





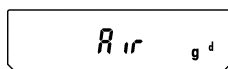
- (e) Select either the hold display mode or the continuous display mode for the specific gravity value display. Press the **[CAL]** key repeatedly until [SG Hold] appears.



Each time the **[O/T]** key is pressed the “” symbol on the left side of the display turns on or turns off. The display is configured as shown below according to the on/off state of “”.

 on: Hold display mode

 off: Continuous display mode (the specific gravity value is updated according to the change of weight in water)

- (f) Press the **[POWER]** key again to return to the mass display.





- 5** When the **[UNIT]** key is pressed a number of times from the mass display, [Airgd] appears for about two seconds. Afterward, the display switches to the [gd] display. This is the sinker weight measurement in air mode. During weight measurements in air, “” turns on in the upper-right of the display.

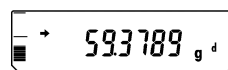
- 6** Press the **[O/T]** key.

- 7** Place the sinker on the balance pan.

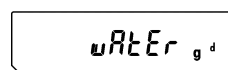
- 8** When the stability mark appears, press the **[CAL]** key. This measures the weight of the sinker in air.

- 9** [wAtEr gd] appears for about two seconds. Afterward, the display switches to the [gd] display. This is the sinker weight measurement in liquid mode. During weight measurements in liquid, “” turns on in the lower-right of the display.

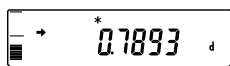
(Example)



(Example)



(Example)



(Hold display mode example)

**10** Place the sinker on the immersed hanging pan. The display shows the weight value in liquid. Press the **[CAL]** key to show the liquid density in the set specific gravity value display mode. Press the **[POWER]** key to return to 9. If air bubbles adhered to the sinker and the result is a density that differs from the expected value, you can recalculate the density by retrying the weight measurement in liquid.

**11** To make the next measurement, unload the pans, press **[CAL]**, and begin again at Step 5.



### Notes


- Although the density display shows 4 decimal places, not all of these digits will stabilize depending on the conditions.
- When the sinker is placed in the sample liquid, it must be completely immersed and must not have bubbles adhering to its surface or the immersed hanging pan.

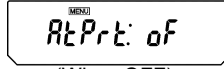
## 13.4 Auto Print

Using Auto Print allows measurement results to be automatically output via the RS-232C connector or DATA I/O connector without pressing the **[PRINT]** key with every measurement. This function can be combined with WindowsDirect (see 6.). When Auto Print is activated, if a sample weighing 10 counts or more is placed on the pan while the mass displayed is within  $\pm 5$  counts of zero, the result is output via the RS-232C cable or DATA I/O connector automatically upon display stabilization.

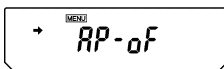
Subsequent sample measurement results will output automatically, if the previous sample is first removed from the pan and the display returns to within  $\pm 3$  counts of zero.

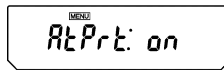
(Example) 



(Example) Setting check  
  
(When OFF)

(Example) During setting  
  
(When ON)

(Example) During setting  
  
(When OFF)

(Example) Setting check  
  
(When ON)



- 1** Press the **[CAL]** key repeatedly from the mass display until “FUnC.SEL” appears. Press the **[O/T]** key. The display will show “CAL”.
- 2** Press the **[CAL]** key repeatedly until “AtPrt:\*\*” appears. the “\*\*” shows the current setting, “on” for on and “oF” for off.
- 3** Press the **[O/T]** key. The display shows “AP-on” and after this, pressing the **[CAL]** key switches the displays between “AP-on” and “AP-oF”. When the current setting is displayed, the stability mark (➔) appears. To change the setting, press the **[O/T]** key when the desired setting appears, or
- 4** Press the **[POWER]** key to return to “AtPrt:\*\*” without changing the setting.
- 5** Pressing the **[POWER]** key again returns to the mass display.
- 6** When the Auto Print mode is set up, the Auto Print symbol appears in the mass display.
- 7** To turn the Auto Print function off, follow steps 1 through 3, above.



### Note

No more than one of the four application modes, Auto Print (13.4), Interval Timer (13.5), Add-on Mode (13.6), Formulation Mode (13.7), can be set ON at the same time.

## 13.5 Interval Timer (AUW-D/AUW/AUX series only)

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

This function automatically outputs the measurement values of the balance at set time intervals.

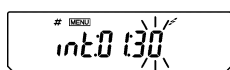
(Example)



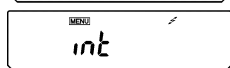
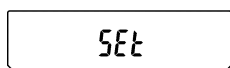
(Example)



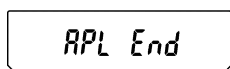
(Example)



(When set to 1 minute, 30 seconds)



(Example)



**1** Press the **[CAL]** key repeatedly from the mass display until “FUnC.SEL” appears. Press the **[O/T]** key to display “CAL”.

**2** Press the **[CAL]** key repeatedly until “int” appears.

**3** Press the **[O/T]** key. “int: \*\*:\*\*” appears. (\*\*\*\* are numbers)

The **[MENU]** symbol and the # symbol appear in order to show number entry mode. \*\*: \*\* shows the current interval setting as [MM:SS] (where MM is minutes and SS is seconds). The leftmost digit blinks.

**4** Pressing the **[UNIT]** key increases the blinking digit by 1. Pressing the **[PRINT]** key moves the blinking digit one place to the right. Set minutes up to 99 and seconds up to 59.

**5** Press **[O/T]** key to set.

**6** Press the **[POWER]** key repeatedly to return to the mass display. The letter “T” and STAND-BY symbol appear indicating interval output standby.

**7** Press the **[PRINT]** key. Automatic output commences and continues at the set interval.

**8** To pause, press the **[POWER]** key.

**9** To discontinue the Interval Timer printing function, hold down the **[POWER]** key during mass display for about three seconds until “APL End” appears. The letter “T” and STAND-BY symbol will disappear.

**Note**

No more than one of the four application modes, Auto Print (13.4), Interval Timer (13.5), Add-on Mode (13.6), Formulation Mode (13.7), can be set ON at the same time.

**Notes**

- The **[O/T]** key can always be used for taring.
- In interval timer standby status, pressing the **[POWER]** key puts the balance in power standby status.
- Using the interval timer function for long periods of time may generate measurement errors due to drift of the balance.
- Short interval settings may not operate properly, depending on the capability of the device receiving the data. In this case, increase the length of the interval.
- During use of the interval timer function, keep PSC (10.3.2) and Clock-CAL (10.3.3) functions off.
- Do not perform any type of calibration while using interval timer function.

## 13.6 Add-on Mode

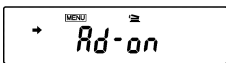
This function is convenient for making many measurements of minute samples. This function automatically output the measurement value and tare after a sample is placed on the pan and the stability mark displays. Pressing the **[POWER]** key displays and output the total.

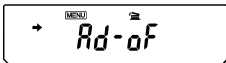
### Setting

(Example) 



(Example) Setting check  
  
(When OFF)

(Example) During setting  
  
(When ON)

(Example) During setting  
  
(When OFF)

(Example) Setting check  
  
(When ON)

  
(Ready for start)

**1** Press the **[CAL]** key repeatedly from the mass display until “FUnC.SEL” appears. Press the **[O/T]** key. The display will show “CAL”.

