in the test space.
  Do not use the function for positioning or control.
- Damages to the load cell due to overshooting may not be completely prevented if collision occurs during high-speed movement in a compression test, etc.
- To perform E-CAL of test force, apply no load and wait for at least 15 minutes after powering the load cell.

NOTE

- Acceptable test force of a load cell is 150 % of the load cell capacity rating, which includes weight of jigs, in tension and compression tests. For load cells with small capacity, be careful about overload on the detector and risk that the load cells fall and fail.
- Turn off the power before opening the ball screw protection cover. Also, be sure to close the ball screw protection cover before turning on the power.
- Be careful to prevent water from entering inside of the instrument since the instrument may be damaged.
- If a computer is connected, an error cannot be cleared from the operating panel. Press the Clear Error button shown on the screen of the computer.
- If any error code other than those listed "5.2.2 Alarm Code List" is displayed, hardware failure other than system errors should also be considered. Contact your Shimadzu representative.
- After initialization, the crosshead position is reset and the test conditions and system settings are all initialized. Be sure to set them again.
- Initialization does not clear the load cell information stored in the CAL connector.

## ■ Inspection and Maintenance

**⚠ WARNING**


**A person with necessary expertise should perform wiring, maintenance and inspection.**

Otherwise an electric shock, injury, or fire may occur.

## ■ Repair, Disassembly and Modification

**⚠ CAUTION**


**Do NOT perform unauthorized modification or disassembly.**

Doing so may cause an electric shock, short-circuit, resulting in an accident. Doing so may also cause injury or failure.


**Contact your Shimadzu representative for repair.**

Otherwise a fire, electric shock, or injury may result.

## ■ Measures against Earthquake

As a measure against earthquake, fix the instrument on the floor to prevent the instrument from falling down.
Fall-prevention fittings to fix the instrument onto floor are available as optional products. Contact us for purchasing the fittings.

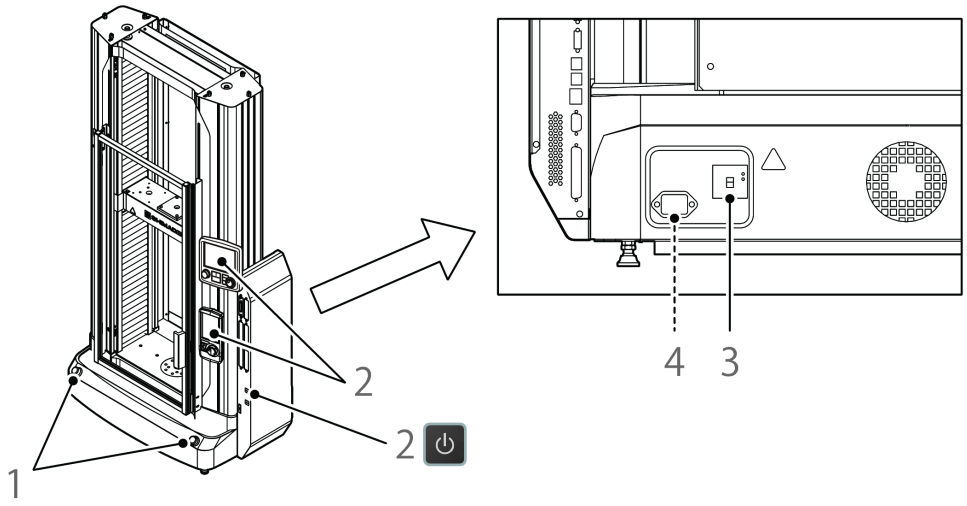
## ■ In an Emergency

Perform the following in case of abnormality that the crosshead does not stop or there is an odor of burning or in case of power failure.
Before starting to use the instrument again, inspect it and if necessary, contact a Shimadzu service personnel.

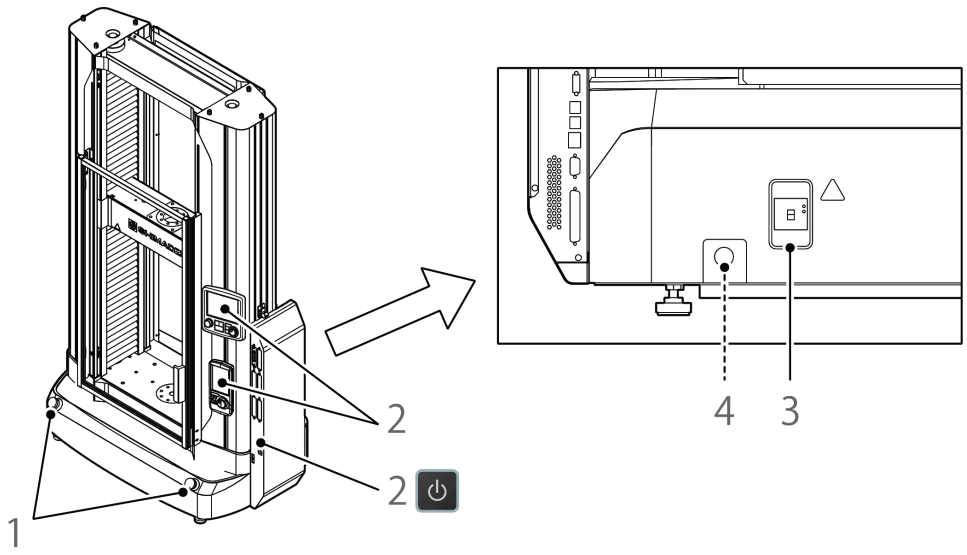
**To stop the instrument in an emergency (power failure)**

1. Press the emergency stop switch of the instrument.
2. Press the power button of the control box and follow the instructions on the controller screen to turn off the instrument.
3. Turn off the power supply breaker (by pressing it downward) on the rear side of the instrument.
4. Turn off the primary side power supply breaker (of your facility) to cut power supply.

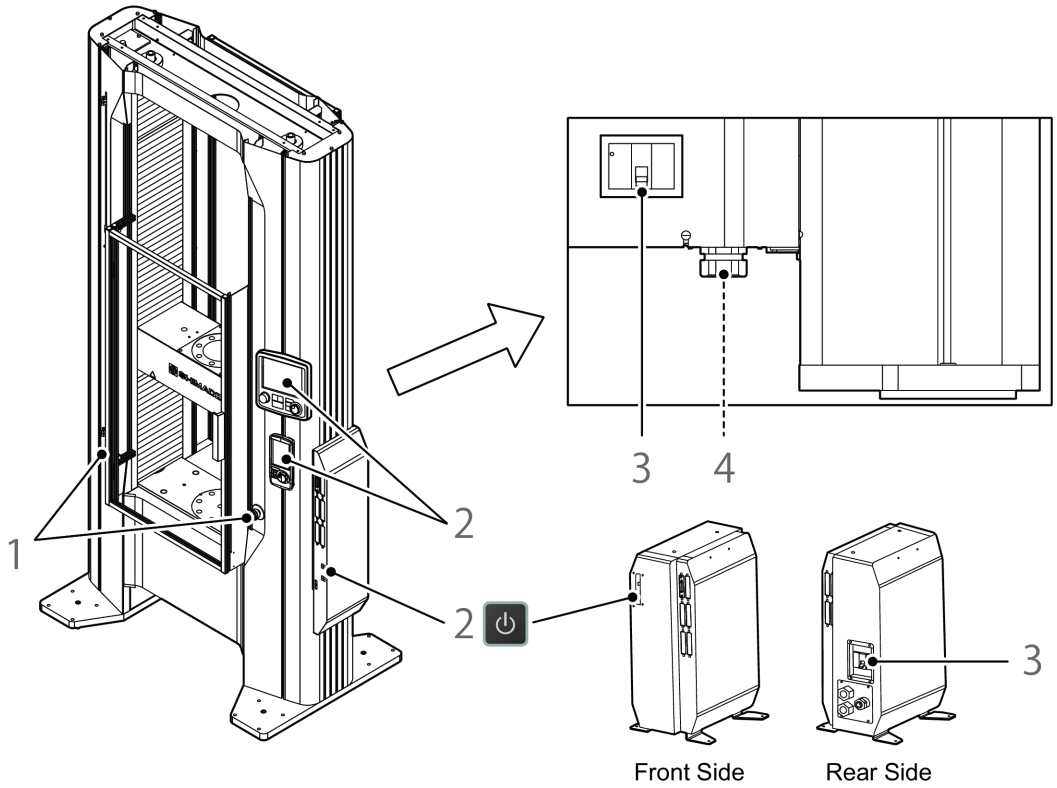
**AGX-10kNV2D**



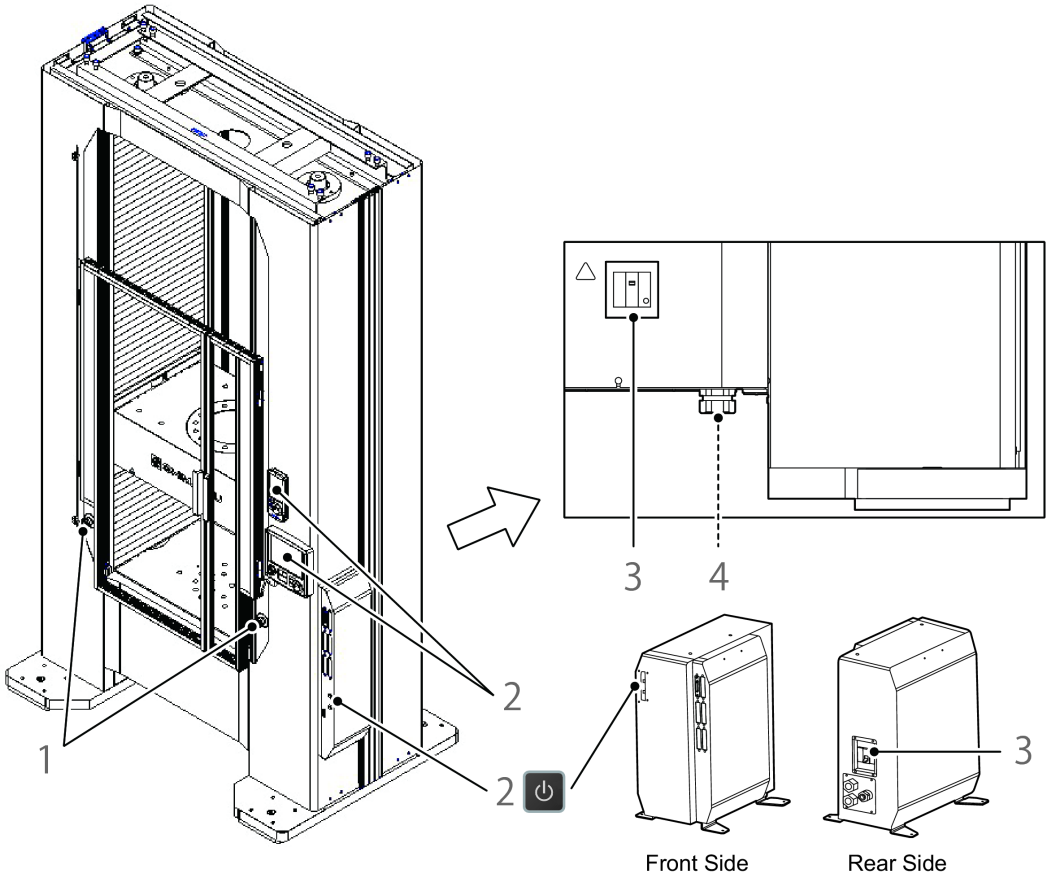
**AGX-20kNV2D / 50kNV2D**




**AGX-50kNV2 / 100kNV2 / 300kNV2**



### AGX-600kNV2



# Warning Labels

In order to ensure safety, warning labels are attached in places requiring caution.

If a warning label is lost or damaged, obtain a new label through your Shimadzu representative and attach it in the correct position. See "Warning Labels on the Equipment" in this Instruction Manual for details on the positions where the labels are attached

## ■ Front Side

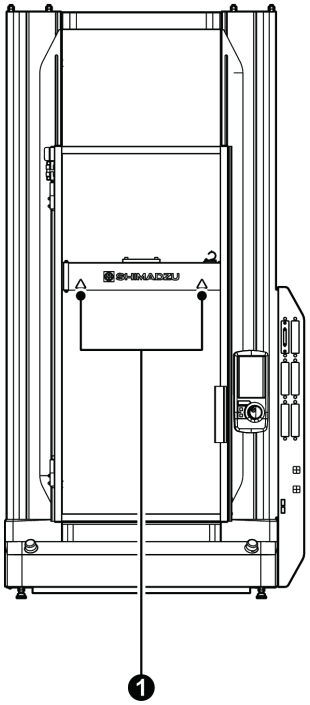
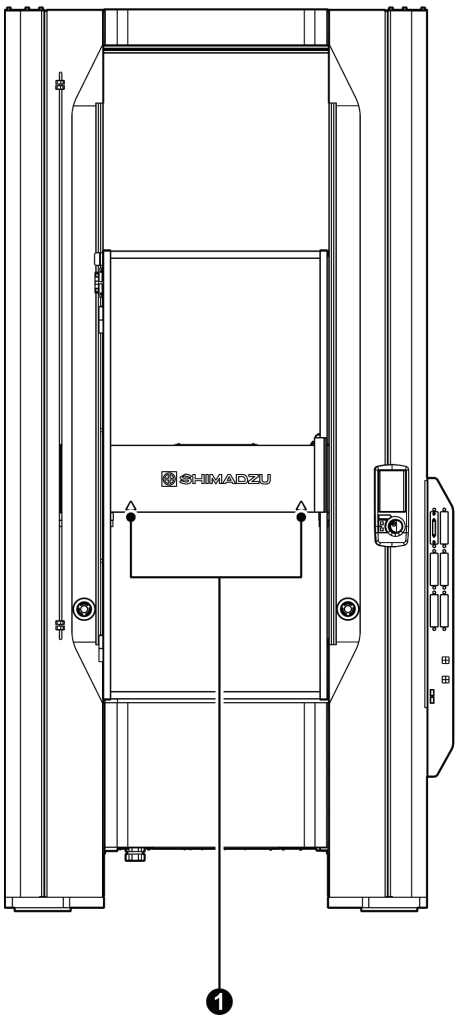



Table-top type




Floor type

| No. | Warning Label | Description |
|---|---|---|
| ❶ |  | Pinch point.<br>(Part No.: S037-72999-34)<br>Keep hands clear while the crosshead is moving. |

## ■ Rear Side (standard model, reinforced yoke model, wide test space model)

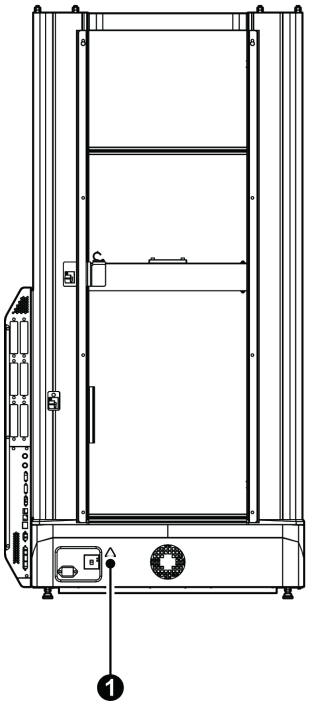
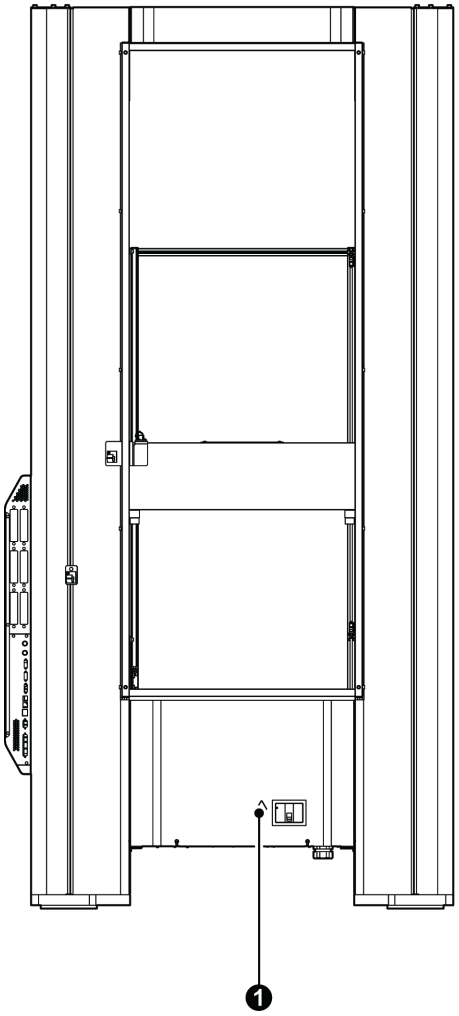


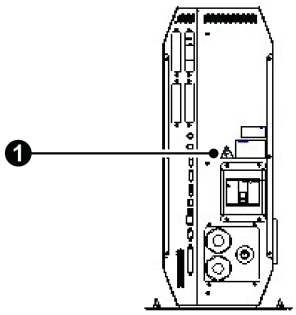

Table-top type



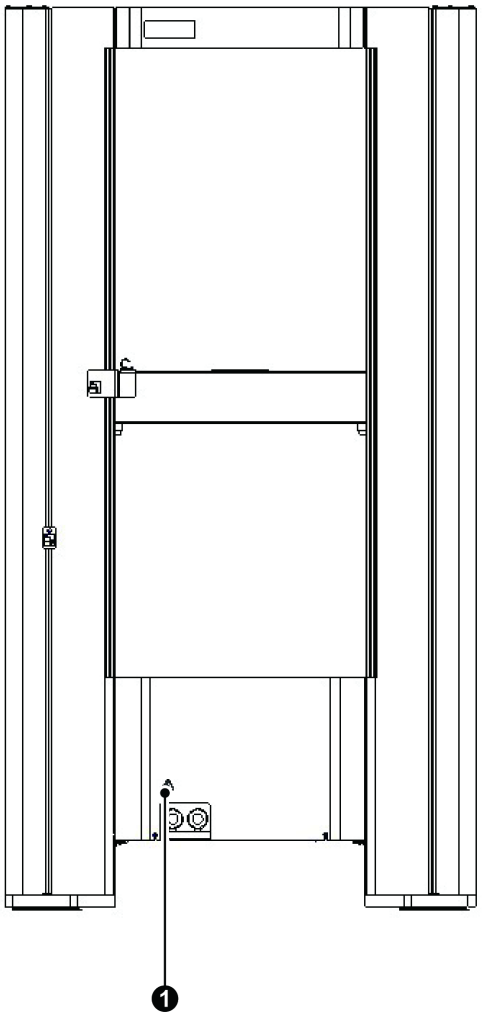

Floor type

| No. | Warning Label | Description |
|---|---|---|
| ❶ |  | Electric shock hazard<br>(Part no.: S037-72999-04)<br>There is a risk of electric shock. Do NOT disassemble the product.<br>Turn off the power before disconnecting a cable. |

## ■ Rear Side (separately installed controller model)




AGX-V/R controller




Floor type

| No. | Warning Label | Description |
|---|---|---|
| ❶ |  | Electric shock hazard<br>(Part no.: S037-73999-04)<br>There is a risk of electric shock. Do NOT disassemble the product. |

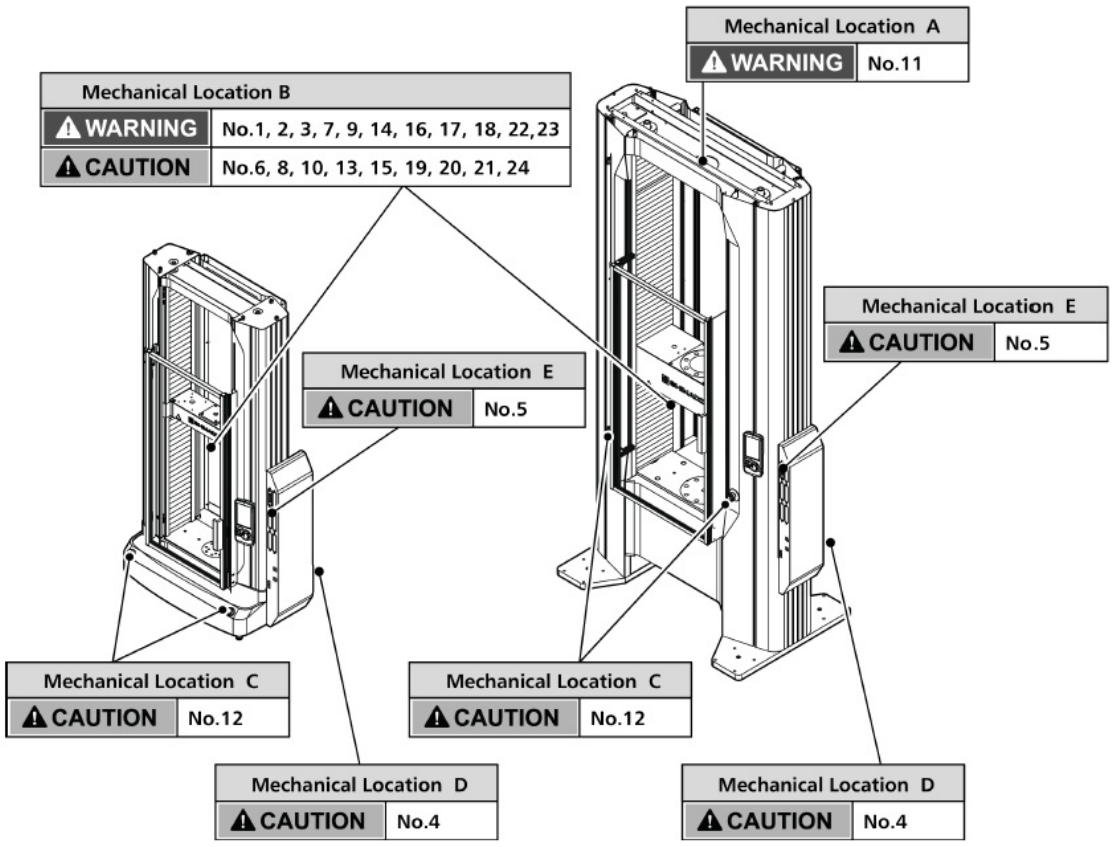
NOTE The appearance of the testing machine varies depending on its type and capacity. The testing machine shown in the figure is AGX-50kNV2S.

# Residual Risk Information

A residual risk indicates a risk that could not be reduced or eliminated in the process of design and manufacture. Check the risk locations in "Residual Risk Map", and take the relevant protective measures described in "List of Residual Risks".

## ■ Residual Risk Map

The "Mechanical Location" and "No." indicated below are in accordance with those in "List of Residual Risks". For details, see "List of Residual Risks" P.xix.



## ■ List of Residual Risks

The "No." and "Mechanical Location" indicated below are in accordance with those in "Residual Risk Map". Be sure to check the actual "Mechanical Location" referring to "Residual Risk Map" P.xviii.
Furthermore, read through and understand the content in "Reference" to take appropriate protective measures.

**Preparation**

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 1 | B | ⚠ WARNING<br>Your hand may be caught by the pneumatic flat grips when they catch a specimen. | Use the finger guard supplied with the pneumatic flat grips. | Reference | Instruction Manual for Pneumatic Flat Grips |
| | | | | Operation Category | Attaching samples |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 2 | B | ⚠ WARNING<br>The upper grip is put on the top of the lower grip when the upper grip is attached. The upper grip may fall if it is unstable on the lower grip. | Ensure that the surface where the upper grip is put has no bump and the upper grip can be stable on it. | Reference | AGX-V2 Series Reference Manual |
| | | | | Operation Category | Attaching test jigs |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 3 | B | ⚠ WARNING<br>When the screwed upper compression plate is removed from the load jig, the upper compression plate may suddenly come off from the screw and you may fail to hold the weight of the falling plate, causing your hand to be pinched. | Purchase and use the multi-joint vacuum adapter. | Reference | AGX-V2 Series Reference Manual |
| | | | | Operation Category | Attaching test jigs |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 4 | D | **⚠ CAUTION**<br>If a bent power cable is used for a long time, the cable covering may break, leading to short-circuit. | Do not bend the power cable and keep any load away from the wired power cable. | Reference | Chapter 2 ( P.13) |
| | | | | Operation Category | Connecting a power supply |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 5 | E | **⚠ CAUTION**<br>A person may trip over the load cell cable sagging onto the floor and cut the cable or fall down. | Use the supplied cable clamp to prevent the load cell cable from sagging onto the floor. | Reference | 3.2.1 ( P.35) |
| | | | | Operation Category | Connecting a load cell |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 6 | B | **⚠ CAUTION**<br>A small load cell may break if large torque is applied while a jig is attached to it. | Carefully read the handling instructions supplied with the load cell to apply appropriate force to fix a jig. | Reference | AGX-V2 Series Reference Manual |
| | | | | Operation Category | Attaching test jigs |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 7 | B | **⚠ WARNING**<br>An operator may accidentally drop a test jig when attaching or removing it. | Be extremely careful not to drop a test jig when attaching or removing it.<br>Wear protective gloves when installing and removing the jig. | Reference | AGX-V2 Series Reference Manual |
| | | | | Operation Category | Attaching samples |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 8 | B | **⚠ CAUTION**<br>Jigs hit each other if the set positions of the crosshead limit switches are inappropriate. | Check the positions of the crosshead limit switches before starting a test. | Reference | 3.5.1 ( P.57) |
| | | | | Operation Category | Setting of the test conditions |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 9 | B | **⚠ WARNING**<br>Your hand may be caught between the compression plates of the compression cage. | Do not touch the compression cage while the testing machine is operating. | Reference | Instruction Manual for Cage-Type Compression/ Bending Test Devices |
| | | | | Operation Category | Attaching test jigs |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 10 | B | **⚠ CAUTION**<br>Jigs hit each other when the crosshead is operated in the high-speed jog mode. | Perform low-speed jog operation if the distance between jigs is short. | Reference | 3.4.1 ( P.45) |
| | | | | Operation Category | Preparing for a test |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |

## Test

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 11 | A | **⚠ WARNING**<br>If a test is performed with the load cell cable passed through the hole in the middle of the crossyoke, your hand may be caught between the crossyoke and load cell when you try to adjust the load cell during the test. | Fix the load cell cable with the cable clamp supplied with the crosshead. For the reinforced yoke model, fix the load cell cable with the cable clamps at the side and upper part of the pole. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.2.1 ( P.35)<br>During a test<br>Qualified person received training to use the instrument |
| 12 | C | **⚠ CAUTION**<br>The emergency stop switch is not easily accessible and cannot be pressed instantly in an emergency. | If the emergency stop switch is not easily accessible, purchase a handy emergency stop switch separately. The reinforced yoke model is provided with the additional emergency stop switch. Install it in a position accessible during testing. | Reference<br>Operation Category<br>Required Qualification/ Education | Chapter 2 ( P.13)<br>During a test<br>Qualified person received training to use the instrument |
| 13 | B | **⚠ CAUTION**<br>The crosshead moves in the reverse direction due to incorrectly set test conditions. | Check the crosshead movement direction displayed when a test is started. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.6.1 ( P.62)<br>When starting a test<br>Qualified person received training to use the instrument |
| 14 | B | **⚠ WARNING**<br>An operator may be injured if he/she is hit by fragments of a broken specimen. | Use the protection cover. If the protection cover cannot be used for the size of the specimen or test jig, wear protective glasses and take a protective measure before starting a test. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.5.2 ( P.60)<br>During a test<br>Qualified person received training to use the instrument |

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 15 | B | **⚠ CAUTION**<br>An operator may cut his/her hand with a sharp edge of a broken specimen. | Wear gloves when removing a broken specimen. | Reference | AGX-V2 Series Reference Manual |
| | | | | Operation Category | After a test |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 16 | B | **⚠ WARNING**<br>An operator may be injured when entering the test space while the crosshead is operating. | Use the protection cover. If the protection cover cannot be used for the size of the specimen or test jig, wear protective glasses and keep enough distance from the test space while performing a test. | Reference | 3.5.2 ( P.60) |
| | | | | Operation Category | During a test |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 17 | B | **⚠ WARNING**<br>The protection cover sensor is removed and a test is performed with the cover opened. | Do not remove the protection cover sensor. | Reference | 3.5.2 ( P.60) |
| | | | | Operation Category | During a test |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |
| 18 | B | **⚠ WARNING**<br>An operator may be caught by the rotating ball screw when performing a test with the ball screw protection cover opened. | Do not open the ball screw protection cover during a test. | Reference | Chapter 2 ( P.13) |
| | | | | Operation Category | During test operation |
| | | | | Required Qualification/ Education | Qualified person received training to use the instrument |

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 19 | B | ⚠ CAUTION<br>An operator mixes up the up/down buttons when operating the crosshead in the job mode and the crosshead moves in an unintended direction. | Check the jog buttons before operating the crosshead. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.4.1 ( P.45)<br>During test operation<br>Qualified person received training to use the instrument |
| 20 | B | ⚠ CAUTION<br>After replacement of a test jig, the crosshead is returned to the origin before the replacement, causing a collision of a new test jig. | Be sure to set the crosshead origin again after replacing test jigs. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.4.2 ( P.46)<br>During test operation<br>Qualified person received training to use the instrument |
| 21 | B | ⚠ CAUTION<br>If the crosshead is moved with the load cell connector disconnected, resulting overload may break a test jig or load cell. | Be sure to perform E-CAL before starting a test. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.3.2 ( P.42)<br>During test operation<br>Qualified person received training to use the instrument |
| 22 | B | ⚠ WARNING<br>The test is initiated from the computer, and the body and hands are pinched. | When not working alone, communicate well with others. | Reference<br>Operation Category<br>Required Qualification/ Education | 3.7.1 ( P.66)<br>When starting a test<br>Qualified person received training to use the instrument |

**Maintenance**

| No. | Mechanical Location | Description | Protective Measure taken by machine user | - | - |
|---|---|---|---|---|---|
| 23 | B | **⚠ WARNING**<br>An operator may be caught by the rotating ball screw if he/she operates the crosshead while greasing the ball screw. | Turn off the testing machine before greasing the ball screw. | Reference | 4.6.1 ( P.76) |
| | | | | Operation Category | When greasing the ball screw |
| | | | | Required Qualification/ Education | Qualified person received training to control the instrument |
| 24 | B | **⚠ CAUTION**<br>Dropping a weight on foot causes injury. | Wear safety shoes when checking the test force. | Reference | 4.4 ( P.73) |
| | | | | Operation Category | When checking test force |
| | | | | Required Qualification/ Education | Qualified person received training to control the instrument |

# Electromagnetic Compatibility

This is group 1 equipment.
Group 1 equipment: group 1 contains all equipment in the scope of this standard which is not classified as group 2 equipment.
Group 2 equipment: group 2 contains all ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used or only used locally, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material, for inspection/analysis purposes, or for transfer of electromagnetic energy.

## ■ CISPR11 Emissions (Electromagnetic Interference)

This is a class A product.
Class A equipment is equipment suitable for use in all locations other than those allocated in residential environments and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

### ⚠ CAUTION


**When this product causes an electromagnetic disturbance to devices being used near this product, create an appropriate distance between those devices and this product in order to eliminate the disturbance.**

This is a class A product. Class A equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

## ■ IEC61326-1 Immunity (Electromagnetic Susceptibility)

This product complies with IEC61326-1 immunity, industrial electromagnetic environment for electromagnetic susceptibility (Immunity).

Compliance with these standards does not ensure that the product can operate at a level of electromagnetic interference that is stronger than the level tested. Interference stronger than the values specified above may cause the product to malfunction.

**When installing or using this product, in an industrial location:**

Locate the product away from any device emitting strong levels of electromagnetic noise. Use a power source that is separated from the power source of any device emitting strong levels of electromagnetic noise.

**To prevent static electricity:**

Prior to touching the product, the operator should be sure to discharge the static electricity stored in their body by first touching a grounded metallic structure.
Do not touch any terminals or connectors that are not connected to cables while the product is turned ON.

Take the following measures before installing and/or using the instrument in industrial locations:

- Install the instrument away from the device with strong electromagnetic noise.
- Supply power from a different power source.
- Take measures to prevent buildup of static electricity.

# Warranty

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. Limitation of Liability:**

(1) In no event will Shimadzu be liable for any lost revenue, profit or data, or for special, indirect, consequential, incidental or punitive damages, however caused regardless of the theory of liability, arising out of or related to the use of or inability to use the product, even if Shimadzu has been advised of the possibility of such damage.

(2) In no event will Shimadzu's liability to you, whether in contract, tort (including negligence), or otherwise, exceed the amount you paid for the product.

**4. 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

(3) 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

Recording media such as CD-ROMs and DVD-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.

# After-Sales Service and Availability of Replacement Parts

## ■ After-Sales Service

If any problem occurs with this product, perform an inspection and take appropriate corrective action as described in "5 Troubleshooting".

If the problem persists, or the symptoms are not covered in "5 Troubleshooting", 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.

# Maintenance, Inspections, and Adjustment

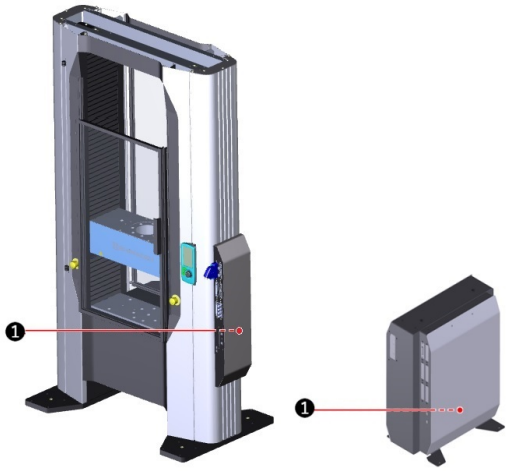
In order to maintain the instrument's performance and obtain accurate measurement data, daily inspection and periodic inspection/calibration are necessary.

