SHIMADZU

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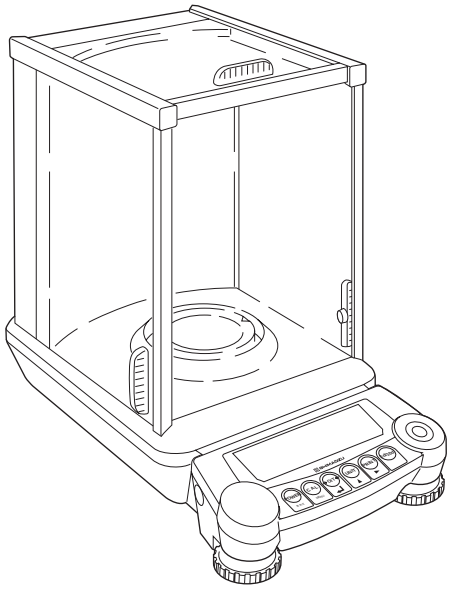
Uni Bloc

Shimadzu Analytical Balance Instruction Manual

AUW-D series **AUW220D, AUW120D**
AUW series **AUW320, AUW220, AUW120**
AUX series **AUX320, AUX220, AUX120**
AUY series **AUY220, AUY120**

For Basic Operation



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

SHIMADZU CORPORATION
KYOTO JAPAN

ANALYTICAL & MEASURING INSTRUMENTS DIVISION

Requests

- Provide this manual to the next user in the event that the instrument is transferred.
- To ensure safe operation, contact your Shimadzu Balance representative for installation, adjustment, or reinstallation after moving the instrument to a different site.

Notices

- The content of this manual is subject, without notice, to modifications for the sake of improvement.
- Every effort has been made to ensure that the content of this manual was correct at the time of creation. However, in the event that any mistakes or omissions are discovered, it may not be possible to correct them immediately.
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- Shimadzu does not guarantee that the WindowsDirect communication function will operate without problems on all PCs. Shimadzu will accept no responsibility for any trouble that arises as a result of using this function. You are recommended to back up all important data and programs in advance.

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Notation Conventions

Note

This instruction manual uses the following notation conventions to indicate Safety Precautions and additional information.

Caution — Indicates a potentially hazardous situation that may result in injury to personnel or equipment damage.

Note — Provides additional information needed to properly use the balance.

Other conventions used in this manual include:

Item	Description
1, 2, 3	Indicates the step number in a procedure or a sequence of changes in the balance display.
[ ] key	Indicates the operation key on the balance. See 2.2.
“ ”	Indicates the message appearing in the balance display.
mass display	Indicates that the balance is in the weighing mode and mass is displayed in one of the weighing units.

Safety Precautions **To be strictly observed**

To ensure that you use the balance safely and correctly, read the following precautions carefully and observe them.

The levels of danger and damage that will arise if the balance is used incorrectly are classified and indicated as shown below.

⚠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.

Precautions are classified and explained by using one of the symbols below, depending on the nature of the precaution.

 Instructions	Indicates an action that must be performed.
 Prohibitions	Indicates an action that must NOT be performed.

⚠ WARNING	
 Prohibitions	**Never disassemble, modify or attempt to repair this product or any accessory.** You could sustain an electric shock or the product could operate abnormally. If you believe that the balance has failed, contact your Shimadzu representative.
 Instructions	**Use the balance with correct power supply and voltage.** **Use the balance with the attached AC adapter.** Using the balance with an incorrect power supply or voltage will lead to fire or trouble with the balance. Note also that if the power supply or voltage is unstable or if the power supply capacity is insufficient, it will not be possible to obtain satisfactory performance from the balance.
 Instructions	**Use the correct weighing units.** Using incorrect weighing units can lead to accidents as a result of weighing errors. Check that the weighing units are correct before starting weighing.
 Prohibitions	**Do not use the balance outdoors or anywhere where it will be exposed to water.** You could sustain an electric shock or the product could operate abnormally.

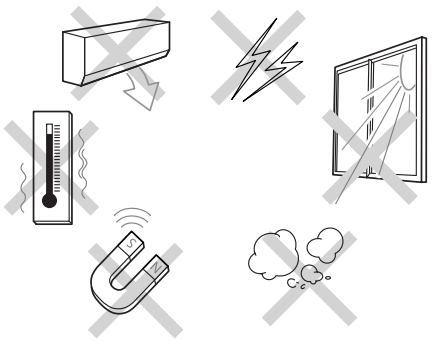
⚠ CAUTION

Prohibitions

Avoid locations where the balance will be exposed to any of the following.

This could cause accidents or poor performance.

- Air flow from an air conditioner, ventilator, door or window
- Extreme temperature changes
- Vibration
- Direct sunlight
- Corrosive or flammable gases
- Dust, electromagnetic waves or a magnetic field



Instructions

Install the balance on a strong and stable flat table or floor in the room.

Placing the balance in an unstable site could lead to injury or trouble with the balance. When selecting the installation site, take into account the combined weight of the balance and the item to be weighed.

Instructions

After a power outage, turn the power back ON.

When a power outage occurs, the power is shut off automatically. Therefore, begin operation from 4.4 “Turning On the Power” (☞ page 12) again.

Instructions

Treat the balance with care and respect.

The balance is a precision instrument. Subjecting it to impacts could cause it to fail. When moving the balance, remove pan and pan supporter. Grasp it firmly with both hands to carry it.
If the balance has to be stored for a long time, store it in the packaging box in which it was delivered.

Prohibitions

Do not connect anything other than peripheral devices specified by Shimadzu to the balance’s connector.

If you do, the balance may stop working normally.
In order to avoid trouble, always connect peripheral devices in accordance with the directions in this manual.

Instructions

If you detect anything abnormal (e.g. a burning smell) disconnect the AC adapter immediately.

Continuing to use the balance with an abnormality could lead to fire or an electric shock.

Shimadzu Balances and 21 CFR Part 11

21 CFR Part 11

21 CFR Part 11, Electronic Records, Electronic Signatures, Final Rule (often referred to as Part 11) is the United States Food and Drug Administration (FDA) regulation affecting computer resources and electronic records that are used for any document that is required to be kept and maintained by FDA regulations.

Requirements concerning computer resources security are key elements in Part 11.

The controls implemented as a result of security related requirements are intended to result in trusted records.

Shimadzu CLASS-Balance Agent

Shimadzu provides a means for compliance with 21 CFR Part 11 with Shimadzu CLASS-Balance Agent software, part of a comprehensive laboratory data management system, Shimadzu CLASS Agent.

Ask your Shimadzu representative about it.

Shimadzu WindowsDirect

When Shimadzu balances are integrated with laboratory software by means of our WindowsDirect function, no communication software is required or used.

The Shimadzu balance functions as a primary device in the system, just as a keyboard, mouse or other data entry hardware does.

For this reason, system validation and compliance may be greatly simplified with the use of Shimadzu balances.

Two-way Communication

Shimadzu balances have always been computer friendly and they can be set up for bi-directional communication as part of a fully automated production system or LIMS.

This manual includes the command codes and information needed by programmers to integrate Shimadzu balances with their software.

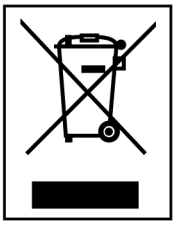
Action for Environment (WEEE)

To all user of Shimadzu equipment in the European Union:

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

Contact Shimadzu service representative when the equipment has reached the end of its life.

They will advise you regarding the equipment take-back.
With your co-operation we are aiming to reduce contamination from waste electronic and electrical equipment and preserve natural resource through re-use and recycling.
Do not hesitate to ask Shimadzu service representative, if you require further information.