**2** Press the **[CAL]** key repeatedly until “Addon:\*\*” appears. The “\*\*” shows the current setting, “on” for on, “oF” for off.

**3** Press the **[O/T]** key. The display shows “Addon-on” and after this, pressing the **[CAL]** key switches the displays between “Addon-on” and “Addon-oF”. When the current setting is displayed, the stability mark (➡) appears. Press the **[O/T]** key when the desired setting is shown, to change the setting. When the Add-on Mode is set up. “--- ADDON MODE ---” is outputted.

**4** Press the **[POWER]** key to return to “Addon:\*\*”

**5** Pressing the **[POWER]** key again returns to the mass display.

**6** When the Add-on Mode is set up, the Add-on mode symbol and Standby mark appears in the mass display. It is ready for start.

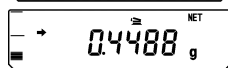
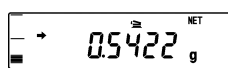
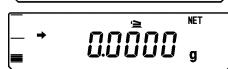
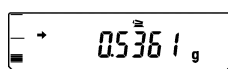


### Note

No more than one of the four application modes, Auto Print (13.4), Interval Timer (13.5), Add-on Mode (13.6), Formulation Mode (13.7), can be set ON at the same time.



(Ready for start)



### Operating Add-on Mode

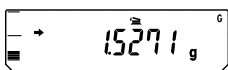
When the Add-on Mode is set on and ready for start, the Add-on symbol and the Standby mark are illuminated in the mass display.

- 1** In the Add-on Mode, place the container (if used) on the pan and press **[O/T]** key to tare. (Taring is accepted when only ready for start.)
- 2** Pressing **[PRINT]** key starts measurement. Standby mark disappears. When GLP Mode ON, some items are outputted. (See 13.8.1)
- 3** Place the sample (first component) in the container. Upon stability, the mass value is outputted automatically with the numbering "CMP001". After output, the display is automatically tared.

The condition of this operation is as below.

- The displayed value is within  $\pm 5$  counts of zero in any unit before placing the sample.
  - The mass of sample is 10 counts or more.
- In the AUW/AUX/AUY series, when the minimum display digit has been eliminated by pressing the **[1d/10d]** key, the evaluation is based on the count number displayed before.

- 4** Repeat the above step 3 until all the component samples have been weighed.



---ADDON MODE---	
CMP001 =	0,5361g
CMP002 =	0,5422g
CMP003 =	0,4488g
TOTAL =	1,5271g

Samples of output  
 Decimal points can be  
 either comma or period in  
 the output. (Refer to 14.4)

## 5 Press the **[POWER]** key.


The measurements up to this point are summed up and displayed on the balance and outputted.

## 6 Clear the pan.

The balance is ready for the next set of measurements at before step 1.



### Note

When Add-on mode is in use, fully-automatic span calibration by PSC (10.3.2) or Clock-CAL (10.3.3) is not performed. Instead, Weight symbol (  ) keeps blinking when span calibration is necessary. Span calibration can be performed between sets of measurements.



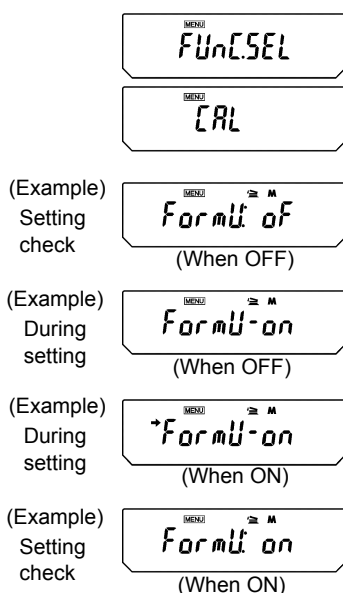
## 13.7 Formulation Mode

This function is convenient for making many measurements of minute samples and seeking the total mass.

In this mode with any unit, when a sample is placed on the pan and **[PRINT]** key is pressed, that value is output via the RS-232C cable or DATA I/O connect and automatic taring is performed each time afterwards. This is repeated every subsequent time a new sample is placed and **[PRINT]** key is pressed. Pressing the **[POWER]** key stops the Formulation mode. When stopped, the measurements up to that point are summed up and displayed.

When the optional printer or computer is connected, the start up is printed out as “----- FORMULATION -----” and upon stop, the total is printed out as “TOTAL=”.

### (Setting Formulation Mode)



**1** Press the **[CAL]** key repeatedly from the mass display until “FUnC.SEL” appears. Press the **[O/T]** key. The display will show “CAL”.

**2** Press the **[CAL]** key repeatedly until “Formu:\*\*” appears. The “\*\*” shows the current setting, “on” for on, “oF” for off.

**3** Press the **[O/T]** key. The display shows “Formu-on” and after this, pressing the **[CAL]** key switches the displays between “Formu-on” and “Formu-oF”. When the current setting is displayed, the stability mark ( ➡ ) appears. Press the **[O/T]** key when the desired setting is shown, to change the setting, or

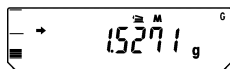
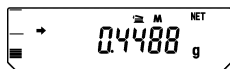
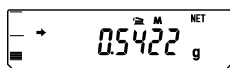
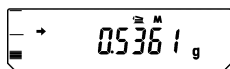
**4** Press the **[POWER]** key to return to “Formu:\*\*”.

**5** Pressing the **[POWER]** key again returns to the mass display.



### Note

No more than one of the four application modes, Auto Print (13.4), Interval Timer (13.5), Add-on Mode (13.6), Formulation Mode (13.7) can be set ON at the same time.



---Formulation Mode---	
CMP001 =	0,5361g
CMP002 =	0,5422g
CMP003 =	0,4488g
TOTAL =	1,5271g

The items above are outputted for the measurement examples shown here. Decimal points can be either comma or period in the output. (Refer to 14.4.)

### (Operating Formulation Mode)

When the Formulation Mode is set on, the add-on symbol and the Memory symbol are illuminated in the mass display.

- 1 In the Formulation Mode, place the container (if used) on the pan and press **[O/T]** key to tare. (Taring is accepted only before weighing the first sample.)
- 2 Place the sample (first component) in the container and press **[PRINT]** key.  
Upon stability, the mass value is outputted to the external Device with the numbering "CMP001". After output, the display is automatically tared.
- 3 Repeat the above step 2 until all the component samples have been weighed.
- 4 Press the **[POWER]** key.  
The measurements up to this point are summed up and displayed on the balance and outputted to the external device.
- 5 Clear the pan.  
The balance is ready for the next set of measurements.



### Note

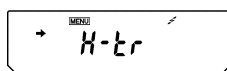
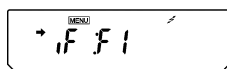
When Formulation mode is in use, fully-automatic span calibration by PSC (10.3.2) or Clock-CAL (10.3.3) is not performed. Instead, Weight symbol ( ) keeps blinking when span calibration is necessary. Span calibration can be performed between sets of measurements.

# 14. Communication with Peripheral Devices

## 14.1 Electronic Printer EP-80

The AUW-D/AUW/AUX/AUY series allows connection to Electronic Printer EP-80.