- For daily maintenance, inspection, and replacement parts, see "4 Performance Inspection and Maintenance".
- Periodic inspection/calibration should be requested to your Shimadzu representative.
- Replacement cycles described for periodic replacement parts are a rough estimate. Replacement may be required earlier than the described replacement cycles depending on usage environment and frequency.

# Disposal Precautions

When disposing of the instrument, contact your Shimadzu representative.
If you dispose them yourself, do so in accordance with the processing standards determined by law, separately from general industrial waste and household garbage.

This product contains a battery.
To dispose of it, ask an industrial waste disposer in compliance with the local laws and regulations.




| No, | Type | Description |
|---|---|---|
| ❶ | CR2032H | Lithium manganese dioxide battery<br>Lithium content: 0.07 g |

**NOTE** For California, USA Only
This product contains a battery that contains perchlorate material. Perchlorate Material - special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate

# Contents

This page is intentionally left blank.

# 1 Overview



**The Shimadzu AUTOGRAPH "AGX-V2 Series" are precision universal testing machines achieving a high level of control performance, operability, and safety.**

The voice operation function is available to provide correct and safe testing. This function enables you to test start or crosshead return, zero reset of display value through voice. The voice guidance prevents unsafe operation due to carelessness coming from overfamiliarity to realize safe and comfortable operation.

**AGX-V2 series are certified as Shimadzu's Eco-Products Plus.**

The optimized design of the drive system has improved energy density based on the maximum test force × maximum test speed by more than 40 % compared to the previous model (AG-Xplus).

**As an extended series, a wide test space model (hereinafter "wide model"), a separately installed controller model, and a reinforced yoke model have been added to the lineup.**

- Wide model
  With this model, the effective width of the test space of the testing machine main unit is expanded to 1,000 mm. In combination with a surface plate, it enables testing of large-sized test specimens that cannot be tested in normal testing machines.
- Separately installed controller model
  This is a model where the controller and electrical parts are separated from the testing machine. This model is environmentally resistant, minimizing the effects of breakage shock and conductive dust (carbon fiber, micro wires, etc.) on electrical components.
- Reinforced yoke model
  This model can perform tests in a test space above the crosshead. Since tests can be performed above and below the crosshead, it is possible to arrange tensile tests in the upper space and compression or bending tests in the lower space.

Depending on your applications, we provide the Table-top Type and Floor Type testing frames with variations of maximum test force, power supply voltage, and pole extension.A frame model without a protection cover is also available in addition to those in the list below.

# 1.1 Testing Frame

## ■ Table-top Type

| Maximum Test Force | Model Type | Power Supply Voltage | Model No. | Pole Extension | P/N |
|---|---|---|---|---|---|
| 10 kN | Standard model | 100 V model | AGX-10kNV2D | Standard | S336-03400-21 |
| | | | AGX-10kNV2D +250 | 250 mm Extension | S336-03400-22 |
| | | | AGX-10kNV2D +500 | 500 mm Extension | S336-03400-23 |
| | | 200 V model | AGX-10kNV2D | Standard | S336-03401-21 |
| | | | AGX-10kNV2D +250 | 250 mm Extension | S336-03401-22 |
| | | | AGX-10kNV2D +500 | 500 mm Extension | S336-03401-23 |
| | Reinforced yoke model | 100 V model | AGX-10kNV2D RY | Standard | S336-03400-26 |
| | | | AGX-10kNV2D +250 RY | 250 mm Extension | S336-03400-27 |
| | | 200 V model | AGX-10kNV2D RY | Standard | S336-03401-26 |
| | | | AGX-10kNV2D +250 RY | 250 mm Extension | S336-03401-27 |
| | Wide model 1000 mm | 100 V model | AGX-10kNV2D W10 | Standard | S336-03410-21 |
| | | 200 V model | | Standard | S336-03411-21 |
| 50 kN | Standard model | 200 V model | AGX-50kNV2D | Standard | S336-03402-21 |
| | | | AGX-50kNV2D +250 | 250 mm Extension | S336-03402-22 |
| | | | AGX-50kNV2D +500 | 500 mm Extension | S336-03402-23 |
| | Reinforced yoke model | 200 V model | AGX-50kNV2D RY | Standard | S336-03402-26 |
| | | | AGX-50kNV2D +250 RY | 250 mm Extension | S336-03402-27 |

## ■ Floor Type

| Maximum Test Force | Model Type | Power Supply Voltage | Model No. | Pole Extension | P/N |
|---|---|---|---|---|---|
| 50 kN | Standard model | 200 V model | AGX-50kNV2 | Standard | S336-03403-21 |
| | | | AGX-50kNV2 +250 | 250 mm Extension | S336-03403-22 |
| | | | AGX-50kNV2 +500 | 500 mm Extension | S336-03403-23 |
| | | | AGX-50kNV2 +750 | 750 mm Extension | S336-03403-24 |
| | | 400 V model | AGX-50kNV2 | Standard | S336-03404-21 |
| | | | AGX-50kNV2 +250 | 250 mm Extension | S336-03404-22 |
| | | | AGX-50kNV2 +500 | 500 mm Extension | S336-03404-23 |
| | | | AGX-50kNV2 +750 | 750 mm Extension | S336-03404-24 |
| | Separately installed controller model | 200 V model | AGX-50kNV2S | Standard | S336-03430-21 |
| | | | AGX-50kNV2S +250 | 250 mm Extension | S336-03430-22 |
| | | | AGX-50kNV2S +500 | 500 mm Extension | S336-03430-23 |
| | | | AGX-50kNV2S +750 | 750 mm Extension | S336-03430-24 |
| | Wide model 1000 mm | 200 V model | AGX-20/50kNV2 W10 | Standard | S336-03413-21 |
| | | 400 V model | | Standard | S336-03414-21 |

| Maximum Test Force | Model Type | Power Supply Voltage | Model No. | Pole Extension | P/N |
|---|---|---|---|---|---|
| 100 kN | Standard model | 200 V model | AGX-100kNV2 | Standard | S336-03405-21 |
| | | | AGX-100kNV2 +250 | 250 mm Extension | S336-03405-22 |
| | | | AGX-100kNV2 +500 | 500 mm Extension | S336-03405-23 |
| | | | AGX-100kNV2 +750 | 750 mm Extension | S336-03405-24 |
| | | 400 V model | AGX-100kNV2 | Standard | S336-03406-21 |
| | | | AGX-100kNV2 +250 | 250 mm Extension | S336-03406-22 |
| | | | AGX-100kNV2 +500 | 500 mm Extension | S336-03406-23 |
| | | | AGX-100kNV2 +750 | 750 mm Extension | S336-03406-24 |
| | Separately installed controller model | 200 V model | AGX-100kNV2S | Standard | S336-03431-21 |
| | | | AGX-100kNV2S +250 | 250 mm Extension | S336-03431-22 |
| | | | AGX-100kNV2S +500 | 500 mm Extension | S336-03431-23 |
| | | | AGX-100kNV2S +750 | 750 mm Extension | S336-03431-24 |
| | Wide model 1000 mm | 200 V model | AGX-100kNV2 W10 | Standard | S336-03415-21 |
| | | 400 V model | | Standard | S336-03416-21 |

| Maximum Test Force | Model Type | Power Supply Voltage | Model No. | Pole Extension | P/N |
|---|---|---|---|---|---|
| 300 kN | Standard model | 200 V model | AGX-300kNV2 | Standard | S336-03407-21 |
| | | | AGX-300kNV2 +250 | 250 mm Extension | S336-03407-22 |
| | | | AGX-300kNV2 +500 | 500 mm Extension | S336-03407-23 |
| | | | AGX-300kNV2 +750 | 750 mm Extension | S336-03407-24 |
| | | 400 V model | AGX-300kNV2 | Standard | S336-03408-21 |
| | | | AGX-300kNV2 +250 | 250 mm Extension | S336-03408-22 |
| | | | AGX-300kNV2 +500 | 500 mm Extension | S336-03408-23 |
| | | | AGX-300kNV2 +750 | 750 mm Extension | S336-03408-24 |
| | Separately installed controller model | 200 V model | AGX-300kNV2S | Standard | S336-03432-21 |
| | | | AGX-300kNV2S +250 | 250 mm Extension | S336-03432-22 |
| | | | AGX-300kNV2S +500 | 500 mm Extension | S336-03432-23 |
| | | | AGX-300kNV2S +750 | 750 mm Extension | S336-03432-24 |
| | Wide model 1000 mm | 200 V model | AGX-300kNV2 W10 | Standard | S336-03417-21 |
| | | 400 V model | | Standard | S336-03418-21 |
| 600 kN | Standard model | 200 V model | AGX-600kNV2 | Standard | S336-03409-21 |
| | | | AGX-600kNV2 +250 | 250 mm Extension | S336-03409-22 |
| | | | AGX-600kNV2 +500 | 500 mm Extension | S336-03409-23 |
| | | | AGX-600kNV2 +750 | 750 mm Extension | S336-03409-24 |
| | Separately installed controller model | 200 V model | AGX-600kNV2S | Standard | S336-03433-21 |
| | | | AGX-600kNV2S +250 | 250 mm Extension | S336-03433-22 |
| | | | AGX-600kNV2S +500 | 500 mm Extension | S336-03433-23 |
| | | | AGX-600kNV2S +750 | 750 mm Extension | S336-03433-24 |

# 1.2 Component Parts

## ■ Standard model, Reinforced yoke model, Wide model AGX-V2

| Part Name | | Part No. | Qty | Remarks |
|---|---|---|---|---|
| Testing machine | | - | 1 | - |
| Smart controller*1 | 300 kN or less | S336-01055-01 | 1 | - |
| | For 600 kN | S336-01055-02 | | |
| Operation Controller*1 | | S336-01060 | 1 | - |
| Voice control device*2 | 300 kN or less | S336-03372-21 | 1 | Supported language: English |
| | For 600 kN | S336-03372-22 | | |
| Power supply cable*3 | AGX-10kNV2D 1φ 200 to 230 V | S336-01192-01 | 1 | • End shape: M5 round terminal  (L, N, E) Length: 3 m Cable O.D: φ7.7 mm • testing machine side: IEC C14 inlet  |
| | AGX-10kNV2D 1φ 100 to 115 V | - | 0 | Power supply cable is not included. **NOTE** Please prepare a power supply cable that complies with the laws and regulations of each country and region. • testing machine side: IEC C14 inlet  |

| Part Name | | Part No. | Qty | Remarks |
|---|---|---|---|---|
| Power supply cable*3 | AGX-20/50kNV2D<br>1φ 200 to 230 V | S336-01156-01 | 1 | • End shape: M5 round terminal<br>  (L, N, E)<br>Length: 5 m<br>Cable O.D: φ16.1 mm<br>• testing machine side: Directly fixed cable |
| | AGX-20/50kNV2<br>3φ 200 to 230 V | S336-01157-01 | | • End shape: M5 round terminal<br>  <br>(R, S, T, E)<br>Length: 5 m<br>Cable O.D: φ15.3 mm<br>• testing machine side: Directly fixed cable |
| | AGX-100kNV2<br>3φ 200 to 230 V | S336-01158-01 | | • End shape: M5 round terminal<br>  (R, S, T, E)<br>Length: 5 m<br>Cable O.D: φ19.0 mm<br>• testing machine side: Directly fixed cable |
| | AGX-300kNV2<br>3φ 200 to 230 V | S336-01159-01 | | • End shape: M5 round terminal<br>  (R, S, T, E)<br>Length: 5 m<br>Cable O.D: φ25.5 mm<br>• testing machine side: Directly fixed cable |
| | AGX-600kNV2<br>3φ 200 to 230 V | S336-01160-01 | | • End shape: M5 round terminal<br>  (R, S, T, E)<br>Length: 5 m<br>Cable O.D: φ29.0 mm<br>• testing machine side: Directly fixed cable |
| Instruction manual | | S349-11981 | 1 | This manual. |
| Rotation bar | | S344-21855 | 1 | Used for replacing jigs. |

| Part Name | | Part No. | Qty | Remarks |
|---|---|---|---|---|
| Hex wrench set | AGX-10kNV2D | S340-48001-09 | 1 | Used for replacing jigs. |
| | AGX-20/50kNV2D | S340-48001-10 | | |
| | AGX-20/50kNV2 | S340-48001-10 | | |
| | AGX-100/300kNV2 | S340-48001-10<br>S086-03813 | | |
| | AGX-600kNV2 | S340-48001-10 | | |
| Cable clamp | | S336-00314 | 2 | For attach to the T-slot of the testing machine pole to secure the load cell cable and thecontroller cable |
| Shortcut connector | | S336-01180-01 | 2 | For plugging the open operating panel connector. |
| USB connector cap | | S070-09702-02 | 2 | Attach this to an empty USB cable connection port. |
| External Emergency Stop Switch*4,*5 | | S336-03195-01*4 | 1 | This is an emergency stop switch to be attached to the testing machine pole. |
| | | S336-01511-41*5 | 1 | A tabletop emergency stop switch that can be installed in any position. |
| Protective glasses | | S086-78103-01 | 1 | Wear these when operating the testing machine. |
| | | S086-78105-32 | | |
| Protective gloves | | S086-78970-11 | 1 | Wear these when replacing jigs, installing or removing the specimen. |

*1 Either one or both items are provided.

*2 A USB cable is included.

*3 The item varies depending on the testing machine type. The part No. of the 3$\varphi$ 200-230 V power cable varies depending of its length.

*4 Provided only with the reinforced yoke model.

*5 Provided only with the wide model including the protection cover.

## ■ Separately installed controller model AGX-V2S

| Part Name | | Part No. | Qty | Remarks |
|---|---|---|---|---|
| Testing machine | | - | 1 | AGX-V2S series only |
| Smart controller*1 | 300 kN or less | S336-01055-01 | 1 | - |
| | For 600 kN | S336-01055-02 | | |
| Operation Controller*1 | | S336-01060 | 1 | - |
| Voice control device*2 | 300 kN or less | S336-03372-21 | 1 | Supported language: English |
| | For 600 kN | S336-03372-22 | | |
| AGX-V/R controller*3 | AGX-V/R 50kN 3φ 200 to 230 V | S336-03186-42 | 1 | Drive motor: 2.0 kW |
| | AGX-V/R 100kN 3φ 200 to 230 V | S336-03186-43 | | Drive motor: 3.5 kW |
| | AGX-V/R 300kN 3φ 200 to 230 V | S336-03186-44 | | Drive motor: 5.5 kW |
| | AGX-V/R 600kN 3φ 200 to 230 V | S336-03186-45 | | Drive motor: 7.5 kW |
| Power supply cable*4 | AGX-V/R 50kN 3φ 200 to 230 V | S336-01157-11 | 1 | • End shape: M5 round terminal  (R, S, T, E) Length: 5 m Cable O.D: φ15.3 mm • testing machine side: Directly fixed cable |
| | AGX-V/R 100kN 3φ 200 to 230 V | S336-01158-11 | | • End shape: M5 round terminal  (R, S, T, E) Length: 5 m Cable O.D: φ19.0 mm • testing machine side: Directly fixed cable |

| Part Name | | Part No. | Qty | Remarks |
|---|---|---|---|---|
| Power supply cable*4 | AGX-V/R 300kN 3φ 200 to 230 V | S336-01159-11 | 1 | • End shape: M5 round terminal  (R, S, T, E) Length: 5 m Cable O.D: φ25.5 mm • testing machine side: Directly fixed cable |
| | AGX-V/R 600kN 3φ 200 to 230 V | S336-01160-01 | | • End shape: M5 round terminal  (R, S, T, E) Length: 5 m Cable O.D: φ29.0 mm • testing machine side: Directly fixed cable |
| Instruction manual | | S349-11981 | 1 | This manual. |
| Rotation bar | | S344-21855 | 1 | Used for replacing jigs. |
| Hex wrench set | AGX-20/50kNV2S | S340-48001-10 | 1 | Used for replacing jigs. |
| | AGX-100kNV2S/ 300kNV2S | S340-48001-10 S086-03813 | 1 | Used for replacing jigs. |
| | AGX-600kNV2S | S340-48001-10 | 1 | Used for replacing jigs. |
| USB extension cable | | S088-50962-07 | 1 | Used for extending the USB cable provided with the voice control device. |
| Cable clamp | | S336-00314 | 2 | For attach to the T-slot of the testing machine pole to secure the load cell cable and thecontroller cable |
| Shortcut connector | | S336-01180-01 | 2 | Attach this to an empty operation unit connector. |
| USB connector cap | | S070-09702-02 | 2 | Attach this to an empty USB cable connection port. |
| Protective glasses | | S086-78103-01 | 1 | Wear these when operating the testing machine. |
| | | S086-78105-32 | | |
| Protective gloves | | S086-78970-11 | 1 | Wear these when replacing jigs, installing or removing the specimen. |

*1 Either one or both items are provided.

*2 A USB cable is included.

*3 The item varies depending on the testing machine type.

*4 The item varies depending on the testing machine type. The part No. of the 3φ 200-230 V power cable varies depending of its length.

# 1.3 Optional Parts

## ■ Internal Units

| Part Name | | Part No. | Qty | Remarks |
|---|---|---|---|---|
| Sensor Amplifier | | S336-01076-01 | 1 | Connect the load cell or displacement gauge via the CAL connector. |
| CAL Connector | For load cells | S336-01064-01 | 1 | Supports load cells |
| | For SG displacement gauge | S336-01064-11 | 1 | Supports SG extensometers and SG width gauges. |
| | For LVDT displacement gauge | S336-01064-21 | 1 | Supports LVDT extensometers and LVDT width gauges. |
| Analog Input Amplifier | | S336-01076-07 | 1 | • 4 channels<br>• Analog voltage input |
| Analog Output Amplifier | | S336-01076-04 | 1 | • 4 channels<br>• Analog voltage output |
| Strain Amplifier | | S336-01076-06 | 1 | • 2 channels<br>• Strain gauge bridge |
| Counter Unit | | S336-01076-05 | 1 | • 4 channels<br>• A/B 2-phase pulse, Up/Down pulse |
| Isolated PIO Unit | | S336-01076-02 | 1 | • 16-bit input, 16-bit output<br>• 12 to 24 V AC/DC |
| Non-Isolated PIO Unit | | S336-01076-03 | 1 | • 16-bit input, 16-bit output<br>• 5 V TTL / Open collector |
| Analog Recorder Unit | | S336-01076-08 | 1 | Connect the AR series analog recorder. |
| AEH Communication Unit | | S336-01076-09 | 1 | Connect the AEH Series automatic extensometer. |

Reference For the maintenance parts and consumables, see "6 Maintenance Parts and Consumables" P.103.

## ■ AGX-V/R controller unit

| Part Name | Part No. | Qty | Remarks |
|---|---|---|---|
| Fall prevention anchor*1 | S339-85487-01 | 1 | Hole-in anchor<br>• O.D.: 6 mm<br>• Compatible drill dia.: 6.4 mm |
| External emergency stop switch | S336-03195-01 | 1 | For adding an emergency stop switch. |

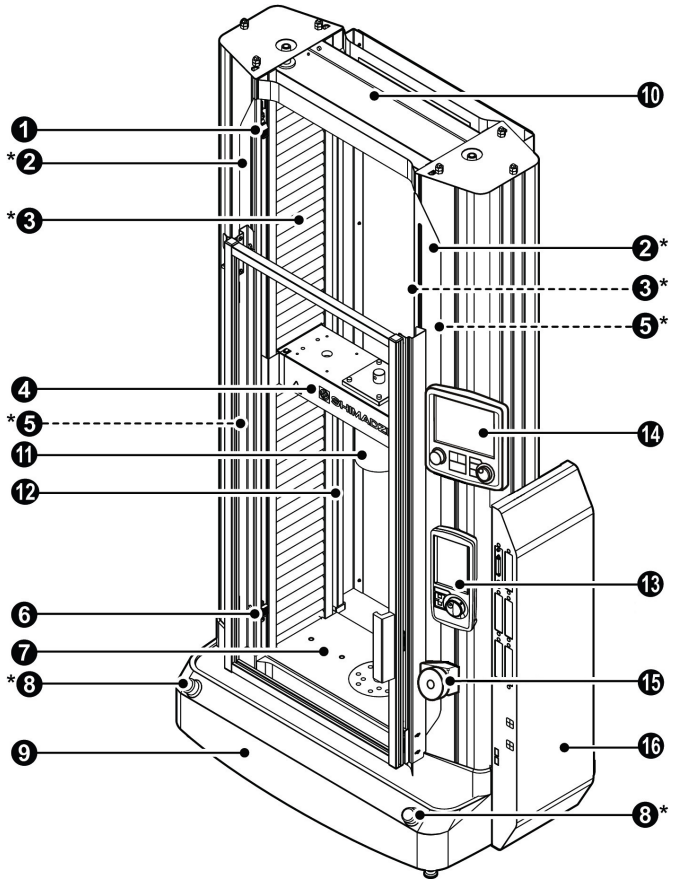
*1 Four pieces of this item are required to fix the controller.

# 2 Names and Functions of Parts

## 2.1 Standard Model, Reinforced Yoke Model, Wide Model

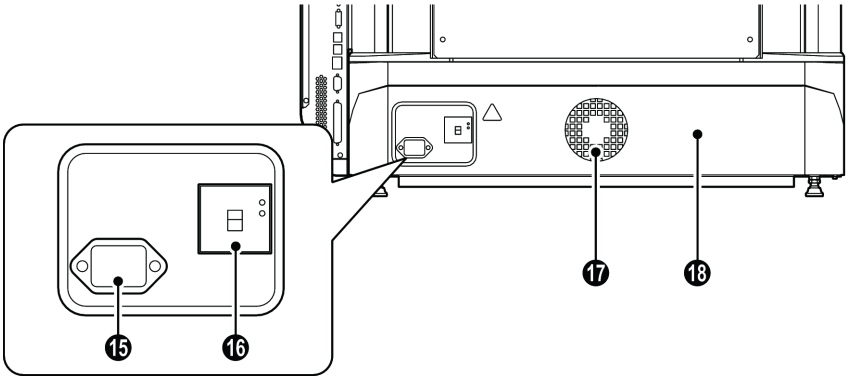
### 2.1.1 AGX-V2: Max. 10 kN (Table-Top) Type

■ **Front Side**




* These parts are provided on the right and left sides.

■ **Rear Side**

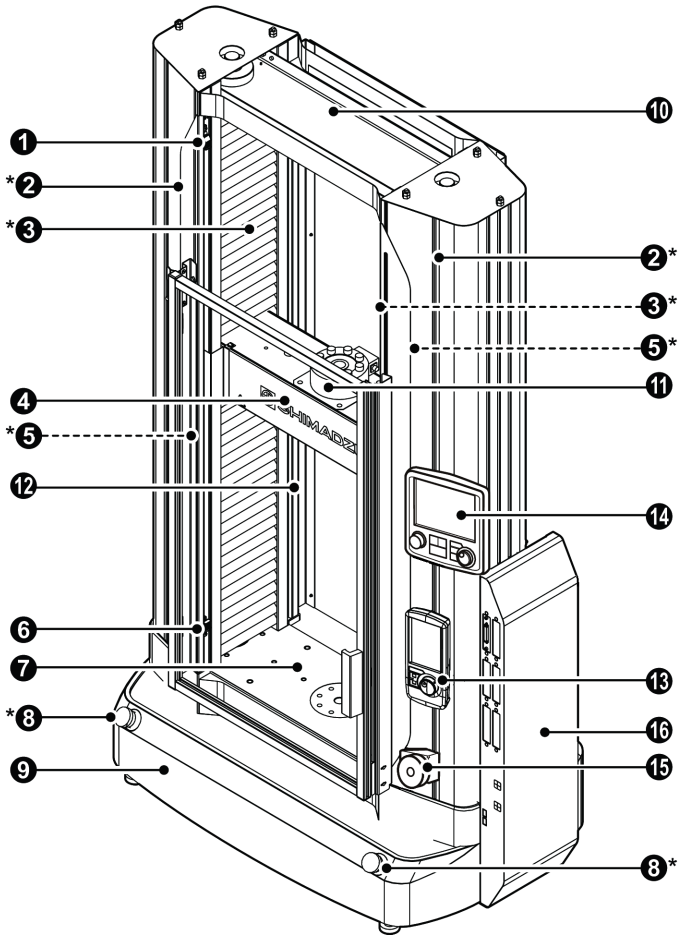


| No. | Name | Description |
|---|---|---|
| ❶ | Crosshead Upper Limit | Set the upper limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❷ | Pole* | A structural part for housing a ball screw. |
| ❸ | Ball Screw Protection Cover* | A cover for protecting the ball screw and preventing a body part from contacting the ball screw. |
| ❹ | Crosshead | A drive part moving up and down to apply test force to a specimen. |
| ❺ | Ball Screw (installed inside the pole)* | A drive part for transmitting driving force from the motor to the crosshead. |
| ❻ | Crosshead Lower Limit | Set the lower limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❼ | Table | A structural part for receiving test force given by the crosshead. |
| ❽ |  Emergency Stop Switch* | A switch for forcibly stopping the crosshead.<br>Pressing the switch cuts power to the servo motor.<br>Turning the switch in the arrow direction shown on it cancels emergency stop. |
| ❾ | Front Cover | A cover of the drive part. |
| ❿ | Crossyoke | A structural part for connecting poles. |
| ⓫ | Load Cell | A load cell is a sensor for measuring test force. |
| ⓬ | Protection Cover (for the model with the cover only) | A cover for preventing specimen fragments from scattering when a specimen is broken during a test. |
| ⓭ | Smart Controller | A controller for controlling the instrument. |
| ⓮ | Operation Controller | A controller for controlling the instrument. |
| ⓯ | Voice Control Device | A device to assist test machine operation with voice. |
| ⓰ | Control Box | A part for controlling the instrument and performing sensor measurement. |
| ⓱ | Power Supply Connector | Used to connect a single phase 100-115 V or 200-230 V source according to the power supply of the instrument. |
| ⓲ | Power Supply Breaker | A power supply breaker of the instrument. An earth leakage breaker is provided. |
| ⓳ | Cooling Fan | A fan for cooling the drive part. |
| ⓴ | Rear Cover | A cover of the drive part. |

* : These parts are provided on the right and left sides.

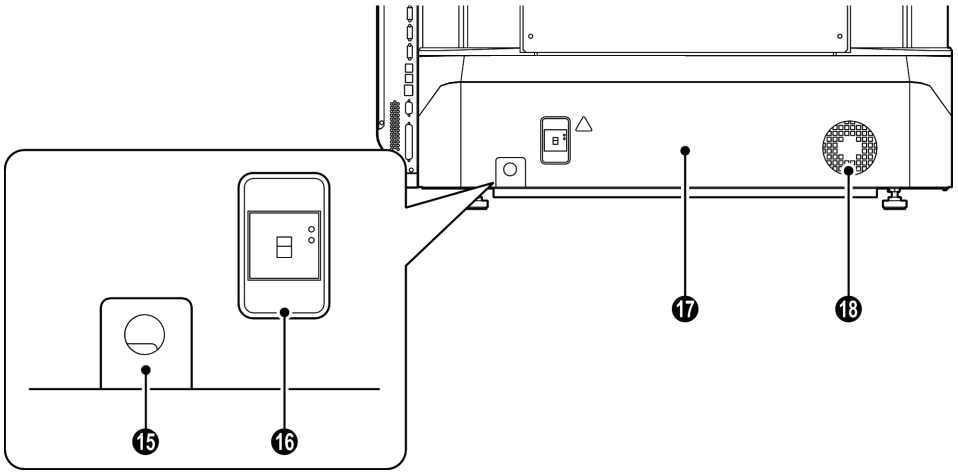
## 2.1.2 AGX-V2: 20/50 kN (Table-Top) Type

### ■ Front Side




* These parts are provided on the right and left sides.

### ■ Rear Side

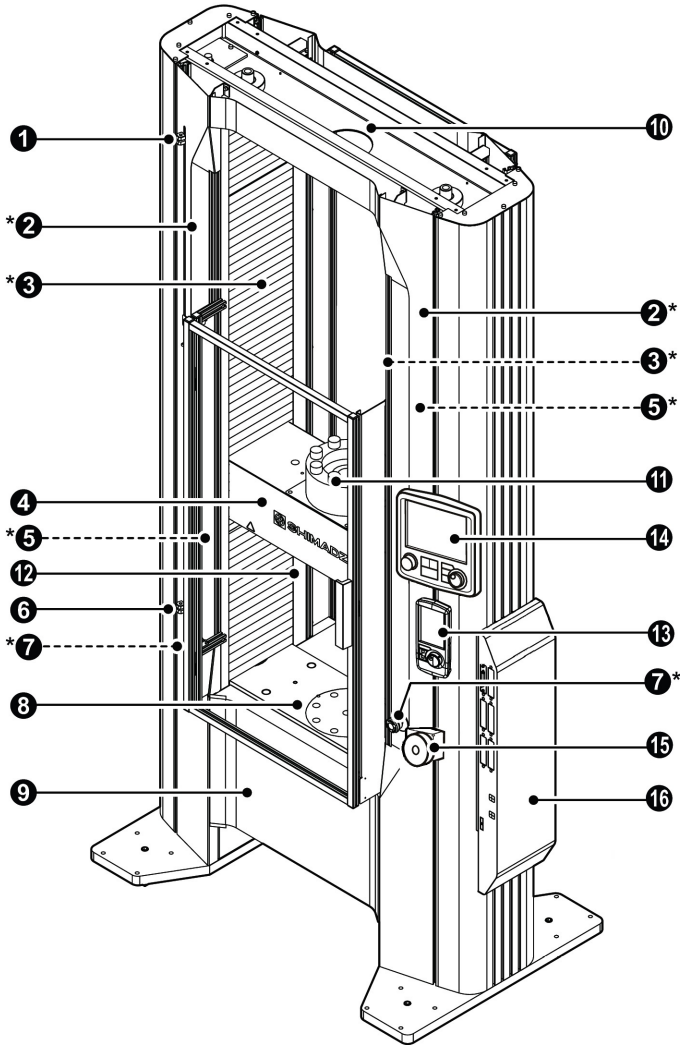


| No. | Name | Description |
|---|---|---|
| ❶ | Crosshead Upper Limit | Set the upper limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❷ | Pole* | A structural part for housing a ball screw. |
| ❸ | Ball Screw Protection Cover* | A cover for protecting the ball screw and preventing a body part from contacting the ball screw. |
| ❹ | Crosshead | A drive part moving up and down to apply test force to a specimen. |
| ❺ | Ball Screw (installed inside the pole)* | A drive part for transmitting driving force from the motor to the crosshead. |
| ❻ | Crosshead Lower Limit | Set the lower limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❼ | Table | A structural part for receiving test force given by the crosshead. |
| ❽ |  Emergency Stop Switch* | A switch for forcibly stopping the crosshead.<br>Pressing the switch cuts power to the servo motor.<br>Turning the switch in the arrow direction shown on it cancels emergency stop. |
| ❾ | Front Cover | A cover of the drive part. |
| ❿ | Crossyoke | A structural part for connecting poles. |
| ⓫ | Load Cell | A load cell is a sensor for measuring test force. |
| ⓬ | Protection Cover (for the model with the cover only) | A cover for preventing specimen fragments from scattering when a specimen is broken during a test. |
| ⓭ | Smart Controller | A controller for controlling the instrument. |
| ⓮ | Operation Controller | A controller for controlling the instrument. |
| ⓯ | Voice Control Device | A device to assist test machine operation with voice. |
| ⓰ | Control Box | A part for controlling the instrument and performing sensor measurement. |
| ⓱ | Power Supply Cable | Used to connect a single phase 200-230 V source. |
| ⓲ | Power Supply Breaker | A power supply breaker of the instrument. An earth leakage breaker is provided. |
| ⓳ | Rear Cover | A cover of the drive part. |
| ⓴ | Cooling Fan | A fan for cooling the drive part. |

* : These parts are provided on the right and left sides.

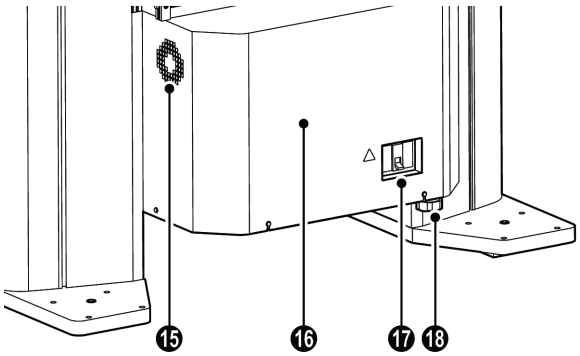
## 2.1.3 AGX-V2: 20/50/100/300 kN (Floor) Type

### ■ Front Side




* These parts are provided on the right and left sides.