WEEE Mark

Contents

1. Introduction

Thank you for choosing the Shimadzu AUW-D/AUW/AUX/AUY Series analytical balance. Shimadzu confidently offers this high-performance analytical balance, the result of over 90 years of experience in manufacturing precision balances. While providing rapid and accurate mass measurement, reliability has been improved even more by employing the UniBloc cell, introduced for use in electronic balances by Shimadzu in 1989. These Shimadzu analytical balances provide WindowsDirect functions for transfer of measurement results to personal computer without installing software. This and other various functions can be used to meet the operator's objectives. Also, the AUW-D/AUW/AUX series offers consistently accurate measurement without calibration work, with temperature detection and time setting, and the built-in motor-driven calibration weight that performs fully-automatic span calibration.

In order to make full use of the functions and performance provided in the AUW-D/AUW/AUX/AUY series balance, please read this instruction manual before using the balance and keep the manual for future reference.

For information on the following points, please contact your Shimadzu Balance representative.

- Product warranty
- After service

This manual has notation for AUW-D series, AUW series, AUX series, AUY series, combined as AUW-D/AUW/AUX/AUY series (or notations two to three series). Note that the menu settings and the calibration display examples shown in this manual are mainly for the AUW220 model. On different models, the numerical values and other items may differ.
The model name can be found in the label placed in front of the weighing chamber. The alphabets in model name indicate its series name. AUW220D and AUW120D are called AUW-D series.

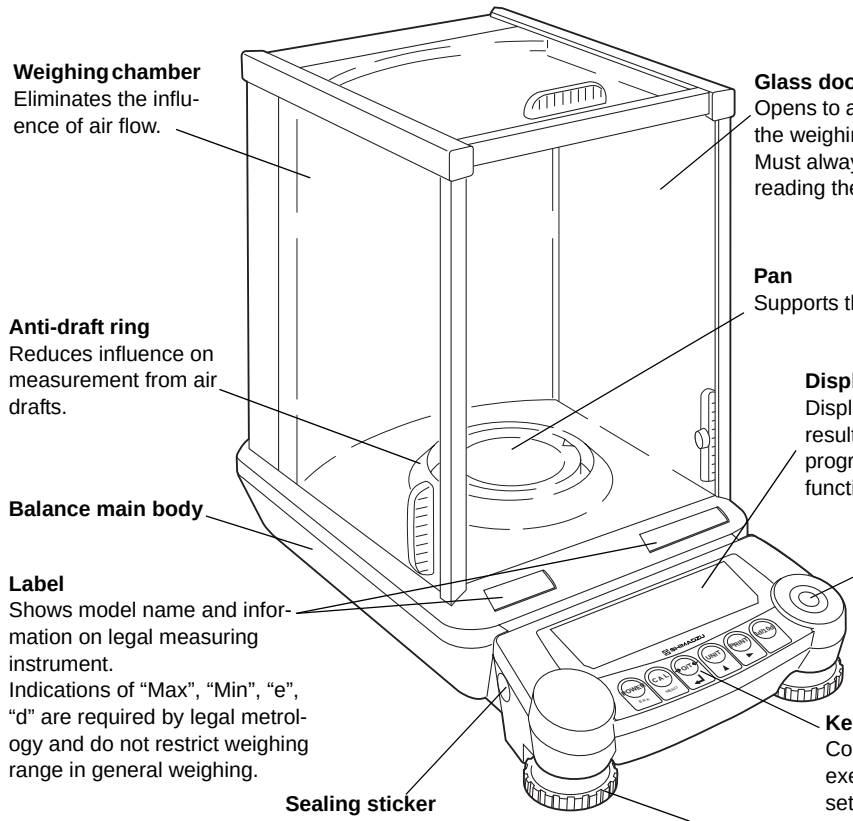
Symbols Used in the Manual

1,2,3 …	Shows operation procedure.
[POWER] key, etc.	**[ ]** shows operation keys .
"E-CAL" etc.	Shows items displayed on the balance, including displays appearing during menu selection.
g display	The balance display is in gram unit so the value changes depending on the load on the pan.
Mass display	The balance display is in one of mass units so the value changes depending on the load on the pan.

2. Component Names and Functions

2.1 Main Components

Read these pages before installation



Weighing chamber
Eliminates the influence of air flow.

Glass door (3 places)
Opens to allow items to be put in the weighing chamber.
Must always be closed when reading the results.

Pan
Supports the object to be weighed.

Anti-draft ring
Reduces influence on measurement from air drafts.

Display panel
Displays information such as results, errors, functions in progress, and information for function settings.

Balance main body

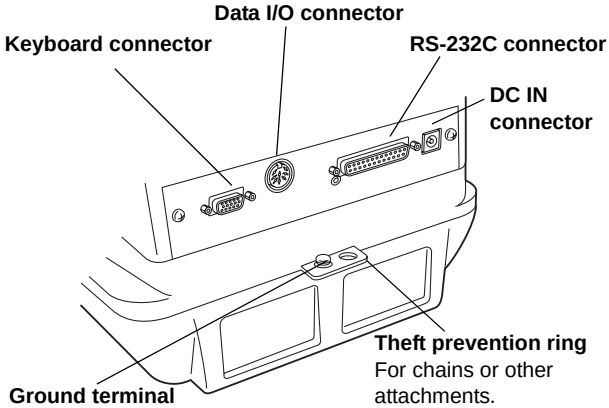
Level indicator
used to install the balance level.

Label
Shows model name and information on legal measuring instrument.
Indications of “Max”, “Min”, “e”, “d” are required by legal metrology and do not restrict weighing range in general weighing.

Key panel
Contains the switches for executing taring, function setting, or calibration.

Sealing sticker
Please do not remove.

Level screws
Adjusted for level installation of the balance.



Data I/O connector

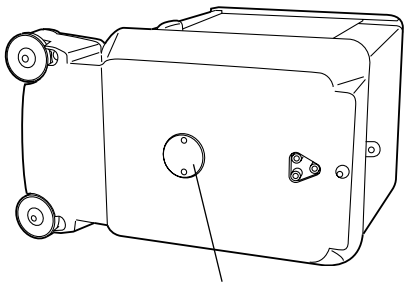
Keyboard connector

RS-232C connector

DC IN connector

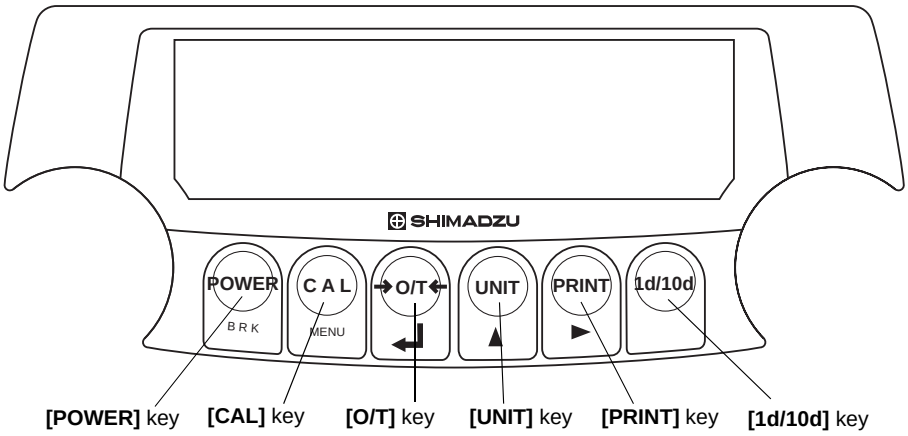
Theft prevention ring
For chains or other attachments.

Ground terminal attachment screw



Below-weigh hook cover

2.2 Key Panel and Operation



The following is a list of the functions for each key.