When using EP-80, follow these procedures for connecting to the balance.



- 1** Set the communication status of the balance to F1 (standard settings 1). (See [14.3.2](#))
- 2** When using a computer as well, set to timer handshake (see [14.3.3.1](#)) in the user settings.
- 3** Turn off the power when the balance is either “oFF” or “STAND-BY”. Then connect the printer cable to the DATA I/O on the back of the balance. Connect the printer cable to the printer, too.
- 4** Turn on the balance power.
- 5** Turn on the printer power.



### Notes

- Refer to the instruction manual of EP-80.
- Continuous output cannot be made to an electronic printer.
- Electronic Printer EP-60A can also be used.

## 14.2 Personal Computer - RS-232C

Programming with the command codes makes it possible to control the balance from a computer. When the balance does not have to be controlled by the computer, WindowsDirect (see [6.](#)) offers very handy data transmission.

### 14.2.1 Connecting the Cable



#### Notes

- The cable must have the correct connections as shown in the diagram below.
- Cables with the connections shown below and the special accessory RS-232 cable are not guaranteed to operate properly for all types of computers and devices.
- Refer to [6.2.2](#) when using WindowsDirect function.

For DOS/V computers (D-sub9 pin) (Null-modem)

Computer side			Balance side		
RXD	2	-----	2	TXD	
TXD	3	-----	3	RXD	
DTR	4	-----	6	DSR	
SG	5	-----	7	SG	
DSR	6	-----	20	DTR	
RTS	7	-----	5	CTS	
CTS	8	-----	4	RTS	
	9	-----	22	.....This connection is not necessarily required.	

## 14.2.2 Data Format

Data format 1 ("F-dF1" in menu item selection) is the Shimadzu's standard data format. (See [14.3.3.5](#))  
The following is the details of this data format.

### (1) Basic format

An example of data format for a negative weight value (-21.6865g) with delimiter of C/R is shown.

Data length of this example: 13 bytes													
Position	1	2	3	4	5	6	7	8	9	10	11	12	13
ASCII code	2DH	20H	20H	32H	31H	2EH	36H	38H	36H	35H	67H	20H	0DH
Data	-			2	1	.	6	8	6	5	g		C/R

The data length varies depending on attached information, unit expression and the delimiter selection as explained in (2).

### Remarks

- Position 1: For a positive value, " " (space) (20H), and for a negative value, "-" (2DH) is in this position.
- Positions 2 to 10: The absolute value. When the numerical value does not use all the 9 positions, the code for space (20H) is entered to each excessive position as shown in this example.  
With AUW-D, space may appear after the value; at the position No.10.
- Positions 11,12: One or two letters indicating the weighing unit. As shown in this example, the code for space is entered at position No.12 if only one letter is used for the unit.
- Position 13: Code for delimiter.

### (2) Information of additional bytes

#### (i) Output with stability information

When outputting data with stability information (Refer to [14.2.3 D7](#)), the code for "S" or "U" is added before Position No.1 in the above example. Consequently, the data becomes 1 byte longer.

When stable: S

When unstable: U

#### (ii) Verified balance as a legal measuring instrument

The brackets "[ ]" bordering auxiliary indicating device of legal measuring instrument are also outputted. In this case, "[" and "]" are inserted to border the part of auxiliary indicating device in the format. Consequently, the data becomes 2 bytes longer.

**(iii) When the delimiter “C/R+L/F” is selected** (Refer to [14.3.3.2](#))

The delimiter information requires one more character. Therefore one more byte is added after Position No.13 in the above example. Consequently, the data becomes 1 byte longer.

**(3) Data format in case of “oL” or “-oL” (Overload)**

The below is the data format for “oL”.

Data length of this example: 13 bytes													
Position	1	2	3	4	5	6	7	8	9	10	11	12	13
ASCII code	20H	20H	20H	20H	20H	4FH	4CH	20H	20H	20H	20H	20H	0DH
Data						<b>O</b>	<b>L</b>						<b>C/R</b>

For “-oL” (negative overload), Position 1 is replaced with “-” (minus, ASCII code: 2DH).

The following parts appearing in “(2) Information of additional bytes” also apply to (3).

**(i) Output with stability information****(iv) When the delimiter “C/R+L/F” is selected**

### 14.2.3 Command Codes



#### Caution

Inputting characters and command codes not shown here into the balance may not only alter the previous settings but may also impair proper measurement.

If by mistake characters or commands not shown here are entered into the balance, immediately unplug the power supply cable and wait about ten seconds before plugging it in again.

Command Code	Function	Description
D01	Continuous output	The balance continuously outputs every 110ms .
D05	1 time output	Corresponds to <b>[PRINT]</b> key
D06	Auto Print	See <a href="#">13.4</a>
D07	1 time output with stability information	The status of the stability mark is appended to the head of the data with output. S: when the stability mark is showing U: when the mark is not showing
D08	1 time output at stability	After command input, the data is output at the first appearance of the stability mark.
D09	Halt output	Auto Print and continuous output halted
Q	ON/OFF switching	Switches between standby status and measurement status.
T	Taring	Corresponds to the <b>[O/T]</b> key
TS	Taring after stability wait	After command input, taring is done at the first appearance of the stability mark.
C18	Span calibration	
M	Formulation mode measurement	See <a href="#">13.7</a>
+	Add-on mode measurement	See <a href="#">13.6</a>
R	Total reset	All application measurements terminated and reset
mg	mg unit registry*	See <a href="#">12.</a>
PERCENT	% unit registry	
PCS	Piece counting registry	
CT	ct unit registry	
MOM	Monme unit registry*	
SDENCE	Solid specific gravity registry	
LDENCE	Liquid specific gravity registry	
%	100% setting	

## 14. Communication with Peripheral Devices

Command Code	Function	Description
G	g, % switching	
- g	g unit removal	
- mg	mg unit removal*	
- PERCENT	% unit removal	
- PCS	Piece counting removal	
- CT	ct unit removal	
- MOM	Monme unit removal*	
- SDENCE	Solid specific gravity removal	
- LDENCE	Liquid specific gravity removal	
C02	High-stability mode setting	
C13	Anti-convection mode setting	
C14	Standard mode setting	
C05	Stability detection band, 1 count setting	
C06	Stability detection band, 5 count setting	
C15	Stability detection band, 10 count setting	
C07	Zero tracking	
C08	Unset zero tracking	
C10	Automatic span calibration	
C11	Unset automatic span calibration	
C17	Display setting status	Measurement conditions set by menu selection in abbreviated form is output.

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



## 14.3 Communication Settings

### 14.3.1 What are communication settings?

These settings are menu item selections for determining communication specifications when connecting to devices such as an electronic printer or a computer.

The settings here are effective for both RS-232C and DATA I/O communication specifications. When a printer or another device is connected to the DATA I/O connector, set the balance communication settings to "Standard Setting 1".

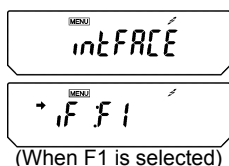
Five standard settings are stored in the balance, that are composed for frequently used types of communication. Selecting a standard setting allows all of these items to be set at once: communication speed (baud rate), delimiters, parity (and bit length), stop bit, data format, and handshake. Setting combinations that are not included in the standard settings may be selected by individual items in the User Settings.