### ■ Rear Side

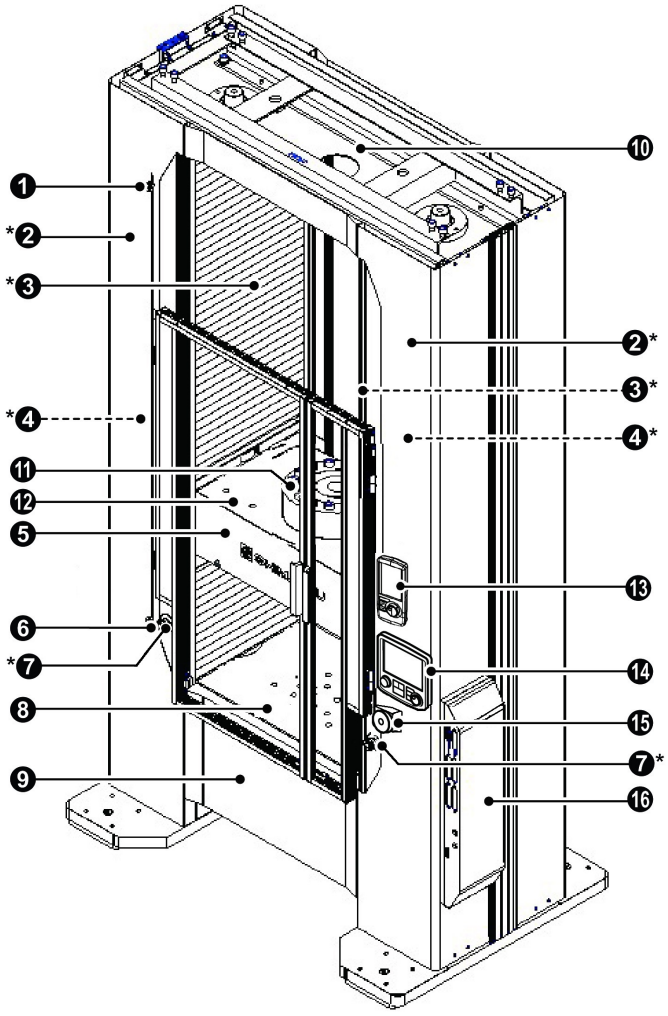


| No. | Name | Description |
|---|---|---|
| ❶ | Crosshead Upper Limit | Set the upper limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❷ | Pole* | A structural part for housing a ball screw. |
| ❸ | Ball Screw Protection Cover* | A cover for protecting the ball screw and preventing a body part from contacting the ball screw. |
| ❹ | Crosshead | A drive part moving up and down to apply test force to a specimen. |
| ❺ | Ball Screw (installed inside the pole)* | A drive part for transmitting driving force from the motor to the crosshead. |
| ❻ | Crosshead Lower Limit | Set the lower limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❼ |  Emergency Stop Switch* | A switch for forcibly stopping the crosshead.<br>Pressing the switch cuts power to the servo motor.<br>Turning the switch in the arrow direction shown on it cancels emergency stop. |
| ❽ | Table | A structural part for receiving test force given by the crosshead. |
| ❾ | Front Cover | A cover of the drive part. |
| ❿ | Crossyoke | A structural part for connecting poles. |
| ⓫ | Load Cell | A load cell is a sensor for measuring test force. |
| ⓬ | Protection Cover<br>(for the model with the cover only) | A cover for preventing specimen fragments from scattering when a specimen is broken during a test. |
| ⓭ | Smart Controller | A controller for controlling the instrument. |
| ⓮ | Operation Controller | A controller for controlling the instrument. |
| ⓯ | Voice Control Device | A device to assist test machine operation with voice. |
| ⓰ | Control Box | A part for controlling the instrument and performing sensor measurement. |
| ⓱ | Cooling Fan<br>(on the side of the rear cover) | A fan for cooling the drive part. |
| ⓲ | Rear Cover | A cover of the drive part. |
| ⓳ | Power Supply Breaker | A power supply breaker of the instrument. An earth leakage breaker is provided. |
| ⓴ | Power Supply Cable | Used to connect a three-phase 200-230 V or 380-440 V source according to the power supply of the instrument. |

* : These parts are provided on the right and left sides.

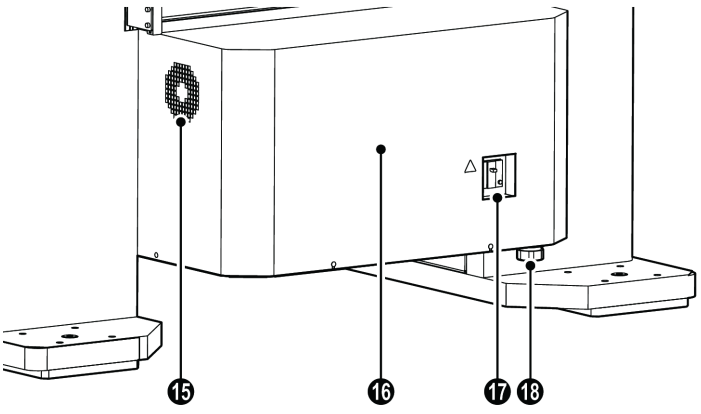
## 2.1.4 AGX-V2: 600 kN (Floor) Type

### ■ Front Side




* These parts are provided on the right and left sides.

### ■ Rear Side

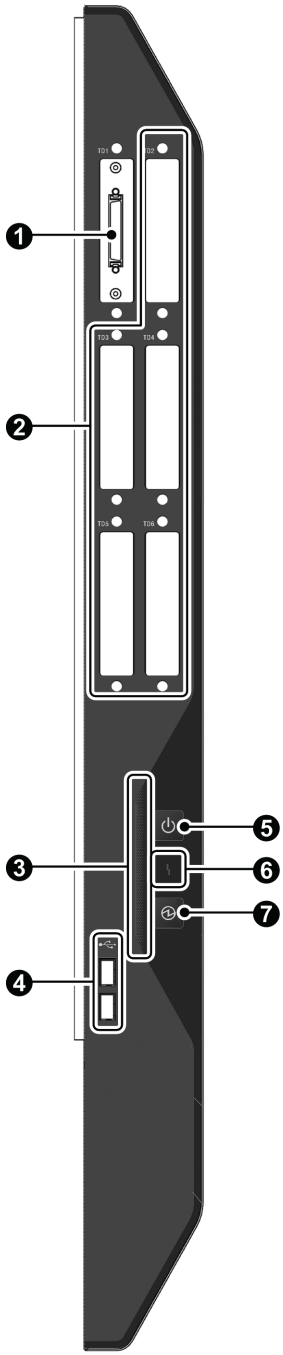


| No. | Name | Description |
|---|---|---|
| ❶ | Crosshead Upper Limit | Set the upper limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❷ | Pole* | A structural part for housing a ball screw. |
| ❸ | Ball Screw Protection Cover* | A cover for protecting the ball screw and preventing a body part from contacting the ball screw. |
| ❹ | Ball Screw (installed inside the pole)* | A drive part for transmitting driving force from the motor to the crosshead. |
| ❺ | Crosshead | A drive part moving up and down to apply test force to a specimen. |
| ❻ | Crosshead Lower Limit | Set the lower limit of the crosshead movement range. The crosshead stops when it reaches the set limit position.<br>Be sure to set it before starting a test. |
| ❼ |  Emergency Stop Switch* | A switch for forcibly stopping the crosshead.<br>Pressing the switch cuts power to the servo motor.<br>Turning the switch in the arrow direction shown on it cancels emergency stop. |
| ❽ | Table | A structural part for receiving test force given by the crosshead. |
| ❾ | Front Cover | A cover of the drive part. |
| ❿ | Crossyoke | A structural part for connecting poles. |
| ⓫ | Load Cell | A load cell is a sensor for measuring test force. |
| ⓬ | Protection Cover<br>(for the model with the cover only) | A cover for preventing specimen fragments from scattering when a specimen is broken during a test. |
| ⓭ | Smart Controller | A controller for controlling the instrument. |
| ⓮ | Operation Controller | A controller for controlling the instrument. |
| ⓯ | Voice Control Device | A device to assist test machine operation with voice. |
| ⓰ | Control Box | A part for controlling the instrument and performing sensor measurement. |
| ⓱ | Cooling Fan<br>(on the side of the rear cover) | A fan for cooling the drive part. |
| ⓲ | Rear Cover | A cover of the drive part. |
| ⓳ | Power Supply Breaker | A power supply breaker of the instrument. An earth leakage breaker is provided. |
| ⓴ | Power Supply Cable | Used to connect a three-phase 200-230 V source. |

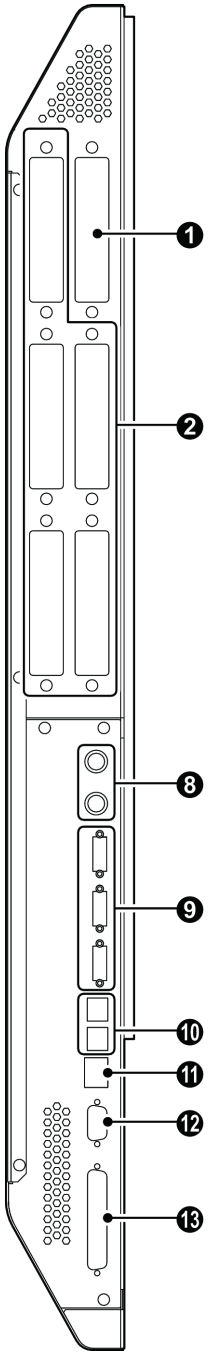
* : These parts are provided on the right and left sides.

## 2.1.5 Control Box

**Front Side**




**Rear Side**

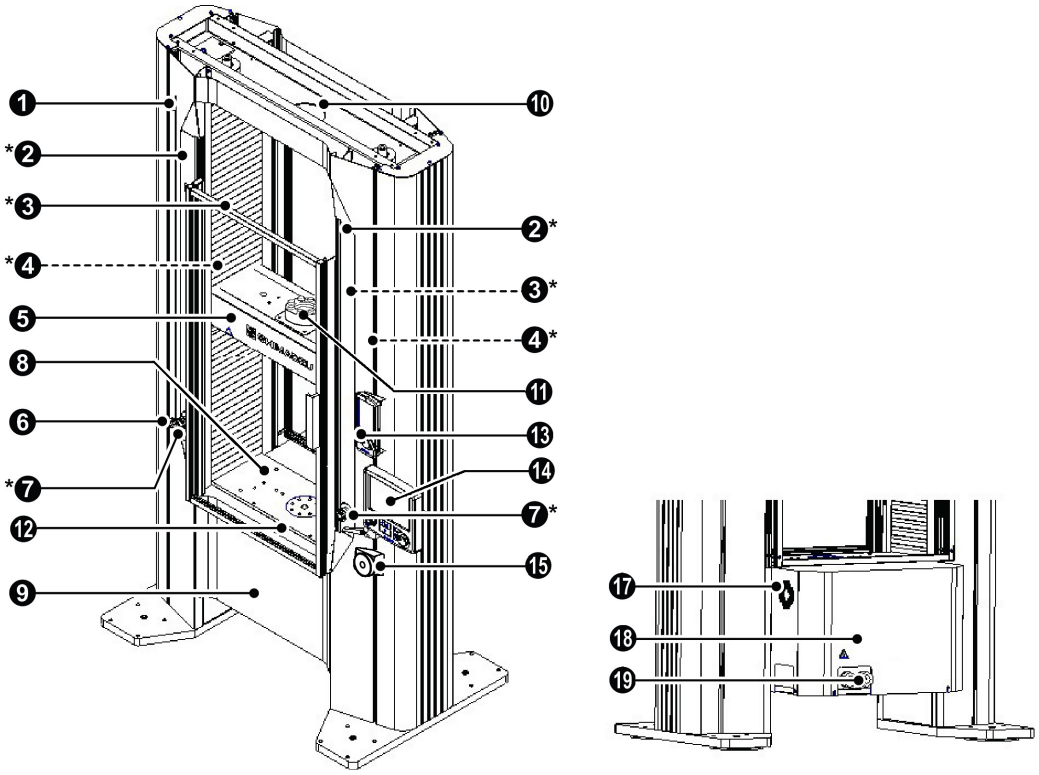


| No. | Name | Description |
|---|---|---|
| ❶ | Sensor Amplifier (for load cell) TD1 | An amplifier for measuring test force that receives signal input from the load cell. |
| ❷ | Extension Slot TD2 to TD6 | Extension slots for connecting amplifiers for various measuring instruments such as an external extensometer and analog input. |
| ❸ | Bar Indicator | The bar indicator lights when the power button ❺ is set to ON. It shows the instrument status with colors.<br>• Crosshead is not operating: White<br>• Crosshead is operating: Orange<br>• Test is in progress: Blue<br>• Alarm has occurred: Red |
| ❹ | USB Connector | An option connector for connecting a USB device. Do not connect any device other than those undergoing our verification for connection. |
| ❺ |  Power Button | A button for turning on or off the instrument. The bar indicator ❸ lights when the power is on. |
| ❻ | Error Indicator | The error indicator lights when an internal error has occurred. If it still lights after the instrument is turned off and on, contact your Shimadzu representative. |
| ❼ |  Standby Button | A button for turning on or off the power to the servo motor. |
| ❽ | Analog Output Connector | A connector for outputting the data (test force, stroke, extension, etc.) measured with the instrument as analog signals to an external device. For the output level, either of ±5 V or ±10 V can be selected. |
| ❾ | Operating Panel Connector | Connectors for the smart controller and operation controller. |
| ❿ | Synchronization Connector | A connector for inputting or outputting synchronization signals from or to more than one control boxes. |
| ⓫ | Ethernet Connector | An Ethernet connector for connecting a computer to the instrument. |
| ⓬ | Interlock Connector | A connector for inputting interlock signals of the protection cover. |
| ⓭ | PIO Connector | A connector for I/O signals of an optional device. |

# 2.2 Separately Installed Controller Model

## 2.2.1 AGX-V2S: Floor Type






NOTE

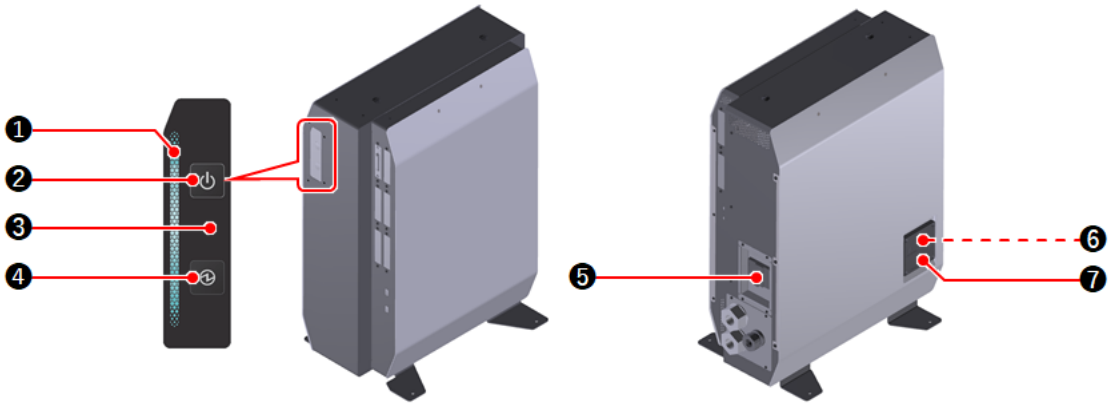
- The appearance of the Testing Machine varies depending on its type and capacity. The Testing Machine shown in the figure is AGX-50kNV2S.
- The parts with "*" are provided on the right and left sides.
- The protection cover ⓬ is equipped on the model with the cover only.

| No. | Name | Description |
|---|---|---|
| ❶ | Crosshead Upper Limit | Set the upper limit of the crosshead movement range. The servo motor stops when the crosshead pushes up the crosshead limit. Be sure to set the limit before starting a test. |
| ❷ | Pole* | A structural part for housing a ball screw. |
| ❸ | Ball Screw Protection Cover* | A cover for protecting the ball screw and preventing a body part from contacting the ball screw. |
| ❹ | Ball Screw (installed inside the pole)* | Transmits the driving force from the servo motor to the crosshead. |
| ❺ | Crosshead | A drive part moving up and down to apply test force to a specimen. |
| ❻ | Crosshead Lower Limit | Set the lower limit of the crosshead movement range. The servo motor stops when the crosshead pushes down the crosshead limit. Be sure to set the limit before starting a test. |
| ❼ |  Emergency Stop Switch* | A switch for forcibly stopping the crosshead. Pressing the switch cuts power to the servo motor. Turning the control part in the direction of the arrow or pulling it cancels the emergency stop. |
| ❽ | Table | A structural part for receiving test force given by the crosshead. |
| ❾ | Front Cover | A cover of the drive part. |
| ❿ | Crossyoke | A structural part for connecting poles. |
| ⓫ | Load Cell | A load cell is a sensor for measuring test force. |
| ⓬ | Protection Cover (for the model with the cover only) | A cover for preventing specimen fragments from scattering when a specimen is broken during a test. |
| ⓭ | Smart Controller | A controller for controlling the instrument. |
| ⓮ | Operation Controller | A controller for controlling the instrument. |
| ⓯ | Voice Control Device | A device to assist test machine operation with voice. |
| ⓱ | Cooling Fan (on the side of the rear cover) | A fan for cooling the drive part. |
| ⓲ | Rear Cover | A cover of the drive part. |
| ⓳ | Power Control Connection Port | A connection port that connects a AGX-V/R controller and the power and control cables. |

* :These parts are provided on the right and left sides.

## 2.2.2 AGX-V/R Controller

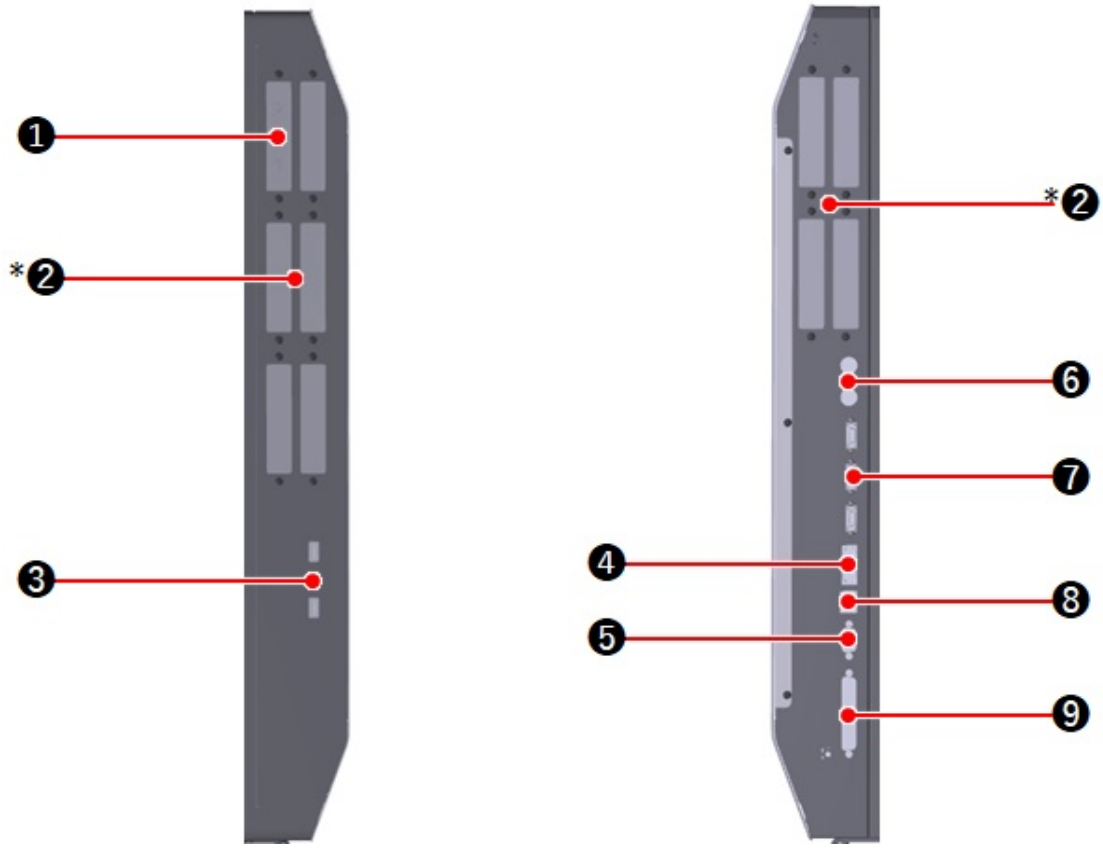
### ■ External Appearance




NOTE The appearance of the AGX-V/R controller varies depending on its capacity. The AGX-V/R controller shown in the figure is AGX-V/R 50kN.

| No. | Name | Description |
|---|---|---|
| ❶ | Bar Indicator | Indicates the controller status with colors.<br>• White: Crosshead is not operating.<br>• Orange: Crosshead is operating.<br>• Blue: Test is in progress.<br>• Red: Alarm has occurred. |
| ❷ | Power Button | Turns on the controller power. Pressing the button again starts turning the power off. |
| ❸ | Error Indicator | Lights up when the controller has an error. |
| ❹ | Standby Button | Supplies the power to the servo motor. Pressing the button again starts shutting the power off. |
| ❺ | Power Supply Breaker | Controls the main power of the controller. It has the overcurrent shutoff function and leakage current shutoff function. |
| ❻ | Cooling Fan | A fan for cooling the inside of the controller. |
| ❼ | Filter | A dust filter. Replace it every 6 months. |

## ■ Connector Panel




NOTE The parts with "*" are provided on the front and rear sides.

| No. | Name | Description |
|---|---|---|
| ❶ | Sensor Amplifier | Connects the load cell. |
| ❷ | Extension Slot* | Add optional units on these slots. |
| ❸ | USB Connector | Connects USB devices. |
| ❹ | Synchronization Connector | Used for synchronizing multiple controllers. |
| ❺ | Interlock Connector | Connects the limit switch for the protection cover. |
| ❻ | Analog Output Connector | Used for outputting measured values as analog voltage. |
| ❼ | Operating Panel Connector | Connects the operation controller and smart controller. |
| ❽ | Ethernet Connector | Connects a computer. |
| ❾ | PIO Connector | Connects an optional device. |

* These parts are provided on the front and rear sides.

# 2.3 Operation Unit

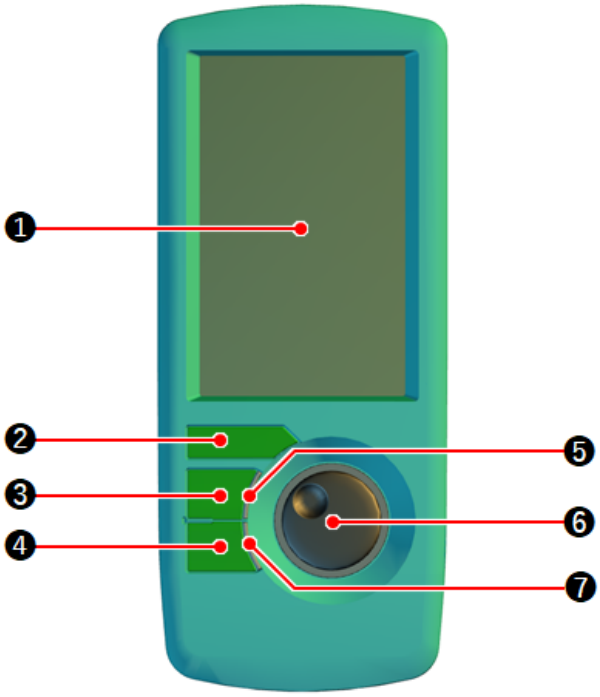
The operation controller and smart controller can be connected to the control box and AGX-V/R controller.

| Function/Performance | Operation Controller | Smart Controller |
|---|---|---|
| Operation of Testing Machine | ✓ | ✓ |
| Test condition creation | ✓ | × |
| Result display | ✓ | ✓ |
| Hard keys | Start, Return, Stop, Manual ON/OFF, Jog up, Jog down | Manual ON/OFF, Jog up, Jog down |
| Screen size | 8.4 inches | 5.0 inches |
| Installation | Fixed to the Testing Machine | Hooked to the Testing Machine/Hand-held operation |

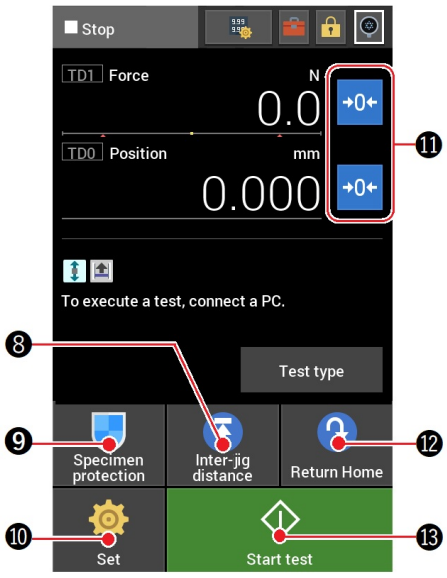
**Hint** Both the operation controller and smart controller can be connected simultaneously.

## 2.3.1 Smart Controller

### ■ External Appearance




### ■ Screen



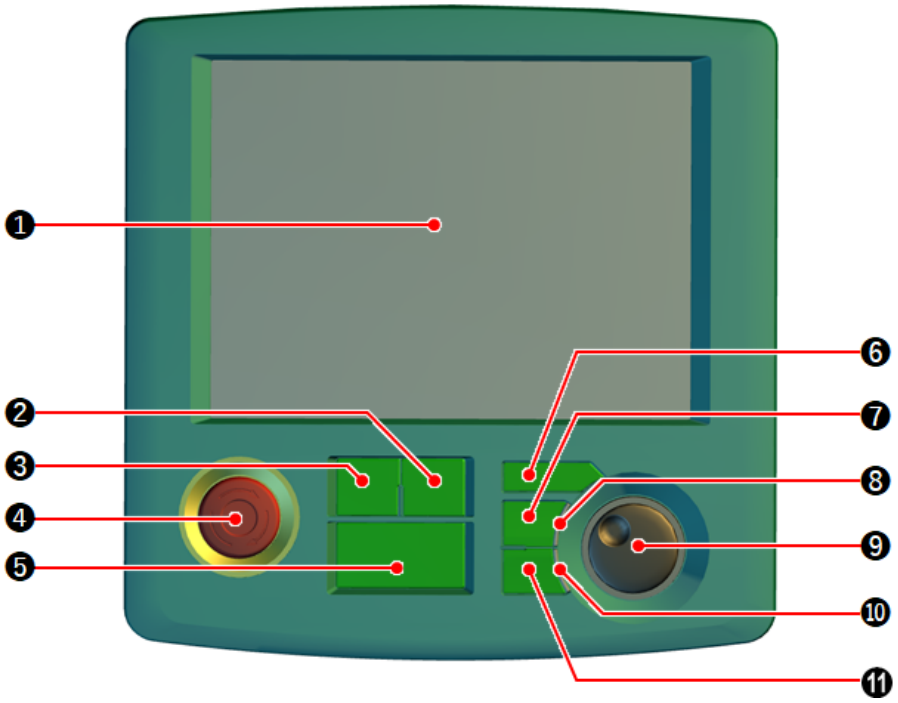
| No. | Name | Description |
|---|---|---|
| ❶ | Touch Panel | Used to display measured values such as test force and stroke, operate the tests, and configure the instrument. |
| ❷ | Manual Button | Switches between the manual mode for jog operation and the stop mode. |
| ❸ | Jog Up Button | Raises the crosshead when the manual mode is selected.<br>The crosshead moves up while the button is held down. |
| ❹ | Jog Down Button | Lowers the crosshead when the manual mode is selected.<br>The crosshead moves down while the button is held down. |
| ❺ | Upper LED Indicator | Lights when the crosshead can be raised or during its motion upward. |
| ❻ | Jog Dial | A dial to raise the crosshead when the manual mode is selected. Turn it clockwise to move the crosshead up, and counterclockwise to move it down. |
| ❼ | Lower LED Indicator | Lights when the crosshead can be lowered or during its motion downward. |
| ❽ | Inter-jig distance | Used to move the crosshead to an appropriate start position according to a registered distance between jigs. |
| ❾ | Specimen protection | Used to automatically adjust the crosshead position to set the force acting on a specimen before starting a test to the setting value. |
| ❿ | Set | Used to change settings. |
| ⓫ | Zero Reset | Clears the current measured value to zero. Holding this down displays the submenu. |
| ⓬ | Return Home | Used to move the crosshead to the origin (where the position is 0). |
| ⓭ | Start Test | Used to start a test.<br>During the test, the button indication changes to  ([Stop Test]). |



Reference "Precision Universal Testing Machines AUTOGRAPH AGX-V2 Series Reference Manual" (Document No.: 349-08953)

## 2.3.2 Operation Controller

### ■ External Appearance



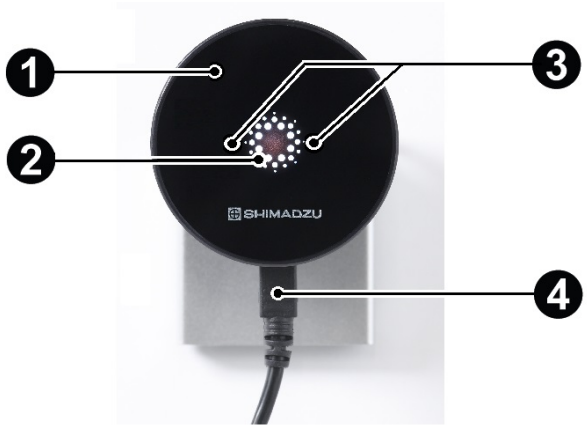

### ■ Screen

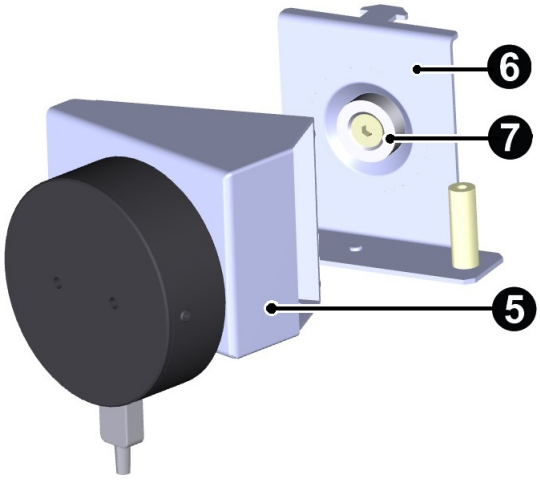
| No. | Name | Description |
|---|---|---|
| ❶ | Touch Panel | Used to display measured values such as test force and stroke, operate the tests, and configure the instrument. |
| ❷ | Return Button | Used to move the crosshead to the origin (where the position is 0). |
| ❸ | Start Button | Used to start a test. |
| ❹ |  Emergency Stop Switch | A switch for forcibly stopping the crosshead. Pressing the switch cuts power to the servo motor.<br>Turning the control part in the direction of the arrow or pulling it cancels the emergency stop. |
| ❺ | Stop Button | Used to stop a test. |
| ❻ | Manual Button | Switches between the manual mode for jog operation and the stop mode. |
| ❼ | Jog Up Button | Raises the crosshead when the manual mode is selected.<br>The crosshead moves up while the button is held down. |
| ❽ | Upper LED Indicator | Lights when the crosshead can be raised or during its motion upward. |
| ❾ | Jog Dial | A dial to raise the crosshead when the manual mode is selected. Turn it clockwise to move the crosshead up, and counterclockwise to move it down. |
| ❿ | Lower LED Indicator | Lights when the crosshead can be lowered or during its motion downward. |
| ⓫ | Jog Down Button | Lowers the crosshead when the manual mode is selected.<br>The crosshead moves down while the button is held down. |
| ⓬ | Zero Reset | Clears the current measured value to zero. Holding this down displays the submenu. |
| ⓭ | Specimen protection | Used to automatically adjust the crosshead position to set the force acting on a specimen before starting a test to the setting value. |
| ⓮ | Inter-jig distance | Used to move the crosshead to an appropriate start position according to a registered distance between jigs. |
| ⓯ | Analog out | Used to configure the analog voltage output port. |
| ⓰ | Maintenance | Used to check the maintenance information. |
| ⓱ | Method | Used to create and edit test conditions. |
| ⓲ | File | Used to retrieve and save test conditions. |
| ⓳ | Calibration | Used to perform electronic calibration (E-CAL). |
| ⓴ | Settings | Used to change settings. |

▶▶ Reference "Operation Controller Instruction Manual" (Document No.: 349-11595)

## 2.3.3 Voice Control Device

### ■ External Appearance




| No. | Name | Description |
|---|---|---|
| ❶ | Main unit | The main unit of the voice control device. |
| ❷ | LED indicator | The lighting pattern indicates the operating status of the voice control device. |
| ❸ | Microphones | Microphones at two places pick up voice sound. |
| ❹ | USB Cable | Used to connect to the USB connector of the control box or the AGX-V/R controller. |
| ❺ | Stand | A stand for using the device when it is detached from the main unit. |
| ❻ | Fixing plate | A fixing part to be attached to the testing machine. |
| ❼ | Magnet | Used for fixing the device to the testing machine. |

▶▶ Reference For details on the voice control device, refer to the "Voice Control Device Instruction Manual" (Document No.: 349-13006)

# 3 Test Procedure

## 3.1 Test Flow

**1** Preparation before turning on the power

"3.2.1 Attaching/Replacing a Load Cell"

▽

**2** "3.3 Setting Up the Instrument"

"Turning On the Power"

▽

Turning on the standby button

▽

"3.3.2 Calibration of a Load Cell"
* Necessary only after turning on the power for the first time

} Warming up for 15 minutes

▽

**3** Daily inspection

"3.5 Configuring/Checking the Safety Devices"
- "3.5.1 Crosshead Limit Switch"
- "3.5.2 Protection Cover"
- "3.5.3 Emergency Stop Switch"
- "3.5.4 Software Limits"

▽

"4.4 Checking the Test Force", "4.5 Checking the Stroke Speed"
* Recommended after turning on the power for the first time

▽

**4** Preparation before test

A Attaching test jigs
- Moving up/down the crosshead

"3.4.1 Moving the Crosshead Up/Down in the Jog Operation"
- Attaching UJ/LJ (Refer to the reference manual)
- Attaching jigs (Refer to the reference manual)

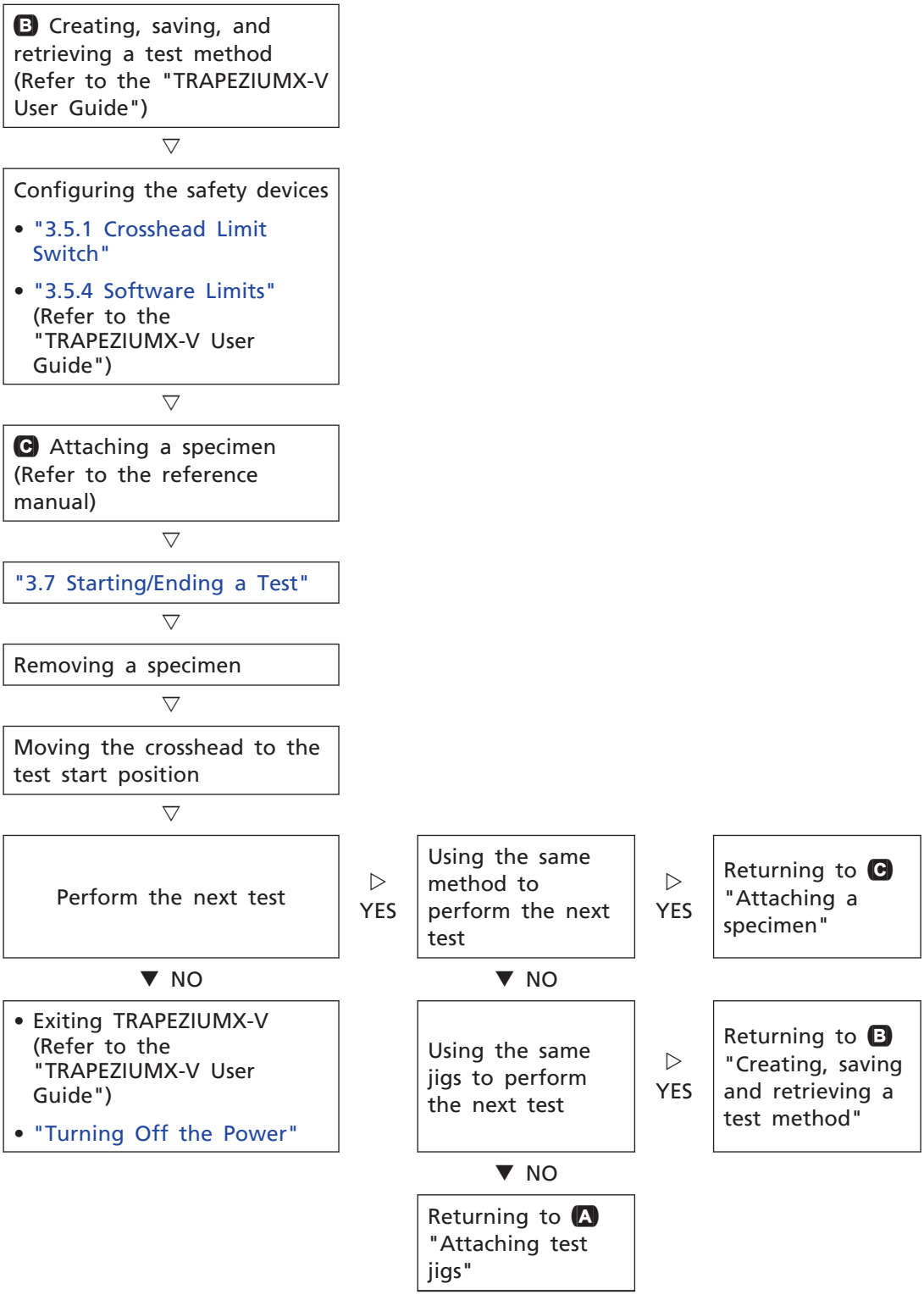
▽

- Starting a computer
- Starting TRAPEZIUMX-V
  (Refer to the "TRAPEZIUMX-V User Guide")

▽

Go to "Test"

## 5 Test


B Creating, saving, and retrieving a test method (Refer to the "TRAPEZIUMX-V User Guide")
Configuring the safety devices
• "3.5.1 Crosshead Limit Switch"
• "3.5.4 Software Limits" (Refer to the "TRAPEZIUMX-V User Guide")
C Attaching a specimen (Refer to the reference manual)
"3.7 Starting/Ending a Test"
Removing a specimen
Moving the crosshead to the test start position
Perform the next test
YES
Using the same method to perform the next test
YES
Returning to C "Attaching a specimen"
NO
NO
• Exiting TRAPEZIUMX-V (Refer to the "TRAPEZIUMX-V User Guide")
• "Turning Off the Power"
Using the same jigs to perform the next test
YES
Returning to B "Creating, saving and retrieving a test method"
NO
Returning to A "Attaching test jigs"

# 3.2 Preparation Before Turning On the Power

## 3.2.1 Attaching/Replacing a Load Cell

Attach/replace a load cell according to the following procedure.