Key	During Measurement	
	Pressed once and released	**Pressed and held for about 3 seconds**
[POWER]	Switches between the operation and standby modes.	Switches the key notification buzzer on/off.
[CAL]	Enter calibration or menu item selection.	Enter calibration or menu item selection.
[O/T]	Tares the balance. (Displays zero.) *1	
[UNIT]	Switches the units of measurement.	
[PRINT]	Outputs the displayed values to an electronic printer, computer, or other external devices.*2	Outputs the date and time to external devices. (Not with AUY)
[1d/10d]	AUW/AUX/AUY: Switches display between 1d/10d. (Minimum display is rounded by one digit.) *3	
	AUW-D: Switches the weighing range.	

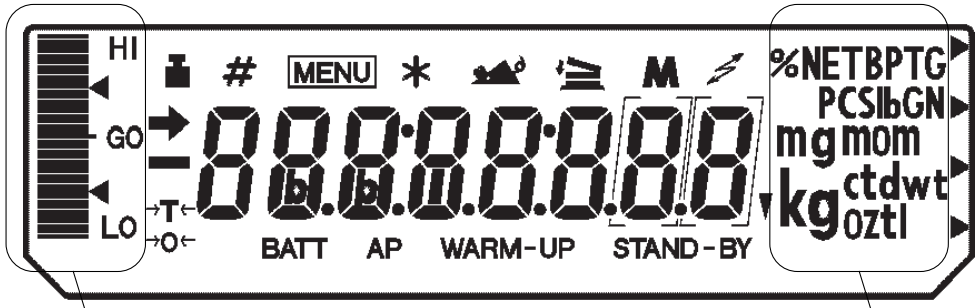
*1 Either “Taring” (at a weight exceeding 2.0% of the capacity) or “Zero-setting” (at a weight within 2.0% of the capacity) takes place with a verified balance as a legal measuring instrument in EU.

*2 Output is not made until the display is stable with a verified balance as a legal measuring instrument in EU.

*3 Not applicable to a verified balance as a legal measuring instrument in EU.

Key	During Menu Item Selection	
	Pressed once and released	**Pressed and held for about 3 seconds**
[POWER]	Return to the menu above the current menu level.	Returns to mass display.
[CAL]	Moves to the next menu item.	
[O/T]	Select or set the displayed item, or enter into the displayed menu.	
[UNIT]	Numerical value input, increases the numeric value of the blinking digit by 1.	
[PRINT]	Numerical value input, moves the blinking digit.	
[1d/10d]	No effect.	

2.3 Balance Display and Functions



Bar graph display section

Units display section

(Some of the symbols and characters on the balance display are not used by this balance.)

Display	Name	Description
➡	Stability mark	Indicates that the weighed value is stable. In menu selection, indicates the currently selected item.
→T←	Tare symbol	Indicates that Taring has been made at over 2.0% of the capacity.
→0←	Zero symbol	**Note: Using a verified balance as a legal measuring instrument in the EU:** Indicates that the balance is set exactly to "Zero" with the zero-setting function (within ±0.25e: e = verification scale interval).
	Weight symbol	Appears during span calibration. Blinks before automatic calibration starts. Blinks to advise necessity of span calibration.
[ ]	Bracket	**Note: Using a verified balance as a legal measuring instrument in the EU:** The figure(s) bordered by the bracket is(are) the auxiliary indicating device.
#	Number symbol	Indicates numeric value entry.
MENU	Menu symbol	Appears during menu selection. Always shown when the menu is locked.
	Add-on symbol	Indicates set-up of Add-on mode or Formulation mode.
M	Memory symbol	Indicates set-up of Formulation mode.
	Communication symbol	Indicates communication with external devices via RS-232C cable or Data I/O connector. Shown when communication functions are ON.
BATT	Battery symbol	Indicates a low battery voltage when using the balance with the optional battery pack.
AP	Auto Print symbol	Indicates set-up of the Auto Print function.
STAND-BY	Standby mark	Appears during standby status. Indicates standby of the interval timer output function.
▼	Inverse triangle	Illuminates as part of the solid specific gravity measurement display.

3. Specifications

Series name		AUW-D series (Dual range type)		AUW series			AUX Series			AUY series	
Model name		AUW220D	AUW120D	AUW320	AUW220	AUW120	AUX 320	AUX220	AUX120	AUY220	AUY120
Capacity		220g/82g	120g/42g	320g	220g	120g	320g	220g	120g	220g	120g
Minimum display		0.1mg/0.01mg	0.1mg/0.01mg	0.1mg	0.1mg	0.1mg	0.1mg	0.1mg	0.1mg	0.1mg	0.1mg
Repeatability (standard deviationσ)		≤0.1mg (220g range) ≤0.05mg (82g range)	≤0.1mg (120g range) ≤0.02mg (42g range)	≤0.15mg	≤0.1mg	≤0.1mg	≤0.15mg	≤0.1mg	≤0.1mg	≤0.1mg	≤0.1mg
Linearity		±0.2mg (220g range) ±0.1mg (82g range)	±0.2mg (120g range) ±0.03mg (42g range)	±0.3mg	±0.2mg	±0.2mg	±0.3mg	±0.2mg	±0.2mg	±0.2mg	±0.2mg
Response time (typical)		3s (220g range), 10s (82g range, Pouring mode)	3s (120g range), 10s (42g range, Pouring mode)	3 s							
Calibration weight		Built-in								None	
Operation temperature range		5 to 40 deg.C									
Temperature coefficient of sensitivity (10 to 30 deg.c)		±2ppm/deg.C (when PSC function is Off)								±2ppm/deg.C	
Sensitivity stability(10 to 30 deg.c)		±2ppm (when PSC function is On)									
Pan size		80mm dia Approx.									
Main body dimensions		220mm W X 330mm D X 310mm H									
Main body Weight		7kg Approx.									
Rated electric power supply		DC 12V, 1A									
Data I/O		RS-232C									
Pollution Degree		2									
Overvoltage Category		Category II									
Altitude		Up to 2000 m									
Installation Site		device may only used indoors									
AC adapter (primary)		AC 100-240 V, 400mA 50/60Hz									
Function	Display backlight			●	●	●					
	PSC automatic span calibration	●	●	●	●	●	●	●	●		
	Clock-CAL	●	●	●	●	●					
	Built-in clock	●	●	●	●	●	●	●	●		
	GLP/GMP/ISO calibration report	●	●	●	●	●	●	●	●		
	WindowsDirect	●	●	●	●	●	●	●	●	●	●
	Interval timer output	●	●	●	●	●	●	●	●		
	RS-232 C I/F	●	●	●	●	●	●	●	●	●	●
	Specific gravity measurement software, piece counting, % display, unit conversion	●	●	●	●	●	●	●	●	●	●
	Analog display	●	●	●	●	●	●	●	●	●	●
	Battery (option)	●	●	●	●	●	●	●	●	●	●