### 14.3.2 Standard Setting

The combinations shown in the table below are available as standard setting 1 to standard setting 6. In the communication settings menu, the standard settings 5 and 6 cannot be selected. The standard settings 5 and 6 (WindowsDirect) can be set easily without entering the menu (see 6.2.1).

	Display at menu item selection	Compatible manufacturer	Baud rate	Delimiter	Parity (and bit length)	Stop bit	Data format	Hand-shake
Standard setting 1	iF:F1	Shimadzu (standard)	1200	C/R	None (8)	1	dF1	Hardware
Standard setting 2	iF:F2	Shimadzu (extended)	1200	C/R	None (8)	1	dF2	Hardware
Standard setting 3	iF:F3	Mettler	2400	C/R+L/F	Even (7)	1	dF3	Hardware
Standard setting 4	iF:F4	Sartorius	1200	C/R+L/F	Odd (7)	1	dF4	Hardware
Standard setting 5*	SETwin	Shimadzu WindowsDirect	300	Win	None (8)	1	dF1	Software
Standard setting 6*	SETwin -	Shimadzu WindowsDirect	300	Win -	None (8)	1	dF1	Software
User settings (see 14.3.3)	iF:USER		User set	User set	User set	User set	User set	User set

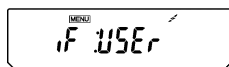
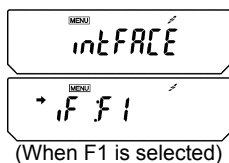
\* Refer to 6.2.1 for selection of these standard settings.

**(Selecting one of standard Settings)**

- 1** From the mass display, press the **[CAL]** key repeatedly until the **[intFACE]** display appears. Press the **[O/T]** key. The display shows “iF:F1”
- 2** If necessary, press the **[CAL]** key repeatedly until the desired standard setting display appears. Then, press the **[O/T]** key.
- 3** Press the **[POWER]** key repeatedly to return to the mass display.

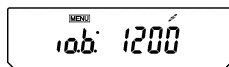
### 14.3.3 User Setting

The user setting allows individual setting for each item in communication settings.

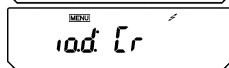
**Making user settings**

Displays of all the items

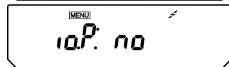
(Example)



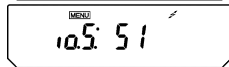
(Example)



(Example)



(Example)



(Example)



(Example)



- 1** In mass display, press the **[CAL]** key repeatedly until “intFACE” appears and press the **[O/T]** key. “iF:F1” appears.
- 2** Press the **[CAL]** key repeatedly until “iF: USER” appears and press the **[O/T]** key. “io.b:\*\*\*\*” appears (communication speed settings). (\*\*\*\* shows the current setting; 2 to 4 characters, the same applies hereafter.) After this, pressing the **[CAL]** key alternates the display in this order: “io.d:\*\*\*\*” (delimiter setting), “io.P:\*\*\*” (parity setting), “io.S:\*\*\*\*” (stop bit setting), “io.F:\*\*\*\*” (data format setting), and “io.H:\*\*\*\*” (handshake setting).
- 3** When the item to be set appears, press the **[O/T]** key. (Refer to the following selections thereafter. )

### 14.3.3.1 Communication speed settings

- (1) The display changes from “io.b:\*\*\*\*” to “b-300”. Pressing the **[CAL]** key cycles through the available settings. The stability mark (➡) appears, when the current setting is displayed.

Display during setting	b-300	b-600	b-1200	b-2400	b-4800
Setting specifics	300bps baud rate	600bps baud rate	1200bps baud rate	2400bps baud rate	4800bps baud rate

Display during setting	b-9600	b-19.2K	b-38.4K
Setting specifics	9600bps baud rate	19.2Kbps baud rate	38.4Kbps baud rate

- (2) When the desired setting appears, press the **[O/T]** key.  
 (3) Press the **[POWER]** key to return to “io.b:\*\*\*\*”.

### 14.3.3.2 Delimiter settings

- (1) The display changes from “io.d:\*\*\*\*” to “d-Cr”. Pressing the **[CAL]** key cycles through the available settings. The stability mark (➡) appears, when the current setting is displayed.

Display during setting	d-Cr	d-LF	d-CrLF	d-Cn	d-win1	d-win-
Setting specifics	delimiter C/ R	delimiter L/ F	delimiter C/R + L/F	delimiter Comma	delimiter Windows- Direct (Enter)	delimiter Windows- Direct (Right)

- (2) When the desired setting appears, press the **[O/T]** key.  
 (3) Press the **[POWER]** key to return to “io.d:\*\*\*\*”.

### 14.3.3.3 Parity settings

The display changes from “io.P:\*\*\*\*” to “P-no”. Pressing the **[CAL]** key cycles through the available settings. The stability mark (➡) appears, when the current setting is displayed.

Display during setting	P-no	P-odd	P-EvEn
Setting specifics	No parity (eight bits)	Odd parity (seven bits)	Even parity (seven bits)

- (1) When the desired setting appears, press the **[O/T]** key.  
 (2) Press the **[POWER]** key to return to “io.P:\*\*\*\*”.

### 14.3.3.4 Stop bit settings

- (1) The display changes from “io.S:\*\*\*\*” to “S-S1”. Pressing the **[CAL]** key cycles through the available settings. The stability mark (➡) appears, when the current setting is displayed.

Display during setting	S-S1	S-S2
Setting specifics	Stop bit, 1 bit	Stop bit, 2bit

- (2) When the desired setting appears, press the **[O/T]** key.  
 (3) Press the **[POWER]** key to return to “io.S:\*\*\*\*”.

**14.3.3.5 Input-output data format settings**

- (1) The display changes from “io.F:\*\*\*\*” to “F-dF1”. Pressing the **[CAL]** key cycles through the available settings. The stability mark (➡) appears, when the current setting is displayed.

Display during setting	F-dF1	F-dF2	F-dF3	F-dF4
Setting specifics	Data format 1. Standard Shimadzu format.	Data format 2. Extended format from data format 1.	Data format 3. Same format as Mettler balances.	Data format 4. Same format as Sartorius balances.

- (2) When the desired setting appears, press the **[O/T]** key.  
 (3) Press the **[POWER]** key to return to “io.F:\*\*\*\*”.

**Caution**

When using EP-80, EP-50, EP-50WIN or EP-60A electronic printer, always use data format 1.

**Note**

When set to data format 2, the balance will always send a process result in response to commands from the computer.

**14.3.3.6 Handshake settings**

- (1) The display changes from “io.H:\*\*\*\*” to “H-oFF”. Pressing the **[CAL]** key cycles through the available settings. The stability mark (➡) appears, when the current setting is displayed.

