

High-Precision Advanced Tuning Fork Balance

M G - S Series

Operation Manual

IMPORTANT

- To ensure safe and proper use of the balance, please read this manual carefully.
- After reading this manual, store it in a safe place near the balance, so you can review it as needed.


Star Micronics

Preface

Thank you very much for having purchased our Tuning-Fork high precision electronic balance MG-S series.

This document describes how to operate the product.

Instructions

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Important Notice












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- Potential dangers are increasing in the industrial equipment industries due to the advent of new materials and processing methods, and speeding up of machines. It is impossible to foresee all situations related to these dangers. In addition, there are so many “impossible” and “don’ts” and so writing all of them in the operation manual is impossible. Therefore, it is safe to think that what is not written in the operation manual “cannot be performed” unless the operation manual positively writes “it is possible.” When performing installation, operation, maintenance or inspection of this product, not only observe what is written or indicated in this document or on the product surface but also pay adequate consideration to safety measures.
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- For any question or further information concerning this document, please contact the store where you purchased the product or with its model (type) name and serial number informed.
- Manufacturer: Star Micronics America, Inc.
Address: 65 Clyde Road Suite G, Somerset, NJ 08873 U.S.A.
Tel: (800) 782-7636 / (848) 216-3300
Email: support@starmicronics.com

How to use this document

■ Symbols used in this document

Understand the meaning of the following symbols and observe the instructions of this document.

Symbols	Meaning
	Used for the situation that invites an imminent risk of death or severe injury if proper precautions are not taken.
	Used for the situation that invites a risk of death or serious injury if proper precautions are not taken.
	Used for caution concerning operations that may lead to a light physical injury to persons or damage of the products/facilities if proper precautions are not taken.
	Used for notation for avoiding from delection, overwrite the weighing data or for accurate weighing and appropriate usage of the equipment.
	Used for reference information on operation
	Used for "Prohibition" items
	Used for "Mandatory" items requiring positive action
	Used for prohibition items to avoid "Electrical shock".
	This symbol indicates the operation/specification related to NTEP approval and verification.

This product/ The product/ The balance	Refers to the product.
[On/Off] key	The name of an operation key located in front of the main unit is represented in square brackets "[]".
<message>	A message on the display is represented in angle brackets "< >".
<<F1>>	"Free key" or "Shortcut" is represented in double angle brackets "<< >>".
Push the key	Signifies pushing lightly an operation key once.
Push the key long	Signifies keeping pushing an operation key until the designated indication appears.

■ About how to read this document

This document consists of the following contents:

1	Prior to use	Describes about operating precautions, names and functions of each section, etc. Please be sure to read this section when using this product for the first time.
2	Basic usage	Describes about basic usage related to weighing such as how to turn on and off the power in addition to the setting procedures to set various functions.
3	Functions related to the operation	Describes about setting items to change the operation of the balance.
4	Function related to the performance	Describes about setting items related to the indication stability and the response speed of the balance.
5	User information setting	Describes about setting items related to the upper and lower limits and preset tare weight.
6	External input/output functions	Describes about setting items related to the specifications and conditions in regard to the external communication.
7	Functions related to the lock	Describes about setting items related to change prohibitions and invalid keystrokes on each menu item.
8	Controlling and adjustment functions	Describes about setting items related to the product administrator.
9	Troubleshooting	Describes about methods of troubleshooting this product such as how to respond to errors and when you are in need of help.
10	How to maintain	Describes how to maintain this product.
	Appendix	Provides necessary data such as the specifications of this product.

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1 Prior to use

1-1 Operating precautions


 **DANGER**

	<p>■ Do not wet the AC adapter. That may cause an electric shock, short-circuiting or failure.</p>
	<p>■ Do not handle the balance with wet hands. That may cause short-circuiting or failure.</p>
	<p>■ Do not use the balance in a wet location. That may cause an electric shock, short-circuiting or failure.</p>
	<p>■ Do not connect to the AC adapter cord or communication cable with its connector or jack being wet. That may cause an electric shock, short-circuiting or failure.</p>
	<p>■ Do not use the balance in a dusty location. That may cause dust explosion or fire. That may cause short-circuit or malfunction of the balance.</p>
	<p>■ Do not use the balance in explosive atmosphere. That may cause explosion or fire. Please order our explosive-proof balances to weigh in such a hazardous area.</p>
	<p>■ Never disassemble or modify the batteries. Make sure you insert batteries with the positive and negative poles correctly inserted, and be careful of short circuits. Such mishandling could damage the batteries, or cause the balance to fail.</p>
	<p>■ Obey the MSDS. Measuring dangerous materials such as flammable liquid could cause an explosion or fire.</p>


 **WARNING**

	<p>■ Do not disassemble or modify the product. Doing so could result in injury, electric shock, fire and other accidents or failures. For inspection and adjustment, contact the retailer from whom the product was purchased.</p>
	<p>■ Do not move the product with a sample to be weighed set on the balance. That may cause the sample to fall from the weighing pan, leading to a bodily injury or destruction of the sample.</p>
	<p>■ Do not route the AC cord across passages. The cord could be tripped on by a passerby and the balance could fall down and break or injure someone.</p>
	<p>■ Do not use the product on an unstable table or a place that is subject to vibration. That may cause the sample to fall from the weighing pan, leading to a bodily injury or destruction of the sample. Besides inaccurate weighing may result.</p>
	<p>■ Do not place an unstable sample on the weighing pan. The sample may fall down, giving rise to a danger. Put an unstable sample in a container (tare) before weighing it.</p>
	<p>■ Only use the specified power supply. Using any power supply other than that specified could cause overheating, fire or failure.</p>
	<p>■ Do not bring the balance by holding the windshield. The main body could drop and break down or injure someone. Make sure to hold the main body to bring the balance.</p>
	<p>■ Do not use the product in an abnormal condition. If it should happen that an abnormal event such as smoking or unusual odor occurs, ask the store where you purchased the product or our sales department for repair. Keeping using the product may result in an electric shock or fire. In addition, do not ever try to repair it for yourself, or very dangerous situation is likely to occur.</p>
	<p>■ Only use the dedicated AC adapter. Use of other types of power or adapters may result in heat generation or malfunction of the balance.</p>

CAUTION

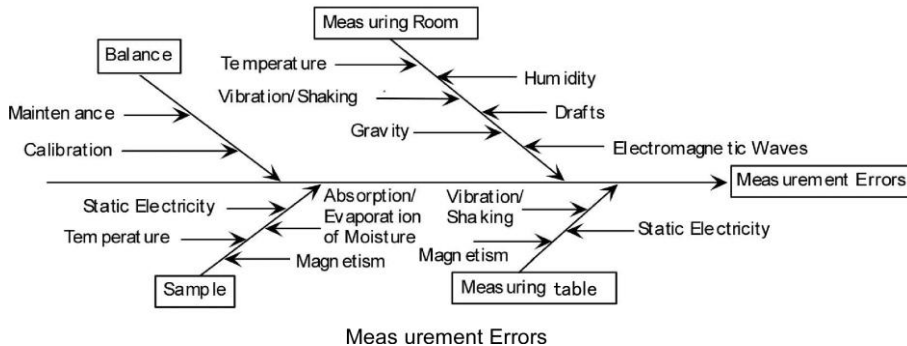
	<ul style="list-style-type: none"> ■ Do not mix old and new batteries, or batteries of different types or manufacturers. ■ Do not use the batteries that leak.
	<ul style="list-style-type: none"> ■ Do not apply excessive force to or impact the balance. Doing so could damage or result in failure of the balance. Carefully place samples on the balance. ■ Do not use volatile solvents. The main unit could deform. Wipe the main unit using dry cloth or a cloth moistened with a small amount of neutral detergent.
	<ul style="list-style-type: none"> ■ Dispose of batteries in accordance with local regulations. ■ If the balance is not going to be used for a long time, store it with the batteries removed. ■ Observe the precautions printed on the batteries used.
FCC caution	<ul style="list-style-type: none"> ■ Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

	<ul style="list-style-type: none"> ■ Do not install the balance in a place where it is directly exposed to airflow from air-conditioning or heating equipment. Due to changes in the ambient temperature, the balance could fail to accurately weigh samples. ■ Do not install the balance in a place exposed to direct sunlight. The internal temperature of the balance could rise and the balance could fail to accurately weigh samples. ■ Do not install the balance where the floor is soft. When a sample is placed on the balance, the balance could slant and fail to accurately weigh samples. ■ Do not install the balance in a place where the ambient temperature or humidity change significantly. The balance could fail to accurately weigh samples.
	<ul style="list-style-type: none"> ■ Adjust (calibrate) the balance when it is installed or relocated. Failure to do so might result in measurement errors. To ensure accurate measurements be sure to adjust (calibrate) the balance. ■ Check for an error periodically. Use environment and chronological change cause an error in measured value, leading to an inaccurate measurement. ■ Unplug the AC adapter from the receptacle when the balance is not going to be used for a long period of time. Unplug the balance from the receptacle to save energy and prevent degradation. ■ Always adjust the level of the balance before use. A tilted balance generates errors which might cause inaccurate weighting.
	<ul style="list-style-type: none"> ■ For proper disposal This product including accessories may not be disposed of in domestic waste in conformance with the specific requirements in your country or state. When you dispose of this product, please contact your local authorities or dealer and ask for the correct method of disposal.
	<p>This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p>This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.</p> <p>This product contains unlicensed transmitting module: - Name: Stand-alone dual-mode Bluetooth module OBS421 series - Model number: CB-OBS421i-i4-01B - FCC ID: PVH0946</p>
FCC Note	

1-2 For more accurate measurement

To make more accurate measurement, it is necessary to lessen error-causing factors in measurement to the extent possible. Error-causing factors include not only an instrument error and performance of the balance itself but also the nature and condition of a specimen, measuring environment (vibration, temperature, humidity, etc.) and the like. These factors will directly affect measurement result in the case of a balance with high resolution capability.



1-2-1 Precautions related to measuring environment

Temperature/ humidity/ atmospheric pressure	→ Try to keep the room temperature constant to the extent possible in order to avoid condensation and indication drift due to change in temperature. → Low humidity is likely to cause generation of static electricity, resulting in inaccurate measurement.
Vibration/shaking	→ It is preferable to locate a measuring room on the first floor or the basement. The higher the room is, the larger the vibration and shaking become. Therefore, a highly located room is not suitable for measurement. Rooms near the railway or road side should also be avoided.
Air draft	→ Places directly exposed to air current from an air-conditioner or to direct sun generate abrupt temperature change and resultantly cause unstable weight indication, and therefore, should be avoided.
Gravity	→ The latitude and altitude of a measuring location differentiate the gravity that affects a specimen, giving a different weight indication to the same specimen.
Electromagnetic wave	→ At a location where a strong electromagnetic wave generating object is in the proximity of a balance, the balance is affected by the electromagnetic wave, making the balance unable to indicate accurate weight, and therefore, such a location should be avoided.

1-2-2 Precautions related to measuring table

Vibration/shaking	→ Vibrations during measurement destabilizes the indication of measurement value, leading to inability to make accurate measurement. And so use of a measurement table that is robust and hardly affected by vibration is required (a vibration-proof structured table or concrete or stone-made table is suitable). In addition, placing a sheet of soft cloth or paper under the balance causes shaking or makes keeping horizontal attitude difficult, and therefore should be avoided. → The measurement table should be installed in a position free from vibration to the extent possible. A corner rather than the center of a room is less affected by vibration and therefore more suitable for installation of the balance.
Magnetism/Static electricity	→ Use of the balance on the table that is subject to magnetism or static electricity should be avoided.

1-2-3 Precautions related to a specimen

Static electricity	→ In general, synthetic resin- and glass-made specimens are high in electric insulation, and so easily charged electrically. Weighing an electrically charged specimen makes the indication value unstable, reducing the reproducibility of the test result. Therefore, neutralize an electrically charged specimen before measurement.
Magnetism	→ Specimens affected by magnetism show different weight in a different position of the weighing pan, reducing the reproducibility. When weighing a magnetized specimen, either eliminate the magnetism from the specimen or place a setting plate on the weighing pan to distance the specimen from the weighing mechanism of the balance so that the mechanism may not be affected by the magnetism.
Moisture absorption/ Evaporation	→ Measuring a moist or evaporating (vaporizing) specimen increases or decreases the indication value of the balance continuously. When this is the case, put the specimen in a container equipped with a small mouth and closely seal the mouth before measurement.
Specimen temperature	→ Difference in temperature between the specimen and the windshield interior generates convection flow within the windshield, causing a measurement error. When the specimen temperature is excessively high or low, allow the specimen temperature to stabilize at the room temperature before measurement. Also, to prevent the convection flow from arising within the windshield, make the windshield interior temperature equal to the room temperature before measurement. → Measurer's body temperature also affects measurement result. Handle a specimen with tweezers instead of directly holding it with fingers and refrain from putting your hands directly in the windshield during measuring operation.

1-2-4 Precautions related to the main unit of a balance

Operating precautions	→ A dust cover, if equipped, for the balance may possibly make the weight indication unstable due to static electricity charged on the cover at a low humidity. When this is the case, wipe the cover with wet cloth or use antistatic agent or use the balance with the cover removed. → For more stable measurement, it is recommended to energize the balance for longer than 30 minutes and load the balance a few times with a weight equivalent to the weighing capacity before measurement.
Calibration	→ Calibrate the balance periodically with an external calibration weight. For the sake of precise calibration, use an external calibration weight weighing nearly equal to the weighing capacity of the balance. → Energize the balance for longer than 30 minutes and load the balance a few times with a weight equivalent to the weighing capacity before calibration. → Calibration is also needed in the following cases: When using the balance for the first time, When using the balance after a long period of non-use, When changing a place of installation, and When there was a large change in temperature, humidity or atmospheric pressure.
Maintenance	→ Attachment of dirt such as powder or liquid to the weighing pan or pan base will cause measurement error or unstable weight indication. For that reason, frequent cleaning of the balance is required. In cleaning the balance, take care for the dust or liquid not to enter into the balance.

1-3 Check for the articles contained in the box

The package box contains the following;

If anything missing or broken should be found, please inform the store where you purchased the product.



Sealing kit is already mounted on the verified balance.

Round pan type (MG-S322)

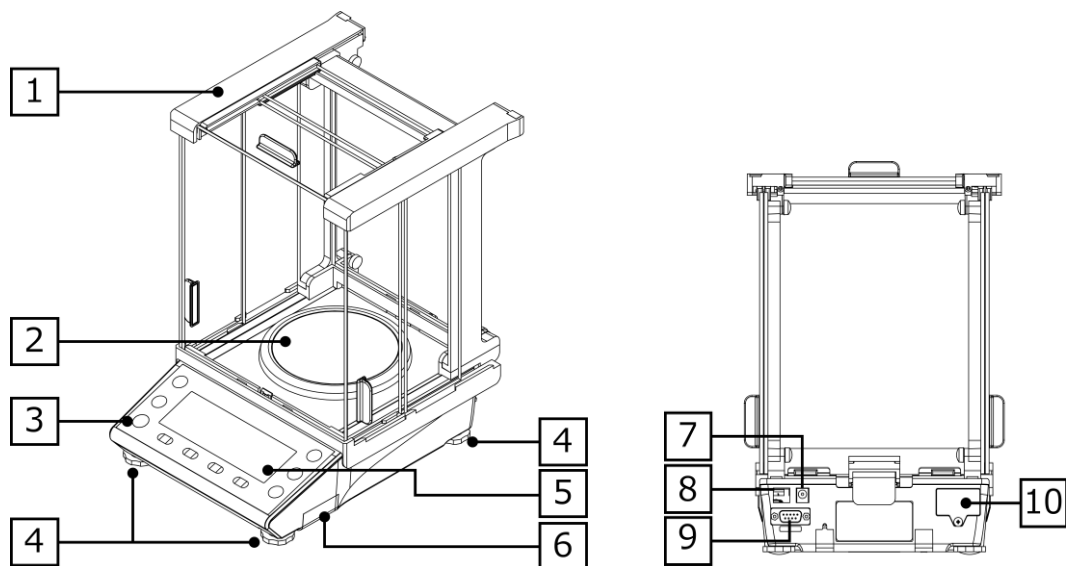
<p>① Main unit (Round): 1</p>	<p>② Round pan: 1</p>	<p>③ Pan base (Round): 1</p>	<p>④ AC adapter: 1</p>
<p>⑤ Operation manual: 1</p>	<p>⑥ Sealing kit (Wire sealing kit and tamper-proof stickers)</p>	<p>⑦ Windshield (Assembly type): 1 (Refer to "Appendix 7 Windshield assembly instructions")</p>	

Square pan type (MG-S1501, MG-S8200)

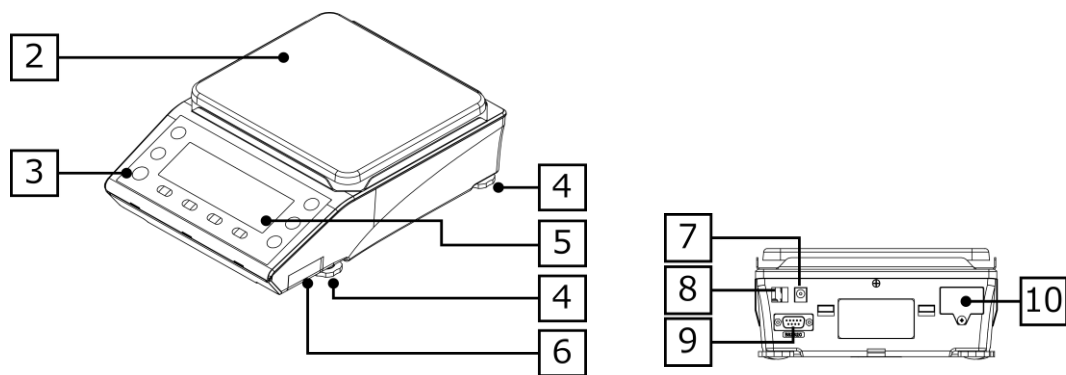
<p>① Main unit (Square): 1</p>	<p>② Square pan: 1</p>	<p>③ Pan base (Square): 1</p>	<p>④ Pan base screw: 1</p>
<p>⑤ AC adapter: 1</p>	<p>⑥ Operation manual: 1</p>	<p>⑦ Sealing kit (Wire sealing kit and tamper-proof stickers)</p>	

1-4 Name and function of each section

Round pan type (MG-S322)



Square pan type (MG-S1501, MG-S8200)

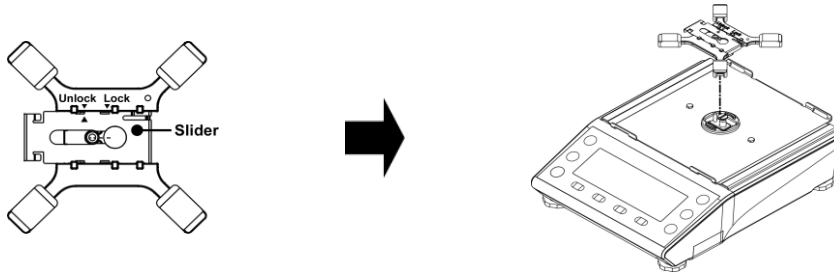


1	Windshield	2	Weighing pan
3	Level	4	Adjuster
5	Display	6	Battery case
7	AC adapter jack	8	USB connector (Type B)
9	RS-232C connector (D-sub 9 pin male)	10	Bluetooth module

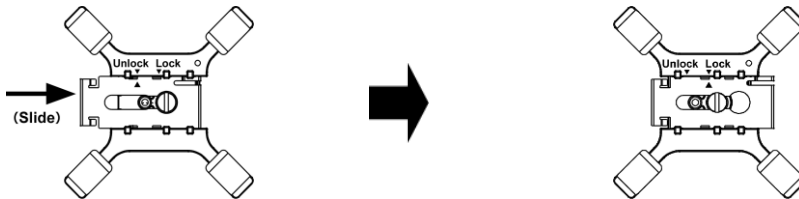
1-5 Assembling and installation of the product

1-5-1 Assembling the balance (Round pan type MG-S322)

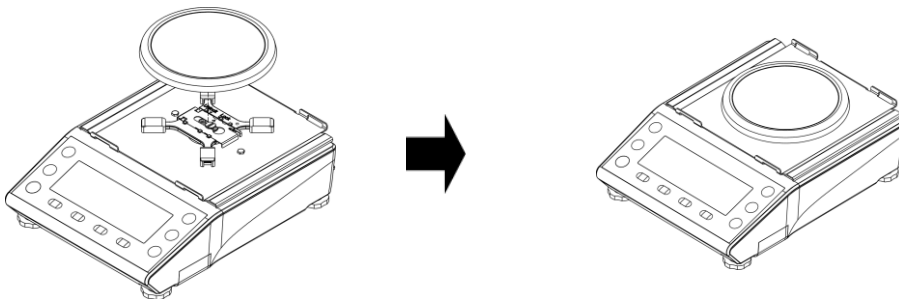
- 1 Attach the "Pan base".**
 "Slider" to check that in the "Unlock" side, then attach to the balance.