3. Specifications

ECTA series name		AUW-D series (dual range type)		AUW series			AUX series			AUY series	
Model name		AUW220D	AUW120D	AUW320	AUW220	AUW120	AUX320	AUX220	AUX120	AUY220	AUY120
g	Accuracy class	I	I	I	I	I	I	I	I	I	I
	Capacity	220g/82g	120g/42g	320g	220g	120g	320g	220g	120g	220g	120g
	Verification scale interval (e)	0.001g	0.001g	0.001g	0.001g	0.001g	0.001g	0.001g	0.001g	0.001g	0.001g
	Number of verification scale interval	220000	120000	320000	220000	120000	320000	220000	120000	220000	120000
	Scale interval (d)	0.0001g/ 0.00001g	0.0001g/ 0.00001g	0.0001g	0.0001g	0.0001g	0.0001g	0.0001g	0.0001g	0.0001g	0.0001g
	Range of use	0.001g to 220g	0.001g to 120g	0.01g to 320g	0.01g to 220g	0.01g to 120g	0.01g to 320g	0.01g to 220g	0.01g to 120g	0.01g to 220g	0.01g to 120g
	Tare range (by subtraction)	220g	120g	320g	220g	120g	320g	220g	120g	220g	120g
ct	Accuracy class	I	I	I	I	I	I	I	I	I	I
	Capacity	1100ct/410ct	600ct/210ct	1600ct	1100ct	600ct	1600ct	1100ct	600ct	1100ct	600ct
	Verification scale interval (e)	0.01ct	0.01ct	0.01ct	0.01ct	0.01ct	0.01ct	0.01ct	0.01ct	0.01ct	0.01ct
	Number of verification scale interval	110000	60000	160000	110000	60000	160000	110000	60000	110000	60000
	Scale interval (d)	0.001ct/ 0.0001ct	0.001ct/ 0.0001ct	0.001ct	0.001ct	0.001ct	0.001ct	0.001ct	0.001ct	0.001ct	0.001ct
	Range of use	0.01ct to 1100ct	0.01ct to 600ct	0.1ct to 1600ct	0.1ct to 1100ct	0.1ct to 600ct	0.1ct to 1600ct	0.1ct to 1100ct	0.1ct to 600ct	0.1ct to 1100ct	0.1ct to 600ct
	Tare range (by subtraction)	1100ct	600ct	1600ct	1100ct	600ct	1600ct	1100ct	600ct	1100ct	600ct
Calibration weight		Built-in								None	
Ambient operation temperature		10 to 30 deg.C									
Pan size		80mm dia approx.									
Main body dimensions		220mmW X 330mmD X 310mmH approx.									
Main body weight		7kg approx.									
Rated electric power supply		DC 12V, 1A									
Data I/O		RS-232C									
Pollution Degree		2									
Overvoltage Category		Category II									
Altitude		Up to 2000 m									
Installation Site		device may only used indoors									
AC adapter (primary)		AC 100-240 V, 400mA 50/60Hz									
Function	Display backlight			●	●	●					
	PSC automatic span calibration	●	●	●	●	●	●	●	●		
	Clock-CAL	●	●	●	●	●					
	Built-in clock	●	●	●	●	●	●	●	●		
	GLP/GMP/ISO calibration report	●	●	●	●	●	●	●	●		
	WindowsDirect	●	●	●	●	●	●	●	●	●	●
	RS-232C I/F	●	●	●	●	●	●	●	●	●	●
	Specific gravity measurement software, piece counting, % display	●	●	●	●	●	●	●	●	●	●
	Analog display	●	●	●	●	●	●	●	●	●	●

4. Installation

4.1 Installation Site

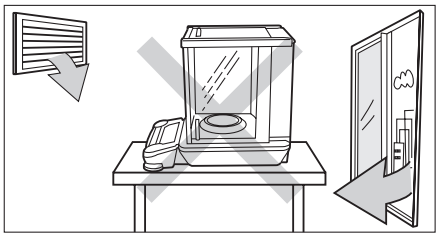
(1) Power Requirements

Select an installation site that is near a power source to allow the use of the attached AC adapter or a site where the special accessory battery pack can be properly used. Verify that the power voltage conforms to that indicated on the AC adapter.

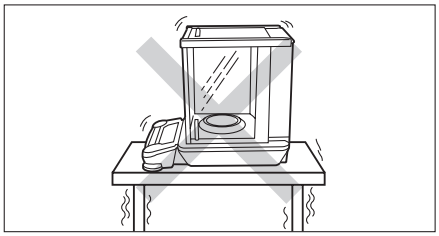
(2) Installation site

Caution

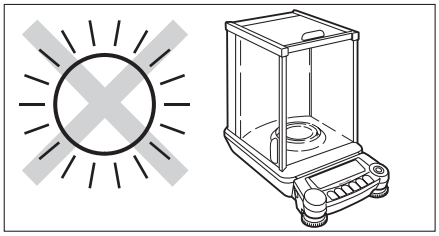
The balance must be installed in a proper place to ensure safe and accurate measurement. Avoid the following types of sites.



- Sites with air current from air conditioners, ventilators, open doors, or windows.



- Sites with vibration.



- Sites in direct sunlight.

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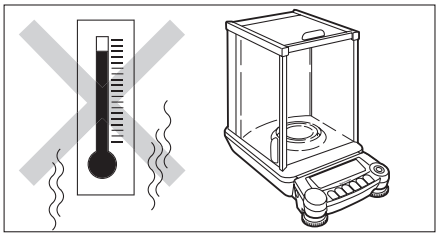


- Sites with extreme temperature changes, or high/low temperature, or high/low humidity.
- Sites near flammable or corrosive gases.
- Sites with dust, electromagnetic waves, or magnetic fields.

Install on a sturdy and level tabletop in the room. Stone is recommended. Rather than the middle of the room, the edges and corners are generally appropriate for vibration-free measurement.

Caution

The glass doors open backwards beyond the rear end of the main body. Make certain enough space is saved to allow the doors fully open.

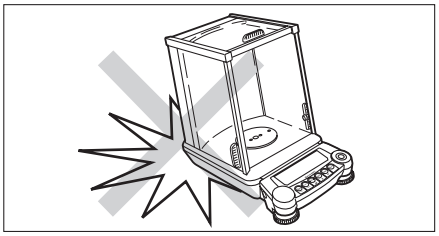
Note

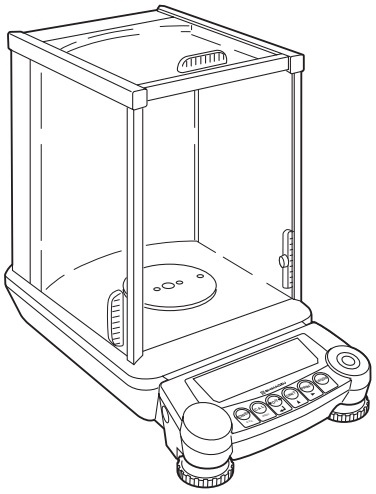
Using a verified balance as a legal measuring instrument in the EU:
The balance must be used within the temperature range indicated on the verification label.

4.2 Unpacking and Delivery Inspection

Caution

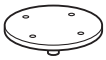
Analytical balance is a precision instrument. Make certain not to allow any impact when placing it on the table.



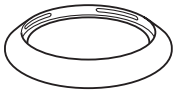


Balance main body

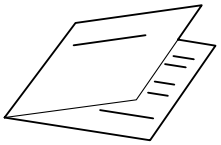
Pan



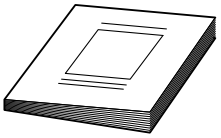
Pan supporter



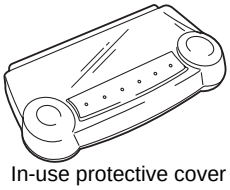
Anti-draft ring



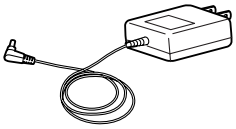
Explanatory operation sheet



Instruction manual



In-use protective cover



AC adapter

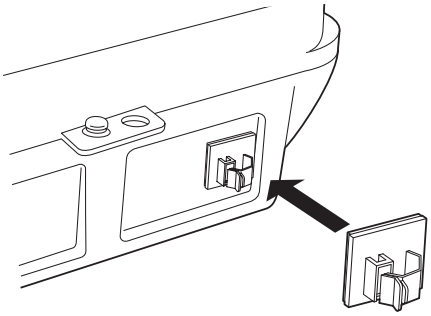
Adapter cable holder

Verify that there has been no damage and that the following standard packing items are present. Contact your local distributor in case of damaged or missing items.