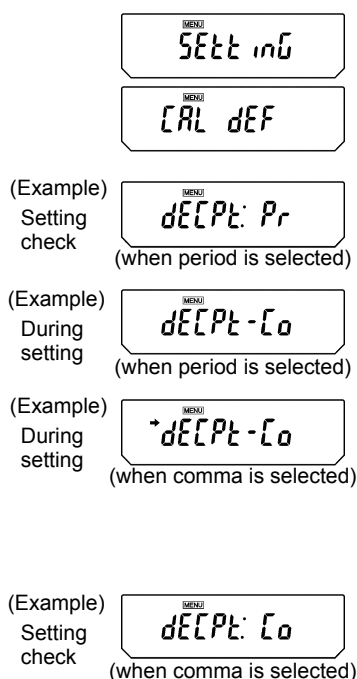
Display during setting	H-oFF	H-Soft	H-HArd	H-tr
Setting specifics	No handshake	Software hand-shake	Hardware hand-shake	Timer handshake

When the desired setting appears, press the **[O/T]** key.

Press the **[POWER]** key to return to “io.H:\*\*\*\*”.

## 14.4 Decimal Point Symbol in Output Data

The AUW-D/AUW/AUX/AUY series offers choice of decimal point symbols in the outputted data to a computer or an electronic printer. The decimal point can be expressed with either “.” (period) or “,” (comma) depending on your preference. Note that the decimal point expression on the balance display is always with “.” (period).



- 1** From the mass display, press the **[CAL]** key repeatedly until “SETtinG” appears, press the **[O/T]** key. “CAL dEF” will appear.
- 2** Press the **[CAL]** key repeatedly until “dECPt:\*\*” appears (\*\* indicates the current setting. “Pr” for period, “Co” for comma).
- 3** Press the **[O/T]** key. The display shows “dECPt-Co” and after this, pressing the **[CAL]** key switches the displays between “dECPt-Co” and “dECPt-Pr”. When the current setting is displayed, the stability mark (➡) appears. To change the setting, press the **[O/T]** key when the desired setting appears, or
- 4** Press the **[POWER]** key to return to “dECPt:\*\*” without changing the setting.
- 5** Pressing the **[POWER]** key again returns to the mass display.

# 15. Maintenance and Transport

## 15.1 Maintenance

### Cleaning

Clean by wiping with a soft cloth soaked in neutral detergent and wrung tightly. The pan can be washed in water. Dry it thoroughly before attaching it to the balance. The side glass doors can be removed to allow cleaning and replacement of the door rail. Never use organic detergents and chemicals or chemical wiping cloths, as they may damage the coating and the display panel.

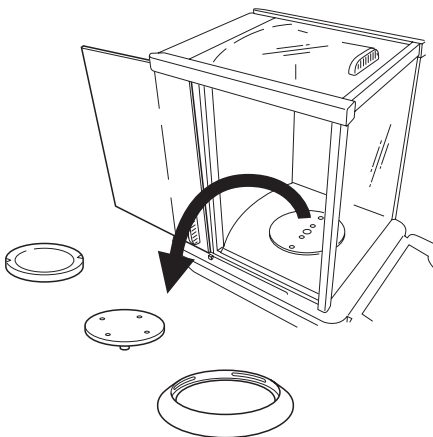


### Caution

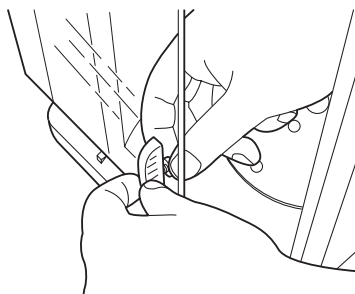
Handle the glass doors with great care to keep them from breaking. When removing the knob on the inside of the door, be very careful not to allow the hand to touch the pan supporter shaft in the weighing chamber. When removing the door rails, take care not to let the rail edge injure the hands.

### When the glass door does not slide smoothly

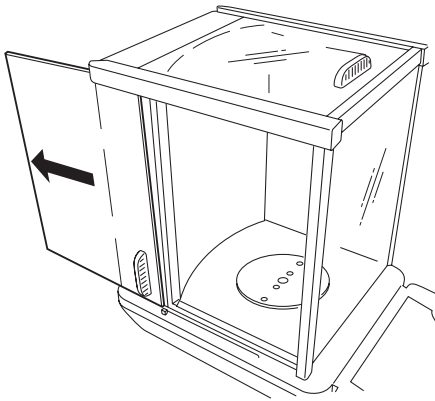
- In the AUW-D/AUW/AUX/AUY series, the side glass doors can be removed to allow replacement and cleaning of the door rails.



- 1** Remove the anti-draft ring, the pan, and the pan supporter from the weighing chamber



- 2** Unscrew and remove the inside knob on the glass door.

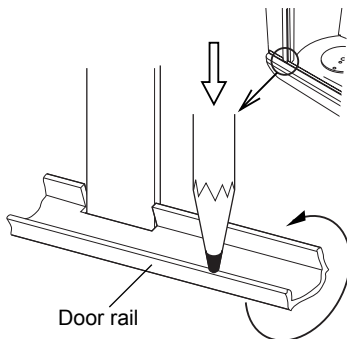


**3** Slide the glass door out backwards.

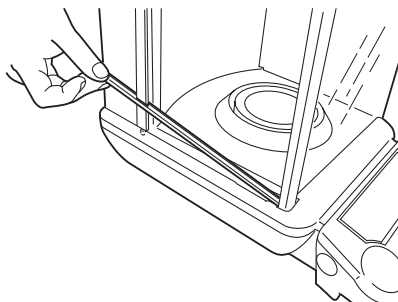
- In the AUW-D/AUW/AUX/AUY series, when the door rails of the side glass doors become dirty or worn, the rails can be replaced.

#### Removing the door rail

- 1** Remove the glass door.
- 2** Press down the outer edge of the door rail with a pointed thing for lifting the door rail.



**3** Lift and remove the rail.



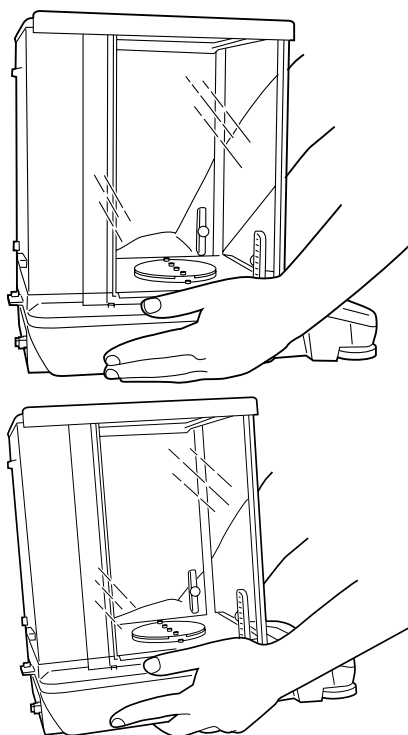
## 15.2 Transport

When moving by hand

... Remove the anti-draft ring, the pan, and the pan supporter from the weighing chamber. Lift the main body as shown in the figures and carry it securely in both hands.

When using other methods of transport

... Use the packing box in which the balance was delivered.



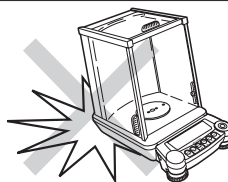
**1** Place hands on the main body as shown in the figure.

**2** Lift the main body slowly with the fingers inserted beneath the bottom of it.



### Caution

This is a precision instrument. Handle with care and never give any impact.