- 2 Move the "Slider" to "Lock" side.**

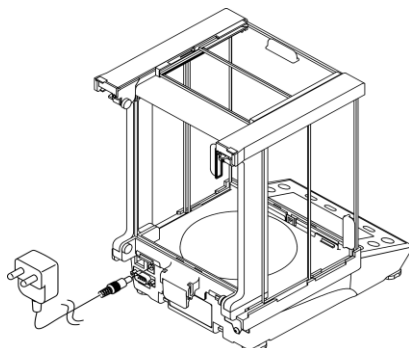


- 3 Mount the weighing pan.**



- 4 Assemble the windshield.**
 Refer to "Appendix 7 Windshield assembly instructions" to assemble the windshield.

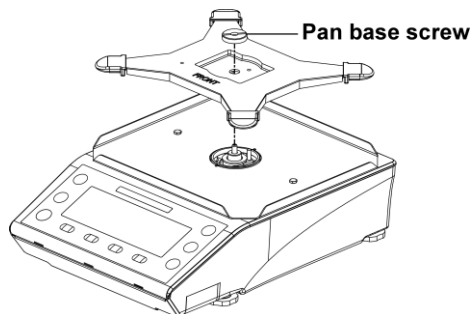
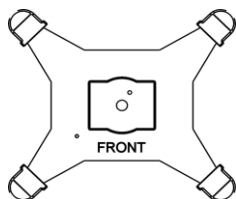
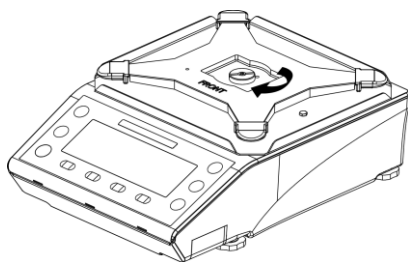
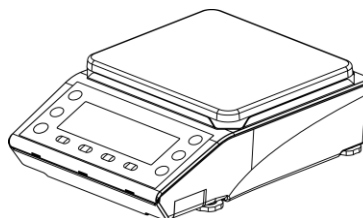
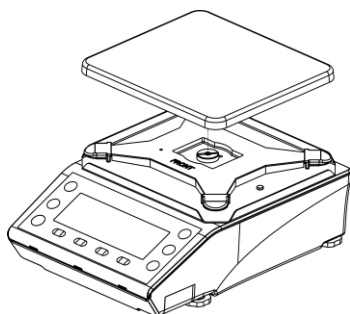
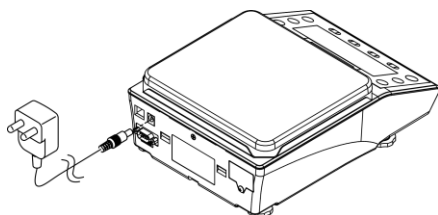
- 5 Connect the AC adapter.**



1-5-2 Assembling the balance (Square pan type MG-S1501, MG-S8200)**1 Attach the "Pan base".**

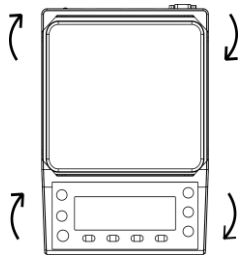
(1) Direct "FRONT" to the display side.

(2) Attach to the balance, then turn the "Pan base screw" to fix.

**2 Tighten the "Pan base screw" firmly.****3 Mount the weighing pan.****4 Connect the AC adapter.**

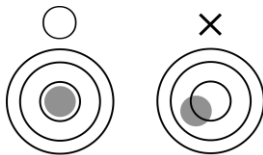
1-5-3 Level

1 Release the transportation lock of the adjuster.



At the time of shipment, the adjusters provided at the four corners of the bottom are locked. Turn them in the direction shown in the figure on the left to loosen them.

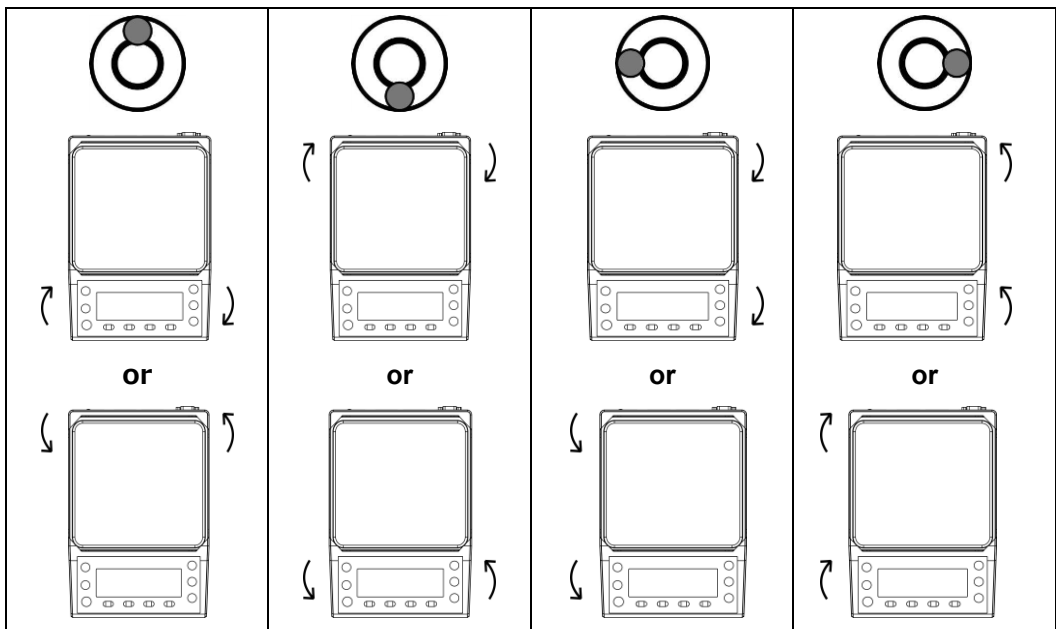
2 Level the balance.



Turn the adjusters so that the bubble enters in the center circle

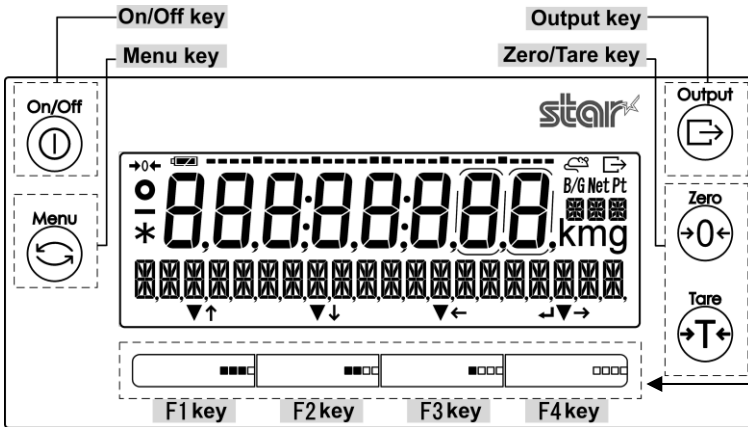
- (1) While watching the level, turn the adjusters provided on the bottom to level the main unit.
- (2) Bring the bubble enters in the center circle as shown in the figure on the left.
- (3) When having leveled the main unit, slightly push the four corners of the balance to make sure that there is no rattle.

Turn the adjusters as shown below depending on the position of the bubble in the level.



1-6 Description of the operation keys

1-6-1 Basic

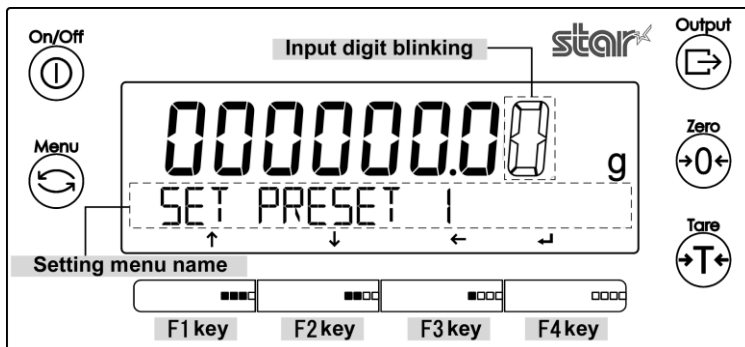


Note
 These keys are called [F] keys or [F1]-[F4] key in this manual as a matter of convenience, while there are not such indications around them.

No	Key	Name of key	Performance
1		[On/Off]	Turns on and off the power for the balance. On: Push the key, Off: Push the key long
2		[Menu]	Used for calling/exiting the setting menu. Used for canceling the setting value selection and going back to the measuring mode.
3		[Output]	Use for data outputting. Use for data importing in the Statistics/Formulation mode.
4		[Tare]	Use for tare subtraction.
5		[Zero]	Use for zero-point adjustment.
6		[F1] ([F] key)	< ▼ > : Use for selecting the mode, function and item. < ↑ > : Use for moving up to the menu/item selections, or use for incrementing the numeric values.
7		[F2] ([F] key)	< ▼ > : Use for selecting the mode, function and item. < ↓ > : Use for moving down to the menu/item selections, or use for decrementing the numeric value.
8		[F3] ([F] key)	< ▼ > : Use for selecting the mode, function and item. < ← > : Use for moving to the upper menu layer, or use for selecting the digit to change.
9		[F4] ([F] key)	< ▼ > : Use for selecting the mode, function and item. < → > : Use for moving to the lower menu layer, or use for selecting the digit to change. < ↵ > : Use for entering/executing the selected menu/item/value, or use for returning to the setting menu/measuring mode.

Reference The [F] keys on which < ↑ >, < ↓ >, < → >, < ← >, < ↵ > or < ▼ > are displayed above are valid.
 Shortcuts for various modes/functions can be assigned to [F] keys. Please refer to "8-2 Shortcut setting for accessing various measuring modes" and "8-3 Free key setting".

1-6-2 Setting value and numeric value inputting

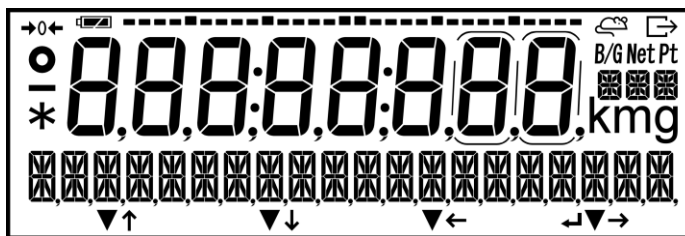


No	Key	Name of key	Performance
1		[Menu]	Cancel the input value and go back to the setting menu.
2		[Tare]	Input a decimal point < . > in "Specific Gravity mode".
3		[Zero]	Use for changing polarity < +/- >.
4		[F1] ([F] key)	< ↑ > : Use for incrementing the numeric values. < 0 → 1 → 2 → ... → 9 → 0 >
5		[F2] ([F] key)	< ↓ > : Use for decrementing the numeric values. < 0 → 9 → 8 → ... → 1 → 0 >
6		[F3] ([F] key)	< ← > : Use for selecting the digit to change.
7		[F4] ([F] key)	< ↵ > : Use for entering the value.

Reference The [F] keys on which < ↑ >, < ↓ >, < → >, < ← >, < ↵ > or < ▼ > are displayed above are available.

1-7 How to interpret the display

1-7-1 Description of segment.



No	Mark	Name	Description
1		Minus	Indicates the negative weight value and numeric.
2		Stable mark	<ul style="list-style-type: none"> - When displayed: The balance is in the stable condition. - When not displayed: The balance is not in the stable condition.
3		Zero point	Indicates the zero point.
4		7 segment	<ul style="list-style-type: none"> - Indicates the weight value - Indicates the simplified character.
5		Battery mark	Display when the balance is powered by batteries.
6		Output	Displayed when data are being output to external devices.
7		Gross weight	Indicates gross weight.
8		Net weight	Indicates that the tare weight is being subtracted.
9		Preset tared weight	Indicates that the preset tare weight is being subtracted.
10		Gram	Indicates the gram unit.
11		milligram	Indicates the milligram unit.
12		16 segment message 16 segment unit	<ul style="list-style-type: none"> - Displays various messages. - Indicates the various units.
13		Operation of the [F] key	Displayed when the [F1] – [F4] keys are effective.
14	<td>Colon</td> <td>Displayed when the date and time display.</td>	Colon	Displayed when the date and time display.
15		Asterisk	<ul style="list-style-type: none"> - Lights in the standby status. - Indicates addition available status when the adding function is used.
16		Bar graph	Indicates the present total amount relative to the weighing capacity defined as 100%.
17		Animal weighing mode	Displayed when the animal weighing mode.

Nos. 9, 11 and 17 are not indicated on the verified balance.

1-7-2 LCD character font

■7-segment

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
A	b	C	d	E	F	G	h	i	J	K	L	M	n	o
P	Q	R	S	T	U	V	W	X	Y	Z	c	comma	point	
P	q	r	s	t	u	v	w	x	y	z	c	,	.	
1	2	3	4	5	6	7	8	9	0	space	minus / hyphen			
1	2	3	4	5	6	7	8	9	0	-	-			

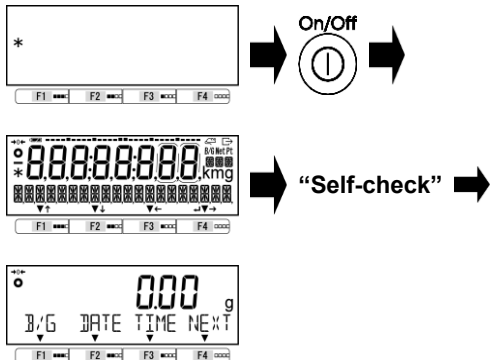
■16-segment

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z				
P	Q	R	S	T	U	V	W	X	Y	Z				
b	c	d	g	l	m	n	o	t	w					
b	c	d	g	l	m	n	o	t	w					
1	2	3	4	5	6	7	8	9	0					
1	2	3	4	5	6	7	8	9	0					
asterisk	slash	left arrow	right arrow	space	plus	minus / hyphen								
*	/	←	→	-	+	-								
comma	point	percent	Degree Celsius											
,	.	%	°C											

2 Basic usage

2-1 Turning on/off the power, and checking for the operation

1 Turn on the power for the balance.



Connect the included AC adapter to the balance.

When the AC adapter is plugged in, the balance enters the standby state and an asterisk < * > appears.

Push [On/Off] key.

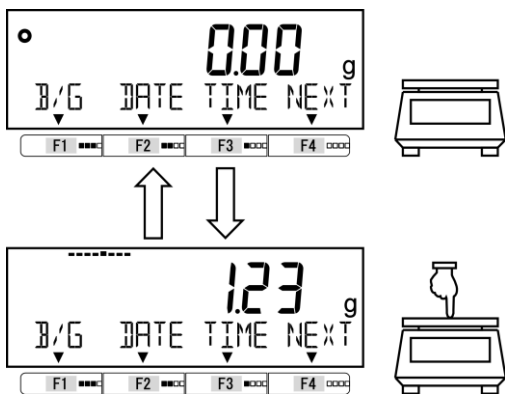
All displays on the LCD lights, followed by the self-check of the balance. During the self-check, the LCD display automatically changes.

Completion of the self-check is followed by the weight mode.

Note Do not push any key during the self-check.

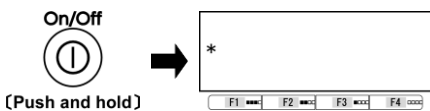
2 Balance operation check.

Press the weighing pan lightly to check if the indication changes.



3 Turn off the power for the balance.

Push and hold [On/Off] key (About 2 seconds)



Reference

- (1) Pushing and holding [On/Off] key obtains the standby status from any operation status.
- (2) When battery driven, the balance on/shutdowns without standby status.
- (3) The balance starts up in the last measuring mode before it was switched off.

Legal Metrology Verified balance always starts up in weighing mode.