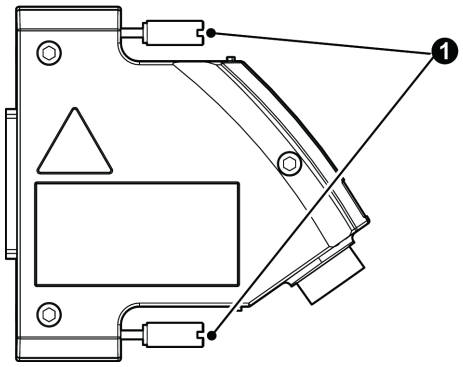
Reference Precision Universal Testing Machines AUTOGRAPH AGX-V2 Series Reference Manual "3.1 Preparation with the testing machine"

**1** **Turn off the instrument.**

NOTE Before replacing a load cell, turn off the power or disconnect the CAL connector from the smart controller according to the specified procedure. Connecting/disconnecting the CAL connector during E-CAL or other data communication may corrupt calibration data.

**2** **Remove the test jig from the load cell.**

**3** **Loosen the two fixing screws ❶ of the CAL connector on the right side of the instrument and remove them.**




**4** **Remove the load cell from the crosshead. For the reinforced yoke model, remove the load cell from the yoke.**

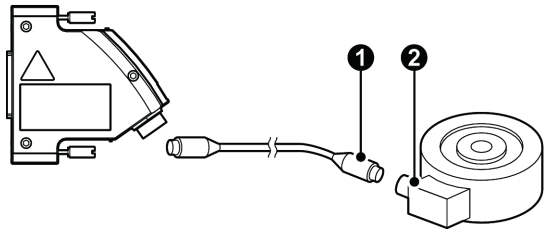
- For 10 kN or smaller load cells, loosen the fixing bolt of the load cell with a rotation bar and while holding the load cell with one hand, turn the fixing bolt with another hand to remove it.
- For 20 kN or larger load cells, use a hex wrench to loosen the bolt and remove it from the crosshead.

## 5 Attach the replacement load cell to the crosshead, so that the text on the nameplate of the load cell is shown with the right side up. For the reinforced yoke model, attach the load cell to the yoke.

**NOTE**

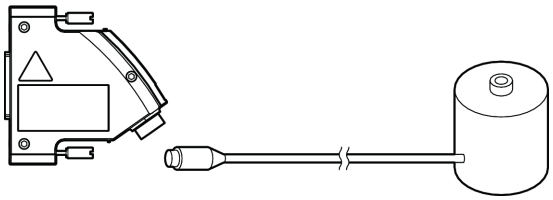
- Tighten the supplied bolt until the load cell is secured to the crosshead without looseness. Otherwise test force may not be measured correctly.
- Do not remove or loosen the locating plate for load cell on the top surface of the crosshead. Otherwise, a correct position of the load cell cannot be set.

## 6 Connect the load cell side end (❶) of the load cell cable to the connector (❷) of the load cell securely.




20 kN or larger load cells

**Hint** This connection is not necessary for 10 kN or smaller load cells since they have an integrated load cell cable.



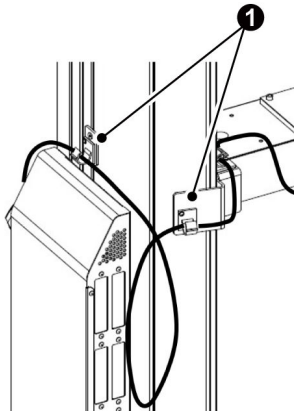
10 kN or smaller load cells

**NOTE**

- A load cell and CAL connector are calibrated as a set before shipment. Be sure to use a set of a CAL connector and load cell that are included in the same package. Connecting any CAL connector other than the supplied one will cause an abnormal test force preventing the load cell from properly detecting overload.
- Tests cannot be performed after the load cell is replaced/attached unless E-CAL is executed.

  Reference "3.3.2 Calibration of a Load Cell" P.42
- Do not perform operation that may apply load to the crosshead while a load cell is not attached or the attached load cell cannot receive transmitted load. Doing so may damage the frame or jig.

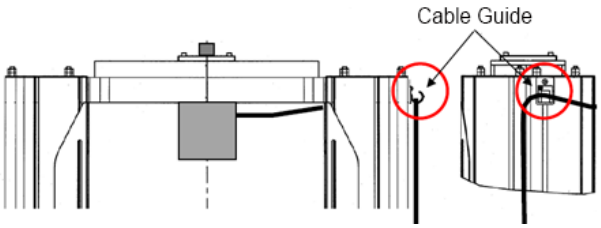
**7** **Secure the load cell cable to the cable guide ❶ on the left of the rear side of the crosshead and on the pole side.**




Standard model (rear)

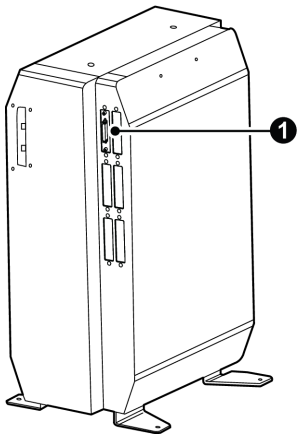
> **NOTE** When securing the load cell cable to the cable guide, keep enough length of the load cell cable to allow the crosshead to move through the movement range.

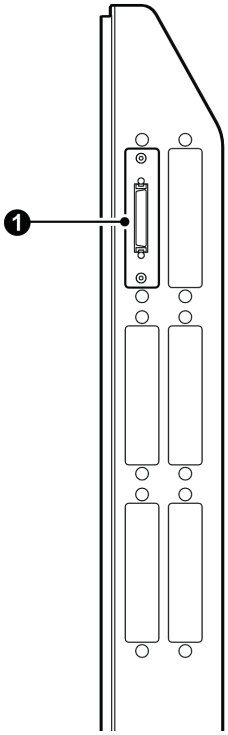
For the reinforced yoke model, secure the cable to the cable guide on the pole side.




For the reinforced yoke model (front)

**8** **Connect the CAL connector to the sensor amplifier (for load cell) ❶ and fix it with the connector fixing screws.**




**Hint** The sensor amplifier connector port may be located on the rear side of the control box. Contact your Shimadzu representative.

# 3.3 Setting Up the Instrument

## 3.3.1 Turning On/Off the Power

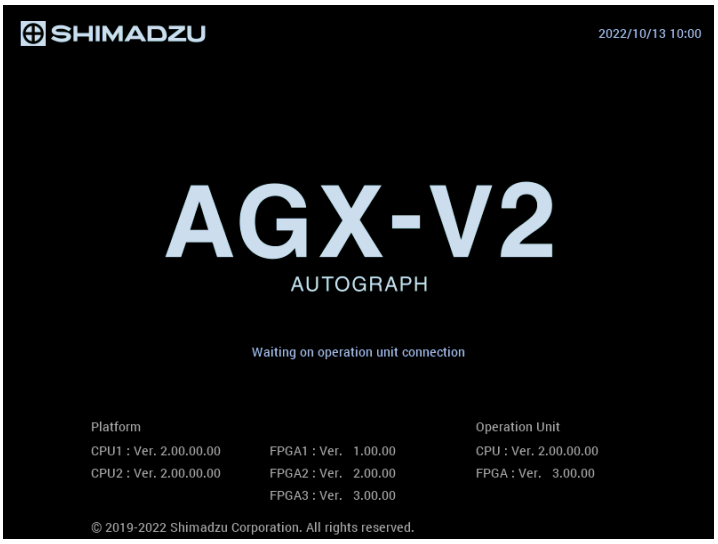
### ■ Turning On the Power

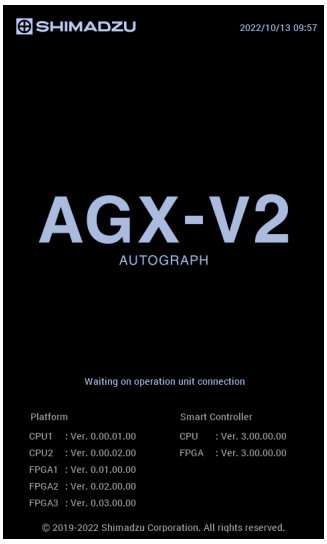
**1** **Turn on the power supply breaker on the rear side of the instrument or AGX-V/R controller.**


**Hint** If the load cell and sensor amplifier are already warmed up sufficiently, the warming up can be skipped by pressing the [Cancel] button.

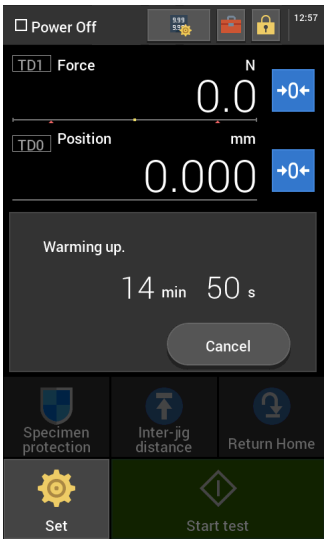
## 2 Press (power button) on the front side of the control box.

The bar indicator on the front side of the control box lights when the power is turned on.
After the power is turned on, the startup screen is displayed on the smart controller and the startup sound is played.




The display changes to the main screen in several tens of seconds.
Warming up continues for 15 minutes after the power is turned on.


**Hint** If the load cell and sensor amplifier are already warmed up sufficiently, the warming up can be skipped by pressing the [Cancel] button.

**3** **Press  (standby button) on the front side of the control box or AGX-V/R controller.**

> NOTE
> - The standby button cannot be active when the emergency stop switch or either of the crosshead limit switches is active.
> - If the emergency stop switch is still held down, turn its control part in the arrow direction to deactivate the switch.

## ■ Turning Off the Power

**1** **Press  (power button) on the front side of the control box or AGX-V/R controller.**

A message confirming whether to turn off the power is displayed on the LCD touch panel of the smart controller.

**2** **Select "Yes".**

The power turns off.

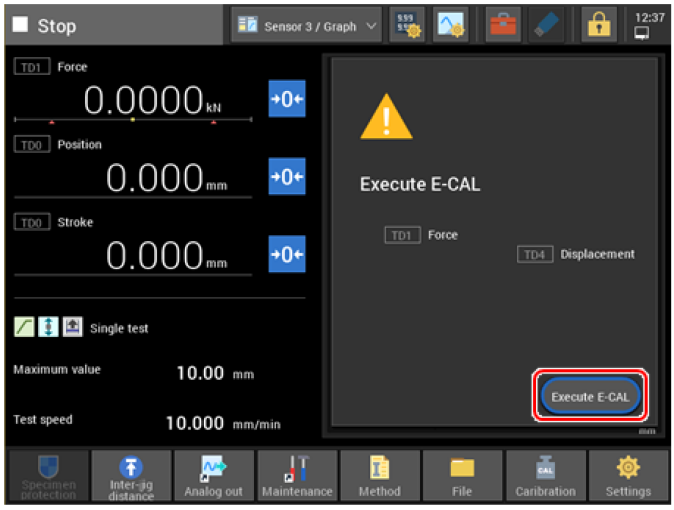
**3** **If you do not use the instrument for some time, turn off the power supply breaker on the rear side of the instrument or AGX-V/R controller.**

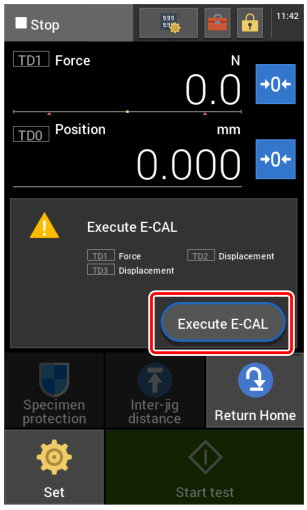
## 3.3.2 Calibration of a Load Cell

**1** **From the LCD touch panel of the smart controller or operation controller execute E-CAL (electronic calibration).**

### When starting up

1 Follow the message displayed after warming up ends and press [Execute E-CAL] to execute E-CAL.

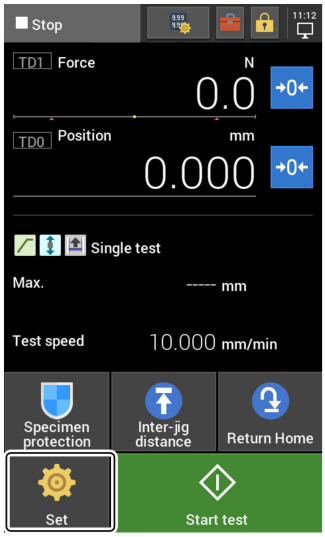



### After starting up

#### ■ Smart Controller

1 Press [Set].



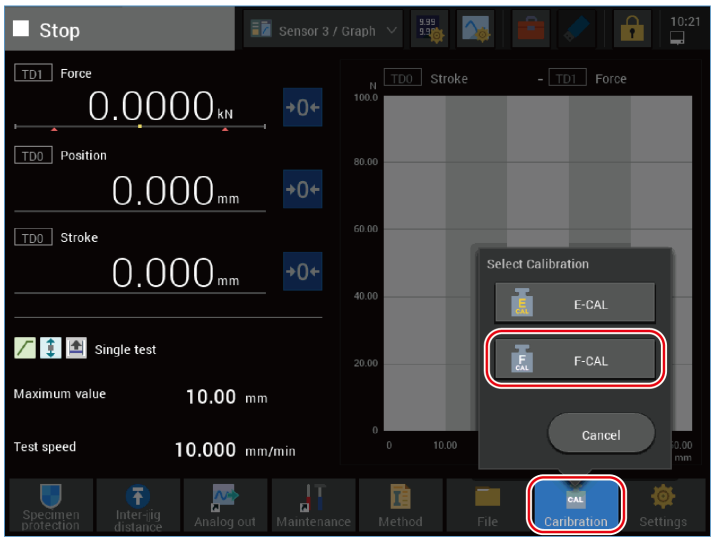
2 Press [Setting 1] - [Execute E-CAL].



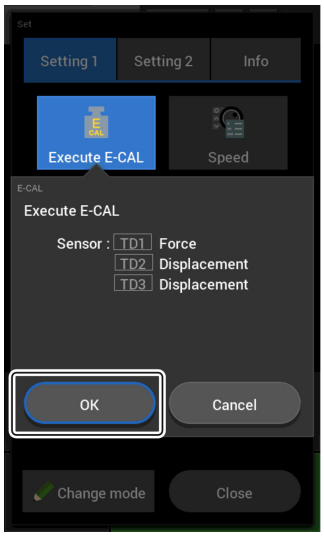

## ■ Operation Controller

1 Press [Calibration].

2 Press [Execute E-CAL].



3 Press [OK] to execute E-CAL.





**NOTE**

- To perform E-CAL of test force, apply no load and wait at least 15 minutes after powering the load cell.
- E-CAL takes approximately 30 seconds to be completed.
- Perform no operation until E-CAL is completed.
- Tests cannot be performed after the load cell is replaced/attached unless E-CAL is executed.
- The sensitivity of the sensor amplifier changes depending on the ambient temperature. When the ambient temperature changes by ±10 °C or more, execute E-CAL again.

**Hint** You can also execute E-CAL from the computer software.

**Reference**

- "3.3.2 Calibration of a Load Cell" P.42
- "Shimadzu Autograph Software TRAPEZIUM X-V User Guide" (Document No.: 349-08931)

# 3.4 Moving the Crosshead

**⚠ DANGER**

Instruction

**Keep hand, head, or any other body part away from the test space while the crosshead is operating.**

Being caught by the instrument may result in serious injury or death.

Prohibition

**Do NOT open the ball screw protection cover. Do NOT move the crosshead with the ball screw protection cover opened.**

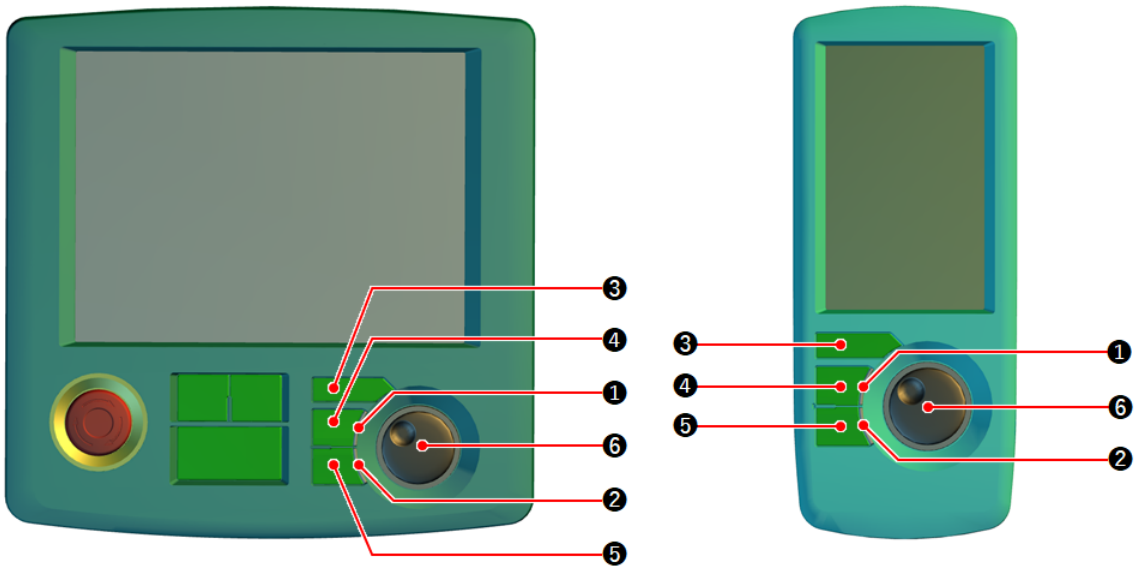
Otherwise a body part may be caught by the rotating ball screw.



## 3.4.1 Moving the Crosshead Up/Down in the Jog Operation

In the jog operation, you can move the crosshead up/down manually.

**1** **Press the manual button ❸ on the operation controller or the smart controller.**




The instrument is set to the manual mode (ready for jog operation), and the upper LED indicator ❶ and the lower LED indicator ❷ light up.

**Hint** In the AGX-V2S series, you can retract the crosshead with jog operation when it reaches the crosshead limit. In this case, either the upper LED indicator ❶ or lower LED indicator ❷ lights up to indicate the direction in which the crosshead can be moved.

**2** **Pressing the jog up button ❹ and jog down button ❺ moves the crosshead up and down, respectively.**

The crosshead moves only when the button is held down. Releasing the button stops the movement.

**3** **Turning the jog dial ❻ moves the crosshead up or down.**

Turning the dial clockwise moves the crosshead up, and turning counterclockwise moves it down.

**Hint** Turning the jog dial rapidly moves the crosshead faster.

**NOTE**

- Keep an eye on the test space during operation although the following safety functions are activated.
  - Crosshead limit
  - Emergency stop switch
  - Safety support functions (contact detect function and overload/underload detection function)

  Although the safety functions are one of the protection mechanisms, they may not completely prevent danger due to overshooting in high-speed operation. The safety functions do not guarantee prevention of collision or overload of the crosshead or load cell.
- Do not use the safety functions for positioning or other forms of control.

## 3.4.2 Performing Crosshead Origin Return with Return Operation

In the return operation, the crosshead moves rapidly to the origin (where the position value is 0).

**⚠ CAUTION**

Instruction

**The crosshead moves rapidly during return operation or offset based on the registered distance between jigs. Keep hands away from the moving part. Be careful to prevent the jigs from interfering with nearby objects.**

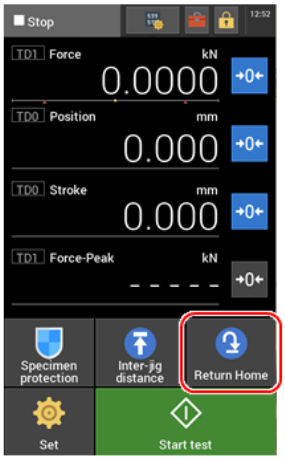
- An operator may get his/her hand caught, resulting in injury, or nearby objects may be damaged.
- Immediately press the emergency stop switch if the instrument movement is abnormal.

Instruction

**The crosshead moves rapidly during return operation or offset based on the registered distance between jigs. Be sure to check the arrow direction displayed on the operation controller and smart controller before starting the return operation.**

Otherwise an operator may touch the crosshead and get injured.

**1** **For the operation controller, press the return button, and for the smart controller, press [Return Home].**




The direction, speed, and distance of return operation are displayed.

**2** **Check the displayed information and press [Move].**

The crosshead moves to the origin.

NOTE

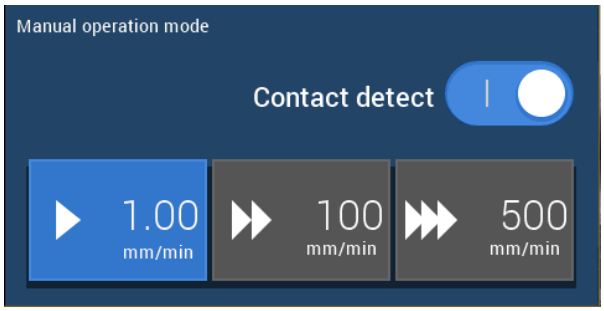
- The return operation is not available in the manual mode.
- Keep an eye on the test space during operation although the following safety functions are activated.
  - Crosshead limit
  - Emergency stop switch
  - Safety support functions (contact detect function and overload/underload detection function)

  Although the safety functions are one of the protection mechanisms, they may not completely prevent danger due to overshooting in high-speed operation. The safety functions do not guarantee prevention of collision or overload of the crosshead or load cell.
- Do not use the safety functions for positioning or other forms of control.

## 3.4.3 Switching the Jog Speed

**1** **Press the manual button on the operation controller or the smart controller.**
The instrument is set to the manual mode.

**2** **Select the desired jog speed from the options displayed in the speed table.**

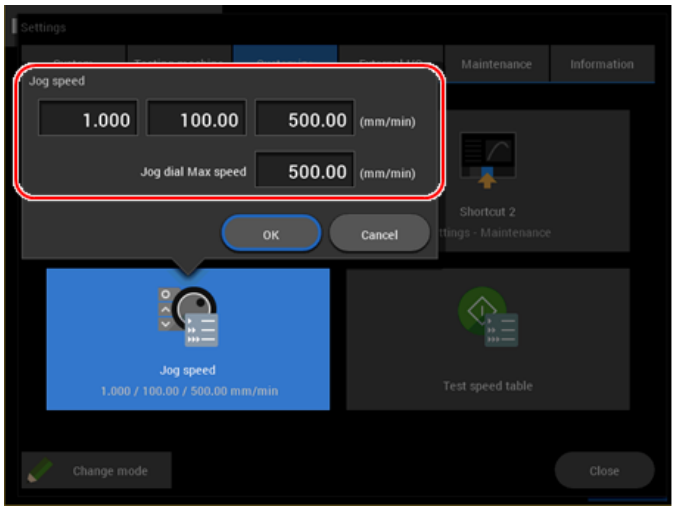


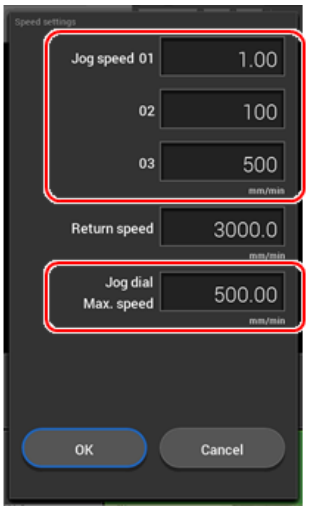

**Hint** The contact detect is a function to monitor the test force during jog operation, stopping the crosshead in case of any sudden change in the test force.

## 3.4.4 Registering the Jog Speed, Jog Dial Max. Speed, and Return Speed

### ■ Registering the Jog Speed and Jog Dial Max. Speed

**1** **For the operation controller, go to [Settings] - [Customize] - [Jog speed] from the main screen. For the smart controller, go to [Set] - [Setting 1] - [Speed].**
The jog speed and the jog dial max. speed currently registered are displayed.



**2** **Enter the desired value to the jog speed and the jog dial max. speed.**

**Hint**

- Up to 50 mm/min can be registered to [Jog speed 01].
- The values must satisfy [Jog speed 01] < [Jog speed 02] < [Jog speed 03].
- The values that can be registered in [Jog speed 03] and [Jog dial Max. speed] are limited up to the maximum test speed of the testing machine.

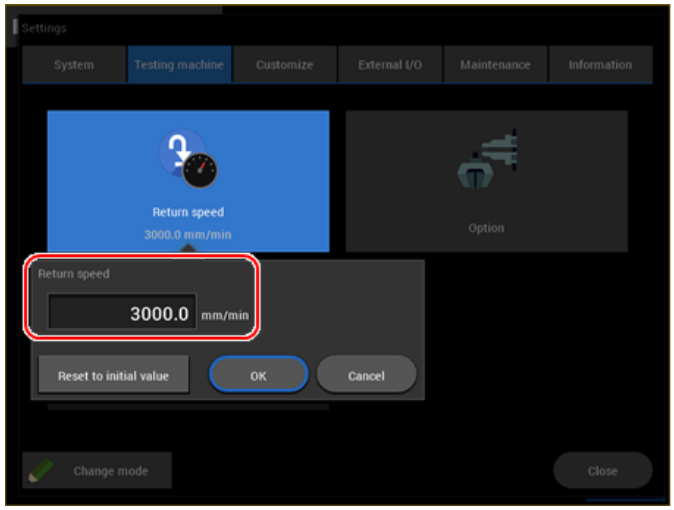
**3** **Press [OK].**

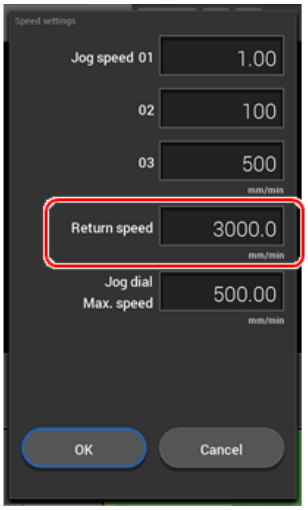
The jog speed and the jog dial max. speed are registered.

## ■ Registering the Return Speed

**1** **For the operation controller, go to [Settings] - [Testing machine] - [Return speed] from the main screen. For the smart controller, go to [Set] - [Setting 1] - [Speed].**

The return speed currently registered is displayed.




**2** **Enter the desired value to the return speed.**

**Hint** The value that can be registered in [Return speed] is limited up to the maximum return speed of the testing machine.

**3** **Press [OK].**

The return speed is registered.

## 3.4.5 Changing the Distance Between Jigs

**⚠ CAUTION**

Instruction

**Keep hands away from the moving part since the crosshead moves rapidly during return or offset based on the registered distance between jigs. Be careful to prevent the jigs from interfering with nearby objects.**

An operator may get his/her hand caught, resulting in injury, or nearby objects may be damaged.
Immediately press the emergency stop button if the instrument movement is abnormal.

Instruction

**The crosshead moves rapidly during return or offset based on the registered distance between jigs.**
**Be sure to check the arrow direction displayed on the controller before starting the return movement.**

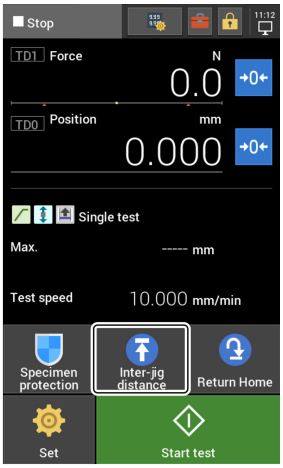
Otherwise an operator may touch the crosshead and get injured.

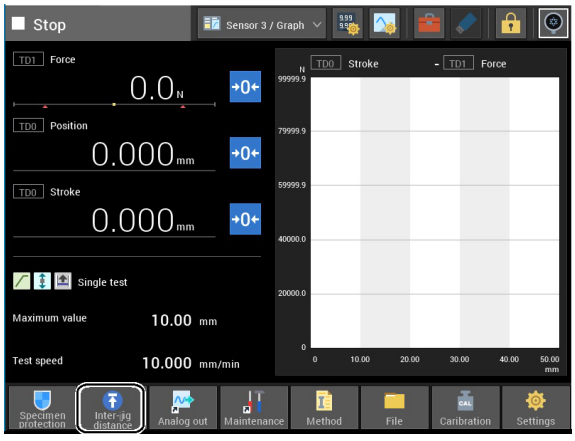
The function is to move the crosshead to keep the registered distance between jigs.

**NOTE** Since the jig weight is measured, change the distance between the jig when the test force measurement is stable more than 15 minutes after the load cell is energized.