### Note

**Using a verified balance as a legal measuring instrument in the EU:**

Span calibration must be newly performed (refer to [10.2](#)) after the balance has been moved and re-installed, before using the balance as a legal measuring instrument in the EU.



# 16. Troubleshooting

## 16.1 Error Code Displays

Error code display	Description	Countermeasures
CAL E2	The zero point shift is large during calibration.	Remove items from the pan. In order to postpone calibration, press <b>[POWER]</b> key.
CAL E3	Large span error in PCAL	Use the correct calibration weight.
CAL E4	Large span error in span calibration	Use the correct calibration weight.
CHE X (X is a numeral) (when the display stops here)	Internal malfunction	Please contact a service representative.
Err 0X (X is a numeral)	Internal malfunction	Please contact a service representative.
Err 20	An improper value setting was attempted.	Enter the correct numbers or decimal points.
Err 24	Power voltage error	Check the power voltage.

## 16.2 Troubleshooting

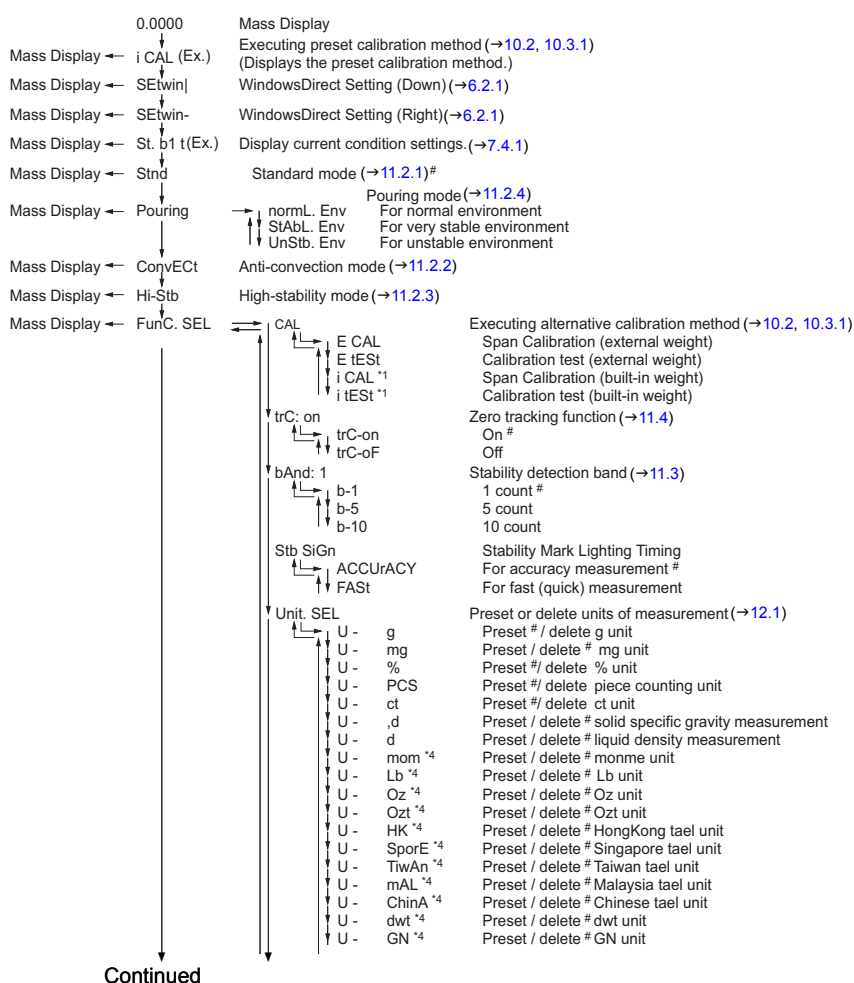
When	Symptom	Possible Causes	Countermeasures
Before measurement	Nothing appears in the display.	The AC adapter is not securely connected. The power switch-board of the room is turned off. The power voltage is incorrect.	Check power supply and connect correctly.
During measurement	The display fluctuates.	Vibration or wind effects	Change the installation site. Change the stability and response settings or change the stability detection band.
	The stability mark does not readily appear.		
	The measured results have poor repeatability.	Attempting to measure volatile substances	Measure with a lid on it.
	The display diverges in the same direction.	The weighed item is electrically charged.	Measure in a metal container. Measure with a metal object larger than the items.
	"CAL d" appears frequently.	The sample temperature and the temperature inside the weighing chamber differ.	Measure at the same temperature. Leave the item in the chamber before measurement. Change to high-stability mode.
		There are air currents entering the weighing chamber.	Leave the glass doors of the weighing chamber open 1 to 2 cm wide when not in use.
		Effects of electronic noise or strong electromagnetic waves	Move away from the noise source.
		Internal trouble with the balance	Contact a service representative.
	"oL" or "-oL" is displayed.	The load on the pan is too large. The pan is detached.	Use within the weighing capacity. Place the pan on correctly.
	Automatic span calibration executes frequently.	Severe temperature variations in the room or the instrument	Move to a location with less temperature fluctuation.
	The mass display is incorrect.	Span calibration has not been done.	Perform correct span calibration.
		No taring to zero before weighing.	Press the <b>[O/T]</b> key to return mass to zero before weighing.
	The desired weighing unit cannot be called by <b>[UNIT]</b> key.	The unit has not been registered beforehand.	Set unit beforehand. (See <a href="#">12.1</a> )
	Cannot transmit or receive data to or from computer or device.	Communication settings are wrong.	Make the proper communication settings.
	Error message appears.		Refer to the error code table.
During calibration	Error message appears.		Refer to the error code table.
Attempt of menu settings	The menu cannot be entered. "LoCKEd" is displayed briefly.	The menu is locked	Remove the menu lock. (See <a href="#">7.4.3</a> )

# Appendices

## A-1. Menu map

(→ in brackets after the menu item shows reference section number)

- **[CAL]** key: Pressing the **[CAL]** key moves to the next menu in the current hierarchy.  
(↓ in the diagram below)
- **[O/T]** key: Pressing the **[O/T]** key moves the current hierarchy to the menu of one hierarchy down.  
(→ in the diagram below) When no menu exists in the hierarchy below, this command is fixed.
- **[POWER]** key: Pressing the **[POWER]** key returns the current hierarchy to the menu of one hierarchy up.  
(← in the diagram below) (Pressing the **[POWER]** key and holding it down returns the interface directly to the mass display.)