2-2 Zero-point adjustment

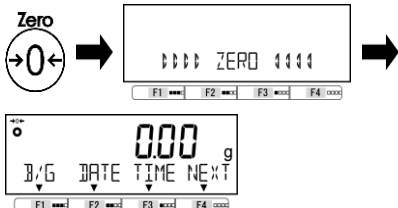
Adjusting the indication to zero is called "Zero-point adjustment".

1 Check the weighing pan.



Make sure that nothing is placed on the weighing pan.

2 Execute "Zero-point adjustment".



Push [Zero] key.

After the weight indication is stabilized, the indication become zero and the symbol "→0←" lights.

Reference

- (1) Zero-point adjustment cannot not be performed when a sample whose weight is over the "Zero-point adjustment range" is placed on the weighing pan. In that case, make the "tare" referring to the "2-3 Weighing a sample placed on a container (tare)"
- (2) Stability waiting during the Zero-point adjustment can be set using the Setting menu <17 WT STABLE>.



For verified balance, <17 WT STABLE> is not indicated and the balance always wait stability during the zero-point adjustment.

2-2-1 Zero-point adjustment range

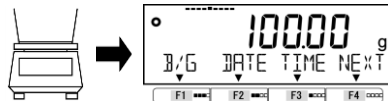
There is a Zero-point adjustment range (limit) in this product. When the weighing load (gross) exceeds the upper or lower limit, "Zero-point adjustment" cannot be executed.

Model	Lower limit (g)	Upper limit (g)
MG-S322	-4.80	4.80
MG-S1501	-22.5	22.5
MG-S8200	-123	123

2-3 Weighing a sample placed on a container (tare)

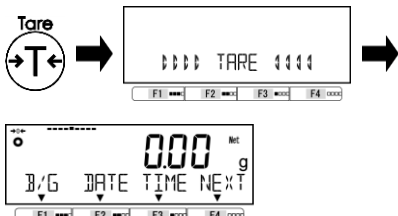
When weighing a sample to be weighed with the object placed on a container (tare), the weight of the container must be subtracted from the total weight to get the actual weight of the object to be weighed. This is called "tare subtraction" or "tare".

1 Place a container on the weighing pan.



The weight of the container is displayed.

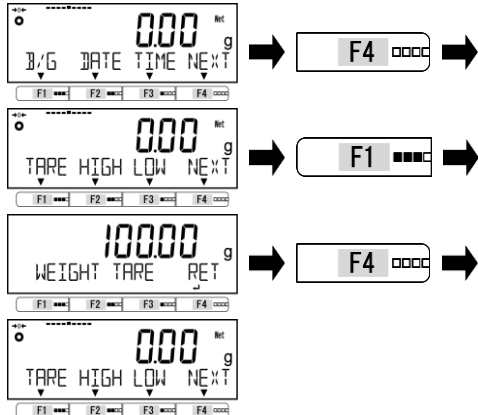
2 Perform tare subtraction.



Push [Tare] key.

The indication changes to zero and the < Net > symbol lights.

3 Check the tare weight.

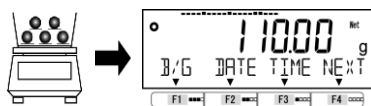


The tare weight can be checked by operating "Free keys" if the <TARE> is assigned to the Free key.

Refer to "8 Controlling and adjustment functions" for setting the Free keys. Push [F4] key to switch the menu bar and push [F1-F3] key on which <TARE> is displayed above.

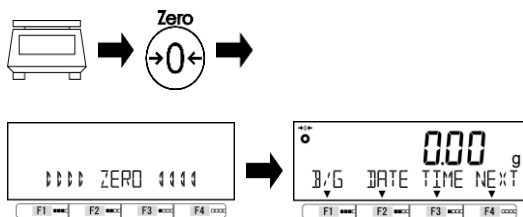
The tare weight is displayed on the display, then push [F4] < ← > key to return to the measuring mode.

4 Put the sample on the tare.



The net weight of the sample is displayed.

5 Clear the tare weight data.



Remove the sample and tare on the weighing pan, then push [Zero] key.

Therefore, the indication becomes zero and < Net > indication disappears.

Reference

(1) Performing the tare narrows the weighing range as much as the amount of the tare weight mass (tare weight).

Weighable range = weighing capacity - tare weight

(2) Tare weight can be output at "3 Check the tare weight" by pushing [Output] key.

Check "External input/output functions" to refer the output setting.

(3) Stability waiting during the tare can be set using the Setting menu <17 WT STABLE>.

Legal Metrology The setting of <17 WT STABLE> is not changeable and the balance always wait stability during tare-subtraction.

(4) When using a tare whose tare weight is already known, the tare can be performed in advance by inputting its tare weight (preset tare). For its setting method, refer to "5 User information setting".

Legal Metrology Preset tare function is not available.

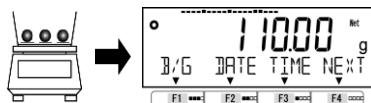
(5) When turning on the power placing a tare that exceeds the initial zero-adjustment range at the time of power supply, the tare subtraction is executed.

Legal Metrology This operation is not valid.

2-4 Weighing the additional sample

Weigh the first sample and the additional sample separately.

1 Place a sample to be weighed.



The mass of the sample to be weighed placed is indicated.

2 Perform the tare.

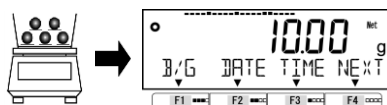


Push [Tare] key.

The indication changes to zero and the < **Net** > symbol appears.



3 Place an additional sample to be weighed.



The mass of the added sample alone is indicated.

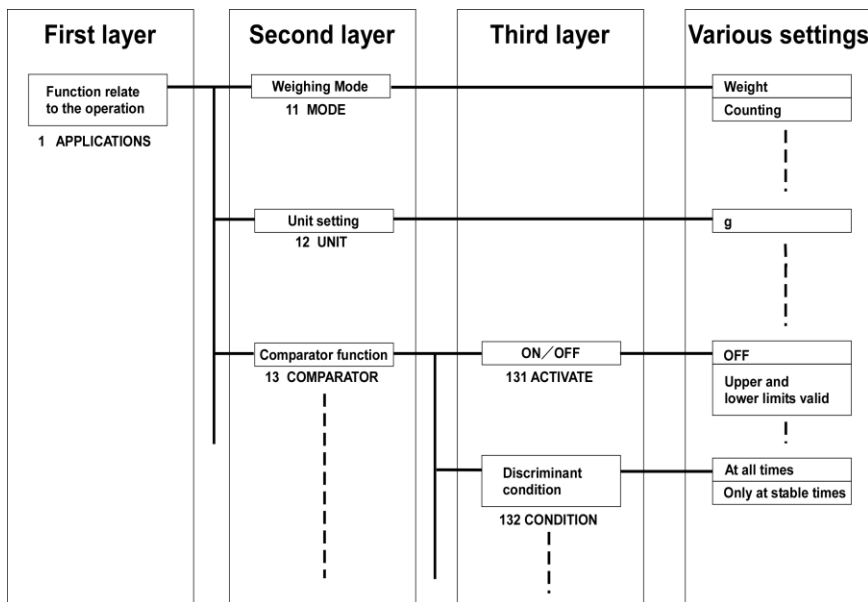
2-5 Basic operation

Reference

Shortcuts for various modes/functions can be assigned to [F] keys. Please refer to "8-2 Shortcut setting for accessing various measuring modes" and "8-3 Free key setting".

2-5-1 Hierarchy of a setting menu

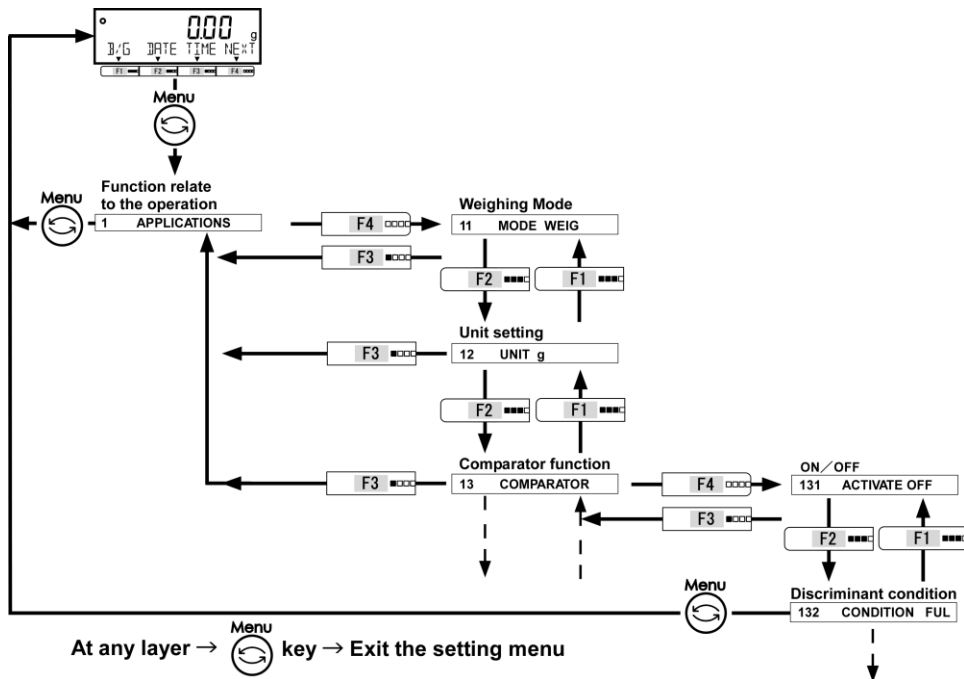
The setting menu of this product is divided into four, from the first layer to the third layer and for various settings.



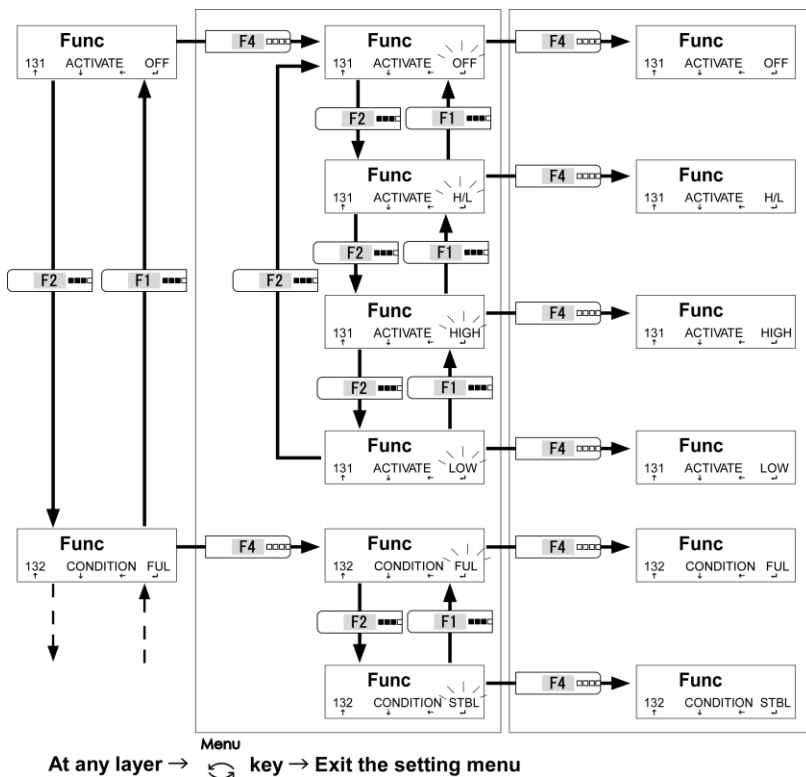
2-5-2 Operation of the setting menu

To perform settings for various functions from the state of weighing, chiefly execute the following procedure.

- Go to the menu item to set



- Select the setting value and execute/fix.



2-5-3 Numeric value input

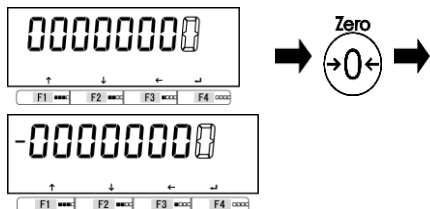
Input upper/lower limit, reference weight, preset tare weight, coefficient, specific gravity of the media liquid, water temperature, date/time and ID/password at each mode.

Reference

Numeric value inputting is limited to eight digits at a maximum.

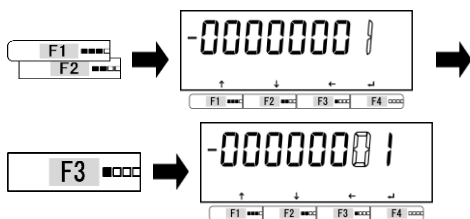
e.g.) When inputting “-5.4321”.

1 Input “-”.



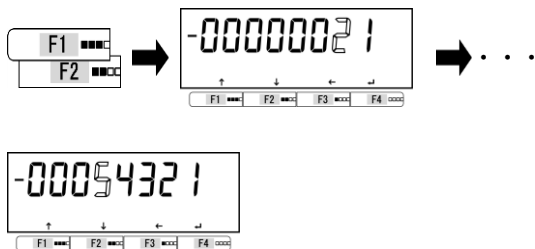
Push [Zero] key to change the polarity to “-”.

2 Input “1”.



The digit for inputting is blinking.
Push [F1, F2] key to increment/decrement the digit to “1”.
Push [F3] key to input the next digit.

3 Input “2, 3, 4, 5”.



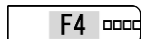
Input “2, 3, 4, 5” by the procedure above.

4 Input “.”.



Push [Tare] key to input “.” on the immediately right of the blinking digit.

5 Fix the input value.



Push [F4] key to fix the input value.
“-5.4321” is saved on the balance.

Reference

“-” and “.” cannot be input in ID or Password setting.
cf. “8-5-1 Balance ID setting”

2-5-4 [F] key switching at each measuring mode

You can switch the measuring mode, or select and set the function, by operating the [F] keys at each measuring mode.

This chapter shows the [F] keys switching by pushing the [F4] key.

Refer to “3 Function related to the operation” for the [F1-F3] keys operation.

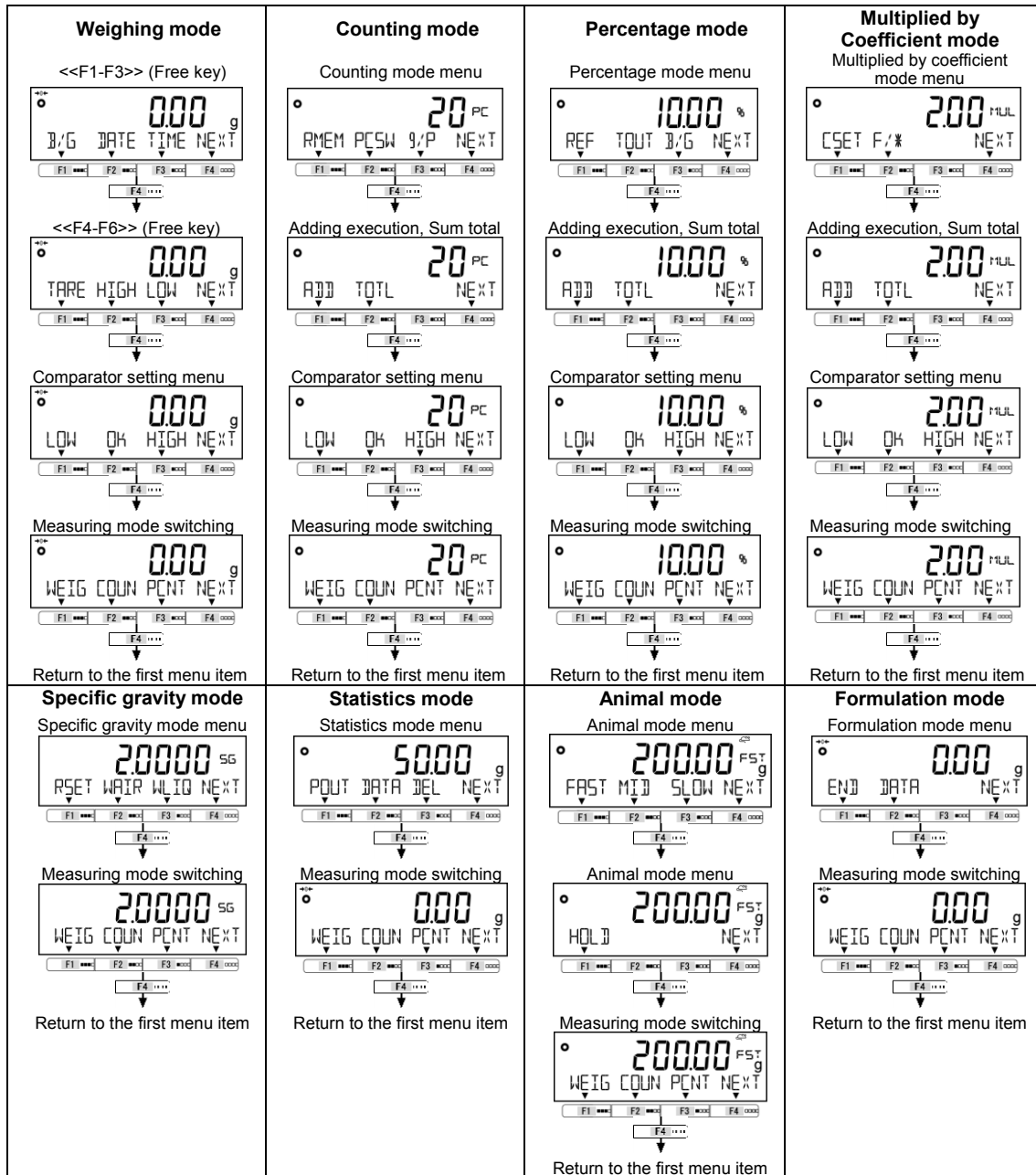
Legal
Metrology

For verified balance:

- “Adding execution, Sum total” is not available;
- “Multiplied by Coefficient mode”, “Statistics mode”, “Animal mode” and “Formulation mode” are not available.

Reference

- (1) In weighing mode, <<F1-F6>> (Free keys) are assigned to [F] keys as described follow; <<F1>> and <<F4>>: [F1] key, <<F2>> and <<F5>>: [F2] key, <<F3>> and <<F4>>: [F3] key. Please take care not to confuse <<F1-F4>> to [F1-F4] keys.
- (2) Refer to “8 Controlling and adjustment functions” for assigning “Free keys” and “Modes” to [F] keys.