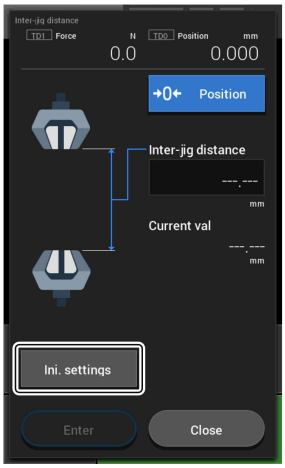
### ■ Registering the Distance Between Jigs

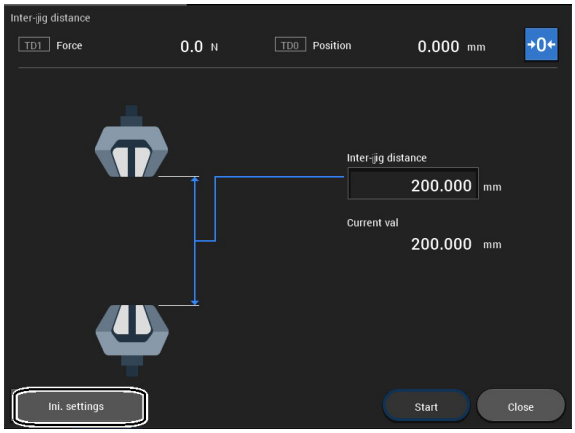
**1** **Press [Inter-jig distance] on the touch panel.**



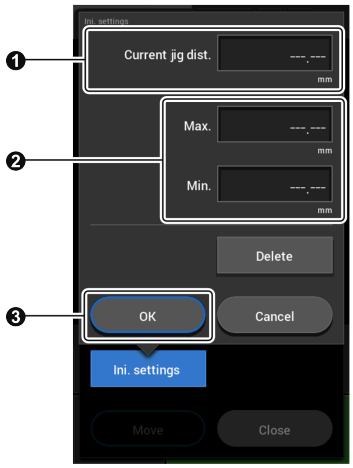



## 2 Press [Ini. settings].



## 3 Input in [Current jig dist.] ❶ (actually measured value) and [Max.]/[Min.] ❷ (upper/lower limit values) and press [OK] ❸.





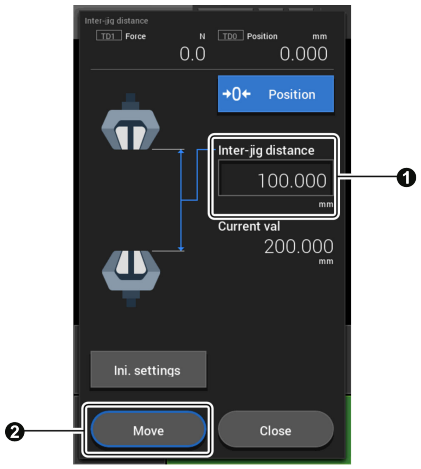
The range where the crosshead can move is determined by the specified upper/lower limit values ❷.

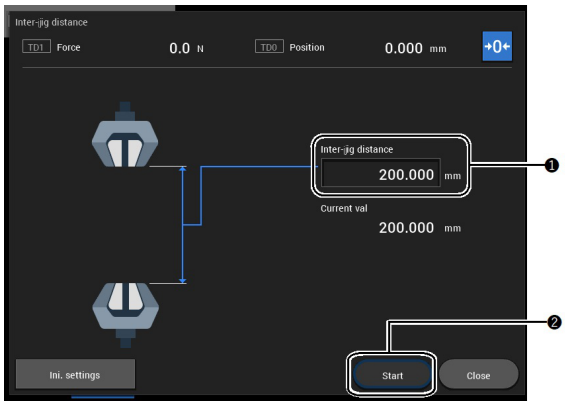
**NOTE**

- Jig weight is used to determine which jig is installed. To measure jig weight, perform the test at least 15 minutes after the load cell is energized and the test force measurement is stable. If the test force measurement value is not stable, it will be identified as a different jig and a warning screen will be displayed when distance movement between jigs is performed.
- To make the initial setting of distance between jigs, measure and input accurate values at the time of setting.
  If inaccurate values are input, the jigs may interfere with each other.
- After the jigs are changed, be sure to make the initial setting of distance between jigs.
  Otherwise the jigs may interfere with each other.
- [Min.] can be set to 20 mm or more in the tension test mode. [Min.] can be set to 0 mm or more in the compression/three-point/four-point bending test mode.

## ■ Offset Based on the Distance Between Jigs

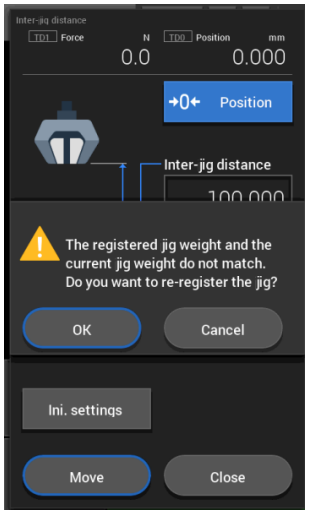
**1** **Input the distance between jigs in [Inter-jig distance] ❶ and press [Move] ❷.**

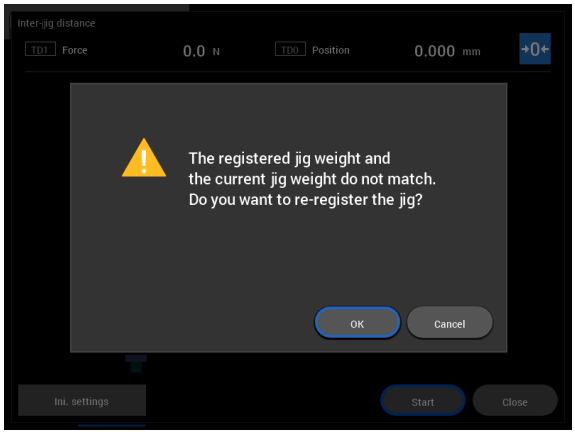


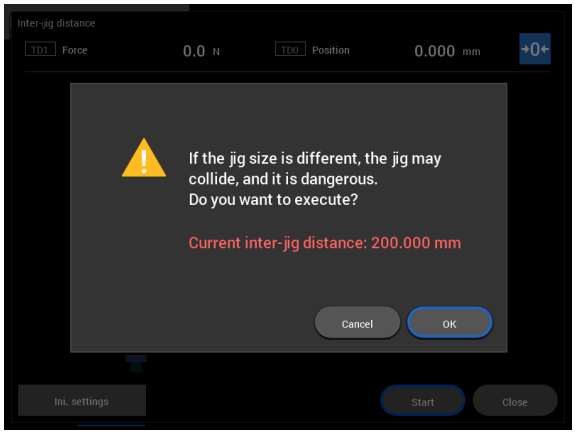
**2** **The weight of the current jig is automatically measured and compared with the jig weight at the time of the registration of the distance between jigs.**
**If there is a difference in weight, a warning screen is displayed because a different jig may be installed.**
**If there is no weight difference, no warning screen is displayed. Proceed to the next section. If a warning screen is displayed, follow the steps below.**

1 If the jig installed in the tester is the same as the jig used to register the distance between jigs, press [OK]. If not, press [Cancel]. The offset based on the distance between jigs will not be performed.



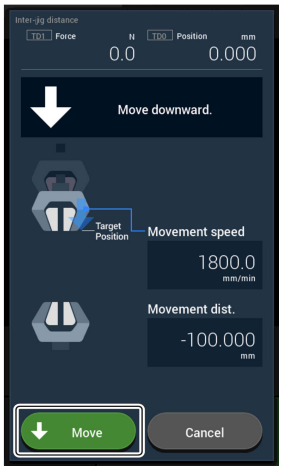



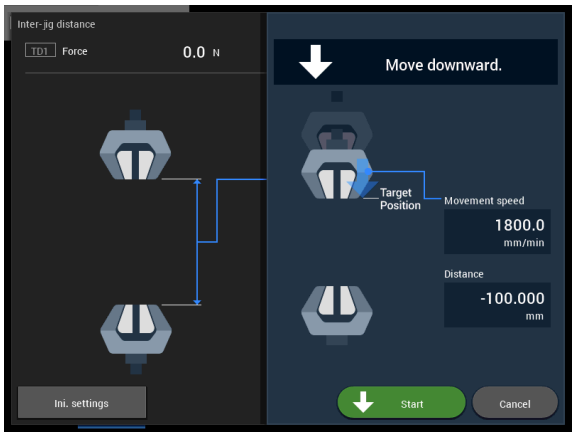

2 Confirm that the actual distance between jigs matches the [Current jig distance] displayed on the screen, then press [OK]. The current jig weight is re-registered and the offset function becomes available.
If they do not match, press [Cancel]. The offset based on the distance between jigs will not be performed.

> **NOTE** Even when using the same jig, this warning screen may be displayed due to unstable test force measurement values or changes in the surrounding environment (such as temperature drift on the load cell).

**3** **The screen for starting the offset based on the distance between jigs is displayed. Confirm the direction and distance of the movement and press [Move].**



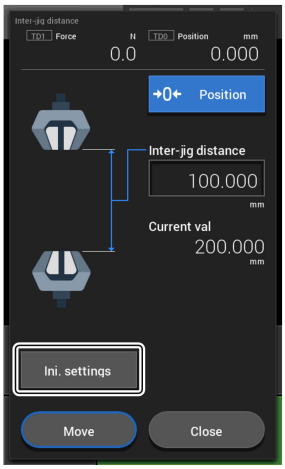



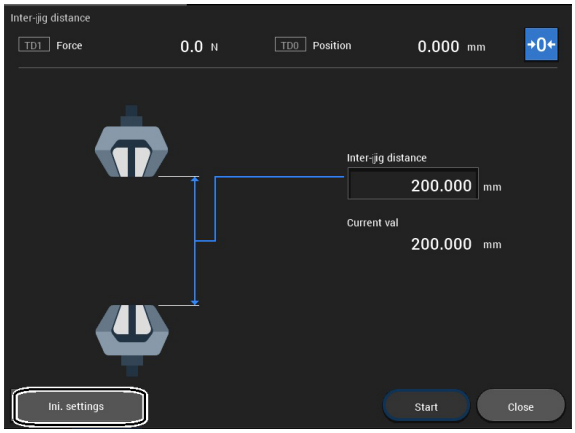

The crosshead starts offset based on the registered distance between jigs.

> **NOTE** Keep an eye on the test space during operation although the following safety functions are activated.
> - Crosshead limit switch
> - Emergency stop switch
> - Safety functions ("TouchLoad" function and overload detection function))
>
> Although each of the safety functions works as a protection system, it may not completely prevent danger due to overshooting in high-speed operation.
>
> The safety functions do not guarantee prevention of collision or overloading in the test space.
>
> Do not use the safety functions for positioning or control.
>
> Reference "3.5 Configuring/Checking the Safety Devices" P.57

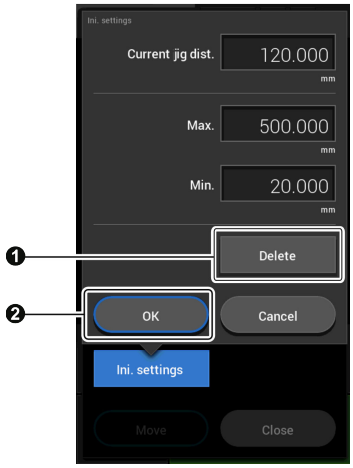
## ■ Deletion of Registered Distance Between Jigs

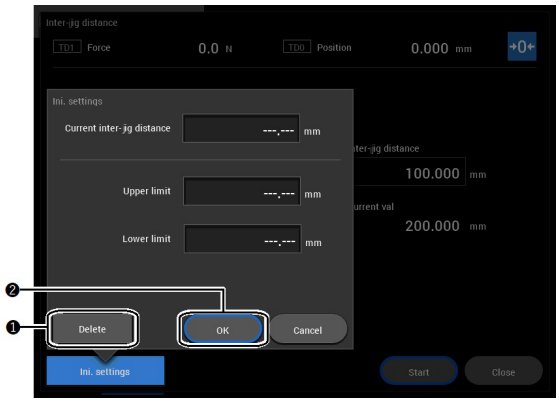
**1** **Press [Ini. settings].**




**2** **Press [Delete] ❶ and then [OK] ❷.**




The registered distance between jigs is deleted.

# 3.5 Configuring/Checking the Safety Devices

Before starting a test, be sure to configure and check the following safety devices.

**Hint** The limit switches to limit the movable range of the crosshead include the following types. Set the limit switches depending on the purpose.

- Crosshead Limit Switches: Limits to be set according to the jigs used (See 3.5.1.)
- Software limits: Limits to be set according to the test content or the size of a specimen (See 3.5.4.)
- Upper/lower limits of distance between jigs: Limits to be set to prevent misoperation during the offset based on the registered distance between jigs (See 3.4.5.)



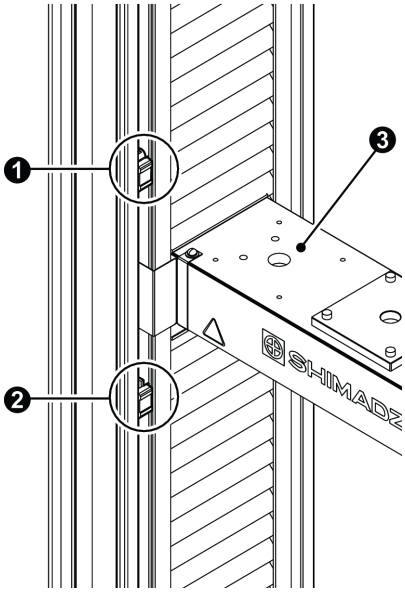
## 3.5.1 Crosshead Limit Switch

The switches limit the movable range of the crosshead. Specify the upper and lower limits of the movable range so that the power to the motor is cut to forcibly stop the crosshead when the crosshead reaches either of the limits.

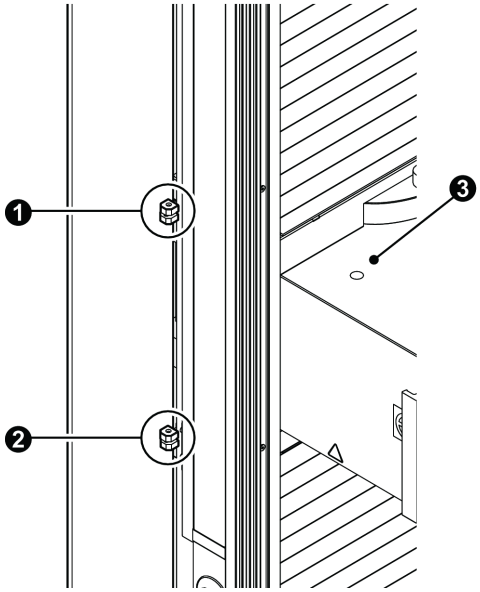
### ■ Setting the Crosshead Limit Switches

Set the crosshead upper limit ❶ and crosshead lower limit ❷ to the positions of the upper and lower limits of the crosshead movement ❸. Set them to the positions where collision between the attached jigs can be prevented.

**table-top type**



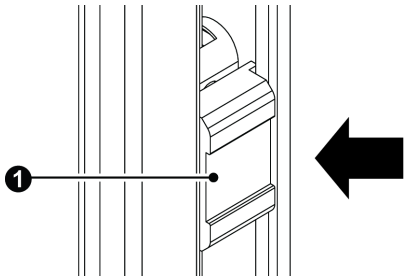

**floor type**



## ■ Changing the Positions of the Crosshead Limit Switches

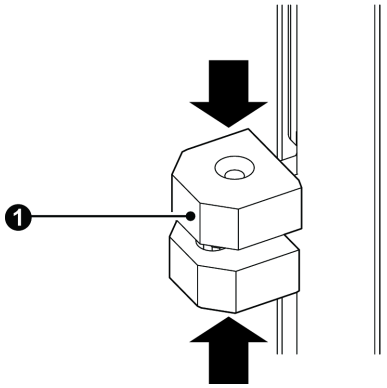
**Table-top type**

Press and hold the middle part of the crosshead limit switch ❶ and slide it up or down to change the position. Release the crosshead limit switch to fix it at the desired position.




**Crosshead limit switch for floor type with 600 kN**

Pinch the knobs of the crosshead limit switch ❶ and slide it up or down to change the position. Release the knobs of the crosshead limit switch to fix it at the desired position.




### ⚠ CAUTION

Prohibition

**Do NOT use the crosshead upper and lower limit switches as a condition to end a test.**

A jig may hit and damage the frame, another jig or the load cell, which may result in injury of an operator.

Instruction

**Specify the estimated movable range of the crosshead correctly with the crosshead upper and lower limit switches.**

A jig may hit and damage the frame, another jig or the load cell, which may result in injury of an operator.

Instruction

**The crosshead limit switches stop within 5 mm from the set positions. Set the positions of the crosshead limit switches to a position 5 mm away from the position where you desire to stop the crosshead limit switches.**

Otherwise the jigs may interfere with each other.

**NOTE**

- Specify the range that can prevent the jig on the crosshead from interfering with the yoke or the jig on the table when the crosshead moves up or down.
- If you have any difficulty in limiting the range, at least specify the range by keeping 20 mm or more clearance between the grips.
- After fixing the crosshead upper and lower limit switches, try to move them up or down to check for slippage.

## ■ When the Crosshead Limit Is Detected

An error message is displayed on the LCD touch panel of the smart controller.

**1** **Release the alarm on the computer software, operation controller, or smart controller.**

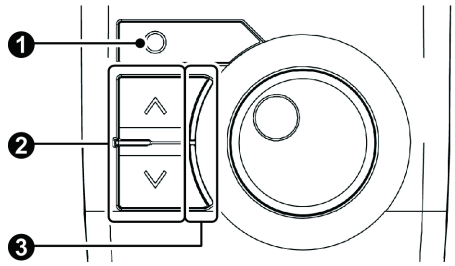
**2** **Press (standby button) on the front side of the control box and AGX-V/R controller.**

**3** **Retract the crosshead using the jog operation on the operation controller or the smart controller.**

NOTE Jog operation is available only in the direction of the crosshead limit release.

Hint In the manual mode, the LED indicator for the direction in which the crosshead can move will light up.

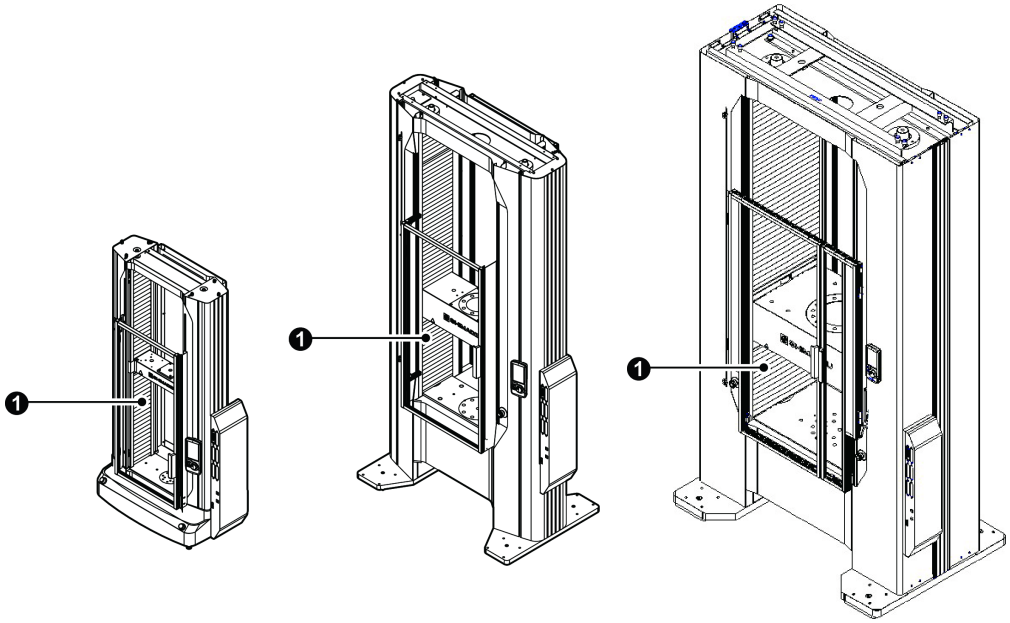
**4** **Press the jog button ❷ to release the crosshead limit switch.**



## 3.5.2 Protection Cover

The protection cover ❶ is designed to prevent fragments of a broken specimen from scattering around the area.
Close the cover before starting a test. Opening the cover during a test or return activates the interlock, an alarm is displayed, and the crosshead stops.

NOTE
- To check the interlock function, open and close the protection cover once or more times after a test ends.
- The jog dial operation can be performed even when the protection cover is open.
- The jog up/down operation can be performed at a speed of 50 mm/min or less even when the protection cover is open.



## 3.5.3 Emergency Stop Switch

Use the switch to stop the crosshead in an emergency. Pressing the emergency stop switch ❶ cuts power to the motor and forcibly stops the crosshead. To release the switch, turn the control part in the arrow direction.

Emergency stop switch (enlarged)

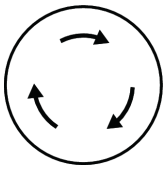
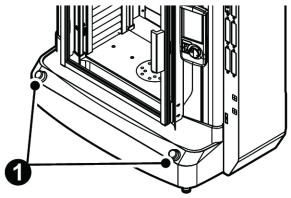
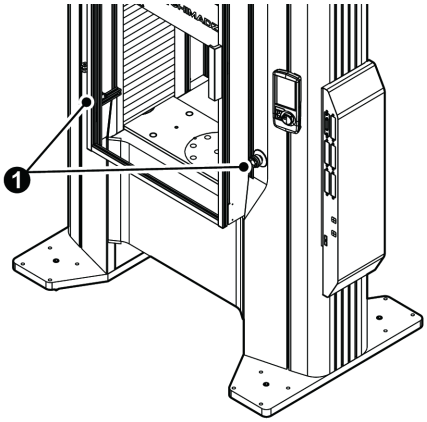


Table-top type




Floor type




**NOTE** The reinforced yoke model comes with an additional emergency stop switch to be attached to the testing machine pole. Install the switch in a position accessible during testing or return operation.
The wide model with protection cover comes with a tabletop emergency stop switch.
Place the switch in a position accessible when the protection cover is open.

## 3.5.4 Software Limits

Set software limits to trigger an alarm and stop the crosshead when the measured value exceeds a specified value during a test. With the special software TRAPEZIUMX-V, maximum and minimum limit values can be set for all connected sensors (stroke/test force/optional additional sensors) individually.

▶▶ Reference "TRAPEZIUMX-V User Guide"

# 3.6 Safety Support Functions

## 3.6.1 Contact Detect Function

With this function, the crosshead will stop if the load cell detects a load fluctuation over a certain level during return operation, an offset based on the registered distance between jigs, or jog operation (except for jog dial operation). The function helps prevent malfunctions and injuries due to collisions between jigs and pinching of fingers.

### ■ Contact Detect Sensitivity

- 300 kN < Load cell rating: 0.01 % of load cell rating
- 100 kN < Load cell rating ≤ 300 kN: 0.02 % of load cell rating
- 50 kN < Load cell rating ≤ 100 kN: 0.04 % of load cell rating
- 1 kN < Load cell rating ≤ 50 kN: 0.1 % of load cell rating
- 100 N < Load cell rating ≤ 1 kN: 1 % of load cell rating
- Load cell rating ≤ 100 N: Not detected

NOTE
- This function does not prevent collisions between jigs or pinching of fingers.
- This function does not prevent overloading of the test force.
- The contact detect function does not work in the jog dial operation.
- The contact detect function will not work when the rating of the connected load cell is 100 N or lower.

## ■ Contact Detect Direction

| Test Conditions | Test Starting Direction | Crosshead Operation Direction | Contact Detect Direction |
|---|---|---|---|
| Tension | Up | Up | Test force change in positive direction |
| | | Down | Test force change in negative direction |
| | Down | Up | Test force change in negative direction |
| | | Down | Test force change in positive direction |
| Compression | Up | Up | Test force change in positive direction |
| | | Down | Test force change in negative direction |
| | Down | Up | Test force change in negative direction |
| | | Down | Test force change in positive direction |

NOTE

- To prevent false detection due to inertial force, contact detect is not detected for one second after the start of crosshead operation.
- No contact detect is detected when the crosshead is moved in the test force unloading direction.
  The contact detect function starts to operate when the test force goes below zero and the test force starts to increase in the negative direction.

## 3.6.2 Overload/Underload Detection Function

### ■ Overload/Underload Detection

The crosshead stops when the test force as described below is detected.

- When the test force reading exceeds the ±102 % of the load cell rating
- When the measured test force (a value without zero offset) exceeds ±150 % of the load cell rating

> NOTE
> - This function does not prevent collisions between jigs or pinching of fingers.
> - This function may not prevent occasional damage to the jig or load cell.

### ■ When Overload/Underload is Detected

**1** **Release the alarm on the computer software, operation controller, or smart controller.**

**2** **Press  (standby button) on the front side of the control box or AGX-V/R controller.**

**3** **Move the crosshead with jog operation on the operation controller or smart controller to unload the test force.**

> NOTE
> - Jog operation is available only in the test force unloading direction.
> - Set the test type, load cell polarity, and movement direction correctly according to the test subject.
>   Otherwise, it may become impossible to unload the test force.

**Hint** If overload/underload status cannot be released, remove the load cell cable from the CAL connector, and perform zero reset of the test force.

# 3.7 Starting/Ending a Test

## ⚠ WARNING


**Do NOT place jigs on the rear cover.**

If you put your body into the test space, your body may get caught in the jig and get injured.


**If your testing machine does not have a protection cover, keep face or other body parts away from a specimen during a test.**

Fragments of a fractured specimen may scatter and damage your eyes and body. Wear protective glasses, install a cover, etc., for possible scattering of fractured specimen.

## ⚠ CAUTION


**Wear protective gloves when replacing jigs, installing or removing the specimen.**

- The jig may pinch your fingers and cause injury.
- Your hand may slip when applying force, causing injury to your fingers.
- Your fingers may contact the fractured surface of the specimen and get injured.

## 3.7.1 Starting a Test

Create test conditions using the operation controller or the computer software TRAPEZIUMX-V and attach a specimen. Now the test can be started.

- To set test conditions

  Reference • "Operation Controller Instruction Manual" (Document No.: 349-11595)

  • "Shimadzu Autograph Software TRAPEZIUM X-V User Guide" (Document No.: 349-08931)

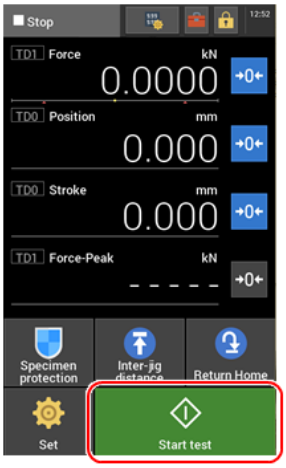
- To attach a specimen

  Reference "Precision Universal Testing Machines AUTOGRAPH AGX-V2 Series Reference Manual" (Document No.: 349-11986)

Before starting a test, configure and check the safety devices again. A test can be started with the operation controller, smart controller, or computer software TRAPEZIUMX-V.

### ■ For Operation Controller or Smart Controller

**1** **Press the start button for the operation controller, or [Start test] for the smart controller.**



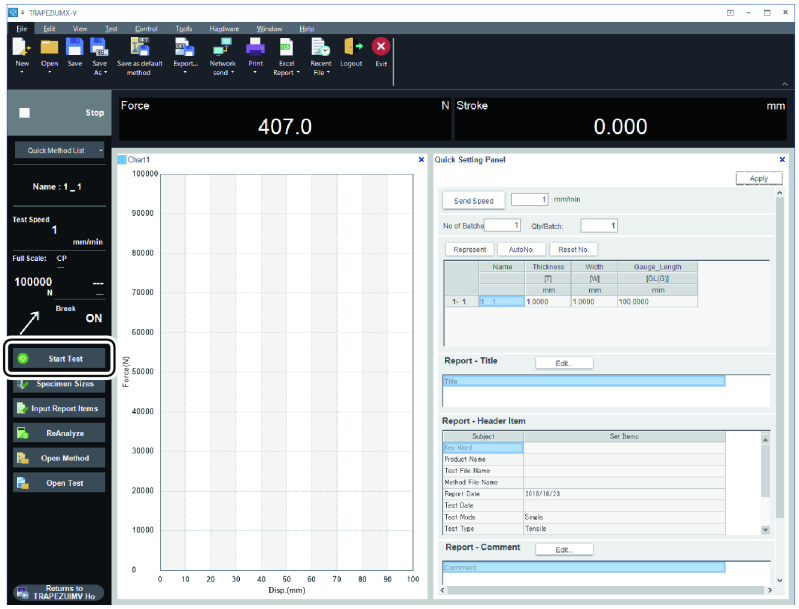

The screen displays the direction, speed, and distance of the test operation.

**2** **Confirm the displayed information, and press [Start test].**

The test operation starts.

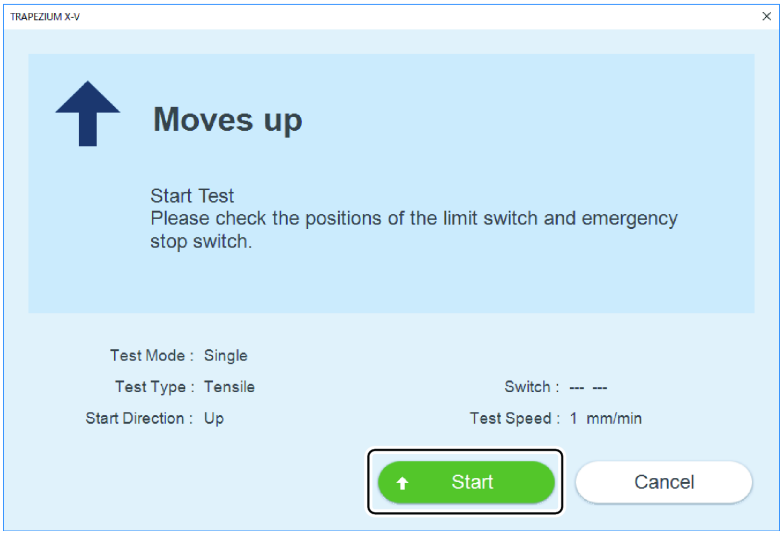
## ■ For the Computer Software TRAPEZIUMX-V

### 1 Press [Start Test].




The screen displays the direction, speed, and distance of the test operation.

### 2 Press [Start].




The test operation starts.

## 3.7.2 Ending a Test

If the test end conditions have been set with the operation controller or the computer software TRAPEZIUMX-V, a test ends when the conditions are satisfied.
To end a test manually, use the operation controller, smart controller, or computer software TRAPEZIUMX-V.

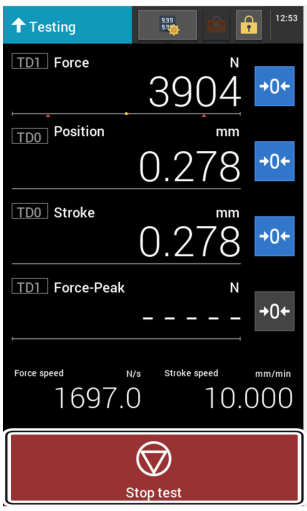
### ■ For Operation Controller

**1** **Press the Stop button.**

The test is ended.

### ■ For Smart Controller

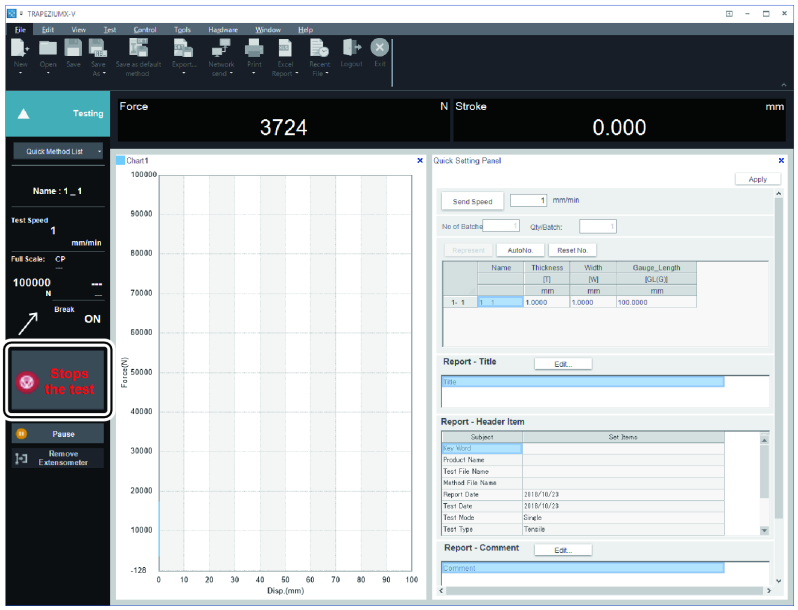
**1** **Press [Stop test].**




The test is ended.

## ■ For the Computer Software TRAPEZIUMX-V

**1** **Press [Stops the test].**




The test is ended.

# 4 Performance Inspection and Maintenance

## 4.1 Periodic Inspection

Shimadzu offers periodic inspection services so that you can benefit from stable performance of your instrument for a long time.
To ensure traceability, it is recommended to have your instrument inspected/serviced once a year.
Service personnel trained by us will visit your site and perform inspection/checkup according to documents provided by us.
Shimadzu also offers validation services according to official standards as well. For more information, contact your Shimadzu representative.
We do not guarantee the product performance if repairs or modifications have been performed by parties other than Shimadzu representative.

**⚠ CAUTION**


**A person with necessary expertise should perform wiring, maintenance and inspection.**
Otherwise an electric shock, injury or fire may occur.

## 4.2 Regular Inspection List

The list below shows the points to be inspected regularly and the recommended inspection frequencies. Perform regular inspection as shown in the list below to ensure safety and precision of the instrument.

| Items to be inspected | | Before work | 3 months | 6 months | 1 year | Reference |
|---|---|---|---|---|---|---|
| Inspection of Safety Device | Emergency Stop Switch | - | ✓ | - | - | P.71 |
| | Crosshead Limit | - | ✓ | - | - | P.71 |
| | Protection Cover | - | ✓ | - | - | P.72 |
| Checking the Test Force | | ✓ | - | - | - | P.73 |
| Checking the Stroke Speed | | - | - | ✓ | - | P.75 |
| Greasing the Ball Screws | | - | - | - | ✓ | P.76 |
| Greasing the Guide Poles | | - | - | - | ✓ | P.77 |
| Replacing the Cooling Fan Filter | | - | - | ✓ | - | P.78 |

# 4.3 Inspection of Safety Devices

If any of the following parts do not operate in inspection, contact your Shimadzu representative. We do not guarantee the product performance if repairs or modifications have been performed by parties other than Shimadzu representative.