Standard packed items and quantity

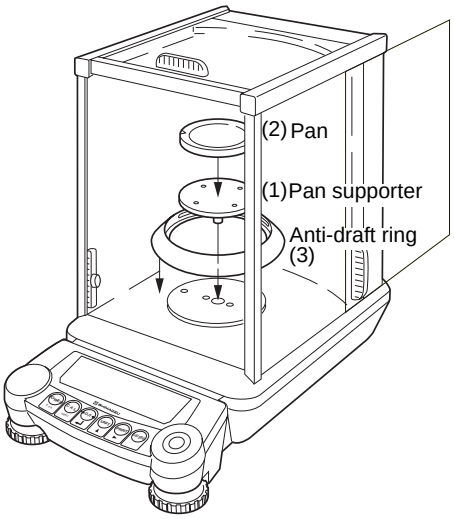
Standard packed items	quantity
Balance main body	1
Pan	1
Pan supporter	1
Anti-draft ring	1
AC adapter	1
Adapter cable holder	1
Instruction manual	1
Explanatory operation sheet	1
Inspection certificate	1
In-use protective cover	1

4.3 Installation



1 Attach the adapter cable holder.

Peel the protective sheet of adhesive off the adapter cable holder , and stick it on the back of the balance as shown in the figure.



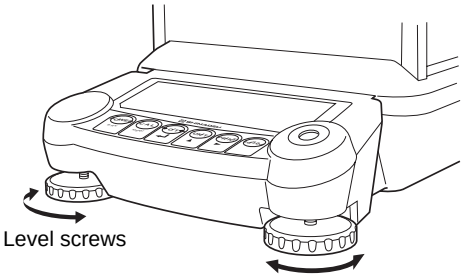
2 Place the balance main body on the installation site.

3 Attach the pan supporter, the pan, and the anti-draft ring.

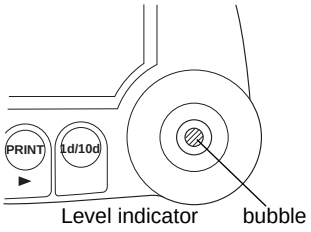
(1) Gently attach the pan supporter on the center axis of the weighing chamber.

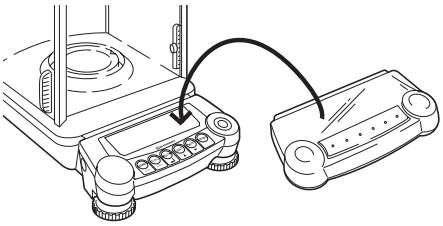
(2) Gently place the pan on the pan supporter.

(3) Place the anti-draft ring.



4 Adjust the horizontal level. (level adjustment) There are two level screws on the front of this balance. The screws grow longer when turned in clockwise direction from above and they grow shorter when turned counter-clockwise. Adjust the level screws until the bubble in the level indicator is in the middle of the red circle.





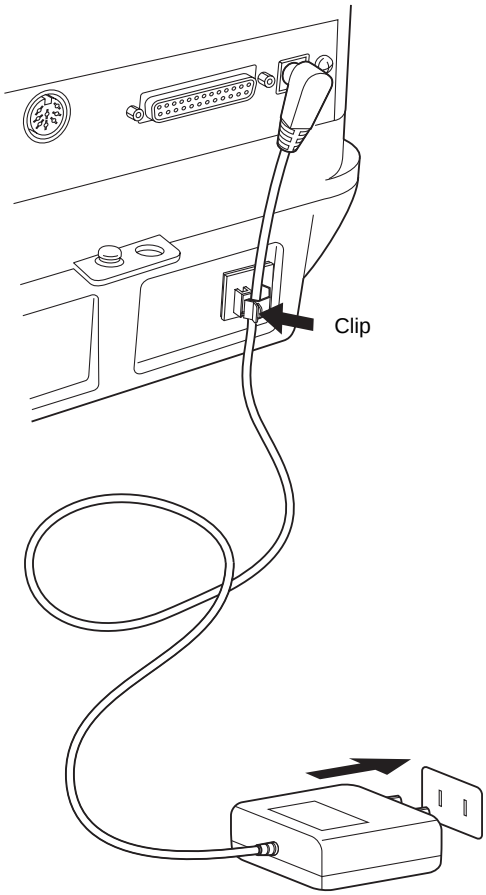
5 Attach the In-use protective cover.

When the key panel and the display must be protected from dirt and wear, place the cover over the key panel.

Note

Using a verified balance as a legal measuring instrument in the EU:
Legal regulations require a verified balance be sealed. This control seal is a self-destructive adhesive label. This seal is irreparably damaged invalidating the verification, if you attempt to remove it. The balance must then be re-verified before it is used for legal measurements.

4.4 Turning On the Power

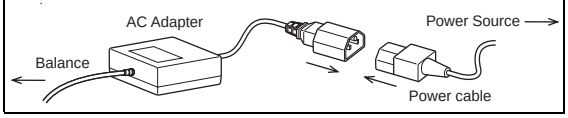


1 Insert the AC adapter plug in to the DC IN connector on the back of the balance. Place the AC adapter cable as shown in figure and hold it with the adapter cable holder.

2 Plug the AC adapter to the power outlet. After the balance performs a self check, calibration will be automatically executed. During this process, the display will change as follows. “CHE 5”, “CHE 4” ..... “CHE 0”, “*.**-*.**”, “CAL 2”, “CAL 1”, “CAL 0”, “CALEnd”, “oFF” (This span calibration immediately after power up can be aborted by pressing the [POWER] key, however at least one span calibration is necessary before use. The AUY series does not perform calibration and the display showing “CAL...” will not appear.)
“*.**-*.**” shows version number of software.

Note

A power cable may be necessary to connect the AC adapter to the power source, depending on the type of the AC adapter



3 Press the **[POWER]** key. After all displays appear, the gram (g) display appears. Also, the display backlight illuminates (AUW series only).

4 Pressing the **[POWER]** key again turns on the standby symbol and puts the balance in standby (warm up) status. (For AUW-D/AUW/AUX series, the current time is displayed according to the built-in clock settings in 8. For the AUW series, the backlight will turn off.)

4.5 Span Calibration

Note

Using a verified balance as a legal measuring instrument in the EU:
Span calibration must be performed once the balance is installed and before using the balance as a legal measuring instrument in the EU. The balance must be connected to power and warmed up for at least one hour prior to span calibration and use as a legal measuring instrument.
When intending to use the AUW-D series in the small range (minimum display d=0.01mg), warm it up for at least four hours.

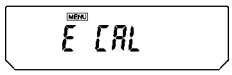
After installation, be certain to complete warm up and span calibration. During span calibration, the balance must be left in a very stable condition. To do this, leave the power on at standby (warm up) for an hour or more before performing calibration. When using the AUW-D series in the small range (minimum display 0.01mg), leave the power on for at least four hours. Also, perform calibration in conditions without people entering and leaving the room and without air flow or vibration. The AUW series is equipped with display backlight. Use of the backlight requires warm up in mass display such as "g", not in standby state. The default setting of backlight is ON.

For AUW-D/AUW/AUX Series (No operation is required)
Fully-automatic span calibration by PSC
The default setting is ON for PSC, which performs fully-automatic span calibrations. When PSC is ON, span calibration is automatically performed, if necessary, when the gram display first appears after the balance is turned ON (See 4.4). When PSC operates, the weight symbol starts blinking about two minutes beforehand for notification. During operation, the display will automatically change and the motor sound of the weight loading system is heard. In order to ensure proper PSC operation, prevent vibrations and air flow. When gram display returns after completion of span calibration by PSC, measurement can begin according to 5. Basic Operation. (Fully-automatic span calibration by PSC is set to ON by default. Also, span calibration with built-in calibration weight is set as preset calibration method by default. For other methods, please refer to 10. Calibration. The AUW-D/AUW series also allow Clock-CAL function to perform span calibrations regularly by time settings.