3 Functions related to the operation

Settings to change the balance operations.

3-1 Hierarchy of functions related to the operation



For verified balance:

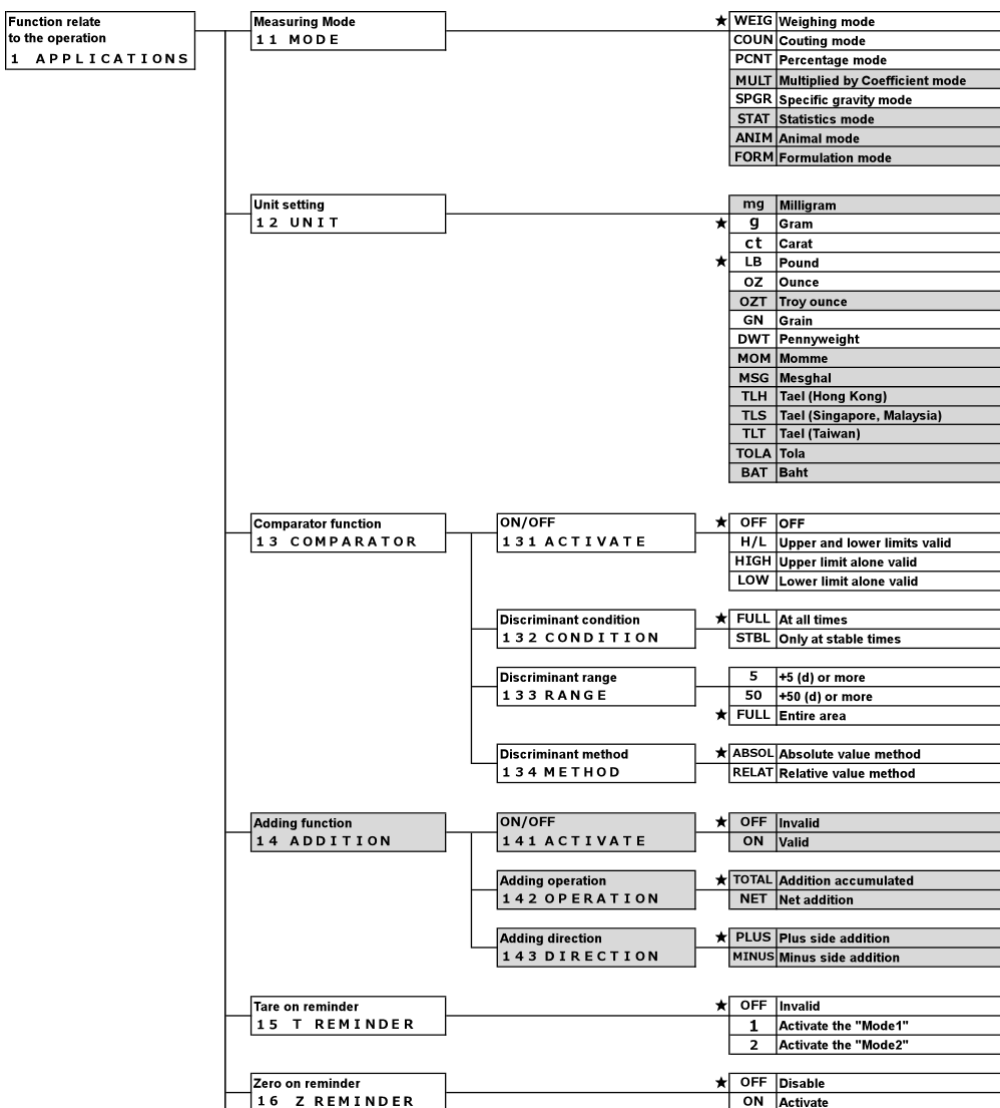
- Gray shaded items () are not indicated;
- <17 WT STABLE> is not indicated and fixed to be <ON>;
- <141 ACTIVATE> is not indicated and fixed to be <OFF>;
- “grain” is not selectable on MG-S1501 and MG-S8200;
- “carat” is not selectable on MG-S8200.



Initial setting value of <12 UNIT> is:

- <g>(gram) on MG-S322, MG-S1501, and non-verified MG-8200;
- <LB>(pound) on verified MG-S8200.

★: Initial setting value in a verified balance



Stability waiting 17 WT STABLE	★ OFF	Invalid
	ON	Valid
Bar graph indication 18 BARGRAPH	★ OFF	Invalid
	ON	Valid
Back Light 1A BACKLIGHT	OFF	Invalid
	3MIN	3 minutes
	5MIN	5 minutes
	10MIN	10 minutes
	30MIN	30 minutes
	★ ON	Always ON
Auto power-off 1B AUTO OFF	★ OFF	Invalid
	3MIN	3 minutes
	5MIN	5 minutes
	10MIN	10 minutes
	30MIN	30 minutes
Simplified SCS 1C SIMPLE SCS	★ OFF	Invalid
	ON	Valid

3-2 Various measuring modes of the balance

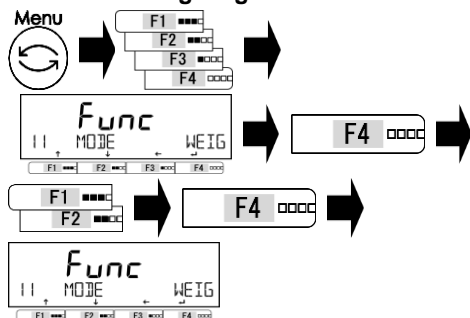
Reference Refer to “6 External input/output functions” to output the measuring data to other devices.

3-2-1 Weighing mode

Weighing mode is the basic mode for weighing.

Reference Various functions can be used with weighing mode by pushing the “Free key”. Please refer to “8-3 Free key setting”.

1 Select the weighing mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>.

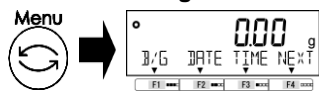
Push [F4] key to change the setting value.

Push [F1/F2] key to select.

WEIG : Weighing mode

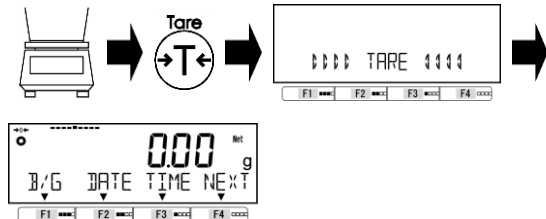
Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the weighing mode.

3 Execute tare-subtraction



Place the container on the weighing pan if necessary.

Push [Tare] key

Tare-subtraction is executed, then the indication changes to zero and the < Net > symbol lights.

4 Weigh the sample.



Place the weighed.

The weighing result is displayed.

3-2-2 Counting mode

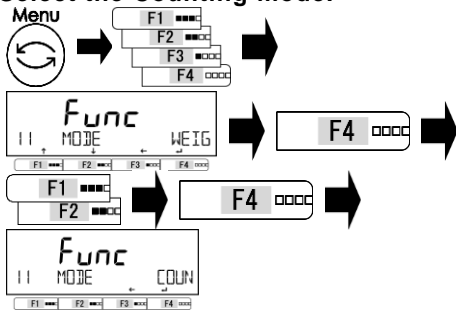
Counting mode can count the number of items by placing the items for which sampling has been completed on the balance and dividing the total weight of those items by the recorded unit weight.

- Legal Metrology**
- (1) When to use for prescription counting in USA, Class II unit shall be selected. Class III units are not legal for trade for prescription counting. Please refer to "Appendix 1-1 Basic Specification" for metrological specification in each weighing unit.
 - (2) For verified balance:
 - Numeric value setting method is not available;
 - Measuring unit indication of pieces is "PC" instead of "PCS".

The unit weight is inputted by following method:

- Actual value setting method: Place the specified number of samples on the balance to record the average unit weight.
- Numeric value setting method: Input numeric value of the unit weight by key operation.

1 Select the Counting mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

COUN: Counting mode

Push [F4] key to fix.

2 Exit the setting menu.



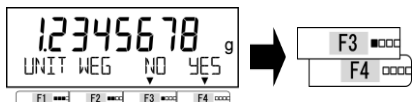
Push [Menu] key to shift to the Counting mode.

3-2-2 (1) Actual value setting method

Place the specified number of samples on the balance to record the average unit weight internally.

- Legal Metrology**
- For verified balance:
- Minimum sample size in pieces "MSS" is 10 PC;
 - <On 5> in Step 2 is not available;
 - 1 to 9 PC cannot be selected on <on VAR>;
 - The unit weight (individual piece weight "MPW") less than 3d and total sample weight less than 30d cannot be adopted.

1 Select whether or not employ the previous recorded unit weight.



Push [F3/F4] key to select whether or not employ the previous data.

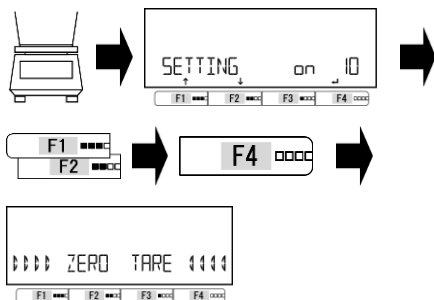
When there is no data record, this step is skipped.

Push [F3/F4] key to select.

NO: Change
YES: Not Change

When <YES> is selected, go to step 6.

2 Select the "number of samples mode".



Place a container (tare) on the weighing pan if necessary.

Push [F1/F2] key to select.

on 5: 5 PC
on 10: 10 PC
on 30: 30 PC
on 50: 50 PC
on 100: 100 PC
on VAR: 1 – 999 PC

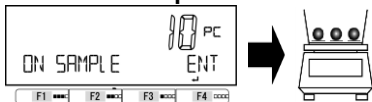
PCSWG: Numeric value setting method
See 3-2-2(2)

Push [F4] key to fix.

Tare-subtraction or zero-point adjustment is executed automatically.

3

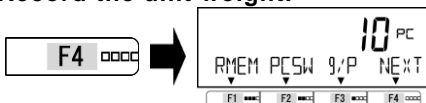
Place the samples.



Place the set number of samples on the container.

4

Record the unit weight.

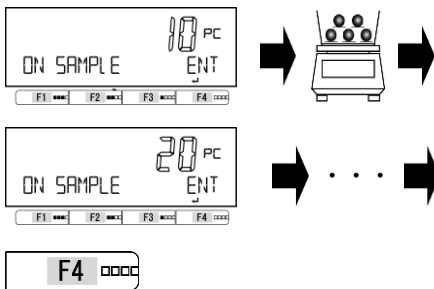


Push [F4] key to fix.

The unit weight is recorded.

5

Simple SCS method (When enabled).



When <1C Simple SCS> is valid, Simple SCS method is activated and the sample counting indication blinks during this function.

Add more samples, then the number of samples and unit weight is automatically updated when the indication becomes stable. The number of additional samples can be up to two times the number of the samples of the latest update.

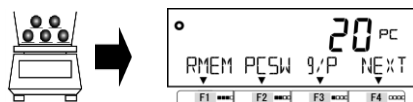
For example, when "10 PC" is set, add 20 or less samples.

Repeat this step until the number of the samples has reached approximately one-fifth to one-half of the total numbers that you are intended to count.

Push [F4] key to fix the updated unit weight.

6

Put samples in place to count them.



Place the samples.

Count result is displayed.

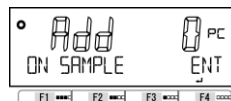
Reference

- When <on VAR> is selected in step 2, select the specified number of the sample among 1 to 999 by operating [F1/F2] keys.

Legal Metrology For verified balance, 1 to 9 PC cannot be selected on <on VAR>.

- When simple SCS is operating, if the weight of the samples is less than the "SCS weight" — 99 times of the minimum readability (d x 99) —, <Add> blinks on the display and unit weight cannot be updated.

In this case, add samples until <Add> indication disappears, or select the larger number of samples in step 2.



Model	Readability d (g)	SCS weight (g)
MG-S322	0.01	0.99
MG-S1501	0.1	9.9
MG-S8200	1	99


- When simple SCS is operating, if the number of the additional samples is larger than two times of the sample number of latest update, <Sub> blinks on the display and unit weight cannot be updated.

In this case, decrease the number of additional samples.

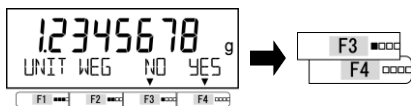


3-2-2 (2) Numeric value setting method

Input numeric value of the unit weight by key operation.

 This method is not available for verified balance.

1 Select whether or not employ the previous recorded unit weight.



Push [F3/F4] key to select whether or not employ the previous data.

When there is no data record, this step is skipped.

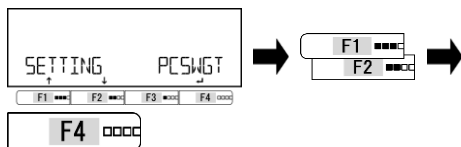
Push [F3/F4] key to select.

NO: Change

YES: Not Change

When <YES> is selected, go to step 4.

2 Select the “unit weight value input mode”.

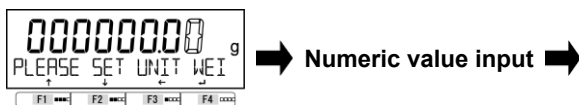


Push [F1/F2] key to select.

PCSWGT: Unit weight value input

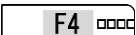
Push [F4] key to fix.

3 Input the unit weight.



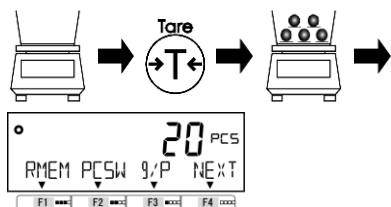
Input the unit weight.

Push [F4] key to fix.



(Refer to “2-5-3 Numeric value input”)

4 Put samples in place to count result.



Place a container (tare) on the weight pan.

Push [Tare] key.

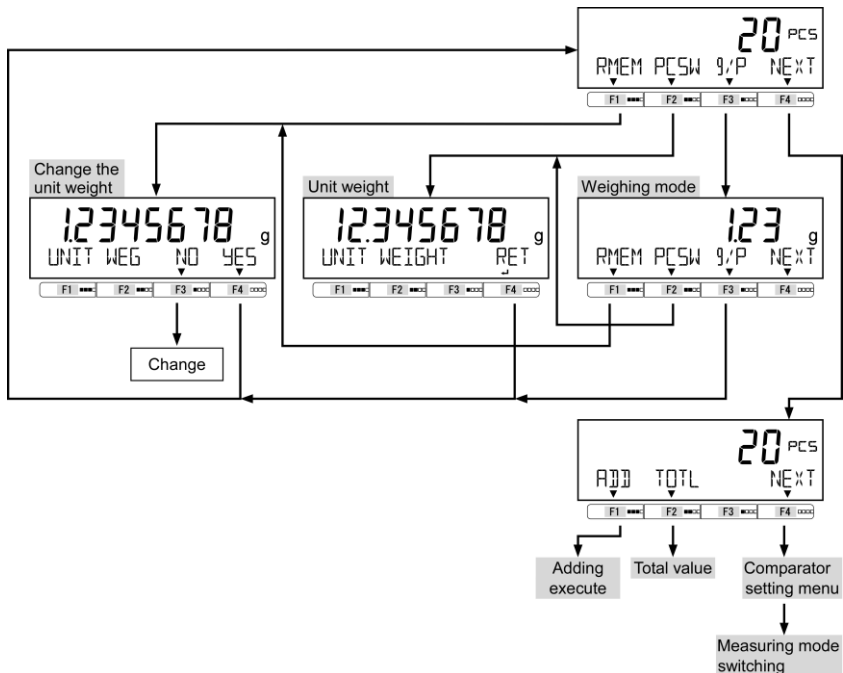
Place the samples.

The count result is displayed.

3-2-2 (3) Switching the display at Counting mode

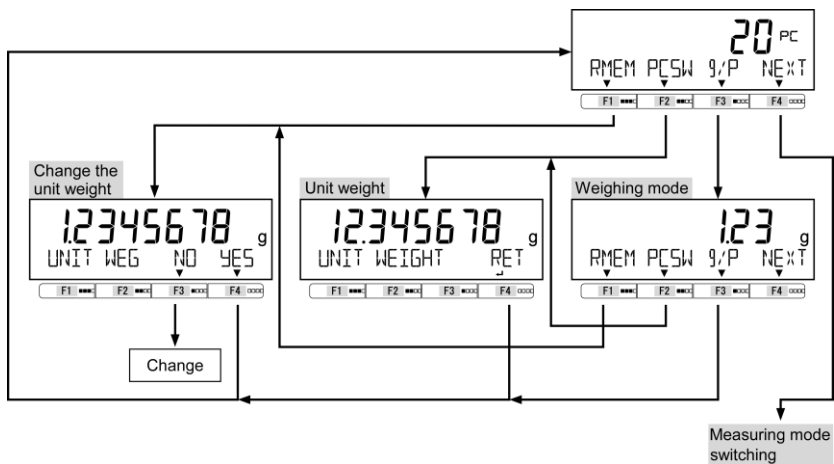
1 Push [F1-F4] keys to switch the display.

For non Legal
Metrology



Reference <ADD> and <TOTL> can be used when <14 ADDITION> is activated.

For Legal
Metrology



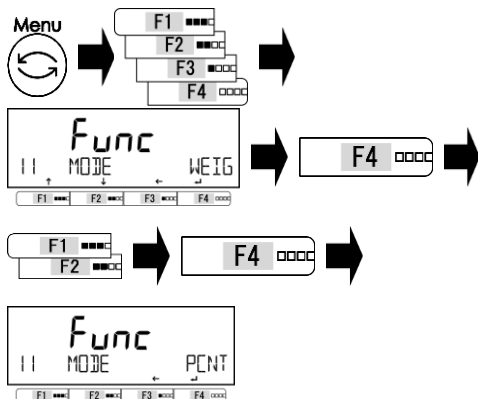
3-3 Percentage mode

The weight of a sample to be weighed is indicated in percent relative to the reference weight. There are two methods to input the reference weight;

- Actual value setting method ([onW]): Place the reference weight on the balance to record the weight.
- Numeric value setting method ([NUM]): Input numeric value of the reference weight by key operation.