## 4.3.1 Emergency Stop Switch

Reference "3.5.3 Emergency Stop Switch" P.61

**1** **While operating the crosshead in the jog operation, press the emergency stop switch.**

NOTE Set the jog speed to 500 mm/min or less.

**2** **Check that the crosshead stops and does not start again even if you tried to continue to move it in the jog operation.**

**3** **Turn the control part of the emergency stop switch in the arrow direction to release.**

## 4.3.2 Crosshead Limit Switch

Reference "3.5.1 Crosshead Limit Switch" P.57

**1** **Set the crosshead upper limit at 20 mm to 30 mm above the crosshead and move the crosshead upward with the jog up button.**

**2** **Check that the crosshead stops when it pushes up the crosshead upper limit and does not start moving even if you continue to press the jog up button.**

**3** **Release the crosshead upper limit and move the upper limit to the upper position.**

**4** **Set the crosshead lower limit at 20 mm to 30 mm below the crosshead and move the crosshead downward with the jog down button.**

**5** **Check that the crosshead stops when it pushes down the crosshead lower limit and does not start moving even if you continue to press the jog down button.**

**6** Release the crosshead lower limit and move the lower limit to the lower position.

## 4.3.3 Protection Cover

Reference "3.5.2 Protection Cover" P.60

**1** On the main screen of the smart controller or operation controller, press →0← (zero reset) of [Position] to set the position value to 0.

**2** Check that the jigs do not interfere with nearby objects and press the jog up/down button to move the crosshead.

**3** While the protection cover is open, press (return) on the smart controller or operation controller.

**4** Check that an interlock alarm is displayed and the crosshead does not move.

**5** Clear the alarm and close the protection cover.

**6** Press (return) on the smart controller to return the crosshead or operation controller.

**7** While return is in progress, open the protection cover.

**8** Check that an interlock alarm is displayed and the crosshead stops.

**9** Clear the alarm and close the protection cover.

**10** **Press (return) on the smart controller or operation controller to return the crosshead.**

**⚠ WARNING**

Instruction

**Keep hands away from the moving part since the crosshead moves rapidly during return to origin. Be careful to prevent the jigs from interfering with nearby objects.**

A hand of an operator may be caught, resulting in injury.

**Hint** Immediately press the emergency stop button if the instrument movement is abnormal.

## 4.4 Checking the Test Force

**⚠ CAUTION**

Instruction

**Wear safety shoes when checking the test force.**

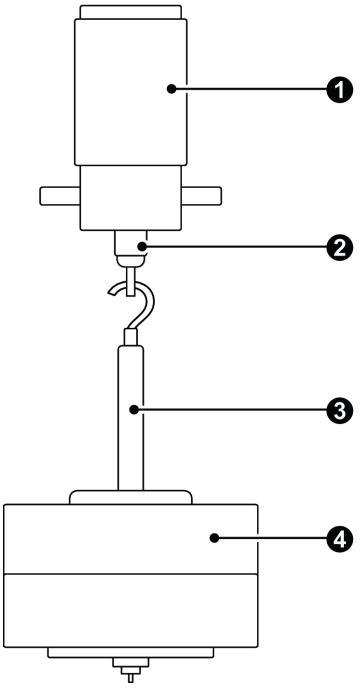
The weight may fall on your feet and cause injury.

Use light weights to simply check whether the test force is almost correct.
(The following values are an example.)
Use a 100 N weight for 1 kN to 10 kN load cells and a 50 N weight for 100 N to 500 N load cells respectively to check displayed test force.

**1** **Prepare the jigs for checking test force.**

Reference "Precision Universal Testing Machines AUTOGRAPH AGX-V2 Series Reference Manual" (Document No.: 349-11986)

**2** **Insert the UJ joint ❷ into the hole at the bottom of the tensile joint ❶ and fix it with a pin.**




**3** **Perform E-CAL (electronic calibration).**

Reference "3.3 Setting Up the Instrument" P.39

**4** **Start the special software TRAPEZIUMX-V, and display the test screen for the tension test condition.**

Reference "TRAPEZIUMX-V User Guide"

**5** **Press on the weight hook ❸ by hand to check that the test force displayed in TRAPEZIUMX-V increases.**

**6** **After preforming zero reset, carefully set a weight ❹.**

**7** **Check that the displayed test force is within the following allowable error range.**

| | |
|---|---|
| Allowable Errors | • Standard-precision unit: Within ±1 % of the indicated value<br>• High-precision unit: Within ±0.5 % of the indicated value |

NOTE If the weight to be set is not supported by the load cell, compare the displayed value with that of the previous check to check that the errors do not greatly vary.

# 4.5 Checking the Stroke Speed

**1** **Press the manual button on the smart controller or operation controller to turn on the manual mode and record the current jog speed.**

**2** **On the [Jog speed] setting screen, set the jog speed to 10 mm/min.**

Reference "3.4.3 Switching the Jog Speed" P.48

**3** **On the main screen, press →0← (zero reset) of [Stroke] to set the stroke value to 0.**

**4** **Start the stopwatch when the stroke value becomes 5 mm and stop it when the stroke value becomes 15 mm.**

**5** **Check the time measured with the stopwatch. The normal value is 60±0.26 seconds.**

Hint The above value is based on the assumption that the error of stopwatch operation is 0.2 seconds.

**6** **On the [Jog speed] setting screen, return the jog speed to an original value.**

If the speed is abnormal, contact your Shimadzu representative.

# 4.6 Maintenance

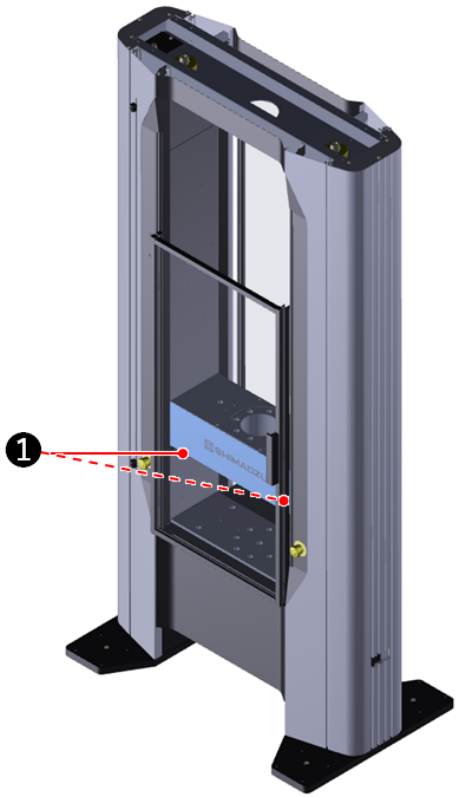
## 4.6.1 Maintaining the Ball Screws

**1** **Prepare grease and grease gun.**

- Grease:
  Alvania EP2 cartridge from Shell Lubricants Japan (P/N: S339-89306-21)
- Grease gun:
  Grease gun CH400 from THK (P/N: S339-89108-01)

> **NOTE**
> - Do not use any molybdenum disulfide grease.
>  The ball screws and ball nut will be shaved, causing backlash to occur.
> - The grease gun above is exclusively for the AGX-V2 series and AGX-V, AG-X/AG-Xplus Retrofit.

**2** **Grease the grease nipples ❶ located on the ball screw nuts of the crosshead with a grease gun.**




> **NOTE** The appearance of the testing machine varies depending on its type and capacity. The testing machine shown in the figure is AGX-300kNVS.

## 4.6.2 Maintaining the Guide Poles

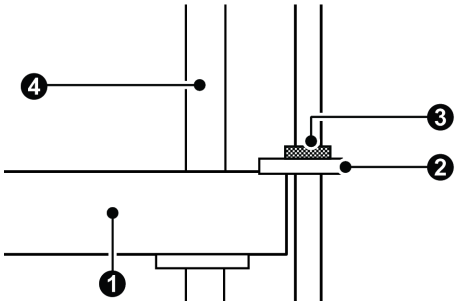
**⚠ DANGER**

Instruction

**Turn off the power before opening the ball screw protection cover.**
**Also, be sure to close the ball screw protection cover before turning on the power.**
Being caught by the rotating ball screw may result in serious injury or death.

For "table-top" testing machines, regularly grease the guide poles.

- Grease name: Molybdenum disulfide lithium-based grease
  Moly LG grease #2 from Sumico Lubricant
  (P/N : S017-27014-05)
- Greasing frequency: Every 6 months



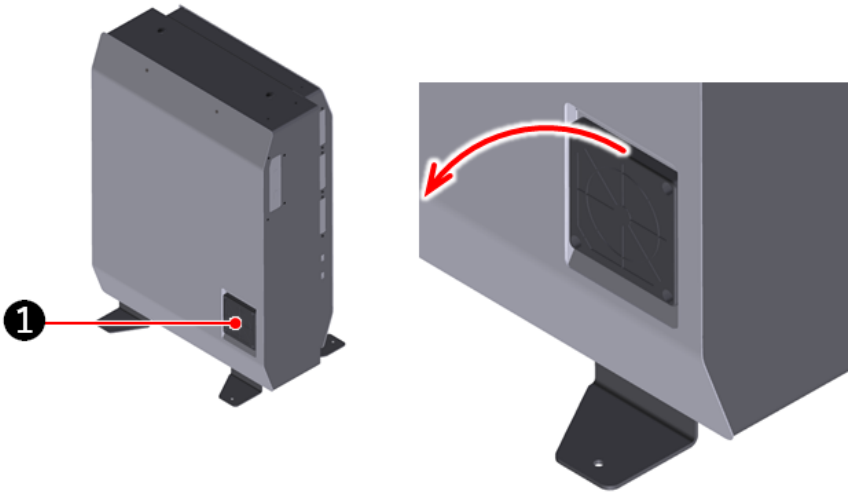

**Hint** Greasing is not necessary for "floor type".

Regularly grease the guide bush ❷ of the crosshead ❶ to keep the point ❸ lubricated.

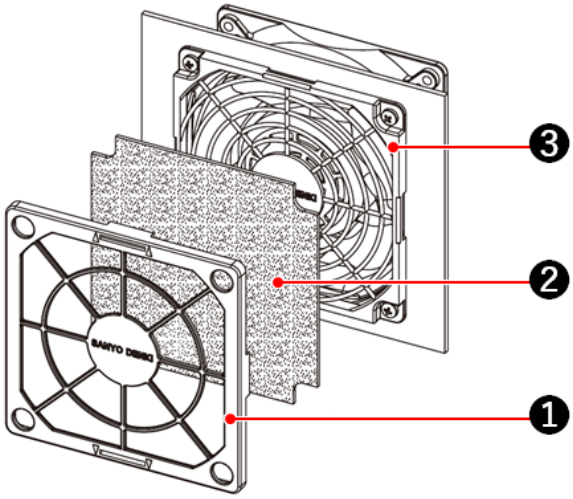
**NOTE** Turn off the power before opening the protection cover of ball screws ❹.
Also, be sure to close the ball screw protection cover before turning on the power.

## 4.6.3 Replacing the Cooling Fan Filter (Only AGX-V2S Series)

**1** Hook your fingers on the upper side of the filter cover ❶ and pull it toward you.




**2** Replace the cooling fan filter ❷ with a new one.




**3** Attach the filter cover ❶ to the filter guard ❸.

## 4.6.4 Cleaning the Operation Unit

The smart controller and operation controller should be maintained in the following ways:

- Operation buttons
  Wipe with a soft cloth damped with water.
- LCD Touch Panel
  Lightly wipe with a dry soft cloth or a soft cloth damped with neutral detergent.
- Case
  Wipe with a dry soft cloth or a soft cloth damped with neutral detergent.

Voice control devices should be maintained in the following ways:

- Body
  Wipe off gently with a dry soft cloth.
- Microphone hole
  Remove dust if it sticks.
- Stand
  Gently wipe with a dry soft cloth or a soft cloth dampened with a mild detergent, then wipe dry.

> **NOTE** Do not let moisture get inside. The device may malfunction.

## 4.6.5 Cleaning the Instrument

- Table surface
  Wipe off dirt with a dry soft cloth or a soft cloth damped with neutral detergent. Then apply antirust oil to the metal surface with a cloth.
- Top and bottom surfaces of the crosshead
  Wipe off dirt with a dry soft cloth or a soft cloth damped with neutral detergent. Then apply antirust oil to the metal surface with a cloth.
- Other casing
  Wipe with a dry soft cloth or a soft cloth damped with neutral detergent.

The voice control device should be maintained in the following ways:

- Body
  Wipe off gently with a dry soft cloth.
- Microphone hole
  Remove any dust that adheres to the surface.
- Stand
  Gently wipe with a dry soft cloth or a soft cloth dampened with a mild detergent, then wipe dry.

> **NOTE** Do not let any moisture get inside. The device may malfunction.

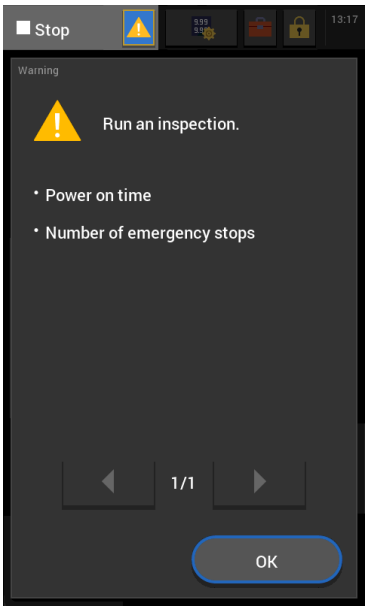
# 4.7 Usage Time/Counts

This instrument has the functions to always monitor time/number of times that the testing machine is used and notify the operator of the information to when a specified value is reached.
"Usage Time Notification Screen" is displayed when a specified value is reached. Although no urgent abnormality has occurred in the testing machine, the testing machine is at high risk of equipment failure. Contact your Shimadzu representative for inspection.
The current usage time/count can be checked, so that the operator can identify the proper timing for maintenance of the testing machine.

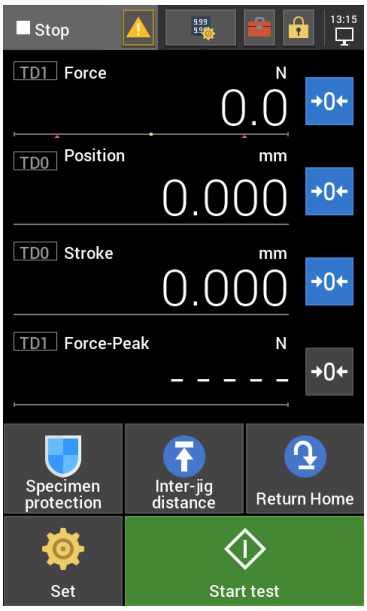
Reference "4.7.2 Checking Usage Time/Counts" P.84

**NOTE** Close the usage time notification screen to use the testing machine as normal; however, the testing machine is at high risk of equipment failure. Contact your Shimadzu representative for inspection.

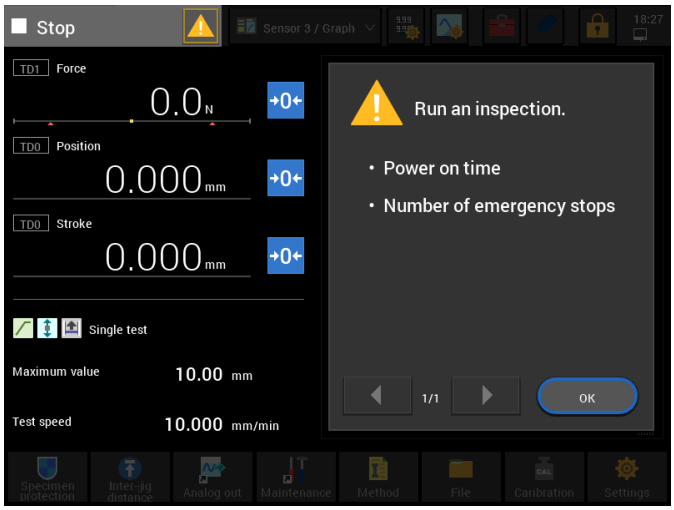
**Hint** The icon is displayed in the status display area on the test screen when there is any item whose specified value is reached. Press the icon to display the usage time notification screen again.




Usage Time Notification Screen




Status Display When a Specified Time Is Reached




Usage Time Notification Screen


Status Display When a Specified Time Is Reached

## 4.7.1 Notification Item

The testing machine provides notification when a specified value of the items listed in the table below is reached.

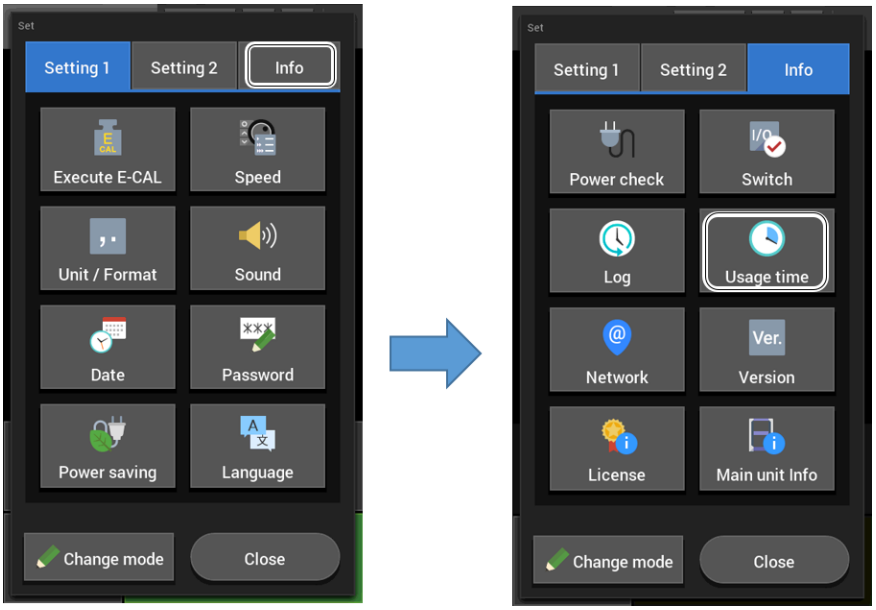
| Notification item | Description |
|---|---|
| First Date of Use | The first date that the testing machine was used is recorded. The testing machine provides notification when the number of years elapsed from the first date reaches the specified value. |
| Powering Time | Displays the total time while the testing machine was powered. The testing machine provides notification when the specified time is reached. |
| Motor On Time | Displays the time while the servo amplifier was set. The testing machine provides notification when the specified time is reached. |
| Motor Servo On Time | Displays the time while the servo amplifier was on. The testing machine provides notification when the specified time is reached. |
| Crosshead Travel Distance | Displays the total travel distance of the crosshead. The testing machine provides notification when the specified distance is reached. |
| Emergency Stop Count | Displays the number of times that the emergency stop alarm was triggered. The testing machine provides notification when the specified count is reached. |
| Over Upper Stroke Limit Count | Displays the number of times that the over upper stroke limit alarm was triggered. The testing machine provides notification when the specified count is reached. |
| Over Lower Stroke Limit Count | Displays the number of times that the over lower stroke limit alarm was triggered. The testing machine provides notification when the specified count is reached. |
| LCD Backlight Lighting Time | Displays the time while the LCD backlight for the smart controller or operation controller lighted. The testing machine provides notification when the specified time is reached. |
| Key Switch Operation Count | Displays the number of times of operating the manual switch, up switch, or down switch on the smart controller or operation controller, whichever was most frequently used. The testing machine provides notification when the specified count is reached. |
| Jog Dial Count | Displays the jog dial encoder pulse count on the smart controller or operation controller. The testing machine provides notification when the specified count is reached. |
| LCD Touch Panel Operation Count | Displays the number of times that the LCD touch panel of the smart controller or operation controller was operated. The testing machine provides notification when the specified count is reached. |

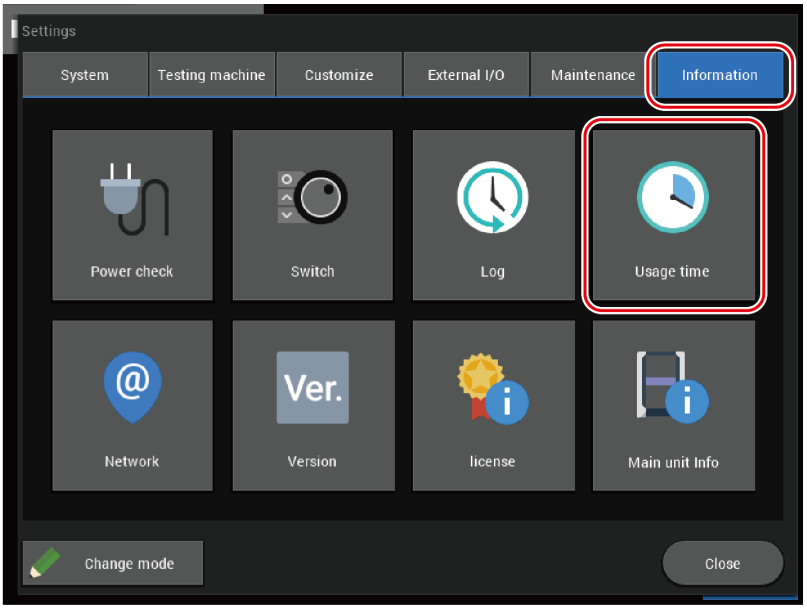
| Notification item | Description |
|---|---|
| Protection Cover Operation Count | (Only when the testing machine is equipped with the protection cover)<br>Displays the number of times that the protection cover was opened and closed. The testing machine provides notification when the specified count is reached.<br>NOTE When the Option is switched ON/OFF, the use count and limit count are reset. |
| Grip Operation Count | (Only when the testing machine is equipped with the hydraulic grips)<br>Displays the number of times of opening/closing the upper or lower chuck of the hydraulic grips, whichever was more frequently used.<br>NOTE When the Option is switched ON/OFF, the use count and limit count are reset. |
| Fan Stop | The testing machine provides notification when speed of the cooling fan incorporated in the testing machine drops to the specified value or less.<br>NOTE The servo alarm may be triggered depending on the circumstance that the testing machine is used. Contact your Shimadzu representative. |
| Filter Replacement | Displays the usage time of the filter of the cooling fan installed on the AGX-V/R controller for the AGX-V2S series and AGX-V/R controller. The testing machine provides notification when the usage time reaches the specified time. Replace the filter when notified. After replacing the filter, reset the usage time in "4.6.3 Replacing the Cooling Fan Filter (Only AGX-V2S Series)".<br>Reference For how to replace the filter, refer to "4.6.3 Replacing the Cooling Fan Filter (Only AGX-V2S Series)" P.78 |

## 4.7.2 Checking Usage Time/Counts

Take the following steps to check the current usage time/counts and the specified values for notification.

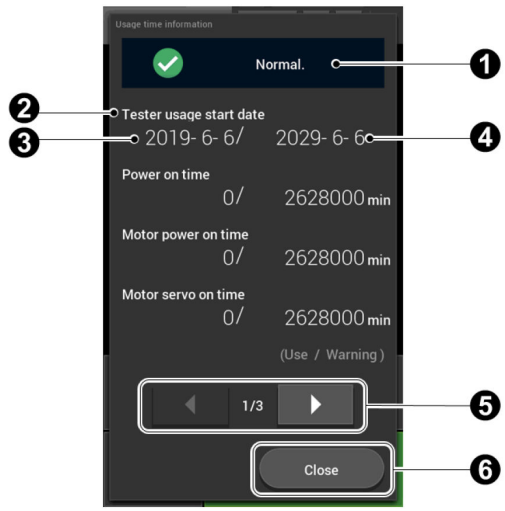
**1** **Press [Settings], and then [Usage time] in the [Info] tab on the smart controller screen.**

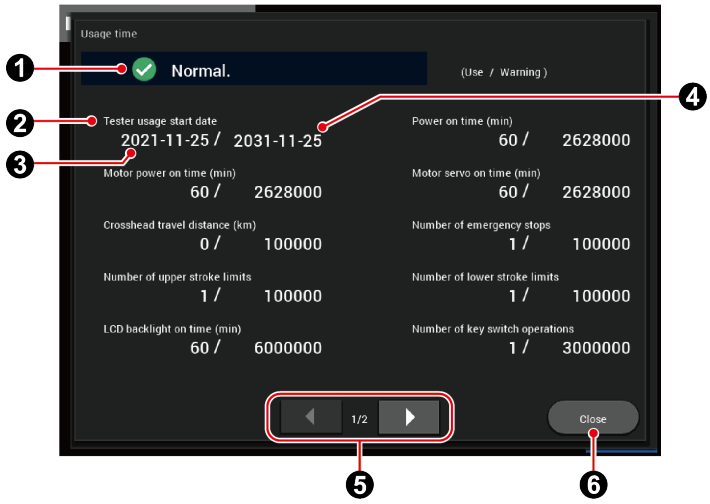



The current usage time/counts and the specified values for notification are displayed.

## 2 Use the page selector button ❺ to display the notification item to check.




| No. | Description |
|---|---|
| ❶ | Displays the current status.<br>Normal : There is no item that the specified value is reached.<br>Run an inspection. : There is at least an item that the specified value is reached. |
| ❷ | Item name for the usage time/count that triggers notification<br>▶▶ Reference "4.7.1 Notification Item" P.82 |
| ❸ | The current usage time/count<br>The figure is displayed in red if the specified value is reached. |
| ❹ | Value of the specified time/count that notification is to be provided when it is reached. "Usage Time Notification Screen" is displayed when the current usage time/count reaches this specified value. |
| ❺ | Page selector button |
| ❻ | Used to close the screen. |

# 5 Troubleshooting

## 5.1 Introduction

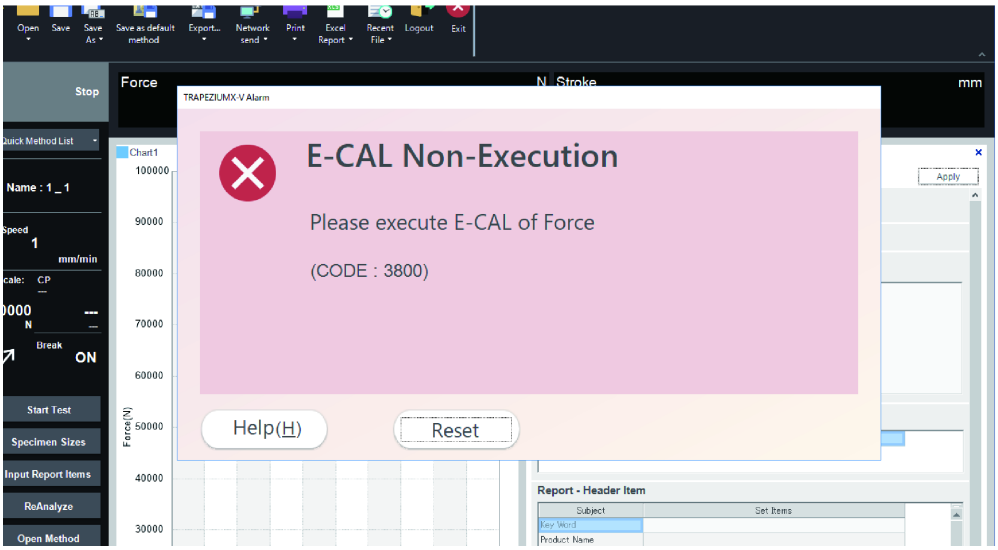
This chapter explains how to address system errors and gives examples of problems. Before deciding that your instrument has failed, consult this chapter for the content that may solve your problem.
If any abnormality other than examples in this chapter has occurred, contact Shimadzu factory, your Shimadzu representative. We do not guarantee the product performance if repairs or modifications have been performed by parties other than Shimadzu or your Shimadzu representative.

## 5.2 Alarm Display

### 5.2.1 Alarm Display

When the instrument has detected an error, an alarm message is displayed on the LCD touch panel of the smart controller and on the screen of the special software TRAPEZIUMX-V.

See an example of the special software TRAPEZIUMX-V display as below.




Alarm messages and corresponding measures are shown in the table of "5.2.2 Alarm Code List" P.87.

While an alarm is displayed, the crosshead stops and the screen cannot be changed. Read the alarm content carefully, clear the alarm display and perform the recovery measure.

> **NOTE** If a computer is connected, an error cannot be cleared from the LCD touch panel of the smart controller. Press the [Reset] button shown on the TRAPEZIUMX-V screen of the computer.

## 5.2.2 Alarm Code List

NOTE If any error code other than those listed below is displayed, hardware failure other than system errors should also be considered. Contact your Shimadzu representative.