Note

For accurate measurement, perform span calibration again when the balance is moved or when the temperature of the installation site has changed. It is recommended that either PSC or Clock-CAL be set to ON so that the necessary calibrations will operate automatically.

For AUY Series
Span calibration with external weights



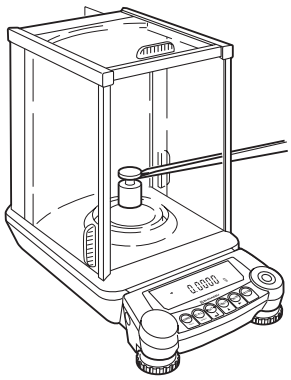
(Example)

1 Leave the pan with nothing on, in g display mode.

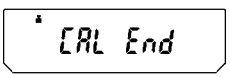
2 Press the **[CAL]** key once. “E-CAL” will be displayed.

3 Press the **[O/T]** key. The zero display will blink. Stability is confirmed after about 30 seconds and the value of the weight that should be loaded will blink.

4 Open the glass door, load the weights of the amount shown, and close the glass door of the weighing chamber.



5 After a short time, the zero display will blink. Remove the weight from the pan and close the glass door. After “CAL End” appears, the display returns to g display mode and the calibration is complete.



Span calibration by external weights is set for routine calibration by default in AUY series. For other methods, see 10. Calibration.

Note

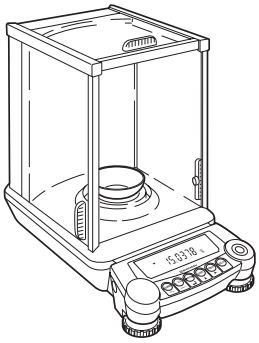
For accurate measurement, perform calibration again when the balance is moved or when the temperature of the installation site has changed. Daily calibration before use is recommended.

5. Basic Operation

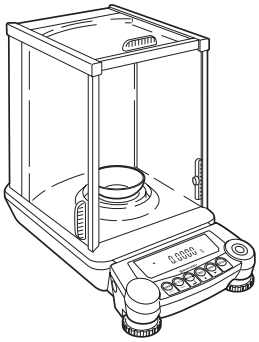
(Read Chapters 1 to 5 for basic but proper operation of the balance.)

> **Note**
>
> Before using the balance, warm up thoroughly (at least one hour) and calibrate. When intending to use the AUW-D series in the small range (minimum display 0.01mg), warm it up for at least four hours.

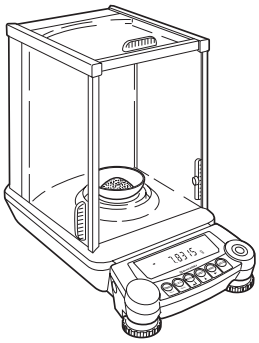
5.1 Weighing



1 Open one of the glass doors of the weighing chamber, place the weighing vessel (container) on the pan, and close the glass door again. (When using a container)



2 Wait for the display to stabilize and press the **[O/T]** key (taring). The appearance of the stability mark (➡) indicates a stable state. The display will read zero.



3 Open the glass door, place the items to be weighed in the weighing vessel and close the glass door.

4 After the display stabilizes, read the display.

Note

- Except when placing or removing items or calibration weights to and from the weighing chamber, keep the glass doors closed unless otherwise described in this manual.
- Air convection causes measurement error if the temperatures of the weighed item and the chamber are different. In order to avoid this, equalize the temperatures by leaving the item in the extra space within the chamber before weighing.

Notes

Using a verified balance as a legal measuring instrument in the EU:
Indicates that the balance is set exactly to “Zero” with the zero-setting function (within ±0.25e: e = verification scale interval).

Using a verified balance as a legal measuring instrument in the EU:
The balance must be used within the temperature range indicated on the verification label.
When PSC (refer to 10.3.2), fully-automatic span calibration, is not activated, operator must carry out span calibration (refer to 10.2) upon blinking of the Weight Symbol.

5.2 Changing the Unit Display

Pressing the **[UNIT]** key switches display between the registered units, piece counting and specific gravity measurement modes. The units other than 'g', 'pcs', '%' and 'ct' are not registered in the default settings.

Note

The units to be used must be registered as described in 12.Units. If the power is turned off and turned on again, the weighing unit will be 'g'. (The registered units remain.)

5.3 Switching the Weighing Range (AUW-D series only)

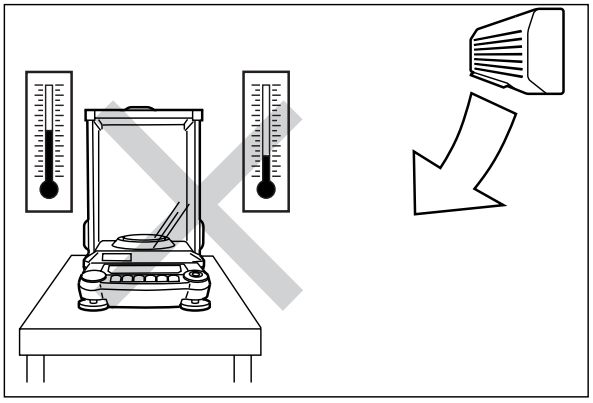
In the dual-range balance AUW-D series, when the power is connected and turned on, the balance is set to the “small range” with a minimum display of 0.01mg. To switch to the “large range” with a minimum display of 0.1mg, press the **[1d/10d]** key (except for AUW-D series, this key has a different function. →9.2) . When measurement exceeds the small range capacity (82g for AUW220D, 42g for AUW120D) during use of the small range, display automatically switches to the large range. In this case, taring with **[O/T]** key in the large range will fix the range, and reducing the load on the pan within the small range capacity will not return it to the small range. **[O/T]** key has to be pressed again, within the small range, to resume the small range display.

Small range 

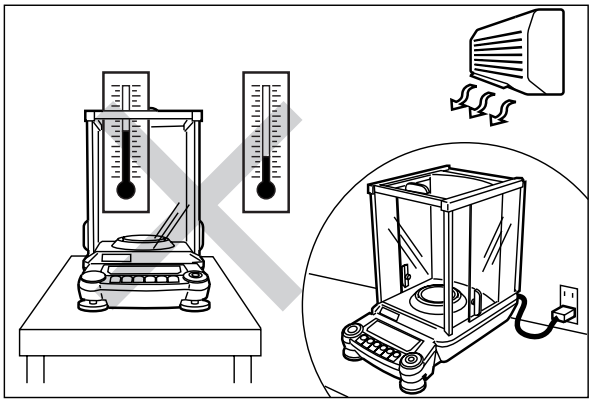
Large range 

5.4 For Stable Measurement in Semi-micro Range
(AUW-D series only)

The small range (semi-micro range, minimum display 0.01mg) of AUW-D series dual range balances produces excellent response and stability. However, weighing in the 0.01mg range is generally more subject to the environment and how measurements are performed compared to the 0.1mg range. When using the small range of AUW-D series, observe the following instructions in order to obtain the best result.

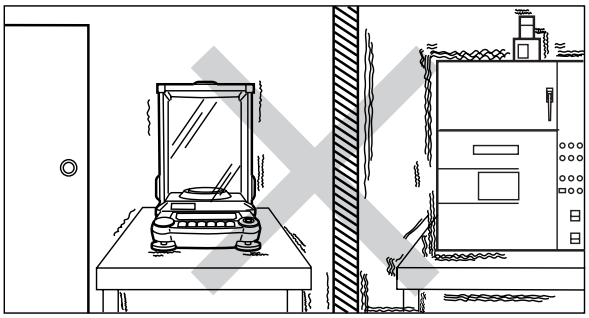


Avoid air current from the air conditioner. When the air conditioner is in operation, the temperature of the air current from it has a large difference from the room temperature. Air current and presence of different temperatures both make the measurement unstable.