Reference	(1) Weight limit.	Models	d (g)	Weight limit (g)
		MG-S322	0.01	0.10
		MG-S1501	0.1	1.0
		MG-S8200	1	10
	(2) The minimum percent to be displayed is automatically set according to the recorded reference weight.	Readability (%)	Range of reference weight	
		1	Lower weight limit <= Reference weight < Lower weight limit X 10	
		0.1	Lower weight limit X 10 <= Reference weight < Lower weight limit X 100	
		0.01	Lower weight limit X 100 <= Reference weight	

1 Select the percentage mode.



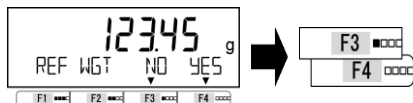
Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>.
 Push [F4] key to change the setting value.
 Push [F1/F2] key to select.
 PCNT : Percentage mode
 Push [F4] key to fix.

2 Exit the setting menu.



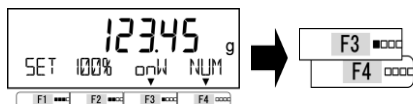
Push [Menu] key to shift to the percentage mode.

3 Select whether or not employ the previous recorded reference value.



Push [F3/F4] key to select whether or not employ the previous data.
 When there is no data record, this step is skipped.
 Push [F3/F4] key to select.
 NO: Change
 YES: Not Change
 When <YES> is selected, go to step 6.

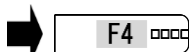
4 Select the method of setting the reference value.



Push [F3/F4] key to select.
 onW : Actual value
 NUM : Numeric value

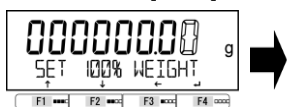
5 Save the reference value.

In the case of [onW].



Place the reference weight on the balance.
Push [F4] key to record.

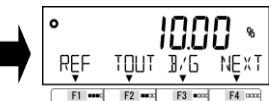
In the case of [NUM].



Input the reference value.
Push [F4] key to fix.

(Refer to "2-5-3 Numeric value input")

6 Weigh the samples.

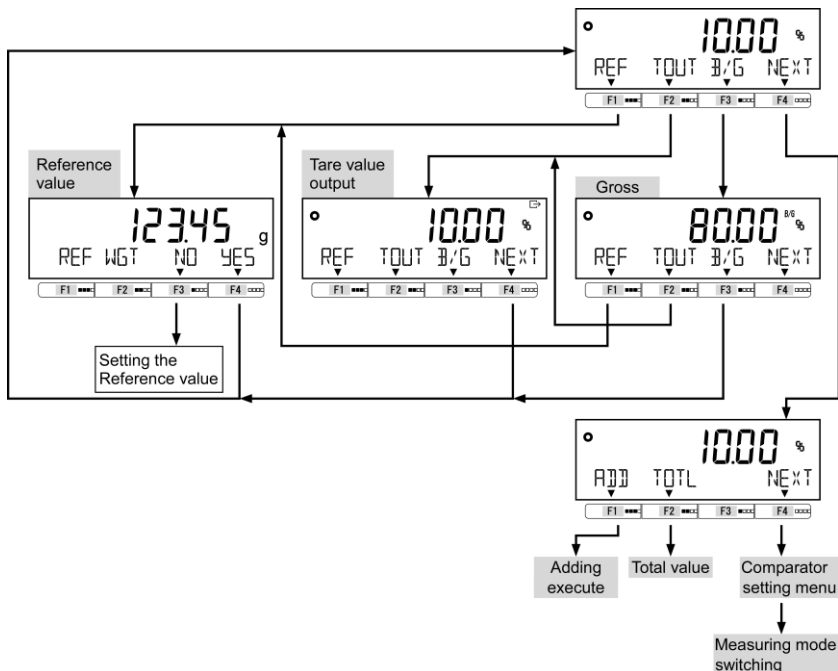


The ratio of the weight of the sample to the reference weight is indicated in percent.

3-3-1 Switching the display at percentage mode

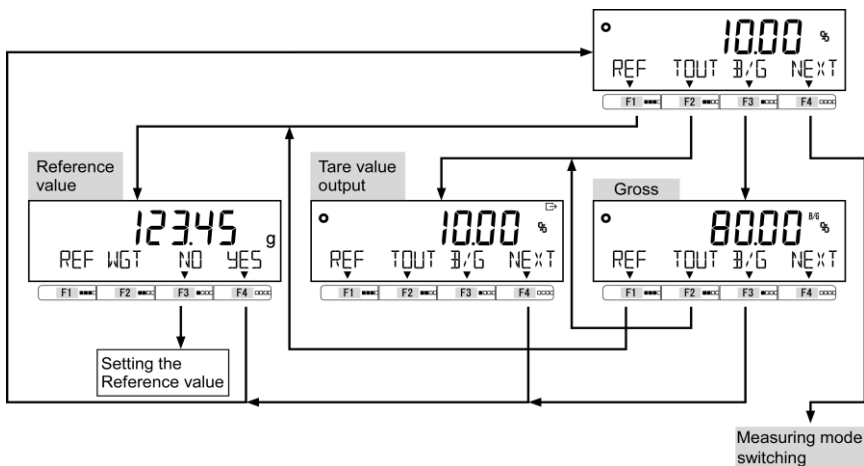
1 Push [F1-F4] keys to switch the display.

For non Legal
Metrology



Reference <ADD> and <TOTL> can be used when <14 ADDITION> is activated.

For Legal
Metrology



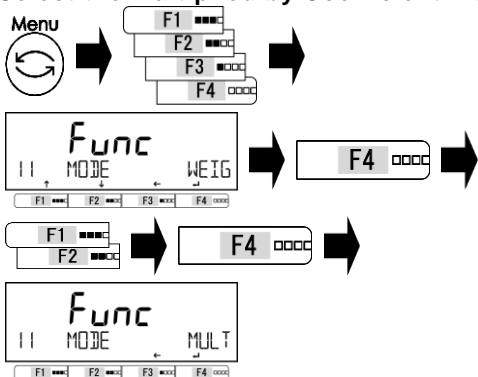
3-4 Multiplied by Coefficient mode

Measured weight is multiplied by the preset coefficient, and the result be displayed.



This mode is not available for verified balance.

1 Select the Multiplied by Coefficient mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

MULT : Multiplied by Coefficient mode

Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the Multiplied by Coefficient mode.

3 Select whether or not employ the previous recorded coefficient.



Push [F3/F4] key to select whether or not employ the previous data.

When there is no data record, this step is skipped.

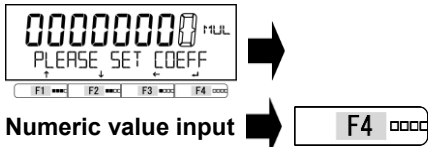
Push [F3/F4] key to select.

NO: Change

YES: Not Change

When <YES> is selected, go to step 6.

4 Set the coefficient.



Numeric value input

(Refer to “2-5-3 Numeric value input”)

Input the coefficient.

Push [F4] key to fix.

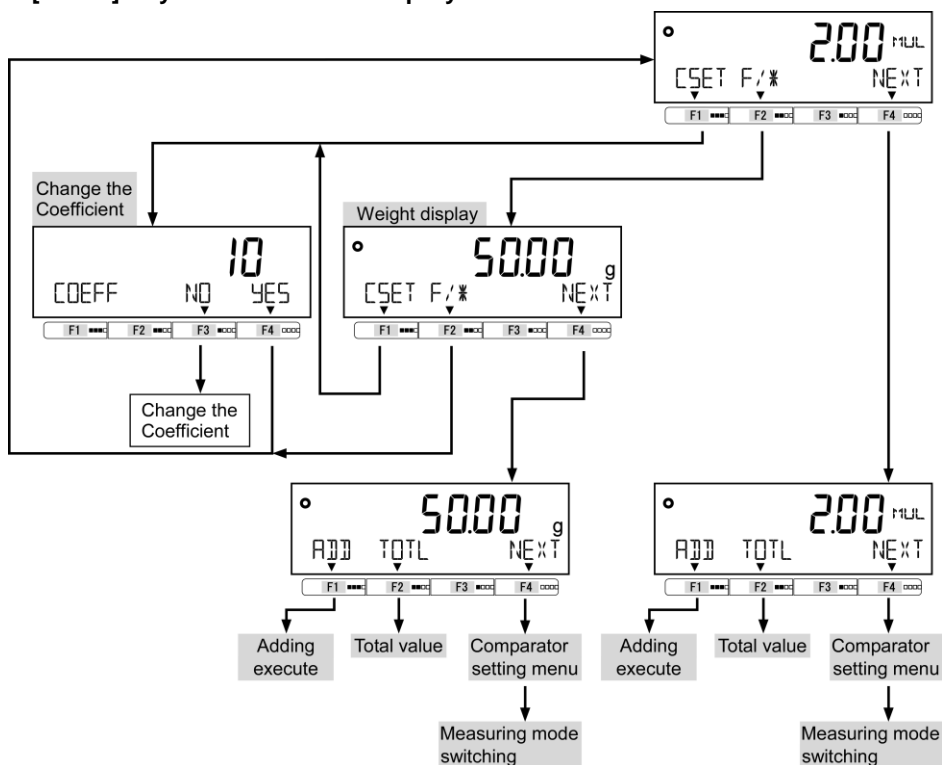
5 Weigh the samples.



The weight of the sample is multiplied by the coefficient and the result is displayed.

3-4-1 Switching the display at Multiplied by Coefficient

1 Push [F1-F4] keys to switch the display.



Reference <ADD> and <TOTL> can be used when the <14 ADDITION> is activated.

3-5 Specific gravity mode

In the specific gravity mode, the ratio of the density of a substance to the density of water at its densest (4°C) for liquids is calculated.



Specific gravity mode is NOT legal for trade.

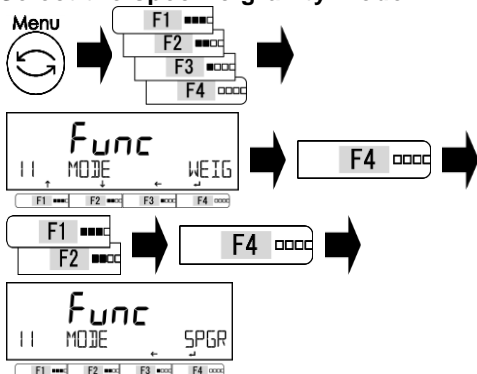
Purchase the optional “specific gravity measurement kit” or prepare the equipments — a water tank, hanging string/wire, net/basket for placing the sample, thermometer etc.— in accordance with the samples to be measured.

When purchased with “specific gravity measurement kit”, please refer to the option’s manual.

Procedure to measure the specific gravity:

1. Prepare the equipments or specific gravity measurement kit
2. Input the water temperature or the specific gravity of the reference liquid.
3. Measure the sample weight in the air.
4. Compensate the buoyancy acting on the net/basket.
5. Measure the sample weight in the water/liquid.
6. The specific gravity of the sample is displayed.

1 Select the specific gravity mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>

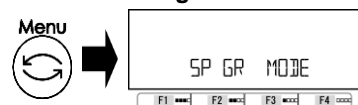
Push [F4] key to change the setting value.

Push [F1/F2] key to select.

SPGR: specific gravity mode

Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the specific gravity mode.

3 Select the reference liquid.

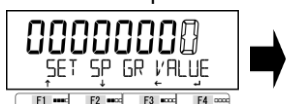


Push [F3/F4] key to select the reference liquid.

OTHER: Liquid other than water
H2O: water

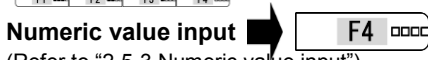
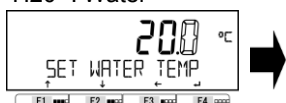
4 Input the specific gravity of the reference liquid or the temperature of the water.

<OTHER>: Liquid other than water



Numeric value input (Refer to “2-5-3 Numeric value input”)

<H2O>: Water

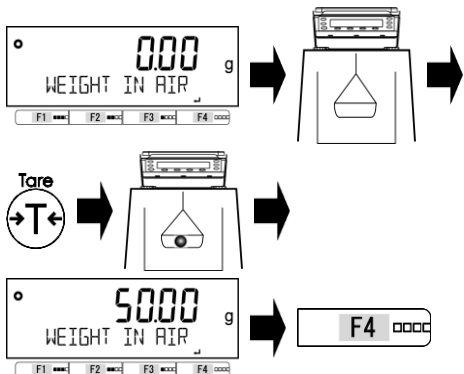


Numeric value input (Refer to “2-5-3 Numeric value input”)

Enter the specific gravity of the reference liquid and push [F4] key to fix.

Enter the temperature of the water and push [F4] key to fix.

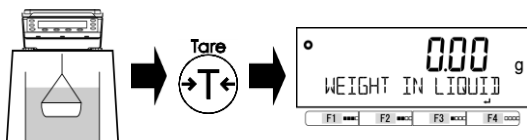
5 Measure the sample weight in the air.



Set the net/basket on the balance and push [Tare] key.

Load the on the net/basket to measure the weight of the sample in the air, then push [F4] key to record it.

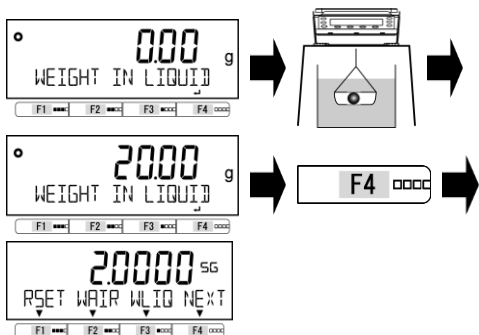
6 Compensate the buoyancy acting on the net/basket.



Remove the sample on the net/basket and push [Tare] key to tare, then sink the net/basket into the water/liquid.

Push [Tare] key to compensate the buoyancy acting on the net/basket.

7 Measure the sample weight in the water/liquid.

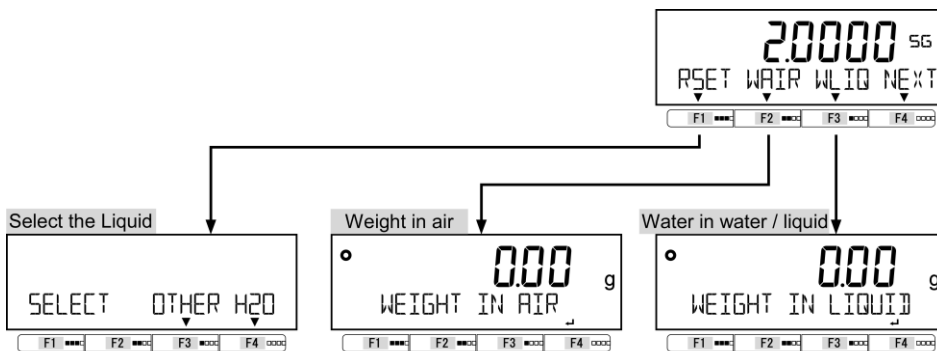


Put the sample on the net/basket in the water/liquid, then push [F4] key to record.

The specific gravity of the sample (for the 4 °C water) is automatically calculated and displayed.

3-5-1 Switching the display at “Specific gravity mode”

1 Push [F1-F4] keys to switch the display.



3-6 Statistics mode

The statistical operation function collects weight data and indicates maximum, average, and other statistical values.

Legal
Metrology

This mode is not available for verified balance.

Reference

- (1) Only “mg” or “g” can be used.
- (2) Each calculation result except “CV” follows the smallest readability among which are used to record the weighing data.
- (3) Up to 999 weight data can be saved.

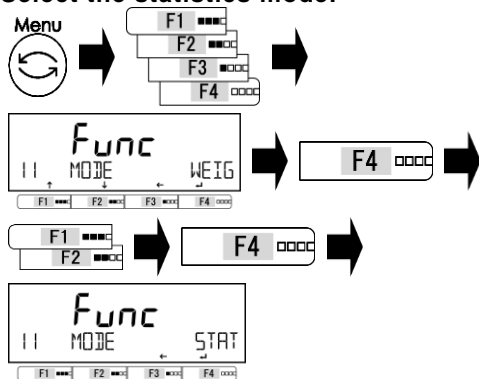
Note

The output timing is fixed to “Once at stable/immediately after [Output] key is pushed” regardless of the setting value of <413/423 CONDITION> of “6 External input/output function”.

The setting of <17 WT STABLE>	The output condition
ON	Once at stable after [Output] key is pushed
OFF	Once immediately after [Output] key is pushed

1

Select the statistics mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>.

Push [F4] key to change the setting value.

Push [F4] key to select.

STAT: Statistics mode

Push [F4] key to fix.

2

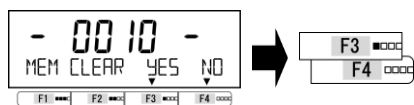
Exit the setting menu.



Push [Menu] key to shift to the statistics mode.

3

Choose whether or not clear all the data.



Push [F3/F4] key to select whether or not clear all the data.

When there is no data stored, this step is skipped.

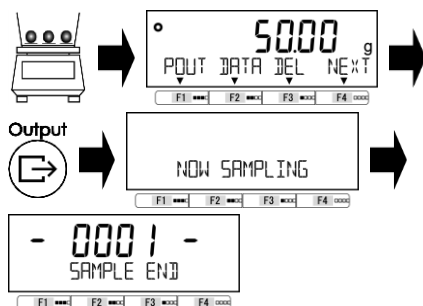
YES : Clear

NO : Not clear

When <NO> is selected, weighing step of the next statistics data starts.

4

Store weighing data.

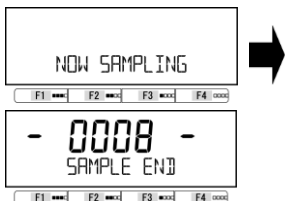


Place the sample in the weighing pan.

Push [Output] key to store the sample weight.

Weighing data is collected and then output.

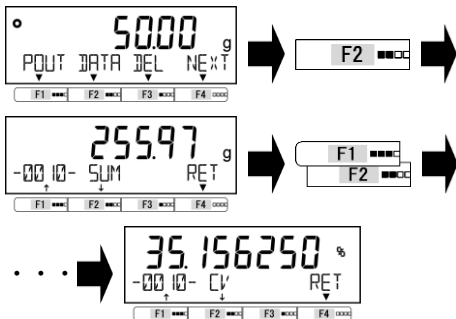
5 Collect more weighing data.



Store data in the same way as in step 4.

Repeat placing samples, storing data, and removing the samples until the required number of data items are collected.