\*1 AUW-D, AUW, AUX series only

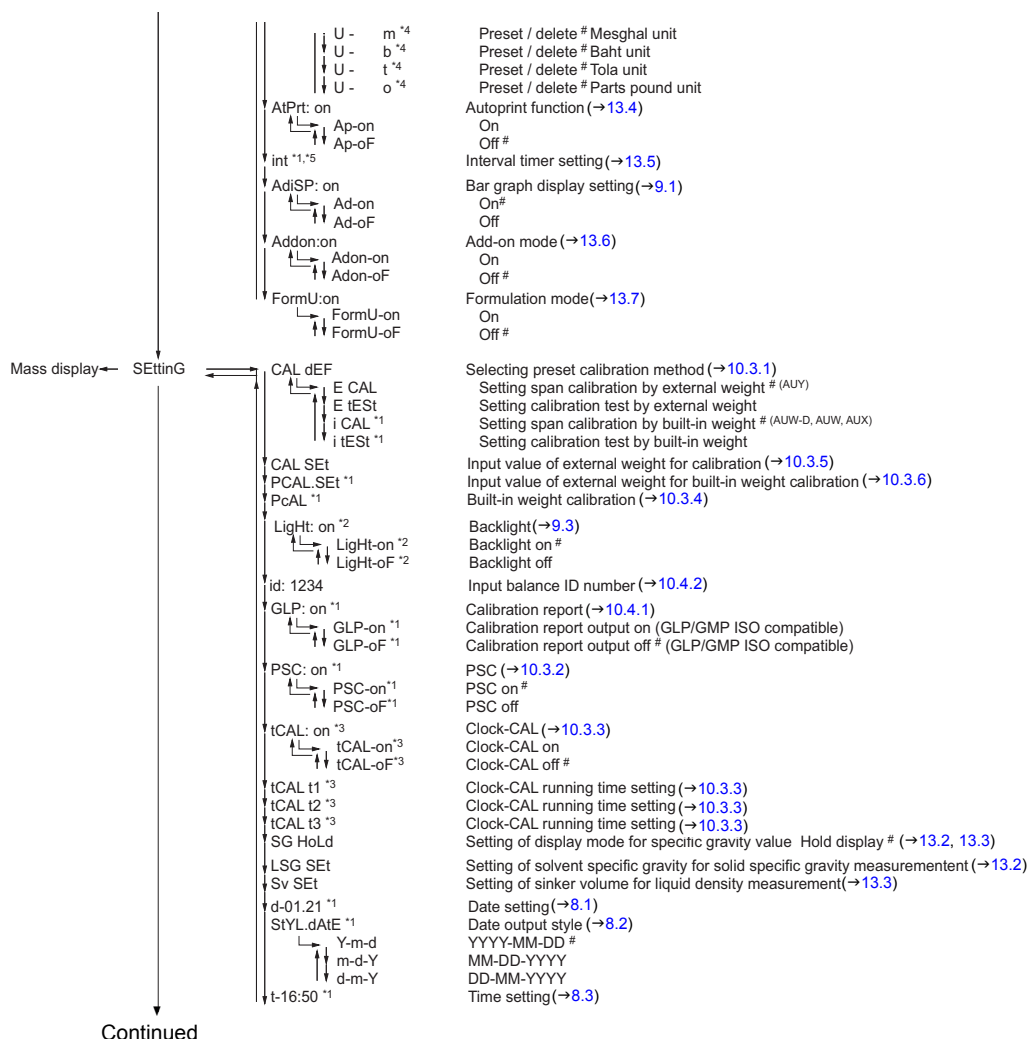
\*2 AUW series only

\*3 AUW-D, AUW series only

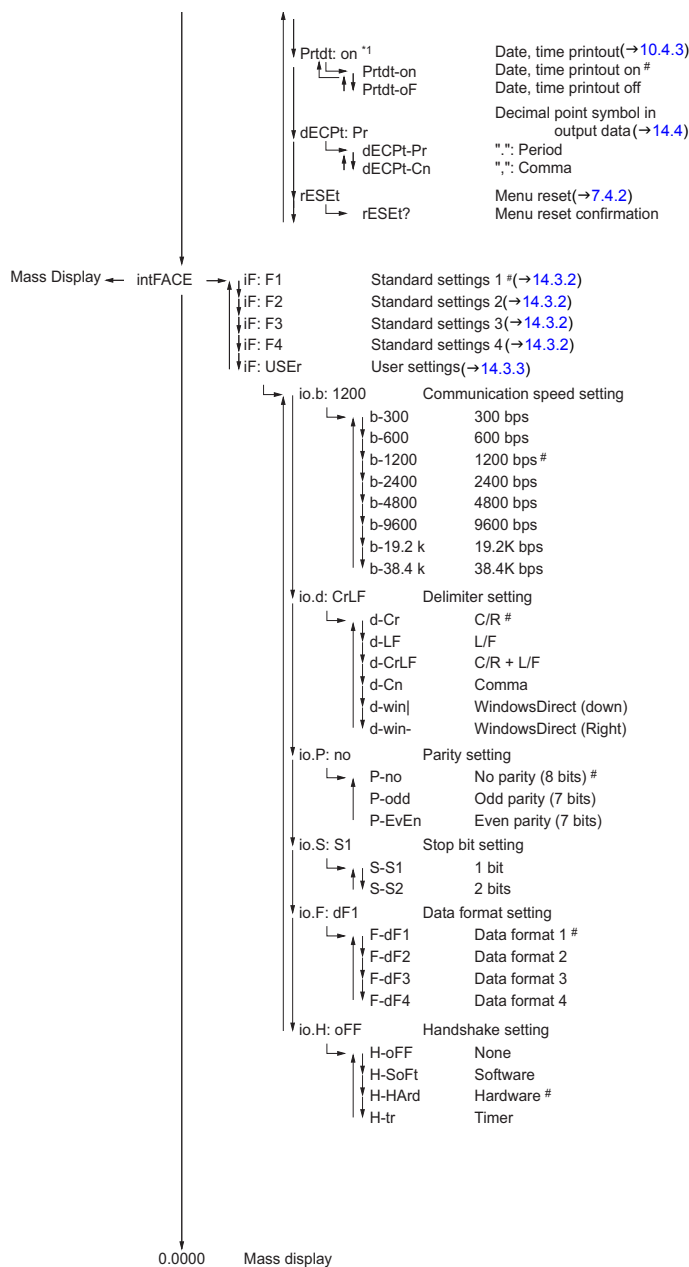
# Default settings

\*4 These units cannot be selected in some countries for legal reason.

\*4, \*5 These units are not available in a verified balance as a legal measuring instrument in the EU.



\*1 AUW-D, AUW, AUX series only  
 \*2 AUW series only (Not for AUW-D)  
 \*3 AUW-D, AUW series only  
 # Default settings



\*1 AUW-D, AUW, AUX series only  
 \*2 AUW series only (Not for AUW-D)  
 \*3 AUW-D, AUW series only  
 # Default settings

## A-2. Standard Accessories and Maintenance Parts List

Part name	Part number	Remarks
Pan	321-41225	
Pan supporter assembly	321-62933	With rubber cushions
Anti-draft ring	321-62903	
AC adapter		Contact your distributor
Level screw	321-62884	
Glass door assembly (right)	321-62932-02	Includes handle
Glass door assembly (left)	321-62932-01	Includes handle
Glass door assembly (top)	321-62935	Includes handle
Front glass assembly	321-62931	
Door rail (right)	321-62901-01	
Door rail (left)	321-62901-02	
In-use protective cover	321-62936	
In-use protective cover (5pieces)	321-62982	
Rubber cushions (4pieces)	321-62984-02	For pan supporter
Knob for glass door (3pieces)	321-62985	
Adapter cable holder	072-60330-02	

## A-3. Special Accessories (Options) List

Part name	Part number	Part number for RoHS	Remarks
Electronic Printer EP-80	321-62675-01 (w/o AC adapter)	321-80016-01 (w/o AC adapter)	Impact-dot print, Can be used with WindowsDirect, Statistical calculation.
Electronic Printer EP-90	321-62675-11 (w/o AC adapter)	321-80016-11 (w/o AC adapter)	Impact-dot print, Can be used with WindowsDirect, Statistical calculation, Sample No. can be attached, Date/time can be attached (except for AU-Y)
RS-232C cable 25P-9P (1.5m)	321-60754-01		For IBM-PC/AT, DOS/V (Null modem)
Footswitch FSB-102TK	321-60110-12		For taring (corresponds to <b>[O/T]</b> key)
Footswitch FSB-102PK	321-60110-11		For output (corresponds to <b>[PRINT]</b> key)
Specific gravity measurement kit SMK-401	321-60550-01		
Application keyboard AKB-301	321-53382-01		UPPER, LOWER and TARGET keys for checkweighing cannot be used with AUW-D/AUW/AUX/AUY series.