The "#" symbol in the table represents numbers 1 to 6.

| CODE | Alarm Display | Measure |
|---|---|---|
| 1 | Initialization Error<br>CPU2 System Error<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 2 | Initialization Error<br>EEP-ROM Error (PF)<br>Restart Instrument. | |
| 3 | Initialization Error<br>Peripheral Device Error<br>Restart Instrument. | |
| 4 | Initialization Error<br>Operation Unit Unconnected<br>Restart Instrument. | • Check connection of the smart controller or operation controller.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 5 | Initialization Error<br>CPU1 Startup Error<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 6 | Initialization Error<br>CPU1 Communication Error<br>Restart Instrument. | |
| 7 | Initialization Error<br>DIP Switch Read Error (PF)<br>Restart Instrument. | |
| 8 | Initialization Error<br>Load Inconsistency Error<br>Restart Instrument. | |
| 9 | Initialization Error<br>Operation Unit Data Set<br>Restart Instrument. | |
| 10 | Initialization Error<br>Absolute Position Read<br>Restart Instrument. | |
| 11 | Initialization Error<br>Stroke Information<br>Restart Instrument. | |
| 12 | Initialization Error<br>Internal Unit Information<br>Restart Instrument. | |

| CODE | Alarm Display | Measure |
|---|---|---|
| 101 | Emergency Stop Alarm (External)<br>Check Safety and<br>Release Switch. | • Check safety in the test space and its surroundings.<br>• Release the emergency stop switch of the operation controller.<br>• Check connection of the smart controller or operation controller. |
| 102 | Emergency Stop Alarm (Internal)<br>Check Safety and<br>Release Switch. | • Check safety in the test space and its surroundings.<br>• Release the emergency stop switch of the instrument. |
| 201 | Crosshead Upper Limit<br>Check Safety and<br>Release Upper Limit Switch. | • Check safety in the test space and its surroundings.<br>• Release the crosshead upper limit of the instrument.<br>• You can also press the standby button to power the motor and lower the crosshead in the jog operation. |
| 202 | Crosshead Lower Limit<br>Check Safety and<br>Release Lower Limit Switch. | • Check safety in the test space and its surroundings.<br>• Release the crosshead lower limit of the instrument.<br>• You can also press the standby button to power the motor and raise the crosshead in the jog operation. |
| 203 | Crosshead Limit Sensor Alarm<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 210 | Crosshead Limit<br>Check Safety and Release Limit Switch. | • Check safety in the test space and its surroundings.<br>• Release the crosshead limit of the instrument. |
| 301 | System Voltage Error<br>24 V Power Supply Voltage<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 302 | System Voltage Error<br>12 V Power Supply Voltage<br>Restart Instrument. | |
| 303 | System Voltage Error<br>+15 V Power Supply Voltage<br>Restart Instrument. | |
| 304 | System Voltage Error<br>-15 V Power Supply Voltage<br>Restart Instrument. | |
| 305 | System Voltage Error<br>SV-VIN1 Input Voltage<br>Restart Instrument. | |
| 306 | System Voltage Error<br>SV-VIN2 Input Voltage<br>Restart Instrument. | |

| CODE | Alarm Display | Measure |
|---|---|---|
| 307 | System Voltage Error<br>USB-VBUS0 Input Voltage<br>Restart Instrument. | • Disconnect the devices connected to the USB connectors.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 308 | System Voltage Error<br>USB-VBUS1 Input Voltage<br>Restart Instrument. | |
| 400 | Return Execution Error<br>Perform "Position zero". | Press the position zero button of the smart controller, operation controller or the computer software. |
| 501 | Distance Between Jigs Error<br>Set initial value for Inter-jig distance. | Open the distance between jigs setting screen of the smart controller, operation controller or the computer software and register the current distance between jigs. |
| 502 | Distance Between Jigs Error<br>This is not a registered jig. | Check that the registered jig/load cell used for registration is connected. |
| 900 | Servo Off<br>The motor power is off.<br>Press the standby button. | Press the standby button to power the motor. |
| 1000 | Servo Startup Error<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 1101 | Servo Alarm<br>I/F Wiring Error (000)<br>An alarm has gone off in the servo amplifier. | |
| 1102 | Servo Alarm<br>Current Error (001)<br>An alarm has gone off in the servo amplifier. | |
| 1103 | Servo Alarm<br>Overload/Temp. Error (010)<br>An alarm has gone off in the servo amplifier. | |
| 1104 | Servo Alarm<br>Power Supply Error (011)<br>An alarm has gone off in the servo amplifier. | • Check that the power supply voltage to the instrument is within ±10 % of the rated value.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |

| CODE | Alarm Display | Measure |
|---|---|---|
| 1105 | Servo Alarm<br>Motor Encoder Wiring (100)<br>An alarm has gone off in the servo amplifier. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 1106 | Servo Alarm<br>Motor Encoder Error (101)<br>An alarm has gone off in the servo amplifier. | |
| 1107 | Servo Alarm<br>Overspeed/Deviation (110)<br>An alarm has gone off in the servo amplifier. | |
| 1108 | Servo Alarm<br>Memory Error (111)<br>An alarm has gone off in the servo amplifier. | |
| 1109 | Servo Alarm<br>SET Error<br>An alarm has gone off in the servo amplifier. | |
| 1110 | Servo Alarm<br>Power On Permission Error<br>An alarm has gone off in the servo amplifier. | |
| 1111 | Servo Alarm<br>Servo On Error<br>An alarm has gone off in the servo amplifier. | |
| 1200 | Computer Connection Error<br>After Checking LAN Cable<br>Restart Instrument. | • Check connection of the communication cable between the instrument and computer and connection of the communication path (e.g., relay).<br>• Exit the computer software and then start it again.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 1300 | USB Drive Error<br>Check Connection of<br>USB Drive. | • Disconnect the USB drive connected to the USB connector and connect it again.<br>• Check that you are using a (validated) USB drive specified by us.<br>• Check that the USB drive has been formatted to FAT16/FAT32. |
| 1401 | Interlock Alarm<br>Check Safety and<br>Clear Interlock. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |

| CODE | Alarm Display | Measure |
|---|---|---|
| 1402 | Interlock Alarm<br>Close Protection cover. | • Close the protection cover. |
| 1403 | Interlock Alarm<br>Open and Close Protection cover. | • Open and close the protection cover.<br>• To perform the next test in succession, open the protection cover and close it again. |
| 2000 | Overrating Alarm<br>Sensor Name (TD#)<br>Exceeded Rated Value. | • Check safety in the test space and its surroundings.<br>• Recover the sensor from the overload. |
| 2100 | Underrating Alarm<br>Sensor Name (TD#)<br>Exceeded Rated Value. | |
| 2200 | Software Limit Alarm<br>Sensor Name (TD#)<br>Reached Limit Value. | |
| 2300 | Automatic Control Alarm<br>Controllable speed of Sensor Name (TD#) exceeded. | • The speed of the instrument has reached the limit value.<br>• Check that the test condition is correct.<br>• Lower the stress or strain increasing rate. |
| 2351 | Automatic Control Alarm<br>Control calculation is not in time. | • Check the test conditions.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |
| 2352 | Automatic Control Alarm<br>Control parameter out of range. | • Check the test conditions.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |
| 2400 | Contact Detect Alarm<br>Force Changed and Safety Function Was Activated. | • Check safety in the test space and its surroundings.<br>• Press the standby button to power the motor. |
| 3000 | CAL Connector Read Error<br>Check the CAL connector of Sensor Name (TD#). | • Disconnect the CAL connector connected to the displayed sensor (TD#) and connect it again.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 3100 | CAL Connector Write Error<br>Check the CAL connector of Sensor Name (TD#). | |
| 3200 | Auto Zero Error<br>Check the measured value of Sensor Name (TD#). | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |

| CODE | Alarm Display | Measure |
|---|---|---|
| 3300 | F-CAL Execution Error<br>Check the reference sensor<br>Sensor Name (TD#) and polarity of the sensor. | • Check that the correct CAL connector is connected to the displayed sensor (TD#).<br>• Disconnect the CAL connector connected to the displayed sensor (TD#) and connect it again.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 3401 | E-CAL Data Creation Error<br>Auto Zero Failed.<br>Try Again. | |
| 3402 | E-CAL Data Creation Error<br>E-CAL Signal Error.<br>Try Again. | |
| 3404 | E-CAL Data Creation Error<br>Outside Adjustable Range.<br>Try Again. | |
| 3405 | E-CAL Data Creation Error<br>Adjustment Was Aborted.<br>Try Again. | |
| 3406 | E-CAL Data Creation Error<br>Calibration Failed.<br>Try Again. | |
| 3407 | E-CAL Data Creation Error<br>System Error | |
| 3501 | E-CAL Execution Error<br>Auto Zero Failed.<br>Try Again. | • Check that the correct CAL connector is connected to the displayed sensor (TD#).<br>• Check that the CAL connector connected to the displayed sensor (TD#) was calibrated (went through F-CAL).<br>• Disconnect the CAL connector connected to the displayed sensor (TD#) and connect it again.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 3502 | E-CAL Execution Error<br>E-CAL Signal Error.<br>Try Again. | |
| 3503 | E-CAL Execution Error<br>E-CAL Data Error.<br>Try Again. | |
| 3504 | E-CAL Execution Error<br>Outside Adjustable Range.<br>Try Again. | |
| 3505 | E-CAL Execution Error<br>Adjustment Was Aborted.<br>Try Again. | |
| 3506 | E-CAL Execution Error<br>Calibration Failed.<br>Try Again. | |
| 3507 | E-CAL Execution Error<br>System Error | |
| 3600 | Linearize Error<br>The calculation results were not appropriate.<br>Try Again. | |
| 3700 | Calibration Error<br>Check Signal of<br>Sensor Name (TD#). | |

| CODE | Alarm Display | Measure |
|---|---|---|
| 3800 | E-CAL Inexecution Alarm<br>Execute E-CAL. | Execute E-CAL of the test force sensor. |
| 4001 | Communication FPGA Error<br>Abnormal Chip Temp.Increase<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 4002 | Communication FPGA Error<br>Inner Core Power Supply<br>Restart Instrument. | |
| 4003 | Communication FPGA Error<br>Inner Circuit Power Supply<br>Restart Instrument. | |
| 4004 | Communication FPGA Error<br>Block RAM Power Supply<br>Restart Instrument. | |
| 4006 | Communication FPGA Error<br>Outside Specifications<br>Restart Instrument. | |
| 4101 | Measurement FPGA Error<br>Abnormal Chip Temp.Increase<br>Restart Instrument. | |
| 4102 | Measurement FPGA Error<br>Inner Core Power Supply<br>Restart Instrument. | |
| 4103 | Measurement FPGA Error<br>Inner Circuit Power Supply<br>Restart Instrument. | |
| 4104 | Measurement FPGA Error<br>Block RAM Power Supply<br>Restart Instrument. | |
| 4106 | Measurement FPGA Error<br>Outside Specifications<br>Restart Instrument. | |
| 4201 | Control FPGA Error<br>Abnormal Chip Temp.Increase<br>Restart Instrument. | |
| 4202 | Control FPGA Error<br>Inner Core Power Supply<br>Restart Instrument. | |
| 4203 | Control FPGA Error<br>Inner Circuit Power Supply<br>Restart Instrument. | |
| 4204 | Control FPGA Error<br>Block RAM Power Supply<br>Restart Instrument. | |
| 4205 | Control FPGA Error<br>PIO Port Error<br>Restart Instrument. | |

| CODE | Alarm Display | Measure |
|---|---|---|
| 4206 | Control FPGA Error<br>Outside Specifications<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |

| CODE | Alarm Display | Measure |
|---|---|---|
| 4501 | Operation Unit 1 Alarm<br>Power Supply Voltage Error<br>Restart Instrument. | • Check connection of the smart controller or operation controller.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 4502 | Operation Unit 1 Alarm<br>Electronic Fuse Error<br>Restart Instrument. | |
| 4503 | Operation Unit 1 Alarm<br>Communication Framing Error<br>Restart Instrument. | |
| 4504 | Operation Unit 1 Alarm<br>Communication CRC Error<br>Restart Instrument. | |
| 4505 | Operation Unit 1 Alarm<br>Check Connection Cable of Operation Unit. | |
| 4506 | Operation Unit 1 Alarm<br>Abnormal Chip Temp.Increase | |
| 4507 | Operation Unit 1 Alarm<br>Inner Core Power Supply | |
| 4508 | Operation Unit 1 Alarm<br>Inner Circuit Power Supply | |
| 4509 | Operation Unit 1 Alarm<br>Block RAM Power Supply | |
| 4510 | Operation Unit 1 Alarm<br>Platform Communication Error | |
| 4511 | Operation Unit 1 Alarm<br>Operation Switch Connection Error | |
| 4512 | Operation Unit 1 Alarm<br>Send FIFO Overflow | |
| 4513 | Operation Unit 1 Alarm<br>Recieve FIFO Overflow | |
| 4601 | Operation Unit 2 Alarm<br>Power Supply Voltage Error<br>Restart Instrument. | |
| 4602 | Operation Unit 2 Alarm<br>Electronic Fuse Error<br>Restart Instrument. | |
| 4603 | Operation Unit 2 Alarm<br>Communication Framing Error<br>Restart Instrument. | |
| 4604 | Operation Unit 2 Alarm<br>Communication CRC Error<br>Restart Instrument. | |
| 4605 | Operation Unit 2 Alarm<br>Check Connection Cable of Operation Unit. | |
| 4606 | Operation Unit 2 Alarm<br>Abnormal Chip Temp.Increase | |

| CODE | Alarm Display | Measure |
|---|---|---|
| 4607 | Operation Unit 2 Alarm<br>Inner Core Power Supply | • Check connection of the smart controller or operation controller.<br>• Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 4608 | Operation Unit 2 Alarm<br>Inner Circuit Power Supply | |
| 4609 | Operation Unit 2 Alarm<br>Block RAM Power Supply | |
| 4610 | Operation Unit 2 Alarm<br>Platform Communication Error | |
| 4611 | Operation Unit 2 Alarm<br>Operation Switch Connection Error | |
| 4612 | Operation Unit 2 Alarm<br>Send FIFO Overflow | |
| 4613 | Operation Unit 2 Alarm<br>Recieve FIFO Overflow | |
| 4701 | Operation Unit 3 Alarm<br>Power Supply Voltage Error<br>Restart Instrument. | |
| 4702 | Operation Unit 3 Alarm<br>Electronic Fuse Error<br>Restart Instrument. | |
| 4703 | Operation Unit 3 Alarm<br>Communication Framing Error<br>Restart Instrument. | |
| 4704 | Operation Unit 3 Alarm<br>Communication CRC Error<br>Restart Instrument. | |
| 4705 | Operation Unit 3 Alarm<br>Check Connection Cable of<br>Operation Unit. | |
| 4706 | Operation Unit 3 Alarm<br>Abnormal Chip Temp.Increase | |
| 4707 | Operation Unit 3 Alarm<br>Inner Core Power Supply | |
| 4708 | Operation Unit 3 Alarm<br>Inner Circuit Power Supply | |
| 4709 | Operation Unit 3 Alarm<br>Block RAM Power Supply | |
| 4710 | Operation Unit 3 Alarm<br>Platform Communication Error | |
| 4711 | Operation Unit 3 Alarm<br>Operation Switch Connection Error | |
| 4712 | Operation Unit 3 Alarm<br>Send FIFO Overflow | |
| 4713 | Operation Unit 3 Alarm<br>Recieve FIFO Overflow | |

| CODE | Alarm Display | Measure |
|---|---|---|
| 5101 | Hydraulic Power Unit Alarm<br>Hydraulic Power Unit Is OFF. | • Turn on the hydraulic power unit.<br>• If the alarm still persists after the power is turned on, contact your Shimadzu representative. |
| 5102 | Hydraulic Power Unit Alarm<br>Oil Level Error<br>Check Hydraulic Power Unit. | • Check the oil level.<br>• If the oil level is low, add hydraulic oil.<br>• If the alarm still persists even if the oil level is higher than the reference value, contact your Shimadzu representative. |
| 5103 | Hydraulic Power Unit Alarm<br>Oil Temperature Error<br>Check Hydraulic Power Unit. | • Do not touch the hydraulic power unit immediately after the alarm occurred.<br>• Stop the hydraulic power unit and leave it for two hours or more.<br>• If the alarm still persists after the temperature of the hydraulic power unit has decreased, contact your Shimadzu representative.<br>• If the oil temperature error occurs frequently, change the use frequency or use a cooling device. |
| 5104 | Hydraulic Power Unit Alarm<br>Thermal Error<br>Check Hydraulic Power Unit. | Overload has occurred in the motor. Contact your Shimadzu representative. |
| 5201 | Voice Ctrl. Alarm<br>Cannot set correctly. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 5202 | Voice Ctrl. Alarm<br>An error has occurred. | |
| 6001 | Parameter Error (1)<br>Test Speed Setting Is Outside Range.<br>Check Speed Setting. | • Check the test conditions.<br>• Check that the test speed setting satisfies the specifications of the instrument.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |

| CODE | Alarm Display | Measure |
|---|---|---|
| 6002 | Parameter Error (1)<br>Maximum Point Setting Is Outside Range.<br>Check Maximum Point. | • Check the test conditions.<br>• Check the maximum point setting is within the effective range.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |
| 6003 | Parameter Error (1)<br>Minimum Point Setting Is Outside Range.<br>Check Minimum Point. | • Check the test conditions.<br>• Check the minimum point setting is within the effective range.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |
| 6004 | Parameter Error (1)<br>Stroke Speed Is Outside Control Range. | • Check the test conditions.<br>• When stress or strain control is performed, check that the stress or strain increasing rate is within the effective range.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |
| 6101 | Parameter Error (2)<br>Test Speed 1 Is Outside Range.<br>Check Speed 1. | • Check the test conditions.<br>• Check that the test speed setting satisfies the specifications of the instrument.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |
| 6102 | Parameter Error (2)<br>Test Speed 2 Is Outside Range.<br>Check Speed 2. | |
| 6103 | Parameter Error (2)<br>Test Speed 3 Is Outside Range.<br>Check Speed 3. | |
| 6104 | Parameter Error (2)<br>Stroke Speed Is Outside Control Range. | • Check the test conditions.<br>• When stress or strain control is performed, check that the stress or strain increasing rate is within the effective range.<br>• Check that the current configuration including the connected sensors is appropriate for the desired test. |

| CODE | Alarm Display | Measure |
|---|---|---|
| 7001 | EEP-ROM (PF) Error<br>EEP-ROM Init. Error<br>Restart Instrument. | • Turn off and on the instrument.<br>• If the error still persists after the power is turned off and on, contact your Shimadzu representative. |
| 7002 | EEP-ROM (PF) Error<br>EEP-ROM Write Error<br>Restart Instrument. | |
| 7003 | EEP-ROM (PF) Error<br>EEP-ROM Read Error<br>Restart Instrument. | |
| 7101 | EEP-ROM (U1) Error<br>EEP-ROM Init. Error<br>Restart Instrument. | |
| 7102 | EEP-ROM (U1) Error<br>EEP-ROM Write Error<br>Restart Instrument. | |
| 7103 | EEP-ROM (U1) Error<br>EEP-ROM Read Error<br>Restart Instrument. | |
| 7201 | EEP-ROM (U2) Error<br>EEP-ROM Init. Error<br>Restart Instrument. | |
| 7202 | EEP-ROM (U2) Error<br>EEP-ROM Write Error<br>Restart Instrument. | |
| 7203 | EEP-ROM (U2) Error<br>EEP-ROM Read Error<br>Restart Instrument. | |
| 7301 | EEP-ROM (U3) Error<br>EEP-ROM Init. Error<br>Restart Instrument. | |
| 7302 | EEP-ROM (U3) Error<br>EEP-ROM Write Error<br>Restart Instrument. | |
| 7303 | EEP-ROM (U3) Error<br>EEP-ROM Read Error<br>Restart Instrument. | |
| 9000 | Battery Error<br>Clock's Battery Voltage<br>Is Low.<br>Replace Battery. | |
| 9100 | Load Frame Setting Error<br>Load Frame Cannot Be Recognized.<br>Restart Instrument. | |
| 9900 | System Error<br>Undefined Error<br>Restart Instrument. | |

# 5.3 Other Problems

Problems without alarms and their measures are shown as below.

## 5.3.1 Problems About Power Supply

| Problem | Measure |
|---|---|
| The instrument does not turn on. | Check that the breaker of the distribution board is on. Check that the power supply cable is not loose. |
| The leakage breaker of the instrument is activated. | There may be leakage inside the instrument. Immediately stop using the instrument and contact your Shimadzu representative. |
| The leakage breaker of the distribution board is activated. | There may be leakage inside the instrument. Immediately stop using the instrument and contact your Shimadzu representative. |

## 5.3.2 Problems About Servo Motor

| Problem | Measure |
|---|---|
| The motor does not operate. | Check that the emergency stop switch is not active. Check that the crosshead limit switches are not active. The motor does not operate while the instrument is starting up. Wait until the startup is completed. |
| A servo error occurs during a test. | Overload may have occurred in the motor. Check whether the instrument is used within the working limits. (Max. ten hours continuous operation, max. 1,000 repeat count, and max. three repeat cycles per minute). |
| A servo error occurs during movement in the jog operation. | Overload may have occurred in the motor. Check that no foreign matter is caught between the crosshead and table. Check that no foreign matter is winding around the ball screw. |

### 5.3.3 Problems About Operating Panel

| Problem | Measure |
|---|---|
| Some keys do not accept input. | Active keys are limited during a test or when a computer is connected. Try again after a test ends or when a computer is not connected. When a computer is connected, an error cannot be cleared from the instrument. Clear it from the computer. |
| No key input is accepted. | No key input is accepted while the instrument is starting up. Wait until the startup is completed. |
| The test force display is "- - - -". | The load cell is not recognized. Turn off the power, check that the calibration cable is connected appropriately, and turn on the power again.<br>If the type of display is "peak value" or "break point value", the value is displayed only after a test ends. |

### 5.3.4 Problems About Options

| Problem | Measure |
|---|---|
| An optional device does not operate. | Check that presence of the optional device has been registered correctly. Some types of optional devices require restart of the instrument. Turn off the instrument, wait ten seconds or more, and turn on the instrument again. |

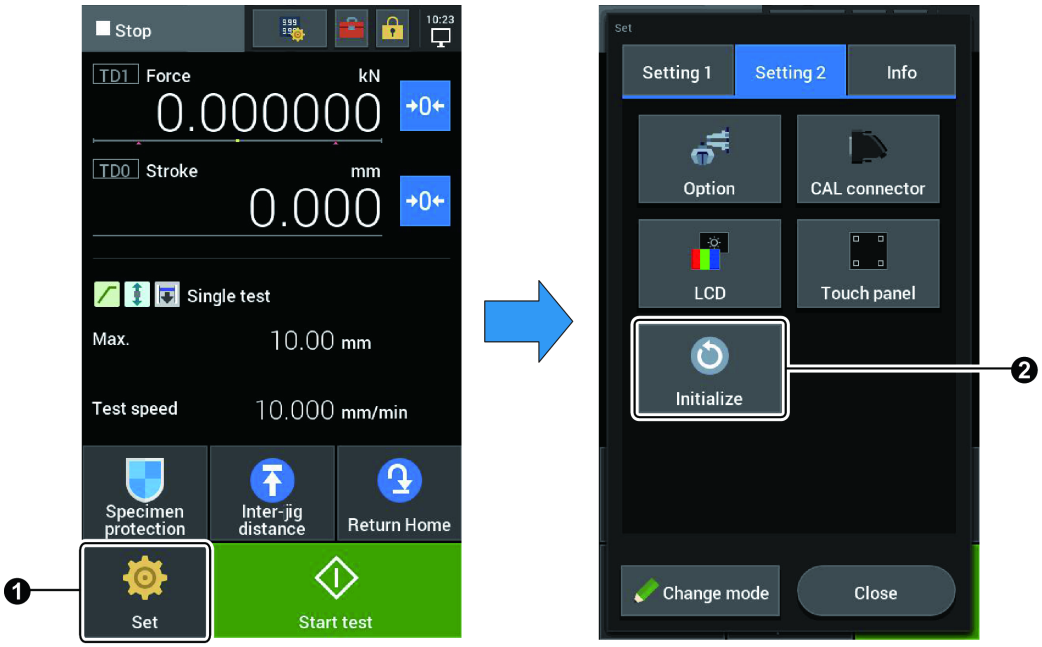
**⚠ CAUTION**

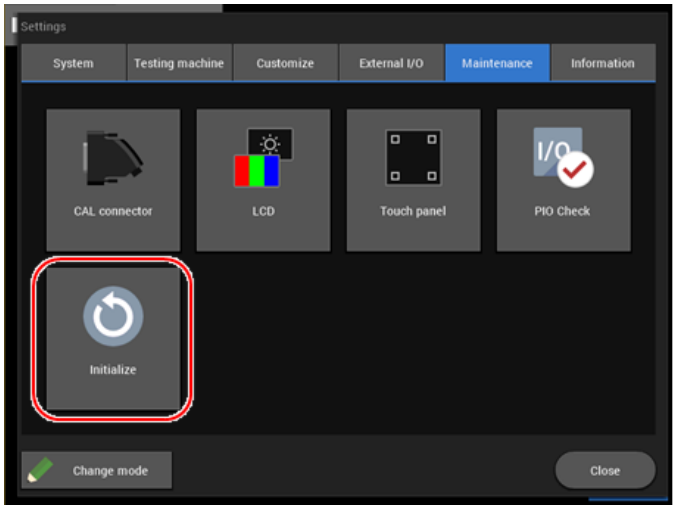

**If the instrument emits abnormal odor or noise, immediately stop using the instrument, press the emergency stop switch, and disconnect the power supply cable.**

# 5.4 System Reset

You can return the instrument settings to the factory default when you need to reset the system parameters to the initial values collectively or when incorrect parameter modification has disabled the instrument operation.

To return the settings to the factory default, open the setting screen by pressing [Set] ❶ on the main screen of the smart controller and press [Initialize] ❷ in the [Setting 2] tab.





**NOTE**

- After initialization, the crosshead position is reset and the test conditions and system settings are all initialized. Be sure to set them again.
- Initialization does not clear the load cell information stored in the CAL connector.

# 6 Maintenance Parts and Consumables

## 6.1 Maintenance Parts

### ■ AGX-V/R controller

| Part Name | Part No. | Qty | Remarks |
|---|---|---|---|
| Cooling Fan Filter*1 | S042-60906-56 | 5 | A replacement resin filter for the cooling fan. |

*1 The cooling fan on the tester expels air and does not use a filter.

## 6.2 Consumables

### ■ Protective Items

| Part Name | Part No. | Qty | Remarks |
|---|---|---|---|
| Protective Glasses*1 | S086-78105-32 | 1 | Wear these when operating the tester. |
| | S086-78103-01 | | |
| Protective Gloves*2 | S086-78970-11 | 10 | Wear these when replacing jigs, installing or removing the specimen. |

*1 Do not use any damaged protective glasses.

*2 Do not use any damaged protective gloves.

### ■ Testing Machine

| Part Name | Part No. | Qty | Remarks |
|---|---|---|---|
| Grease (for ball screws)*1 | S339-89306-21 | 1 | Alvania EP2 cartridge, 400 cc |
| Grease (for guide poles) | S017-27014-05 | 1 | Moly LG Grease #2, 400 g |

*1 Grease gun CH400 (P/N: S339-89108-01) is required for greasing.

# 7 References

## 7.1 Basic Specifications

### 7.1.1 Standard Model

■ **Table-top type**

| Model No. | | | AGX-10kNV2D | AGX-20kNV2D | AGX-50kNV2D |
|---|---|---|---|---|---|
| Maximum Capacity | | | 10 kN | 20 kN | 50 kN |
| Testing Speed Range | | | 0.0005 to 3000 mm/min | 0.0005 to 1500 mm/min | |
| Testing Speed Precision*1 | | | ±0.1 % | | |
| Return Speed | | | 0.0005 to 3000 mm/min | 0.0005 to 2000 mm/min | |
| Crosshead Speed and Acceptable Test Force [For all testing speeds] | | | 10 kN | 20 kN | 50 kN |
| Frame Stiffness | | | 60 kN/mm or more | 180 kN/mm or more | |
| Stroke Control Resolution | | | 12.5 nm | 8.33 nm | |
| Effective Specimen Width | | | 420 mm | 500 mm | |
| Crosshead-Table Distance | Standard | | 180 to 1150 mm | 200 to 1150 mm | |
| | 250 mm Extension | | 180 to 1375 mm | 200 to 1375 mm | |
| | 500 mm Extension | | 180 to 1600 mm | 200 to 1600 mm | |
| Dimensions Width × Depth × Height | Standard | | 798×515×1582 mm | 975×579×1708 mm | |
| | 250 mm Extension | | 798×515×1832 mm | 975×579×1958 mm | |
| | 500 mm Extension | | 798×515×2082 mm | 975×579×2208 mm | |
| Mass | Standard | 100 V | 210 kg | - | |
| | | 200 V | 210 kg | 410 kg | |
| | 250 mm Extension | 100 V | 230 kg | - | |
| | | 200 V | 220 kg | 420 kg | |
| | 500 mm Extension | 100 V | 240 kg | - | |
| | | 200 V | 230 kg | 440 kg | |
| Power Requirements*2 | 100 V model | | 1.5 kVA | - | |
| | 200 V model | | 2.0 kVA | 5.5 kVA | |
| Breaker Capacity*3 | 100 V model | | 15 A | - | |
| | 200 V model | | 10 A | 30 A | |

| Model No. | AGX-10kNV2D | AGX-20kNV2D | AGX-50kNV2D |
|---|---|---|---|
| Short Circuit Rating (Icu/Ics) | 2.5 kA/1.0 kA | | |
| Short-Circuit Current Rating | 1.5 kA | | |
| Protective Conductor Current*4 | 0～5 mA | | |
| Ground | Type-D*5 | | |
| Noise*6 | 65 dB(A) | | |

*1 Test speed precision is calculated from the travel amount within a prescribed time at a constant speed from 0.5 mm/min to 500 mm/min.

*2 100 V model: Single phase 100 V to 115 V, 200 V model: Single phase 200 V to 230 V. Separately prepare a power supply for a computer.

*3 Prepare an inverter-compatible (medium-speed) breaker.

*4 The value varies depending on the operation status. The value indicates the current of the fundamental component in a TT grounded system, S-phase grounding.

*5 Type-D: 100 Ω or less grounding resistance.

*6 Measured 1 m away from the front of the machine.

## ■ Floor type

| Model No. | | AGX-20kNV2 | AGX-50kNV2 | AGX-100kNV2 | AGX-300kNV2 | AGX-600kNV2 |
|---|---|---|---|---|---|---|
| Maximum Capacity | | 20 kN | 50 kN | 100 kN | 300 kN | 600 kN |
| Testing Speed Range | | 0.00005 to 1500 mm/min | | | 0.00005 to 720 mm/min | 0.00005 to 540 mm/min |
| Testing Speed Precision*1 | | ±0.1 % | | | | |
| Return Speed | | 0.00005 to 2000 mm/min | | 0.00005 to 1800 mm/min | 0.00005 to 720 mm/min | 0.00005 to 540 mm/min |
| Crosshead Speed and Acceptable Test Force [For all testing speeds] | | 20 kN | 50 kN | 100 kN | 300 kN | 600 kN |
| Frame Stiffness | | 180 kN/mm or more | | 300 kN/mm or more | 400 kN/mm or more | 700 kN/mm or more |
| Stroke Control Resolution | | 8.33 nm | | | 3.33 nm | 2.50 nm |
| Effective Specimen Width | | 600 mm | | | | 790 mm |
| Crosshead -Table Distance | Standard | 215 to 1265 mm | | 215 to 1250 mm | 215 to 1440 mm | 215 to 1650 mm |
| | 250 mm Extension | 215 to 1490 mm | | 215 to 1475 mm | 215 to 1665 mm | 215 to 1875 mm |
| | 500 mm Extension | 215 to 1715 mm | | 215 to 1700 mm | 215 to 1890 mm | 215 to 2100 mm |
| | 750 mm Extension | 215 to 1940 mm | | 215 to 1925 mm | 215 to 2115 mm | 215 to 2325 mm |

| Model No. | | | AGX-20kNV2 | AGX-50kNV2 | AGX-100kNV2 | AGX-300kNV2 | AGX-600kNV2 |
|---|---|---|---|---|---|---|---|
| Dimensions Width × Depth × Height | Standard | | 1206×765×2170 mm | | | 1206×765×2420 mm | 1605×1122×2837 mm |
| | 250 mm Extension | | 1206×765×2420 mm | | | 1206×765×2670 mm | 1605×1122×3087 mm |
| | 500 mm Extension | | 1206×765×2670 mm | | | 1206×765×2920 mm | 1605×1122×3337 mm |
| | 750 mm Extension | | 1206×765×2920 mm | | | 1206×765×3170 mm | 1605×1122×3587 mm |
| Mass | Standard | 200 V | 640 kg | | 780 kg | 950 kg | 2960 kg |
| | | 400 V | 650 kg | | 790 kg | 970 kg | - |
| | 250 mm Extension | 200 V | 660 kg | | 810 kg | 980 kg | 3020 kg |
| | | 400 V | 670 kg | | 810 kg | 990 kg | - |
| | 500 mm Extension | 200 V | 680 kg | | 830 kg | 1000 kg | 3070 kg |
| | | 400 V | 680 kg | | 840 kg | 1020 kg | - |
| | 750 mm Extension | 200 V | 690 kg | | 850 kg | 1030 kg | 3130 kg |
| | | 400 V | 700 kg | | 860 kg | 1050 kg | - |
| Power Requirements*2 | 200 V model | | 4.5 kVA | | 6.5 kVA | 7.5 kVA | 13.0 kVA |
| | 400 V model | | 4.0 kVA | | 5.0 kVA | 6.5 kVA | - |
| Breaker Capacity*3 | 200 V model | | 15 A | | 20 A | 30 A | 40 A |
| | 400 V model | | 10 A | | 10 A | 15 A | - |
| Short Circuit Rating (Icu/Ics) | | | 2.5 kA/2.0 kA | | | | 7.5 k A/7.5kA |
| Short-Circuit Current Rating | | | 1.5 kA | | | | |
| Protective Conductor Current*4 | | | 0～5 mA | | | | |
| Ground | 200 V model | | Type-D*5 | | | | |
| | 400 V model | | Type-C*4 | | | | - |
| Noise*6 | | | 65 dB(A) | | | 70 dB(A) | 75 dB(A) |

*1 Test speed precision is calculated from the travel amount within a prescribed time at a constant speed from 0.5 mm/min to 500 mm/min.

*2 200 V model: 3 phase 200 V to 230 V, 400 V model: 3 phase 380 V to 440 V. Separately prepare a power supply for a computer.

*3 Prepare an inverter-compatible (medium-speed) breaker.

*4 The value varies depending on the operation status. The value indicates the current of the fundamental component in a TT grounded system, S-phase grounding.

*5 Type-D: 100 Ω or less grounding resistance. Type-C: 100 C or less grounding resistance.

*6 Measured 1 m away from the front of the machine.

## 7.1.2 Reinforced Yoke Model

### ■ Table-top type

| Model No. | | | AGX-10kNV2D RY | AGX-20kNV2D RY | AGX-50kNV2D RY |
|---|---|---|---|---|---|
| Maximum Capacity | | | 10 kN | 20 kN | 50 kN |
| Testing Speed Range | | | 0.0005 to 3000 mm/min | 0.0005 to 1500 mm/min | |
| Testing Speed Precision*1 | | | ±0.1 % | | |
| Return Speed | | | 0.0005 to 3000 mm/min | 0.0005 to 2000 mm/min | |
| Crosshead Speed and Acceptable Test Force [For all testing speeds] | | | 10 kN | 20 kN | 50 kN |
| Frame Stiffness | | | 60 kN/mm or more | 180 kN/mm or more | |
| Stroke Control Resolution | | | 12.5 nm | 8.33 nm | |
| Effective Specimen Width | | | 420 mm | 500 mm | |
| Yoke-Crosshead Distance | Standard | | 100 to 1100 mm | 150 to 1000 mm | |
| | 250 mm Extension | | 100 to 1325 mm | 150 to 1225 mm | |
| Dimensions Width × Depth × Height | Standard | | 798×515×1606 mm | 975×579×1763 mm | |
| | 250 mm Extension | | 798×515×1856 mm | 975×579×2013 mm | |
| Mass | Standard | 100 V | 230 kg | - | |
| | | 200 V | 220 kg | 480 kg | |
| | 250 mm Extension | 100 V | 240 kg | - | |
| | | 200 V | 230 kg | 495 kg | |
| Power Requirements*2 | 100 V model | | 1.5 kVA | - | |
| | 200 V model | | 2.0 kVA | 5.5 kVA | |
| Breaker Capacity*3 | 100 V model | | 15 A | - | |
| | 200 V model | | 10 A | 30 A | |
| Short Circuit Rating (Icu/Ics) | | | 2.5 kA/1.0 kA | | |
| Short-Circuit Current Rating | | | 1.5 kA | | |
| Protective Conductor Current*4 | | | 0～5 mA | | |
| Ground | | | Type-D*5 | | |
| Noise*6 | | | 65 dB(A) | | |

*1 Test speed precision is calculated from the travel amount within a prescribed time at a constant speed from 0.5 mm/min to 500 mm/min.

*2 200 V model: 3 phase 200 V to 230 V, 400 V model: 3 phase 380 V to 440 V. Separately prepare a power supply for a computer.

*3 Prepare an inverter-compatible (medium-speed) breaker.

*4 The value varies depending on the operation status. The value indicates the current of the fundamental component in a TT grounded system, S-phase grounding.

*5 Type-D: 100 Ω or less grounding resistance. Type-C: 100 C or less grounding resistance.

*6 Measured 1 m away from the front of the machine.