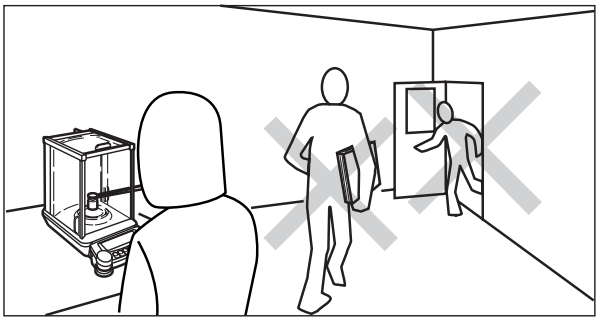


The temperature of the balance does not change as fast as the room temperature. Changing room temperature prior to measurement causes temperature difference remaining for a long period. Even without direct blow of air current, contact of air of different temperatures generate air convection in the weighing chamber and result in unstable display.

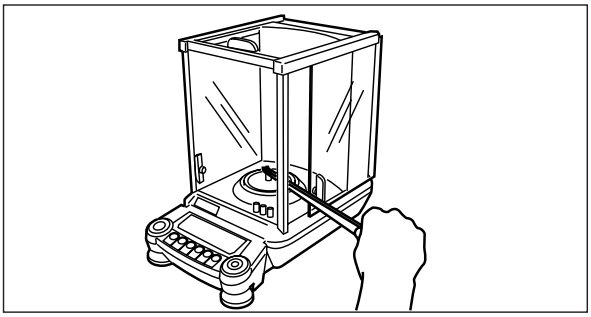
- Leave the glass doors open while not in use. This prevents temperature gap between weighing chamber and ambience.



Avoid the location where vibration from any machinery is transmitted.
Corners of a room are less subject to influence of vibration.



Do not use the door of the room. Do not allow other people enter, exit or move in the room.



Open glass door minimum. Use long tweezers etc. Equalize the temperature of the samples to the chamber's.
Remove influence of the heat emitted from human body and the heat from the sample to be weighed.
Equalize the temperature of the object to be weighed to that of balance weighing chamber (If possible keep the object in the extra space of the chamber prior to measurement). Use a long pair of tweezers, spatula or other instruments to keep hands away from the weighing chamber. Open the glass door as little as possible when loading / unloading.

6. WindowsDirect Function

6.1 What is WindowsDirect?

The AUW-D/AUW/AUX/AUY series can transfer data directly to a computer running MS-Excel, mass input window of analytical instrument software or other applications on Windows®* OS, as if the numeric value in the balance display were typed from the keyboard. This function is called WindowsDirect. It uses components that are already part of the Windows OS, and does not need communication software to be installed. Combination with Auto Print function (13.4) is also possible to further enhance productivity. WindowsDirect does not allow the computer to send commands to the balance. In order to control the balances, programming with command codes (14.2.3) is required.

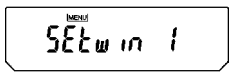
- Only numerical values can be transferred through WindowsDirect.

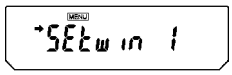
6.2 WindowsDirect Settings

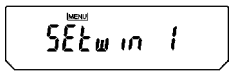
Simple settings are made for the balance and the computer. Connection is by RS-232C cable specified by Shimadzu.

If bi-directional communication software is used: WindowsDirect function should be turned off. Set up the optimal communication parameters for the software according to“14.3 Communication setting”.

6.2.1 Setting the Balance







(Example)

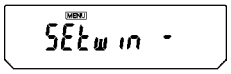
1 From the mass display, press the **[MENU]** key twice. “SEtwin |” appears.

2 Press the **[O/T]** key. Now all the communication settings for WindowsDirect are made. After setting, the stability mark appears. At this time, pressing the **[O/T]** key again unsets the WindowsDirect and returns the communication settings to the default settings.

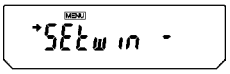
3 Press the **[POWER]** key to go to STAND-BY, then unplug the AC adapter cable from the balance. This is necessary after the above setting.

Notes

- When data is outputted to the computer by WindowsDirect function, the effect is the same as “typing the numerical value displayed on the balance and pressing Enter key on the computer’s keyboard”. If you wish the effect of “**pressing → key**” instead of “**pressing Enter key**” on the computer’s keyboard”, select “SEtwin -” in the above step **1**, instead of “SEtwin |”. The “SEtwin -” setting menu display appears when the **[MENU]** key is pressed one more time from “SEtwin |”.



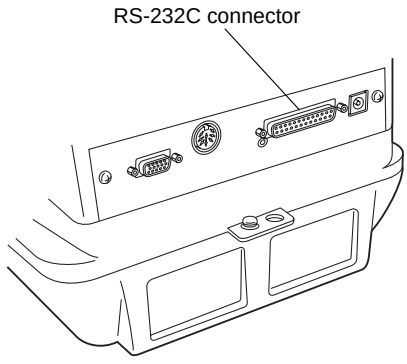
(When not set)



(When set)

- The communication parameters selected by “SEtwin -” or “SEtwin |” settings here are listed in the table in 14.3.2.
- After WindowsDirect setting has been made using the “SEtwin -” or “SEtwin |” setting, individual communication parameters can be changed using the Communications Settings menu (14.3). In this case, the ➡ (stability mark) may still appear if you go to the “SEtwin -” or “SEtwin |” display but WindowsDirect may not operate. To restore WindowsDirect optimal settings then, first remove the stability mark by pressing the **[O/T]** key at the “SEtwin -” or “SEtwin |” display. This restores the default Communications settings. Then, reset “SEtwin -” or “SEtwin |” following the procedure described in 6.2.1.

6.2.2 Connecting the RS-232C Cable



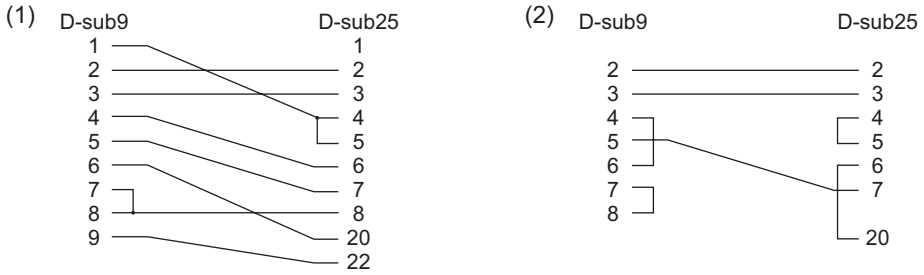
1 Check that the balance is in “oFF” or “STAND-BY” status.

2 Remove power from the balance and turn off the computer.

3 Connect the RS-232C cable to the RS-232C connector on the back of the balance.

4 Connect the RS-232C cable to the computer.

When using WindowsDirect, use a Null modem cable of one of the below wirings.

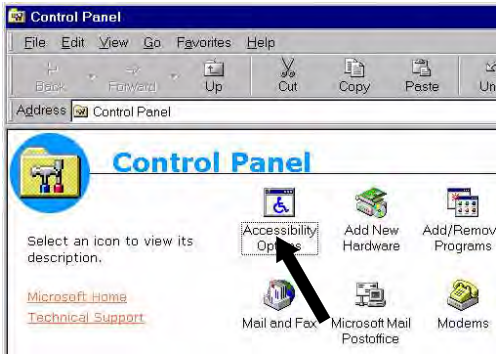


A cable of hte (1) wiring is available as an optional accessory.