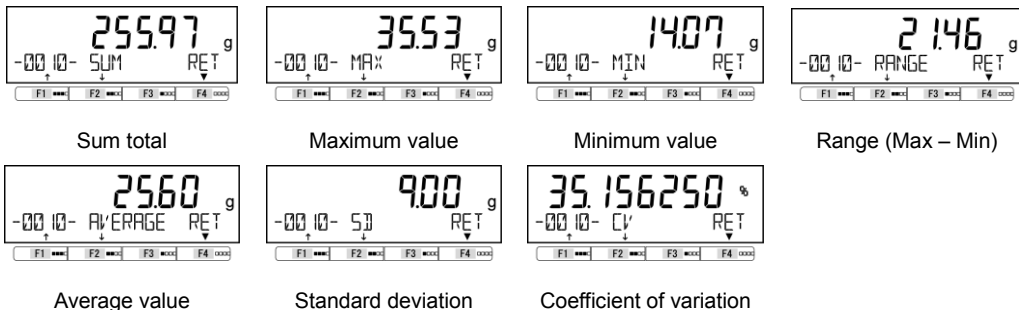
6 Display the statistical operation result.



Push [F2] key (<DATA>).

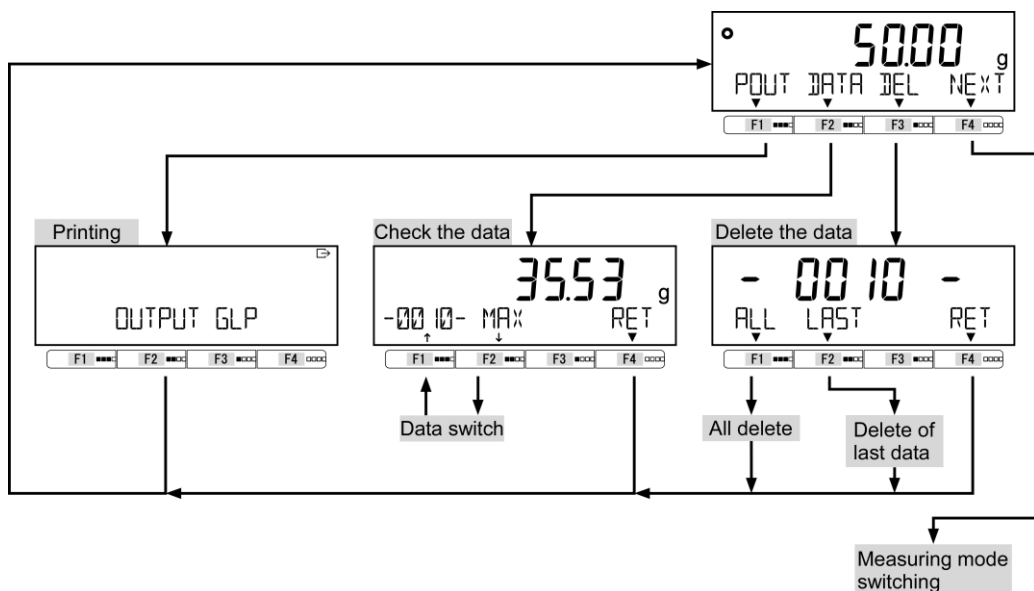
The display changes to the statistical operation display

Push [F1/F2] key to switch to another calculated item.



3-6-1 Switching the display at “Statistics mode”

1 Push [F1-F4] keys to switch the display.



3-7 Animal mode

The balance can accurately weigh animals and other samples that move during measurement. Even when animals and other samples move during measurement, when weight variations fit within the set value range, the indication is held (hold) and the measurement result can be read.



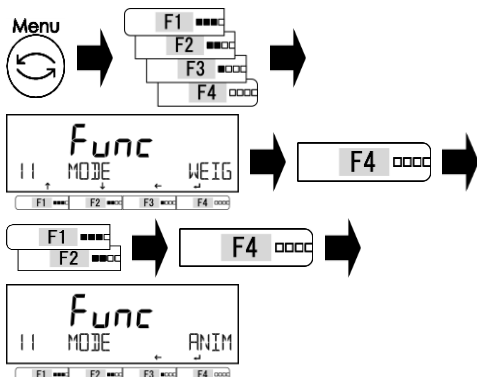
This mode is not available for verified balance.

Reference

- (1) When the external output is activated, the output condition is fixed as following;
 - Output once after the indication is held except when the <HOLD> is pushed (step 5-b).
 - Output once after the [Output] key is pushed during the indication is held.
- (2) Only "g" can be used.

1

Select the animal mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>. Push [F4] key to change the setting menu. Push [F1/F2] key to select. ANIM: Animal mode Push [F4] key to fix.

2

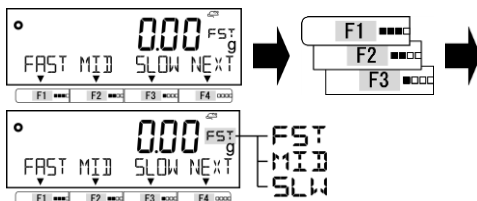
Exit the setting menu.



Push [Menu] key to shift to the animal mode.

3

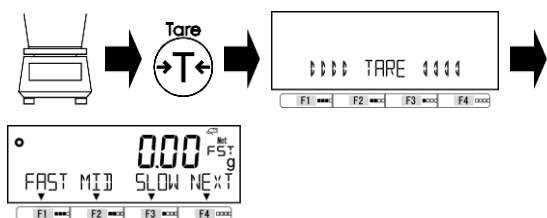
Select the activity level .



Push [F1-F3] keys to select.
 FAST: Wild
 MID: In-between
 SLOW: Quiet

4

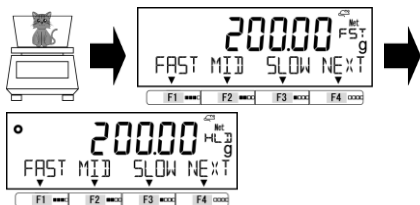
Execute tare-subtraction



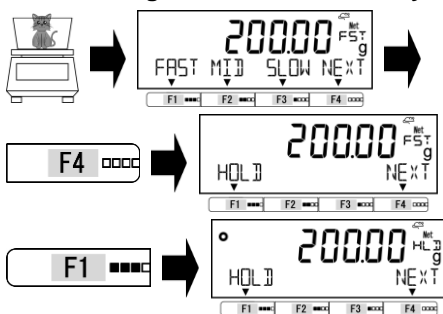
Place the container on the weighing pan. Push [Tare] key Tare-subtraction is executed, then the indication changes to zero and the < Net > symbol lights.

5

a) Weigh the animal.

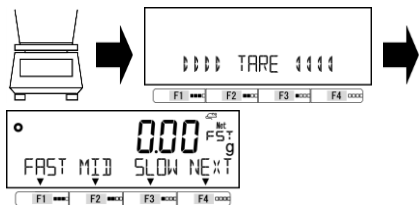


b) When the animal is too wild, weigh the animal using manual <HOLD> key.



6

Remove the animal.



Place the animal on the weighing pan.
After the weight variations fit within the set range, the weighing indication is held and <HLD> indication appears.

Push [F4] <NEXT> key to display the <HOLD> menu on [F1] key.
Place the animal on the weighing pan.
Push [F1] <HOLD> key, then the weighing indication is held and <HLD> indication appears.

Remove the animal, then automatically tare subtracted.

3-8 Formulation mode

“Formulation mode” can store and refer the weight of each component compounded.

Legal Metrology

This mode is not available for verified balance.

Reference

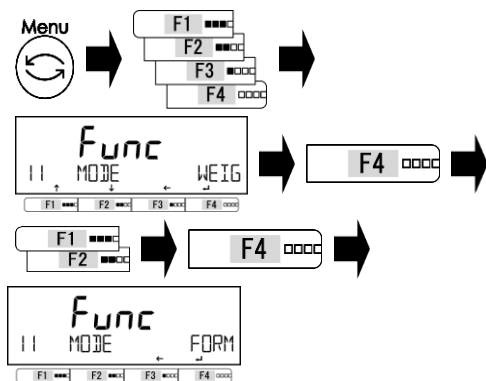
- (1) Only “mg” or “g” can be used.
- (2) Up to 30 components can be stored.
- (3) “Preset tare function” cannot be used.

Note

The output timing is fixed to “Once at stable/immediately after [Output] key is pushed” regardless of the setting value of <413/423 CONDITION> of “6 External input/output function”.

The setting of <17 WT STABLE>	The output condition
ON	Once at stable after [Output] key is pushed
OFF	Once immediately after [Output] key is pushed

1 Select the formulation mode.



Push [Menu] key, then push [F1-F4] keys to go to <11 MODE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

FORM: Formulation mode

Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the Formulation mode.

3 Choose whether or not clear all the data.



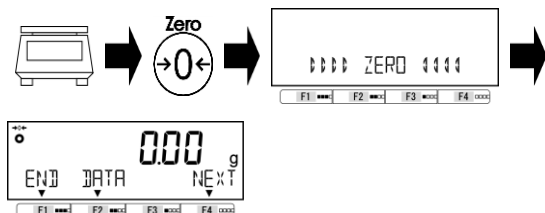
Push [F3/F4] key to select whether or not clear the data. When there is no data stored, this step is skipped.

<YES>: Clear

<NO>: Not clear

When <NO> is selected, weighing step of the next component starts.

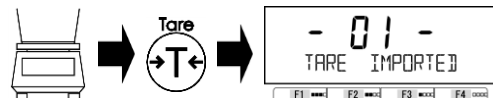
4 Zero point adjust.



Make sure that nothing is placed on the weighing pan, then push [Zero] key.

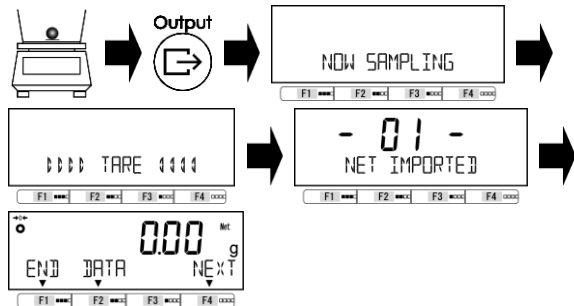
Displays become zero and the symbol “→0←” lights.

5 Store the tare weight.



Load the tare and push [Tare] key to store the tare weight.

6 Store the sample weight.



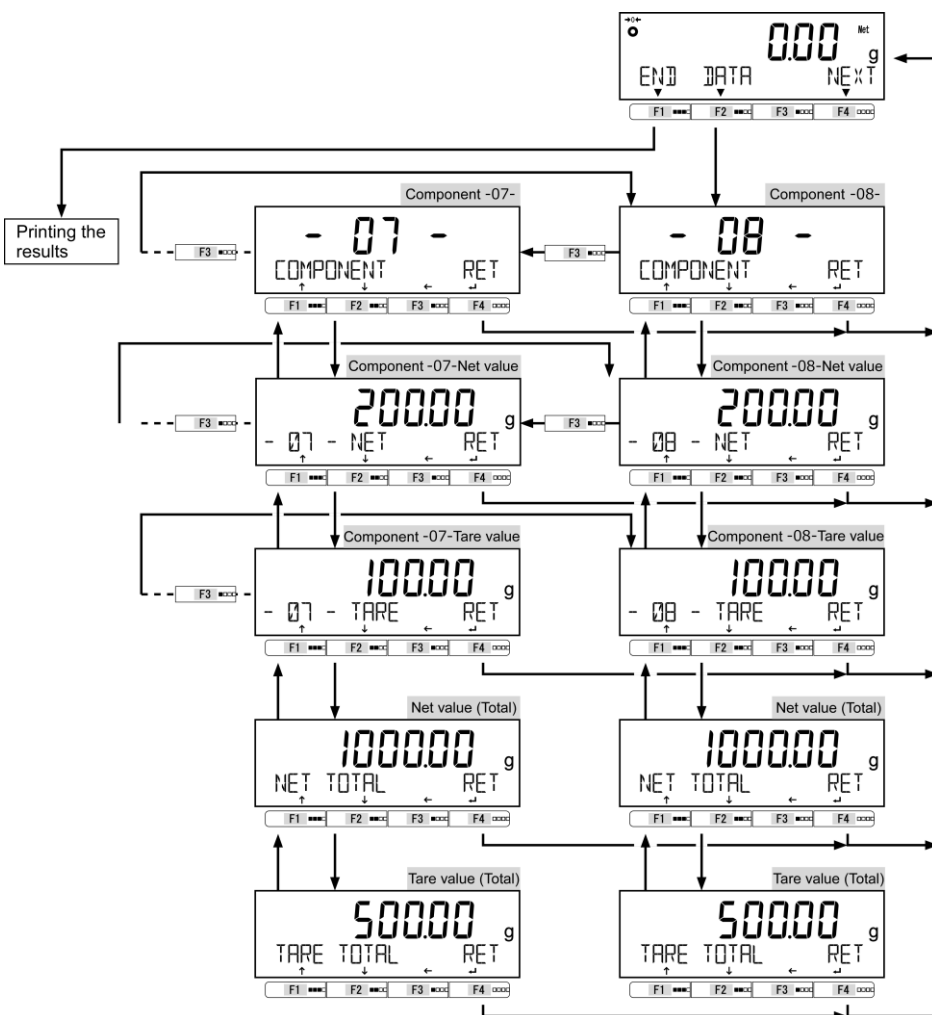
Put the sample on the tare and push [Output] key to store the sample weight.

Repeat the step 6 for all the samples to be compounded.

When to set the tare individually for each sample, repeat steps 4-6.

3-8-1 Check the stored data of each component

1 Push [F1-F4] keys to check the weight of each component.



3-9 Unit setting

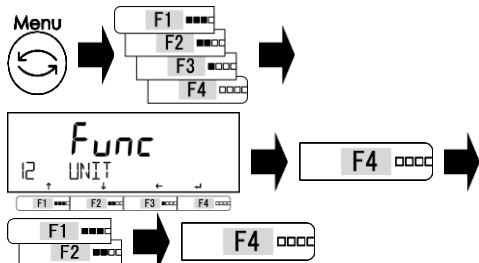
Various units can be selected. Please also refer to "Appendix 1-1 Basic specifications" and "Appendix 3 Unit indication and conversion table".



For verified balance, selectable measuring units are limited to:

- MG-S322: "gram", "carat", "pound", "ounce" and "grain";
- MG-S1501: "gram", "carat", "pound" and "ounce";
- MG-S8200: "gram", "pound" and "ounce."

1 Select the unit setting.



Push [Menu] key, then push [F1-F4] keys to go to <12 UNIT>.

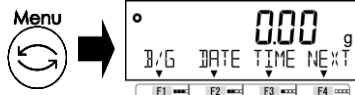
Push [F4] key to change the setting value.

Push [F1/F2] key to select the unit (Refer to Unit Setting Menu List).

Push [F4] key to fix.

mg : milligram	g : gram	ct : carat	LB : pound
OZ : ounce	OZT : troy ounce	GN : grain	DWT : pennyweight
MOM : momme	MSG : mesghal	TLH : Hong Kong tael	TLT : Taiwan tael
TLS : Singapore, Malaysia tael	TOLA : tola	BAT : baht	

2 Exit the setting menu.



Push [Menu] key to shift to the measuring modes.

3-10 Comparator function

It is possible to preset threshold values (limits) and determine whether or not a measured value is within the range defined by the preset values.



The comparator function can be used in Weighing mode, Percentage mode, and Counting mode.

3-10-1 How to perform discrimination

Set the lower and the upper limits. Then, whether the weight of a sample to be weighed is "LOW" (lower than the lower limit), "OK" (appropriate) or "HIGH" (higher than the upper limit), is indicated on the LCD with "16-segment messages".

Discrimination	16-segment messages		
	Single point setting (lower limit)	Single point setting (upper limit)	Two-point setting (upper and lower limits)
Over the upper limit	< OK > Blinking	< HIGH > Blinking	< HIGH > Blinking
Appropriate amount	< OK > Blinking	< OK > Blinking	< OK > Blinking
Below the lower limit	< LOW > Blinking	< OK > Blinking	< LOW > Blinking

The discrimination is performed according to the following criteria:

- Absolute value: The discrimination is performed based on the upper and lower limit values that have been set in advance.
- Relative value: A reference numeric value is set in advance, and the discrimination is performed based on the range defined by the upper and lower limit values that have been set for the reference numeric value.

(For example) Two-point (upper and lower limits) setting, Reference value = 1000.0g,
Lower limit value = 900.0 g, Upper limit value = 1200.0 g

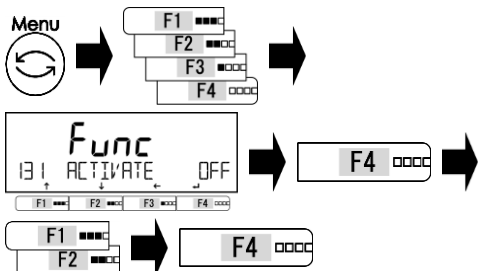
Discrimination method	Reference value	Lower limit value	Upper limit value
	1000.0 g	900.0 g	1200.0 g
Absolute value		900.0 g	1200.0 g
Relative value	1000.0 g	-100.0 g	200.0 g

3-10-2 Comparator function setting

Reference

For the setting of the reference value and upper and lower limit values, refer to “5 User information setting”.

1 Select the comparator function.



Push [Menu] key, then push [F1-F4] keys to go to <131 ACTIVATE>

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: OFF

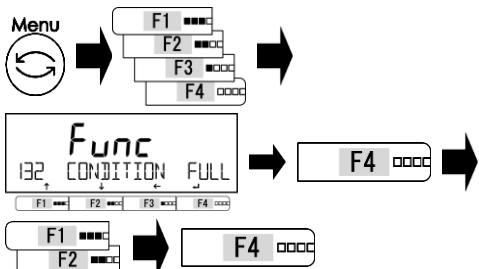
H / L: Upper and lower limits valid

HIGH: Upper limit alone valid

LOW: Lower limit alone valid

Push [F4] key to fix.

2 Select the discriminant condition.



Push [F1-F4] keys to go to

<132 CONDITION>

Push [F4] key to change the setting value.

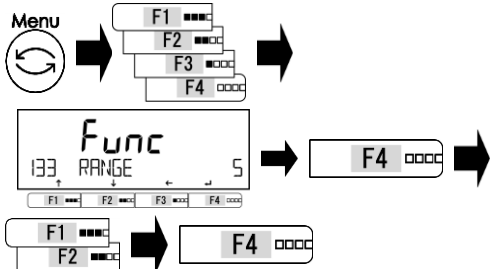
Push [F1/F2] key to select.