### Note

The number and specifications noted here are subject to change without notice. The RS-232C cables are not guaranteed to match every computer or device. Also, their lock screws may not match the connector threads on the balance.

## A-4. Specifications for RS-232C Connector

### RS-232 Specifications

Pin number	Name	Function	Comment
1	FG	Frame ground	
2	TXD	Data output	
3	RXD	Data input	
4	RTS	Internal connection with CTS	
5	CTS	Internal connection with RTS	
6	DSR	Handshake reception	
7	SG	Signal ground	
8	NC	Open	
9	NC	Open	
10	NC	Open	
11	NC	Open	
12	NC	Open	
13	NC	Open	
14	NC	Open	
15	NC	Open	
16	NC	Open	
17	NC	Open	
18	NC	Open	
19	NC	Open	
20	DTR	Handshake (transmission)	
21	NC	Open	
22	NC	Open	
23	NC	Open	
24	NC	Open	
25	NC	Open	

## A-5. Table of Unit Conversion Constants

The following conversions are used to display in various mass units.

1g	= 1000 mg
	= 5 ct
	= 0.266667 mom
	= 0.00220462 Lb
	= 0.0352740 Oz
	= 0.0321507 Ozt
	= 0.0267173 TL-HK
	= 0.0264555 TL-Singapore
	= 0.0266667 TL-Taiwan
	= 0.0264600 TL-Malaysia
	= 0.0266071 TL-China
	= 0.643015 dwt
	= 15.4324 GN
	= 0.216999 m
	= 0.0657895 b
	= 0.0857339 t
	= 1.12877 o



### Note

Units except for “g” (gramme) and “ct” (carat) are not available for a verified balance as a legal measuring instrument in the EU.



### Note

The unit of parts pounds (o) is not outputted to external devices.



## A-6. Performance Check Guide

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



### Notes

- The following is a standard guideline used to determine whether the balance is working properly. The specific criterion can be set according to each user's requirements.
- Conduct the performance check in a location without changes in room temperature. Install the balance following the instruction of this manual.
- Leave the calibration weight in the weighing chamber before start performance check so that the temperatures will be equalized.
- For placing and removing the weight, use a long pair of tweezers. Do not put hand into the weighing chamber.

### Repeatability

**For AUW-D series, perform steps 3 to 5 in both large and small ranges.**

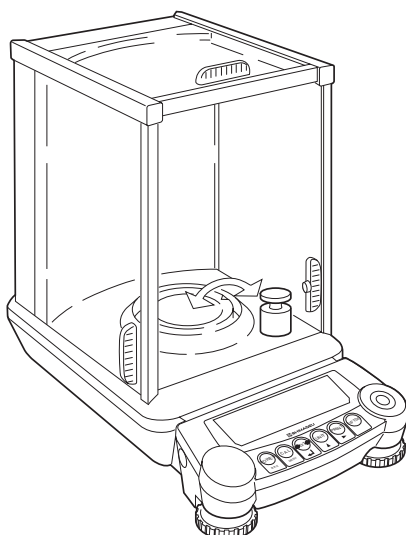
**1** Leave the power on in mass display (backlight of AUW series illuminates if it is set to on) and let stand for one hour (two hours for AUW-D series).

**2** Following chapter 11, set the stability and response to the standard mode, set the stability detection band to 1 count, and set zero tracking to OFF.

**3** With a pair of tweezers, place a weight close to the weighing capacity on the pan and take it off six times. For each time record

Xi: the value displayed each time the weight is loaded

Yi: the value shown when the weight is removed



Load and unload a weight close to the capacity 6 times

Loaded: X1, X2...Xi...X6

Removed: Y1, Y2...Yi...Y6

$Rx = X_{max} - X_{min}$

$Ry = Y_{max} - Y_{min}$

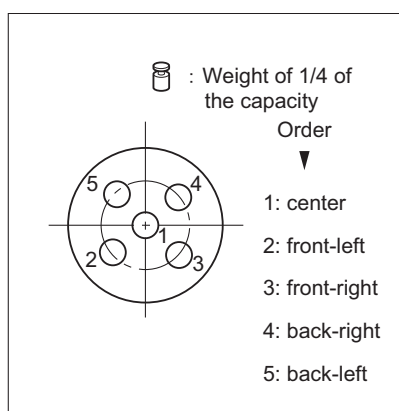
(Max is the maximum value. Min is the minimum value.)

**4** Compute Rx and Ry according to the expressions given above.

**5** Rx and Ry values within 1.0mg are normal.  
(In the small range of AUW-D series, within 0.30mg. )

### Cornerload Performance (four-corner error)

For AUW-D series, conduct this check in the large range.



**1** Warm up the balance thoroughly. Warm up for at least one hour.

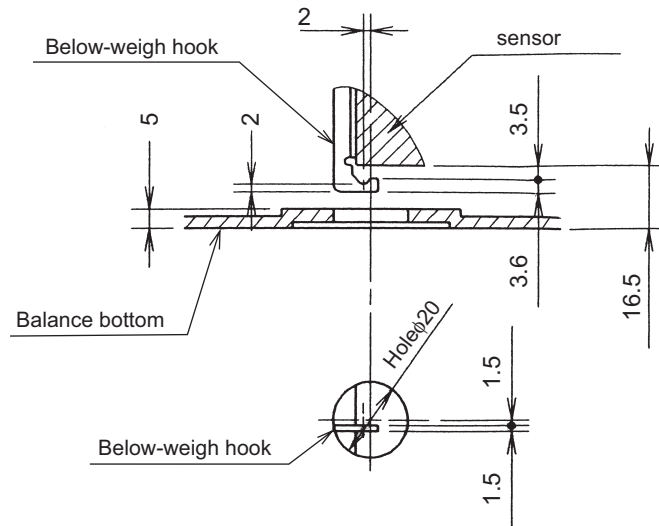
**2** Place a weight of about one-quarter of the capacity on the pan at the locations and in the order of the numbers given in the figure. Record the results X1 through X5, for the locations 1 through 5, respectively.

If all the differences between the value measured in the center location and each of the other locations are within  $\pm 1\text{mg}$ , the balance cornerload performance is considered normal.

(In AUW-D series, this check is not necessary in the small range.)

## A-7. Below-weigh Hook Dimensions

(Unit: mm)



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