## 7.1.3 Wide Model (W1000)

### ■ Table-top type

| Model No. | | | AGX-10kNV2D W1000 |
|---|---|---|---|
| Maximum Capacity | | | 10 kN |
| Testing Speed Range | | | 0.0005 to 3000 mm/min |
| Testing Speed Precision*1 | | | ±0.1 % |
| Return Speed | | | 0.0005 to 3000 mm/min |
| Crosshead Speed and Acceptable Test Force [For all testing speeds] | | | 10 kN |
| Frame Stiffness | | | - |
| Stroke Control Resolution | | | 12.5 nm |
| Effective Specimen Width | | | 1000 mm |
| Crosshead-Table Distance | Standard | | 180 to 1125 mm |
| Dimensions Width × Depth × Height | Standard | | 1377×504×1582 mm |
| Mass | Standard | 100 V | 350 kg |
| | | 200 V | 340 kg |
| Power Requirements*2 | 100 V model | | 1.5 kVA |
| | 200 V model | | 2.0 kVA |
| Breaker Capacity*3 | 100 V model | | 15 A |
| | 200 V model | | 10 A |
| Short Circuit Rating (Icu/Ics) | | | 2.5 kA/1.0 kA |
| Short-Circuit Current Rating | | | 1.5 kA |
| Protective Conductor Current*4 | | | 0～5 mA |
| Ground | | | Type-D*5 |
| Noise*6 | | | 65 dB(A) |

*1 Test speed precision is calculated from the travel amount within a prescribed time at a constant speed from 0.5 mm/min to 500 mm/min.

*2 200 V model: 3 phase 200 V to 230 V, 400 V model: 3 phase 380 V to 440 V. Separately prepare a power supply for a computer.

*3 Prepare an inverter-compatible (medium-speed) breaker.

*4 The value varies depending on the operation status. The value indicates the current of the fundamental component in a TT grounded system, S-phase grounding.

*5 Type-D: 100 Ω or less grounding resistance. Type-C: 100 C or less grounding resistance.

*6 Measured 1 m away from the front of the machine.

## ■ Floor type

| Model No. | | | AGX-50kNV2 W1000 | AGX-100kNV2 W1000 | AGX-300kNV2 W1000 |
|---|---|---|---|---|---|
| Maximum Capacity | | | 50 kN | 100 kN | 300 kN |
| Testing Speed Range | | | 0.0005 to 1500 mm/min | | 0.0005 to 720 mm/min |
| Testing Speed Precision*1 | | | ±0.1 % | | |
| Return Speed | | | 0.0005 to 2000 mm/min | 0.0005 to 1800 mm/min | 0.0005 to 720 mm/min |
| Crosshead Speed and Acceptable Test Force [For all testing speeds] | | | 50 kN | 100 kN | 300 kN |
| Stroke Control Resolution | | | 8.33 nm | | 3.33 nm |
| Effective Specimen Width | | | 1000 mm | | |
| Crosshead-Table Distance | Standard | | 255 to 1170 mm | 255 to 1170 mm | 255 to 1350 mm |
| Dimensions Width × Depth × Height | Standard | | 1606×765× 2170 mm | 1606×765× 2170 mm | 1606×765× 2420 mm |
| Mass | Standard | 100 V | 1150 kg | 1200 kg | 1470 kg |
| | | 200 V | 1200 kg | 1210 kg | 1490 kg |
| Power Requirements*2 | 200 V model | | 4.5 kVA | 6.5 kVA | 7.5 kVA |
| | 400 V model | | 4.0 kVA | 5.0 kVA | 6.5 kVA |
| Breaker Capacity*3 | 200 V model | | 15 A | 20 A | 30 A |
| | 400 V model | | 10 A | 10 A | 15 A |
| Short Circuit Rating (Icu/Ics) | | | 2.5 kA/2.0 kA | | |
| Short-Circuit Current Rating | | | 1.5 kA | | |
| Protective Conductor Current*4 | | | 0～5 mA | | |
| Ground | 200 V model | | Type-D*5 | | |
| | 400 V model | | Type-C*5 | | |
| Noise*6 | | | 65 dB(A) | | 70 dB(A) |

*1 Test speed precision is calculated from the travel amount within a prescribed time at a constant speed from 0.5 mm/min to 500 mm/min.

*2 200 V model: 3 phase 200 V to 230 V, 400 V model: 3 phase 380 V to 440 V. Separately prepare a power supply for a computer.

*3 Prepare an inverter-compatible (medium-speed) breaker.

*4 The value varies depending on the operation status. The value indicates the current of the fundamental component in a TT grounded system, S-phase grounding.

*5 Type-D: 100 Ω or less grounding resistance. Type-C: 100 C or less grounding resistance.

*6 Measured 1 m away from the front of the machine.

## 7.1.4 Separately Installed Controller Model

### ■ Main unit

| Model No. | | AGX-20kNV2S | AGX-50kNV2S | AGX-100kNV2S | AGX-300kNV2S | AGX-600kNV2S |
|---|---|---|---|---|---|---|
| Maximum Capacity | | 20 kN | 50 kN | 100 kN | 300 kN | 600 kN |
| Testing Speed Range | | 0.00005 to 1500 mm/min | | | 0.00005 to 720 mm/min | 0.00005 to 540 mm/min |
| Testing Speed Precision*1 | | ±0.1 % | | | | |
| Return Speed | | 0.00005 to 2000 mm/min | | 0.00005 to 1800 mm/min | 0.00005 to 720 mm/min | 0.00005 to 540 mm/min |
| Crosshead Speed and Acceptable Test Force [For all testing speeds] | | 20 kN | 50 kN | 100 kN | 300 kN | 600 kN |
| Frame Stiffness | | 180 kN/mm or more | 180 kN/mm or more | 300 kN/mm or more | 400 kN/mm or more | 700 kN/mm or more |
| Stroke Control Resolution | | 8.33 nm | | | 3.33 nm | 2.50 nm |
| Effective Specimen Width | | 600 mm | | | | 790 mm |
| Crosshead-Table Distance | Standard | 215 to 1265 mm | | 215 to 1250 mm | 215 to 1440 mm | 215 to 1650 mm |
| | 250 mm Extension | 215 to 1490 mm | | 215 to 1475 mm | 215 to 1665 mm | 215 to 1875 mm |
| | 500 mm Extension | 215 to 1715 mm | | 215 to 1700 mm | 215 to 1890 mm | 215 to 2100 mm |
| | 750 mm Extension | 215 to 1940 mm | | 215 to 1925 mm | 215 to 2115 mm | 215 to 2325 mm |
| Dimensions Width × Depth × Height | Standard | 1130×765×2170 mm | | | 1130×765×2420 mm | 1530×1122×2840 mm |
| | 250 mm Extension | 1130×765×2420 mm | | | 1130×765×2670 mm | 1530×1122×3090 mm |
| | 500 mm Extension | 1130×765×2670 mm | | | 1130×765×2920 mm | 1530×1122×3340 mm |
| | 750 mm Extension | 1130×765×2920 mm | | | 1130×765×3170 mm | 1530×1122×3590 mm |

| Model No. | | | AGX-20kNV2S | AGX-50kNV2S | AGX-100kNV2S | AGX-300kNV2S | AGX-600kNV2S |
|---|---|---|---|---|---|---|---|
| Mass | Standard | 200 V | 640 kg | | 810 kg | 980 kg | 2910 kg |
| | 250 mm Extension | 200 V | 660 kg | | 830 kg | 1010 kg | 2960 kg |
| | 500 mm Extension | 200 V | 670 kg | | 850 kg | 1030 kg | 3020 kg |
| | 750 mm Extension | 200 V | 690 kg | | 870 kg | 1060 kg | 3070 kg |
| Noise*2 | | | 65 dB(A) | | | 70 dB(A) | 75 dB(A) |

*1 Test speed precision is calculated from the travel amount within a prescribed time at a constant speed from 0.5 mm/min to 500 mm/min.

*2 Measured 1 m away from the front of the machine.

## ■ Separate Type AGX-V/R Controller

| Model No. | | AGX-V/R 50kN | AGX-V/R 100kN | AGX-V/R 300kN | AGX-V/R 600kN |
|---|---|---|---|---|---|
| Drive Motor | | 2.0 kW | 3.5 kW | 5.5 kW | 7.5 kW |
| Dimensions Width × Depth × Height | | 320 × 506 × 678 mm | | | 420 × 606 × 678 mm |
| Mass | | 30 kg | 35 kg | 35 kg | 55 kg |
| Power Requirements*1 | Voltage*2 | 3φ 200 to 230 V | | | |
| | Frequency | 50/60 Hz | | | |
| | Capacity | 4.5 kVA | 6.5 kVA | 7.5 kVA | 13.0 kVA |
| Breaker Capacity*3 | | 15 A | 20 A | 30 A | 40 A |
| Short Circuit Rating ($I_{CU}$/$I_{CS}$) | | 2.5 kA/2.0 kA | | | 7.5 kA /7.5 kA |
| Short Circuit Current Rating | | 1.5 kA | | | |
| Protective Conductor Current*4 | | 0 to 5 mA | | | |
| Protective Ground | | Type-D grounding*5 with equipotential bonding*6 | | | |

*1 Separately prepare a power supply for the computer.

*2 The voltage in the table indicates the phase-to-phase voltage.

*3 Since inrush currents and harmonic currents flow, use a harmonic surge-resistant power breaker.

*4 The value varies depending on the operation status. The value indicates the current of the fundamental component in a TT grounded system, S-phase grounding.

*5 The grounding resistance is 100 Ω max.

*6 When connecting the AGX-V/R controller, optional devices, or computer to separate power sources, make sure that there is no potential difference between all protective earth terminals. (Less than 10 V AC/DC)

# 7.2 Functional Specifications

## ■ Measurement Specifications

| Item | | Description |
|---|---|---|
| Test Force Measurement | | |
| Detection Method | | Strain Gauge Load Cell |
| Measurement Precision*1 | High-Precision Unit*2 (1/1000) Capacity: 50 N to 300 kN | Within ±0.5 % of the displayed test force: Guarantees that the instrument passes the test force validation test. (at 1/1 to 1/1000 load cell ratings)<br>As the Shimadzu shipment standard, it has been verified that the measurement precision is within ±0.3 % of the indicated value at 1/1 to 1/100 load cell ratings. |
| | High-Precision Unit*3 (1/500) Capacity: 600 kN | Within ±0.5 % of the displayed test force: Guarantees that the instrument passes the test force validation test. (at 1/1 to 1/500 load cell ratings)<br>As the Shimadzu shipment standard, it has been verified that the measurement precision is within ±0.3 % of the indicated value at 1/1 to 1/100 load cell ratings. |
| | Wide Range -Precision Unit*4 (1/2000) Capacity: 50 N to 300 kN | Within ±1 % of the displayed test force: Guarantees that the instrument passes the test force validation test. (at 1/1000 to 1/2000 load cell ratings)<br>Within ±0.5 % of the displayed test force: Guarantees that the instrument passes the test force validation test. (at 1/1 to 1/1000 load cell ratings)<br>As the Shimadzu shipment standard, it has been verified that the measurement precision is within ±0.3 % of the indicated value at 1/1 to 1/100 load cell ratings. |
| | Standard -Precision Unit*5 (1/1000) Capacity: 10 N to 300 kN | Within ±1 % of the displayed test force: Guarantees that the instrument passes the test force validation test. (at 1/1 to 1/1000 load cell ratings) |
| | Standard -Precision Unit*6 (1/500) Capacity: 600 kN | Within ±1 % of the displayed test force: Guarantees that the instrument passes the test force validation test. (at 1/1 to 1/500 load cell ratings) |

| Item | | Description |
|---|---|---|
| Test Force Display | Display Method | Digital display (on the smart controller) |
| | Display Unit | Selectable from SI (mN, N, kN), kilogram-force (gf, kgf, tf), or pound-force (lbf, kip) |
| | Display Item | Current value, peak value (When the special software is enabled) and break point value (When the special software is enabled) |
| | Display Resolution Capacity: 300 kN, 600 kN | • More than 15 % of the load cell rating: 1/30 000<br>• More than 2.2 % to 15 % of the load cell rating: 1/100 000<br>• More than 0.33 % to 2.2 % of the load cell rating: 1/300 000<br>• 0.33 % of the load cell rating or less: 1/1 000 000 |
| | Display Resolution Capacity: 250 kN | • More than 15 % of the load cell rating: 1/10 000<br>• More than 2.2 % to 15 % of the load cell rating: 1/50 000<br>• More than 0.33 % to 2.2 % of the load cell rating: 1/250 000<br>• 0.33 % of the load cell rating or less: 1/1 250 000 |
| | Display Resolution Capacity: Other than the above | • More than 15 % of the load cell rating: 1/10 000<br>• More than 2.2 % to 15 % of the load cell rating: 1/50 000<br>• More than 0.33 % to 2.2 % of the load cell rating: 1/200 000<br>• 0.33 % of the load cell rating or less: 1/1 000 000 |
| Test Force Measurement Low-pass Filter | Damping Characteristics | Fourth-order Bessel characteristics |
| | Cutoff Frequency | 0.3 Hz, 1 Hz, 3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1000 Hz, 3000 Hz, without filter |
| | Frequency Switching | Automatic selection according to the measurement condition or user preference |
| Measurement Range | | 1 Range (rangeless) |
| Sampling Frequency | | 10 kHz max. (configurable with the special software) |
| Zero Adjustment | | Can be executed with dedicated software, smart controller, or operation controller. |
| Test Force Calibration | | Electronic calibration (Can be executed with dedicated software, smart controller, or operation controller.) |
| Calibration Before Shipment | High-Precision Unit, Wide Range -Precision Unit | Tension, compression, or tension and compression[*7] |
| | Standard -Precision Unit | Tension and compression |
| Crosshead Position Measurement | | |
| Detection Method | | Battery-less multiple-turn absolute encoder |
| Position Detection Precision | | Within ±0.05 % of the indicated value or ±0.01 mm, whichever is larger |

| Item | | Description |
|---|---|---|
| Position Display | Display Method | Digital display (Displayed on the smart controller, operation controller) |
| | Display Unit | μm, mm, cm, inch, % |
| | Display Resolution | 0.01 μm min. (maximum number of displayed digits: up to seven digits) |
| Displacement Display (When the Testing machine is equipped with the internal unit) | Display Method | Digital display (Displayed on the smart controller, operation controller) |
| | Display Unit | μm, mm, cm, inch, % |
| | Display Resolution | • More than 15 % of rating : 1/10 000<br>• 15 % of rating or less: 1/50 000 |
| Virtual sensor | Function | Performs linear operation on one or more displacement or strain measurements, and registers the results as measurement and control sensors. |
| | The number of channels | 4 Channels |
| Internal Unit (Optional Product) | | |
| Sensor Amplifier | Number of Channels | 1 channel |
| | Applicable Sensor | Load cell, SG extensometer, SG width gauge, LVDT extensometer, LVDT width gauge |
| | Excitation Voltage | 1.0 Vop, 2.0 Vop, 5.0 Vop, 10 Vop, automatic switching |
| | Excitation Signal | 1 kHz sine wave |
| | Compatible Connector | Special calibration connector |
| Analog Input Amplifier | Number of Channels | 4 channels |
| | Input Voltage Range | ±5 V, ±10 V |
| | Absolute Maximum Voltage | ±12 V |
| | Measurement Resolution | 24 bits |
| | Voltage Accuracy | ±0.5 % of input voltage or ±10 mV, whichever is larger |
| | Compatible Connector | BNC connector |

| Item | | Description |
|---|---|---|
| Counter Unit | Number of Channels | 4 channels |
| | Pulse Format | 90° 2-phase pulse, up/down pulse |
| | Signal Format | Line driver, 5 V TTL, open collector |
| | Maximum Pulse Rate | 5 MPPS (line driver, 5 V TTL), 100 kPPS (open collector) |
| | Pulse Count Range | -2 147 483 648 to +2 147 483 647 |
| | Compatible Connector | 26-pin half-pitch connector |
| Strain Amplifier | The number of channels | 2 Channels |
| | Target sensor | Strain gauge bridge |
| | Excitation voltage | 0.5 Vop, 1.0 Vop, 2.0 Vop, 5.0 Vop |
| | Excitation signal | 1 kHz sine wave |
| | Applicable connector | NDIS connector |
| | Measurement Accuracy*8 | ±0.1 % of the full scale |
| | Measurement range | • Excitation voltage of 0.5 Vop ±200000×$10^{-6}$ strain<br>• Excitation voltage of 1.0 Vop ±100000×$10^{-6}$ strain<br>• Excitation voltage of 2.0 Vop ±50000×$10^{-6}$ strain<br>• Excitation voltage of 5.0 Vop ±20000×$10^{-6}$ strain |

*1 The official standards including JIS B7721, EN 10002-2, ISO 7500-1, and ASTM E4 recommend that the Testing machine undergo validation after installation. In a test to measure test force for a long time, such as creep test, drift can occur in the measured values due to changes in ambient temperature or self-heating of the load cell. Set a sufficiently wide range for drift amount when performing such a test.

*2 The Testing machine of this type conforms to JIS B7721 Grade 0.5, EN 10002-2 Grade 0.5, ISO 7500-1 Class 0.5, BS 1610 Class 0.5, and ASTM E4. For the load cell with a capacity less than 50 N or the load cell with a capacity of 600 kN, the high-precision type (1/1000) settings are not available.

*3 The Testing machine of this type conforms to JIS B7721 Grade 0.5, EN 10002-2 Grade 0.5, ISO 7500-1 Class 0.5, BS 1610 Class 0.5, and ASTM E4.

*4 The Testing machine of this type conforms to JIS B7721 Grade 1, EN 10002-2 Grade 1, ISO 7500-1 Class 1, BS 1610 Class 1, and ASTM E4. For the load cell with a capacity less than 50 N or the load cell with a capacity of 600 kN, the wide range-precision type (1/2000) settings are not available.

*5 The Testing machine of this type conforms to JIS B7721 Grade 1, EN 10002-2 Grade 1, ISO 7500-1 Class 1, BS 1610 Class 1, and ASTM E4. For the load cell with a capacity less than 10 N or the load cell with a capacity of 600 kN, the standard-precision type (1/1000) settings are not available.

*6 The Testing machine of this type conforms to JIS B7721 Grade 1, EN 10002-2 Grade 1, ISO 7500-1 Class 1, BS 1610 Class 1, and ASTM E4.

*7 Designate the calibration direction when placing an order.

*8 Calibration is performed in the factory at excitation voltage of 2.0 Vop and full scale of 50000×$10^{-6}$ strain.

## ■ Control Specifications

<table>
<tr><th colspan="2">Item</th><th>Description</th></tr>
<tr><td colspan="2">Control Frequency</td><td>1 kHz</td></tr>
<tr><td rowspan="6">Stroke Control</td><td>Control Resolution</td><td rowspan="4">Reference "7.1 Basic Specifications" P.104</td></tr>
<tr><td>Testing Speed Range</td></tr>
<tr><td>Testing Speed Precision</td></tr>
<tr><td>Return Speed</td></tr>
<tr><td>Acceleration and deceleration rate during test</td><td>Initial setting 3000 mm/min/s
<table>
<tr><th>Model</th><th>Settable range</th></tr>
<tr><td>AGX-10kNV2D<br>AGX-10kNV2D RY<br>AGX-10kNV2D W10</td><td>1 to 30000 mm/min/s</td></tr>
<tr><td>AGX-50kNV2D<br>AGX-50kNV2D RY</td><td>1 to 15000 mm/min/s</td></tr>
<tr><td>AGX-50kNV2<br>AGX-50kNV2 W10<br>AGX-50kNV2S</td><td>1 to 15000 mm/min/s</td></tr>
<tr><td>AGX-100kNV2<br>AGX-100kNV2 W10<br>AGX-100kNV2S</td><td>1 to 15000 mm/min/s</td></tr>
<tr><td>AGX-300kNV2<br>AGX-300kNV2 W10<br>AGX-300kNV2S</td><td>1 to 7200 mm/min/s</td></tr>
<tr><td>AGX-600kNV2<br>AGX-600kNV2S</td><td>1 to 5400 mm/min/s</td></tr>
</table></td></tr>
<tr><td>Distance between Jigs Setting</td><td>The crosshead can be moved to an appropriate start position according to a registered distance between jigs.<br>Minimum distance between jigs<br>• In the tensile test mode: 20 mm<br>• In the compression/three-point/four-point bending test mode: 0 mm</td></tr>
<tr><td>Distance between Jigs Speed</td><td>Same as the return speed</td></tr>
<tr><td>Test Force Control</td><td rowspan="4">Control Parameter</td><td rowspan="4">Automatic setting through auto-tuning</td></tr>
<tr><td>Stress Control</td></tr>
<tr><td>Elongation Control*1</td></tr>
<tr><td>Strain Control*1</td></tr>
</table>

*1 An extensometer is separately needed for elongation and strain control.

## ■ Input and Output Specifications

| Item | | Description |
|---|---|---|
| Standard Equipment | | |
| Analog Output | Number of Channels | 2 channels |
| | Full Scale (FS) | 5 V or 10 V (Switched depending on the setting) |
| | Output Voltage Range | ±5 V (FS: 5 V), ±10 V (FS: 10 V) |
| | Output Resolution | 168 µV (FS: 5 V), 336 µV (FS: 10 V) |
| | Output Rate | 100 kHz |
| | Voltage Accuracy | ±0.5 % of input voltage or ±10 mV, whichever is larger |
| | Output Content | Test force, stroke, and values measured with the internal unit (optional) |
| | Output Adjustment | 0 V, FS Forced output is possible |
| | Compatible Connector | BNC connector |
| Non-Isolated PIO Unit | Number of Channels | 1 channel |
| | Input Bit Count | 16 bits |
| | Output Bit Count | 16 bits |
| | Input Signal Format | 5 V TTL, open collector |
| | Output Bit Count | Open collector |
| | Compatible Connector | D-sub 37-pin male connector |

| Item | | Description |
|---|---|---|
| Iinternal Unit (Optional) | | |
| Analog Output Amplifier | Number of Channels | 4 channels |
| | Full Scale (FS) | 5 V or 10 V (Switched depending on the setting) |
| | Output Voltage Range | ±5 V (FS: 5 V), ±10 V (FS: 10 V) |
| | Output Resolution | 168 µV (FS: 5 V), 336 µV (FS: 10 V) |
| | Output Rate | 100 kHz |
| | Voltage Accuracy | ±0.5 % of input voltage or ±10 mV, whichever is larger |
| | Output Content | Test force, stroke, and values measured with the internal unit (optional) |
| | Output Adjustment | 0 V, FS Forced output is possible |
| | Compatible Connector | BNC connector |
| Non-Isolated PIO Unit | Number of Channels | 1 channel |
| | Input Bit Count | 16 bits |
| | Output Bit Count | 16 bits |
| | Input Signal Format | 5 V TTL, open collector |
| | Output Bit Count | Open collector |
| | Compatible Connector | D-sub 37-pin male connector |
| Insulation PIO Unit | Number of Channels | 1 channel |
| | Input Bit Count | 16 bits |
| | Output Bit Count | 16 bits |
| | Input Signal Format | 12 to 24 V AC/DC photocoupler insulation |
| | Output Bit Count | 12 to 24 V AC/DC photo MOS relay insulation |
| | Compatible Connector | D-sub 37-pin female connector |
| Analog Recorder Unit | Applicable Analog Recorder | AR series |
| | Compatible Connector | D-sub 9-pin male connector |

## ■ Controller Specifications

| Controller | | Operation Controller | Smart Controller |
|---|---|---|---|
| Measured Value Display Mode | | 5 display modes are provided:<br>• 3 measured values + graphs + test conditions<br>• 5 measured values + graphs<br>• 10 measured values<br>• 3 measured values (with large characters)<br>• Graphs (large) | 2 display modes are provided:<br>• 2 measured values + test conditions<br>• 4 measured values |
| Crosshead Movement | Hard Button Operation | Test Start / Return / Test Stop / Manual ON/OFF / Jog up / Jog down / Emergency stop | Manual ON/OFF, Jog up, Jog down |
| | Jog Dial Operation | Fine adjustment of crosshead position | |
| | Touch Panel Operation | Test Start / Test Stop / Return / Specimen Protection / distance movement between jigs | Test piece Protection / distance movement between jig |

| Controller | | Operation Controller | Smart Controller |
|---|---|---|---|
| Method Setting | Control Parameter | Stroke / test force / stress / displacement / strain / virtual sensor*1 | - |
| | Control Mode*2 | One-direction (single) test mode<br>Performs a test by driving the crosshead in one direction with the control parameter.<br>• Control hold position: 1 point can be registered within control parameter.<br>• Control hold time: 1 to 99999 seconds | |
| | | Cycle test mode<br>Performs a test by repeatedly driving the crosshead vertically with the control parameter.<br>• Reverse set position: 2 points at the maximum point (control parameter) and the minimum point (control parameter)<br>• Hold control at reverse position: Possible<br>Control hold time: 1 to 99999 seconds<br>• Maximum cycle number: 1000 cycles<br>• Cycle count function: Supplied<br>• Motion after set cycle number is reached: Stop or break<br>Stop: Loading is automatically stopped.<br>Break: Load is kept applied until a break is detected exceeding the maximum point of the reverse set position. | |
| | | Stress auto mode<br>Registers 1 stress speed, 1 strain speed, 1 stroke speed, and 2 switch points (1st: auto switch, 2nd: stroke setting). | |
| | | Strain test mode<br>Registers 1 strain speed, 2 stroke speeds, and 2 switch points (1st: strain, 2nd: stroke setting). | |
| | | 3-step stroke test control mode<br>Registers 3 stroke speeds, and 2 switch points (stroke). | |
| Specimen Information Settings*3 | | • Tensile tests: Plate / Rod / Area<br>• Compression tests: Prismatic column / Cylinder / Area<br>• 3-point bend / 4-point bend tests: Prismatic column / Cylinder | - |

| Controller | | Operation Controller | Smart Controller |
|---|---|---|---|
| Graph Display | Parameter | Stroke / test force / stress / displacement / strain / virtual sensor / time*4 | - |
| | Function | Draws time graphs and X-Y graphs during a test.*5 | - |
| USB Drive Connection | | Connecting a USB drive to the AGX-V/R Control/Measuring unit allows for using the following function:<br>• Screen capture<br>Captures the main screen and saves it as an image file.*6<br>• Real-time data sampling<br>Allows for saving the real-time data of total 3 channels: stroke, test force (or stress), and installed sensor 1 channel.*7 *8 | - |
| Method File | | Saves and load method settings (25 types). | - |

*1 The items may vary depending on the installed sensor.

*2 The Testing machine has use restrictions for the continuous operation and cycle test. (See "Use Restrictions" P.126)

*3 This setting is used for stress and strain value display.

*4 The items may vary depending on the installed sensor.

*5 Can be drawn up to 30 minutes from test start.

*6 Portable Network Graphics (PNG) format

*7 Can sample data up to 30 minutes from test start.

*8 Data is saved in the CSV format.

## ■ Voice operation device specifications

| Item | | Description |
|---|---|---|
| Testing machine Operation*1 | Shutdown | Testing machine power off, standby off |
| | Crosshead Operation*2 | Test start, return start, inter-jig distance travels, specimen protection start, jig operations, stop |
| | Test/measured values | E-CAL execution, zero reset, peak value/ break point value response, test starting direction response |
| | Others | Wake-up word registration, chuck open, SIE operation, screen change |
| Voice operation device body size (Outer Diameter x Thickness) | | 60×20 mm |
| Weight | | 303 g |
| Cable Length | | 1.5 m (Standard model, Reinforced yoke model, Wide model)<br>3.0 m (Separately installed controller model) |

*1 Voice operation is possible only when the operation assistance with voice guidance of the main unit is ON ("Other Functional Specifications" P.125).

*2 Crosshead operation is possible only when the protection cover function is ON.

## ■ Communication Specifications

| Item | | Description |
|---|---|---|
| Computer Communication | LAN communication*1 | 100BASE-TX |
| | LAN Cable | UTP category 6 |
| | Maximum Cable Length*2 | 100 m |
| | Compatible Connector | RJ-45 connector |

*1 Do not use a hub (wired/wireless) but connect a PC and the instrument directly with a LAN cable.
*2 The maximum length of a LAN cable is 100 m. Use a cable as short as possible.

## ■ Safety and Protection Functions

| Item | | Description |
|---|---|---|
| Safety Function | Emergency Stop Switch | Two located on the front side*1*2 |
| | Stroke Limit Switch | Crosshead upper and lower limits can be set (photoelectric sensor) |
| | Software Limits | Upper and lower limits of displacement or test force can be set |
| | Overload Limit | • An alarm is issued and the instrument stops when the measured value after zero offset is equal to or more than ±102 % of the load cell rating.<br>• An alarm is issued and the instrument stops when the measured value before zero offset is equal to or more than ±150 % of the load cell rating.<br>Reference "3.6.2 Overload/Underload Detection Function" P.64 |
| | "TouchLoad" Detection | An alarm is issued and the instrument stops when test force fluctuates during the jog operation, return, and movement to the distance between jigs.<br>Reference "3.6.1 Contact Detect Function" P.62 |
| | Servo Motor Overload Protection | An alarm is issued and the instrument stops when the specified value is reached. |
| | Servo Amplifier Overload Protection | An alarm is issued and the instrument stops when the specified value is reached. |
| | Earth Leakage Breaker | Supplied |
| | Ball Screw Protection Cover | Supplied |
| | Jig Collision Prevention Function | Distance between jigs can be registered to prevent collision between jigs (this function requires special software). |

| Item | | Description |
|---|---|---|
| Maintenance Function | Self-Maintenance Function | 10-year inspection notification function |
| | Self-Check Function | Monitors the powering time, motor on time, servo on time, travel distance of the crosshead, emergency stop switch operation count, stroke limit activation count, backlight lighting time, button operation count, jog dial count, touch panel operation count, power supply voltage, and cooling fan speed. |
| | Log Save Function | Supplied (this function requires special software) |
| Alarm Sound | | An alarm sound is emitted. |
| Protection Cover | Front Side | Door type (The upper portion is fixed) |
| | Rear Side | Fixed |
| | Material | Polycarbonate (thickness: 3 mm) |
| | Interlock | Supplied<br>Only the jog operation and jog dial operation can be used at a crosshead speed of 50 mm/min or less when the door is open. |

*1 One additional column-mount type switch is included in the reinforced yoke model.
*2 Wide model with protection cover comes with one additional table-top type switch.

## ■ Other Functional Specifications

| Item | | Description |
|---|---|---|
| Specimen Break Detection Function | Setting | Can be set with the special software and the smart controller, as part of the test conditions |
| | Types of Detection Functions | Voluntary settings of break sensitivity, break level, and peak break level (can be enabled and disabled individually) |
| | Start Point of Break Detection | The break detection starts when the test force increases equal to or more than "test force S".<br>Any value within Break Level < S ≤ 99.999 %/load cell rating |
| | Break Sensitivity | After the start point of break detection, when the test force decreases with a gradient equal to or more than "test force A" per second, it is detected as a break.<br>Any value within 0.005/load cell rating ≤ A ≤ 1000 %/load cell rating can be set. |
| | Break Level | After the start point of break detection,when the test force decreases to "test force B", it is detected as a break.<br>Any value within 0.001 ≤ B ≤ Start Point of Break Detection can be set. |
| | Peak Break Level | After the start point of break detection, when the test force decreases to "C %/peak test force," it is detected as a break.<br>Any value within 0.1 ≤ C ≤ 99.99 % can be set. |
| | Crosshead Movement When Specimen Is Broken | Stop, or origin return (Select either of them) |
| Sound Function | | Select operation sound according to the surrounding environment (Standard/Clear/Silent)<br>Operation assistance with voice guidance (ON/OFF)<br>Volume setting (5 levels) |
| Power Save Function | | Turning off the servo power, turning off the backlight for the LCD operating panel<br>▶▶ Reference "Precision Universal Testing Machines AUTOGRAPH AGX-V2 Series Reference Manual" (Document No.: 349-11986) |

# 7.3 Use Restrictions and Installation Environment

## ■ Use Restrictions

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Continuous Operating Time</td><td>Max. 10 hours</td></tr>
<tr><td>Cycle Test</td><td>• Set power*1: The test speed × set test force must not exceed the following values.
<table>
<tr><th>Model</th><th>Set power</th></tr>
<tr><td>AGX-10kNV2D<br>AGX-10kNV2D RY<br>AGX-10kNV2D W10</td><td>15000 kN・mm/min</td></tr>
<tr><td>AGX-50kNV2D<br>AGX-50kNV2D RY</td><td>37500 kN・mm/min</td></tr>
<tr><td>AGX-50kNV2<br>AGX-50kNV2S<br>AGX-50kNV2S W10</td><td>37500 kN・mm/min</td></tr>
<tr><td>AGX-100kNV2<br>AGX-100kNV2S<br>AGX-100kNV2 W10</td><td>75000 kN・mm/min</td></tr>
<tr><td>AGX-300kNV2<br>AGX-300kNV2S<br>AGX-300kNV2 W10</td><td>108000 kN・mm/min</td></tr>
<tr><td>AGX-600kNV2<br>AGX-600kNV2S</td><td>162000 kN・mm/min</td></tr>
</table>
• Continuous Cycle Count: Max. 1000 cycles</td></tr>
<tr><td>Attaching T Slot (Pole) Jig</td><td>• T nut to be used: Easy nut made by SUS<br>• Maximum weight of jig: 3 kg max. per jig, gross weight of 5 kg max.<br>• Jig size: The jig must not enter the test space.</td></tr>
</table>

*1 Cycle test can be performed in the range that the product of set test speed and maximum target test force does not exceed these values.

## ■ Installation Environment

| Item | | Description |
|---|---|---|
| Temperature*1 | | +5 °C to +40 °C |
| Humidity*2 | | 20 % to 80 % |
| Power Supply Voltage Fluctuation | | Max. ±10 % of the nominal value |
| Vibration | Frequency | Max. 10 Hz |
| | Amplitude | Max. 5 μm |
| | Vibration Acceleration Level | Max. 65.9 dB (The above frequency and amplitude are converted based on the reference value $1\times10^{-5}$ $m/s^2$) |
| Noise | | 55 dB ( A ) or less when voice operation is used*3 |

*1 With max. ±2 °C variation during a test

*2 Without condensation

*3 Loud environmental noises may disturb voice operation.

# Index

This page is intentionally left blank.