FULL: At all times

STBL: Only at stable times

Push [F4] key to fix.

3 Select the discriminant range.



Push [F1-F4] keys to go to

<133 RANGE>

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

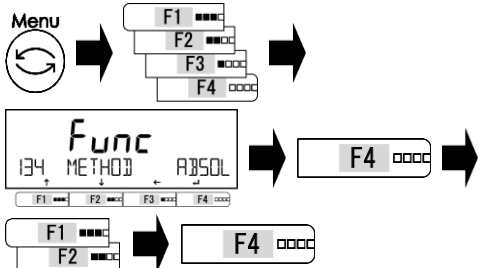
5: +5 d or more

50: +50 d or more

FULL: Entire area

Push [F4] key to fix.

4 Select the discriminant method.



Push [F1-F4] keys to go to

<134 METHOD>

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

ABSOL: Absolution value method

RELAT: Relative value method

Push [F4] key to fix.

3-11 Adding function

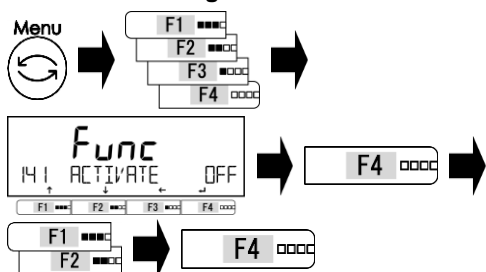
Weigh a plurality of samples to be weighed in sequence and indicates its total value.
The adding function includes two ways of calculating method.

- Method of weighing samples to be weighed while replacing the samples: Addition accumulating function.
- Method of weighing samples to be weighed without replacing the samples: Net adding function.

Legal Metrology This function is not available for verified balance.

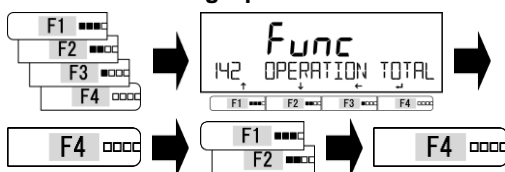
Reference The adding function can be used in Weighing mode, Percentage mode, Counting mode, and Multiplied by Coefficient mode.

1 Select the adding function.



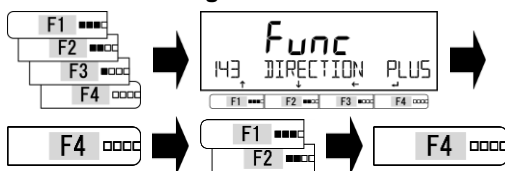
Push [Menu] key, then push [F1-F4] keys to go to <141 ACTIVATE>
Push [F4] key to change the setting value.
Push [F1/F2] key to select.
OFF: Invalid
ON: Valid
Push [F4] key to fix.

2 Select the adding operation.



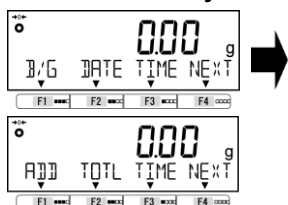
Push [F1-F4] keys to go to <142 OPERATION>
Push [F4] key to change the setting value.
Push [F1/F2] key to select.
TOTAL: Addition accumulated
NET: Net addition
Push [F4] key to fix.

3 Select the adding direction.



Push [F1-F4] keys to go to <143 DIRECTION>
Push [F4] key to change the setting value.
Push [F1/F2] key to select.
PLUS : Plus side addition
MINUS : Minus side addition
Push [F4] key to fix.

4 Set the "Free key".



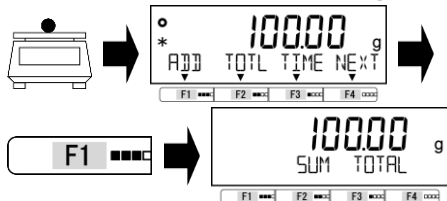
Set the following function to the <<F1-F6>> (Free keys).
<62* F* KEY ADD> : Adding execute
<62* F* KEY TOTL> : Total indication
(Refer to "8 Controlling and adjustment functions" for setting the free keys.)

Reference Step 4 is required only when you are using an adding function on the weighing mode.

3-11-1 Weighing by means of the plus side addition

When <<ADD>> is assigned to [F1] key and <<TOTL>> is assigned to [F2] key.

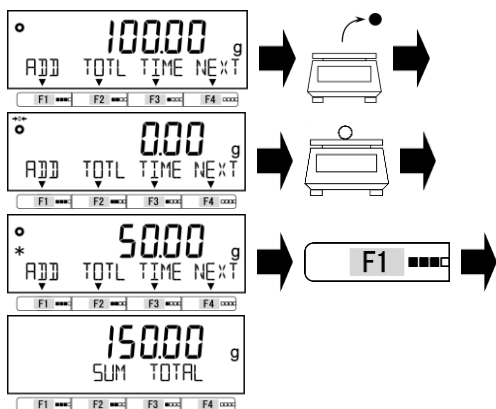
1 Place a first sample to be weighed.



Place a first sample to be weighed.
After <*> appears, push [F1](<<ADD>>) key.

The weighed value is stored and <SUM TOTAL> is indicated for a few seconds.

2 In the case of the addition accumulating Replace a sample to be weighed with a new one.



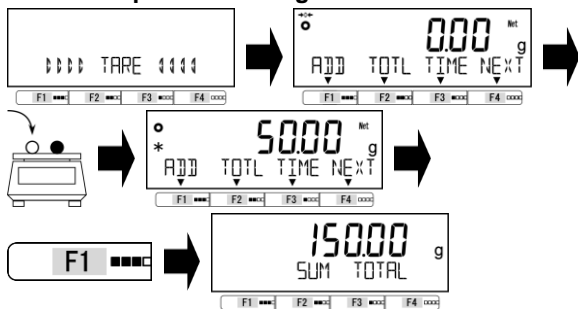
Remove the previous sample to be weighed to return the indication to zero and then place the next sample to be weighed.

After <*> appears, push [F1](<<ADD>>) key.

The weighed value is stored and <SUM TOTAL> is indicated for a few seconds.
Repeat this operation to perform addition.

In the case of the net addition

Add a sample to be weighed.

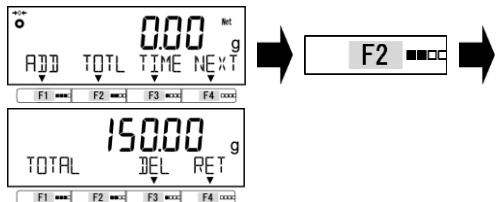


The indication automatically returns to zero. Then add the next sample to be weighed.

After <*> appears, push [F1](<<ADD>>) key.

After indicating <SUM TOTAL> and the accumulated value for a few seconds, the balance returns to the weight indication, followed by the automatic tare.
Repeat this operation to perform addition.

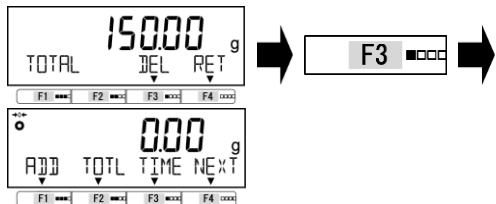
3 Indicate the total value.



Push [F2](<<TOTL>>) key.

Total value is indicated.

4 Delete the total value.



Push [F3]() key.

The total value is deleted.

3-11-2 Weighing by means of the minus side addition

When <ADD> is assigned to [F1] key and <TOTL> is assigned to [F2] key.

1 Place a sample to be weighed.

Place a sample to be weighed.
Push [Tare] key.

2 In the case of the addition accumulating
Remove the sample to be weighed and perform adding.

Remove the sample to be weighed.
After <*> appears, push
[F1]<<ADD>> key.
The weighed value is stored and <SUM
TOTAL> is indicated for a few seconds.
Repeat this operation to perform addition.

In the case of the net addition

Remove the sample.

Remove the sample to be weighed.
After <*> appears, push
[F1]<<ADD>> key.
After indicating <SUM TOTAL> and the
accumulated value for a few seconds, the
balance returns to the weight indication,
followed by the automatic tare.
Repeat this operation to perform addition.

3 Indicate the total value.

Push [F2]<<TOTL>> key.
Total value is indicated.

4 Delete the total value.

Push [F3]<> key.
The total value is deleted.

3-12 Tare-subtraction reminder function

When the “tare-subtraction reminder” is activated, <PUSH TARE> alert is displayed when the tare (container) is loaded.

Note

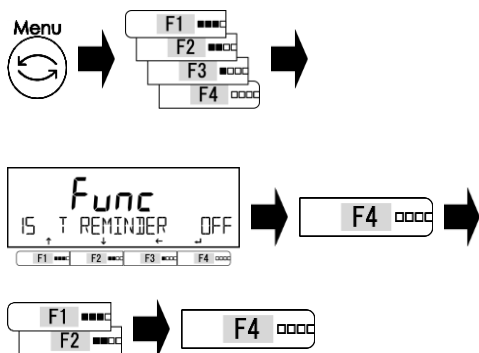
When the zero-point-adjustment reminder operates at the same time, the zero-point adjustment reminder has priority.

Reference

There are two modes in the tare-subtraction reminder function;

- (1) 1 (Mode 1): <PUSH TARE> is indicated when the weighing indication is over the zero-point-adjustment range.
- (2) 2 (Mode 2): <PUSH TARE> is indicated when the weighing indication is over the zero-point-adjustment range before tare subtraction, and when the net indication is negative after tare subtraction.

1 Select the “tare-subtraction reminder function”.



Push [Menu] key, then push [F1-F4] keys to go to <15 T REMINDER>.

Push [F4] key to change the setting menu.

Push [F1/F2] key to select.

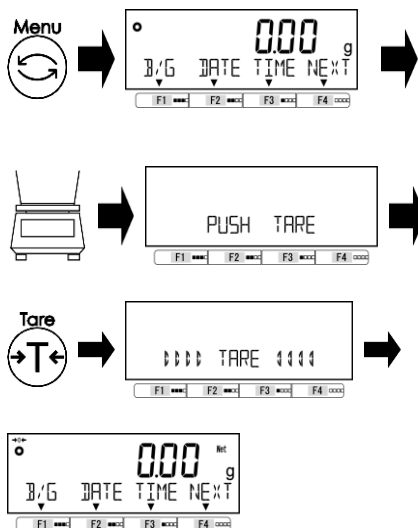
OFF : Invalid

1 : Activate the “Mode 1”

2 : Activate the “Mode 2”

Push [F4] key.

2 Exit the setting menu and operate with “tare-subtraction reminder”.



Push [Menu] key to exit the setting menu.

Place a tare (container) on the weighing pan, then <PUSH TARE> alert is displayed.

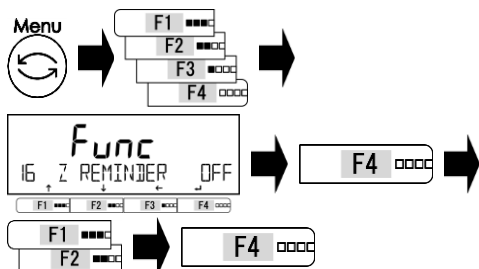
The alert disappears after [Tare] key is pushed and tare-subtraction is completed.

Therefore, the indication becomes zero and <Net> indication appears.

3-13 Zero-point-adjustment reminder function

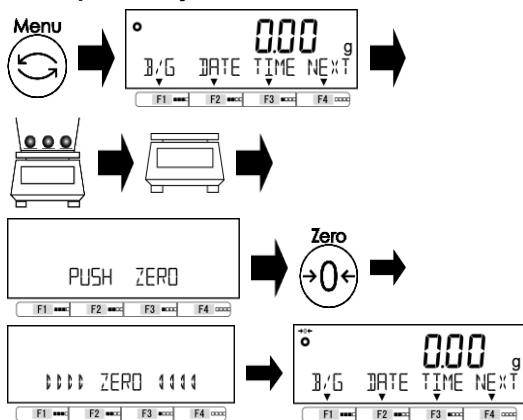
When the “zero-point-adjustment reminder” is activated, <PUSH ZERO> alert is displayed when the load return to within the “zero-point adjustment range” after the load is once over the range.

1 Activate the “zero-point-adjustment reminder”.



Push [Menu] key, then push [F1-F4] keys to go to <16 Z REMINDER>, and then push [F4] key to change the setting. Push [F1/F2] key to select activate or disable the function.
 OFF: Disable
 ON: Activate
 Push [F4] key to fix.

2 Exit the setting menu and operate with “zero-point adjustment reminder”.

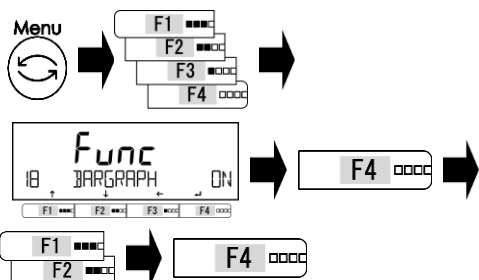


Push [Menu] key to exit the setting menu. Put the samples on the weighing pan then remove it, then the <PUSH ZERO> alert is displayed. The alert disappears after [Zero] key is pushed and zero-point adjustment is completed.

3-14 Bar graph indication

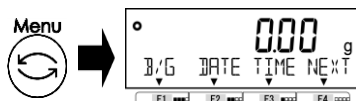
Set the indication/non-indication of the bar graph.

1 Select the bar graph indication.



Push [Menu] key, then push [F1-F4] keys to go to <17 BARGRAPH>. Push [F4] key to change the setting value. Push [F1/F2] key to select.
 OFF: Invalid
 ON: valid
 Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

3-15 Stabilization wait setting

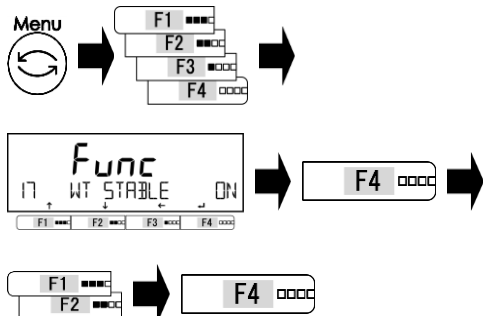
Set when to indicate the weighed value after the zero-point adjustment or tare; either after or before the weighed value stabilizes.



For verified balance:

- This setting menu is not available;
- The balance always wait stabilization before indicating weighed value after the zero-point adjustment or tare.

1 Select the stabilization wait setting.



Push [Menu] key, then push [F1-F4] keys to go to <17 WT STABLE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: Invalid

ON: Valid

Push [F4] key to fix.

2 Exit the setting menu.

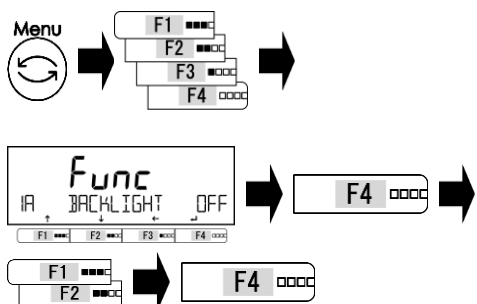


Push [Menu] key to shift to the measuring mode.

3-16 Backlight setting

Setting the backlight control.

1 Select the backlight setting.



Push [Menu] key, then push [F1-F4] keys to go to <1A BACKLIGHT>.

Push [F4] key to change the setting value.

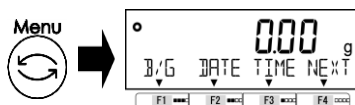
Push [F1/F2] key to select.

Refer to the "Set List".

Push [F4] key to fix.

Set List		
OFF : Invalid	3MIN : 3 minutes	5MIN : 5 minutes
10MIN : 10 minutes	30MIN : 30 minutes	ON : Always ON

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

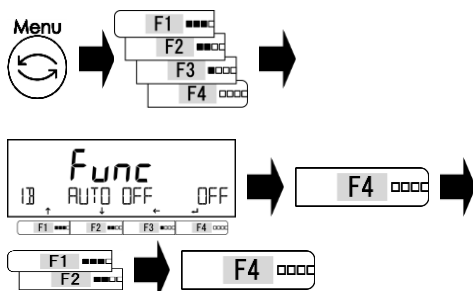
Reference

For accurately weighing, please set <1A BACKLIGHT> to continuously "ON" or "OFF". When the balance is battery powered, it is recommended to set backlight settings to continuously "OFF" to save the power.

3-17 Auto power-off

This function is to automatically turn off the power for the balance.

1 Select the auto power-off.



Push [Menu] key, then push [F1-F4] keys to go to <1B AUTO OFF>.

Push [F4] key to change the setting value.

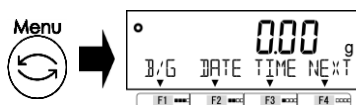
Push [F1/F2] key to select.

Refer to the "Set List".

Push [F4] key to fix.

Set List		
OFF : Invalid	3MIN : 3 minutes	5MIN : 5 minutes
10MIN : 10 minutes	30MIN : 30 minutes	

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

Reference

The "Backlight setting" and "Auto power-off" function does not work under the following conditions:

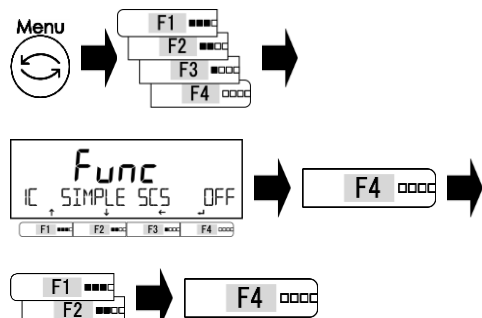
- (1) Setting menu is being displayed.
- (2) A sample is placed on the weighing pan and the display is not stable (When <O> is not displayed).

3-18 "Simple SCS(Self Counting System) method" setting

"Simple SCS method" is auxiliary function for Counting mode.

First, put a set number of samples in place. Next, put up to two times the set number of additional samples in place. The balance will automatically update the average sample weight. Repeating this step allows accurate counting.

1 Select the simple SCS.



Push [Menu] key, then push [F1-F4] keys to go to <1C SIMPLE SCS>.

Push [F4] key to change the setting value.

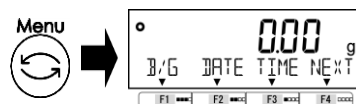
Push [F1/F2] key to select.