RS-232C Cable 25P-9P (1.5m) P/N 321-60754-01

6.2.3 Setting Up the Computer

(leave the balance unplugged)

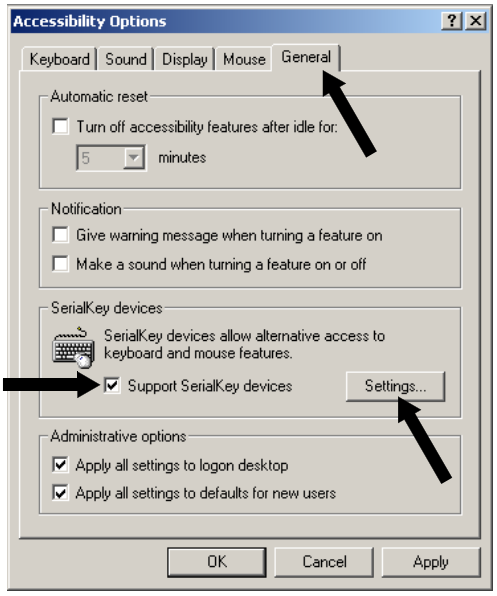


1 Turn ON the power to the computer and start Windows®*.

2 Click “Start”, choose “Settings”, and “Control Panel”.

3 Select “Accessibility Options.”

4 Verify that there are no check marks for any items on all five tabs including “General.”



5 Put a check mark at “Support Serialkey device” in the “General” tab. This should be the only check mark on all the tabs of Accessibility Options unless “Administrative options” appears in the “General” tab. Put check marks at both the items of “Administrative options” to maintain the settings even after restarting Windows®.

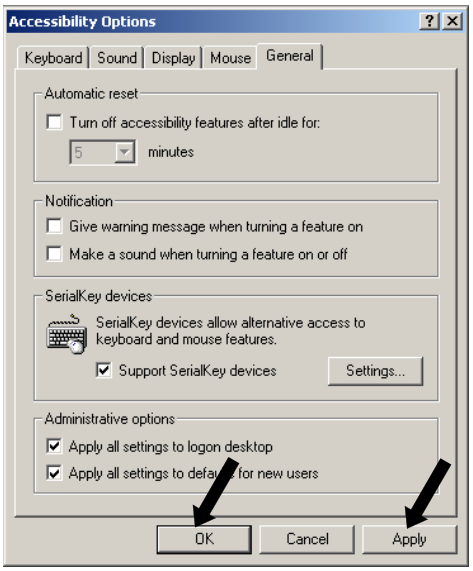
6 Open “Settings”.

7 Select the serial port corresponding to the RS-232C port of your personal computer. (Serial port: any one of COM1 to 4. Usually, COM1)

8 Select a “Baud rate” of 300.

9 Click “OK”.

10 Click “Apply” and wait.



11 Click “OK”.

6.2.4 Start and Checking Operation

1 Confirm Windows® is free from any application.

2 After Windows® has completely started, connect power cable from the AC adapter to the balance, when “oFF” is displayed, press the **[POWER]** key. The mass display appears.

> **Note**
>
> Turning on the balance before Windows®* is completely activated may cause incorrect operation.

3 Open the “Note pad” accessory in Windows®* (or start the application you wish to use).

4 Press the **[PRINT]** key of the balance.
Verify that the numeric value displayed on the balance appears at the cursor position on the screen of computer. The effect is the same as typing the value from the computer keyboard and pressing the ENTER key. Characters indicating the unit of measure are not sent to the computer.

5 Test combination with Auto Print function, if you wish to use it.

6 End the operation using the standard close or exit procedure.

Windows®* = Windows® 95, Windows® 98, Windows® Me, Windows® 2000, Windows® XP, and higher.

6.3 Troubleshooting the WindowsDirect Communication Function

If the WindowsDirect communication function doesn't run properly, check the following points.
If this doesn't resolve the problem, contact your Shimadzu representative.

Q1 WindowsDirect communication has been set but it is not operating at all.

A1

- Check the type of communications cable used for the connection (Shimadzu authorized part or another part available on the general market) and the soundness of the connection.
- If a USB serial converter is used, depending on the circumstances at the setup there is a possibility that it has been automatically set to a COM port number higher than 4, and in this case you should reassign it to a COM port number that can be used by serial key devices (COM1 to COM4).
- It is possible that the driver used as an accessory with the USB serial converter has not been set up properly. Try uninstalling the driver and installing it again.
- Some notebook PCs feature a setting for disabling RS-232C ports as a power-saving measure. Before trying to use the WindowsDirect communication function, make the setting that enables the use of RS-232C ports.
- Communications with other applications and PCs via a LAN may interfere with the serial key device settings. Try using WindowsDirect communication without using the LAN.

Q2 The WindowsDirect communication function won't work after I restart the PC.

A2

- Some PCs don't recognize that a serial key device has been set when they start up. For details on how to deal with this, contact your Shimadzu representative.

Q3 I want to use the WindowsDirect communication function with Windows Vista.

A3

- Windows Vista doesn't have the serial device setting screen that is required to set the WindowsDirect communication function. For details on the setting, contact your Shimadzu representative.

Q4 Data is input to the PC as garbled characters.

A4

- Either the balance or the PC is not set for the WindowsDirect connection function. Make the settings again.

Windows®* = Windows® 95, Windows® 98, Windows® Me, Windows® 2000, Windows® XP, and higher.

Q5 When data is input into Excel, the cursor doesn't move to another cell.

A5

- If a function for conversion to 2-byte characters is available in Windows, turn the setting for this function off.
- Click the [Edit] tab under [Options] in Excel and check [Move selection after Enter] (if cells move in response to keyboard input there is no problem).
- Check the input data in another application (e.g. Notepad).

Q6 The operation is sometimes abnormal.

A6

- Depending on the processing capability of the PC, malfunctions may occur if the communications speed is high. Set 300 bps for the communication speed. Malfunctions may also occur if the interval for data transmission from the balance is too short. Ensure that one batch of data is displayed on the screen before the next batch of data is sent. And if there is limited processing capability, don't use the continuous output function.
- When data is sent from the balance, don't touch the PC's keyboard or mouse.

7. Menu Item Selection

7.1 What is a menu?

The AUW-D/AUW/AUX/AUY series is equipped with many useful functions. The menu is provided to allow the operator to efficiently select the functions that meet the operator's objectives. Understand the menu procedures to gain full command of the functions provided in the AUW-D/AUW/AUX/AUY series. Procedures of each menu item selection are explained with the display examples in chapters 8 to 14. However, when selecting menu items, refer to the menu map for more efficient setting.

7.2 What is a menu map?

The AUW-D/AUW/AUX/AUY series menu consists of four levels. The menu map displays this hierarchy in an easy-to-understand format. The map allows quick access to the menu item desired. Also, it gives the default settings information. The menu map is in Appendices A-1.

7.3 Menu Item Selection Procedures

See the menu map (Appendix A-1).
The AUW-D/AUW/AUX/AUY series menu consists of four levels with the most often used menus in the first level for an easy-to-use structure. The menu can be entered by pressing the **[CAL]** key from the mass display. The menu operation keys for movement in the menu tree are shown in the following table. From any menu level, pressing repeatedly or holding down the **[POWER]** key returns to the mass display.

Operated key	During Menu selection		
	Pressed once and released	**Pressed and held for about 3 seconds**	**Moving direction on Menu Map**
[POWER]	Return to the menu above the current menu level.	Returns to mass display.	←
[CAL]	Moves to the next menu item.		↓
[O/T]	Select the displayed menu item, or move to the next menu below the current menu level.		→
[UNIT]	In numerical value input, increases the numeric value of the blinking digit by 1.		
[PRINT]	In numerical value input, moves the blinking digit to the right.		
[1d/10d]	No effect.		

1 Press the **[CAL]** key from the mass display. “i-CAL” appears. (The type of regular-use calibration appears. “i-CAL” is default of AUW-D/AUW/AUX series. In the AUY series this is “E-CAL” or “E-tESt”.)

2 After that, pressing the **[CAL]** key changes the display in the order shown below.