OFF: Invalid

ON: valid

Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

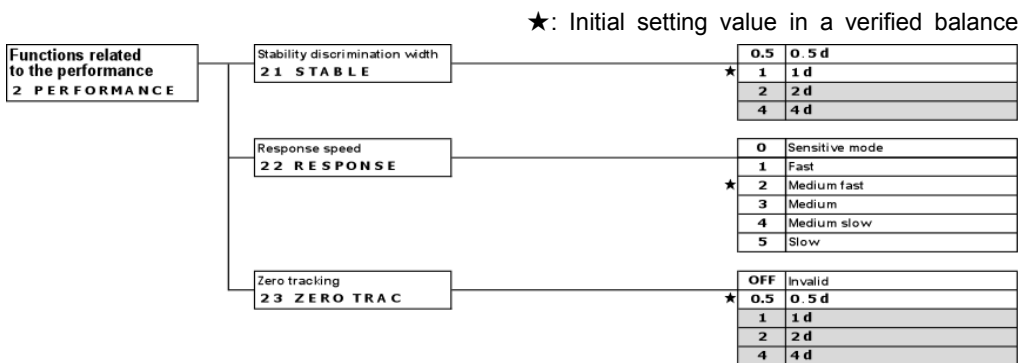
4 Functions related to the performance

Set the balance indication stability and response speed.

4-1 Hierarchy of functions related to the performance



For verified balance, gray shaded items () are not indicated.



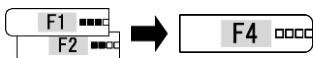
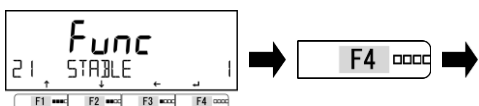
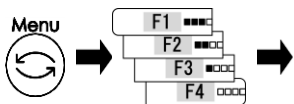
4-2 Stability discrimination width

When the larger numeric value is set in this setting menu, the laxer stability judgement is applied and the balance indicate “Stable mark” <◉> in more unstable conditions.



For verified balance, <21 STABLE 2, 4> are not available.

1 Select the stability discrimination width.



Push [Menu] key, then push [F1-F4] keys to go to <21 STABLE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

0.5: 0.5d

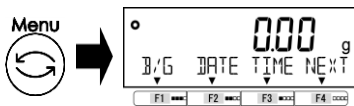
1: 1.0d

2: 2.0d

4: 4.0d

Push [F4] key to fix.

2 Exit the setting menu.

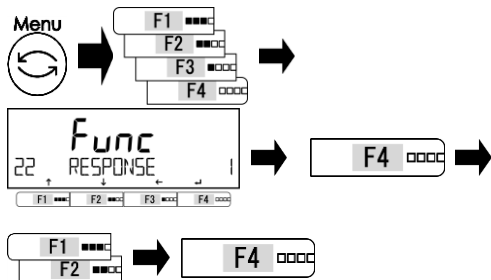


Push [Menu] key to shift to the measuring mode.

4-3 Response speed

The larger numeric value is set in this setting menu, the more stable the balance indication becomes in unstable conditions.

1 Select the response speed.



Push [Menu] key, then push [F1-F4] keys to go to <22 RESPONSE>.

Push [F4] key to change the setting value.

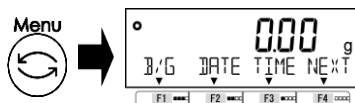
Push [F1/F2] key to select.

Refer to Set List.

Push [F4] key to fix.

Set list		
0 : Sensitive mode	1 : Fast	2 : Medium fast
3 : Medium	4 : Medium slow	5 : Slow

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

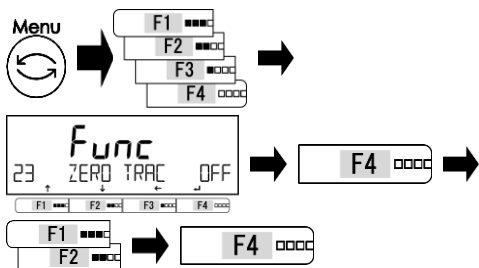
4-4 Zero tracking

Setting to the zero tracking function makes it possible to automatically correct the zero-point fluctuation caused by the temperature fluctuation, etc. when "0" is indicated, through which the "0" indication is maintained.



For verified balance, <23 ZERO TRAC 1, 2, 4> are not available.

1 Select the zero tracking.



Push [Menu] key, then push [F1-F4] keys to go to <23 ZERO TRAC>.

Push [F4] key to change the setting value.

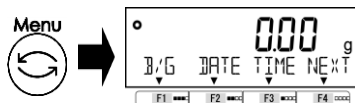
Push [F1/F2] key to select.

Refer to Set List.

Push [F4] key to fix.

Set list				
OFF : Invalid	0.5 : 0.5d	1 : 1.0d	2 : 2.0d	4 : 4.0d

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

5 User information setting

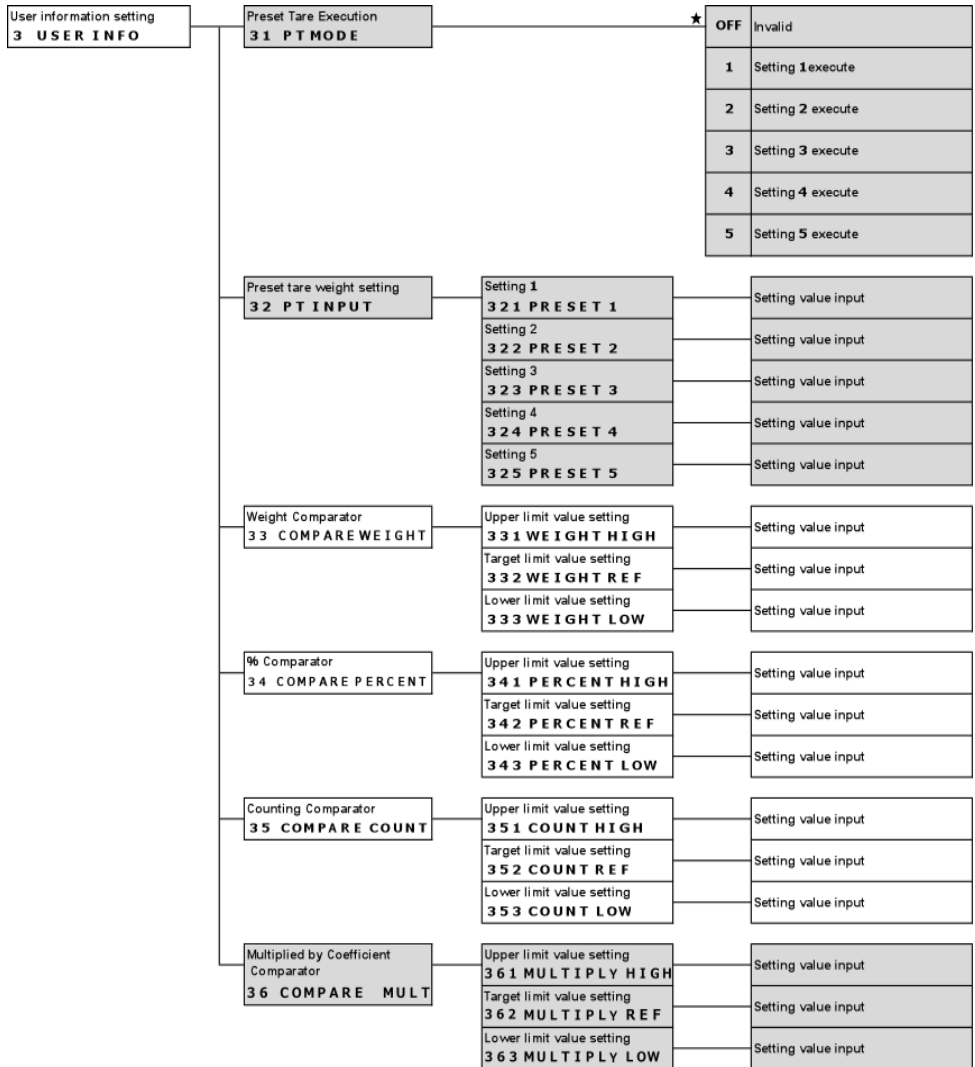
Describes about setting items related to the comparator function.

5-1 Hierarchy of user information setting



For verified balance, gray shaded items () are not indicated.

★: Initial setting value in a verified balance



5-2 Preset tare

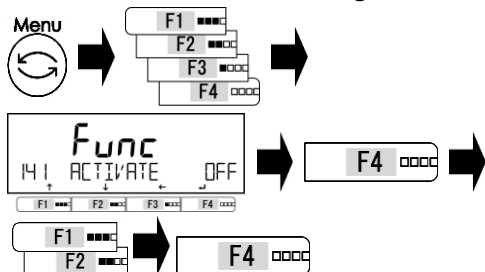
When using a tare whose tare weight is already known, the tare subtraction can be performed in advance by inputting its tare weight (preset tare weight). Five preset tare weight values can be registered.



This function is not available for verified balance.

5-2-1 Preset tare setting

1 Select the Preset tare setting.



Push [Menu] key, then push [F1-F4] keys to go to <31 PT MODE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

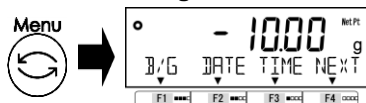
Refer to Set List.

Push [F4] key to fix.

Set list

OFF : Invalid	1 : Setting 1 execute	2 : Setting 2 execute
3 : Setting 3 execute	4 : Setting 4 execute	5 : Setting 5 execute

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

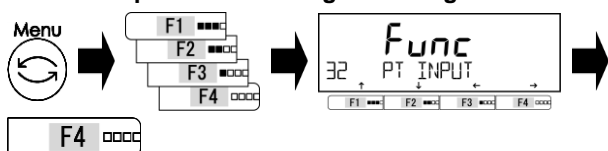
Preset tared value is displayed with < Net Pt > indication when preset tare value is available.

5-2-2 Inputting of a preset tare weight value

There are two ways of inputting a preset tare weight value. described below:

- Actual value setting method: Weighing a sample with a balance and then making it a setting value.
- Numeric value setting method: Inputting a setting value directly via key operation.

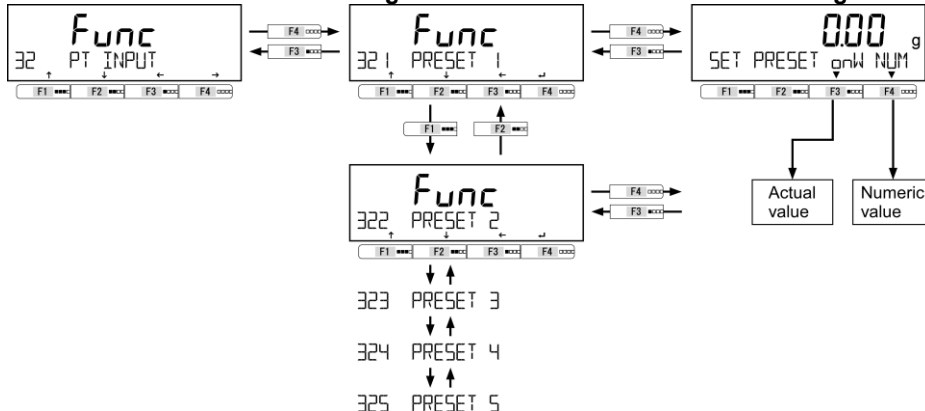
1 Select the preset tare weight setting.



Push [Menu] key, then push [F1-F4] keys to go to <32 PT INPUT>.

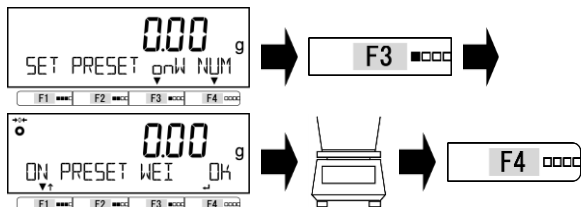
Push [F4] key.

2 Select the "Actual value setting method" or "Numeric value setting method".



5-2-2 (1) Actual value setting method

1 Set a preset tare weight value.



Push [F3] key to select.

onW : Actual value

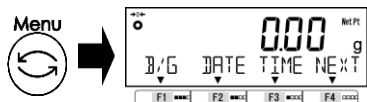
< **Net Pt** > is indicated.

Place a sample to be weighed that is equivalent to the tare weight value.

Push [F4] key to fix.

The preset tare weight value is stored.

2 Exit the setting menu.

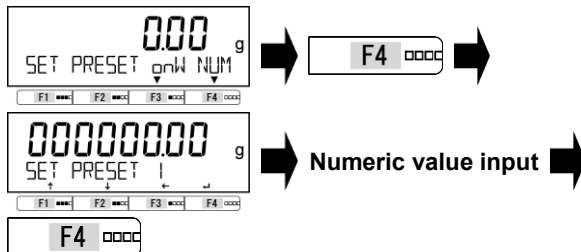


Push [Menu] key to shift to the measuring mode.

< **Net Pt** > is indicated.

5-2-2 (2) Numeric value setting method

1 Set a preset tare weight value.



Push [F4] key to select.

NUM : Numeric value

Input the preset tare value.

Push [F4] key to fix.

The preset tare weight value is stored.

(Refer to "2-5-3 Numeric value input")

2 Exit the setting menu.

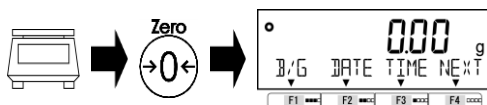


Push [Menu] key to shift to the measuring mode.

< **Net Pt** > is indicated.

5-2-2 (3) Exiting the preset tare mode

1 To exit the preset tare mode.



Make sure that nothing is placed on the weighing pan.

Push [Zero] key.

Then < **Net Pt** > disappears and the preset tare mode has exited.

5-3 Setting of the discrimination value of the comparator function

There are two ways of inputting a reference value and upper and lower limit values as described below:

- Actual value setting method: Weighing a sample with a balance and then making it a setting value.
- Numeric value setting method: Inputting a setting value directly via key operation.

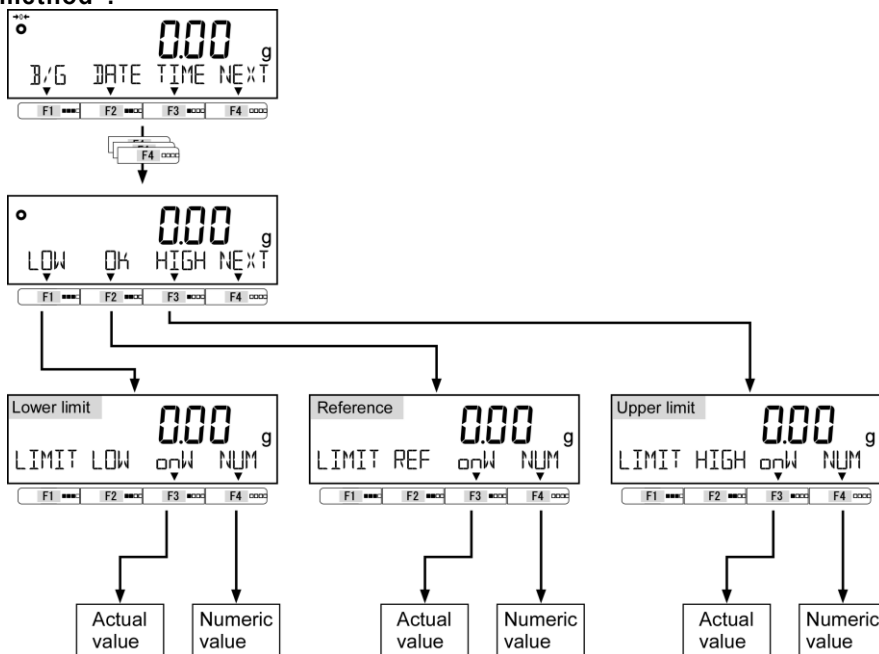
The discrimination is performed according to the following criteria:

- Absolute value: The discrimination is performed based on the upper and lower limit values that have been set in advance.
- Relative value: A reference numeric value is set in advance, and the discrimination is performed based on the range defined by the upper and lower limit values that have been set for the reference numeric value.

(For example) Two-point (upper and lower limits) setting, Reference value = 1000.0g,
Lower limit value = 900.0 g, Upper limit value = 1200.0 g

Discrimination method	Reference value	Lower limit value	Upper limit value
	1000.0 g	900.0 g	1200.0 g
Absolute value		900.0 g	1200.0 g
Relative value	1000.0 g	-100.0 g	200.0 g

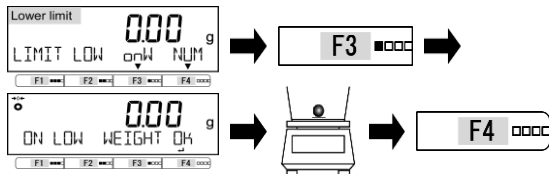
1 Select the "Actual value setting method" or "Numeric value setting method".



- Reference**
- (1) Reference value, Lower limit value and Upper limit value can be set also via Setting menu below.
 - Comparator setting for Weighing mode: 33 COMPARE WEIGHT
 - Comparator setting for Percentage mode: 34 COMPARE PERCENT
 - Comparator setting for Counting mode: 35 COMPARE COUNT
 - Comparator setting for Multiplied by Coefficient mode: 36 COMPARE MULT
 - (2) Comparator function is available in Weighing mode, Percentage mode, Counting mode and Multiplied by Coefficient mode.

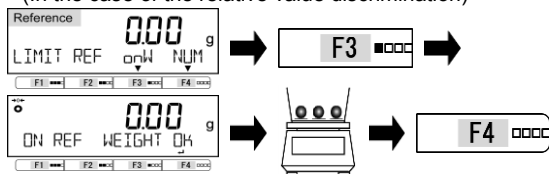
5-3-1 Actual value setting method

1 Set a lower limit value.



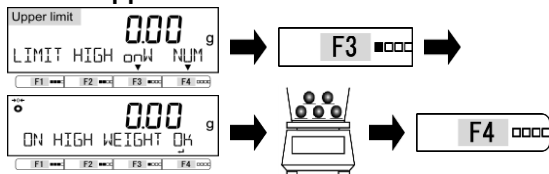
Push [F3] key to select.
 onW : Actual value
 Place a sample to be weighed that is equivalent to the lower limit value.
 Push [F4] key to fix.
 The lower limit value is recorded.

2 Set a reference value.
 (In the case of the relative value discrimination)



Push [F3] key to select.
 onW : Actual value
 Place a sample to be weighed that is equivalent to the reference limit value.
 Push [F4] key to fix.
 The reference value is recorded.

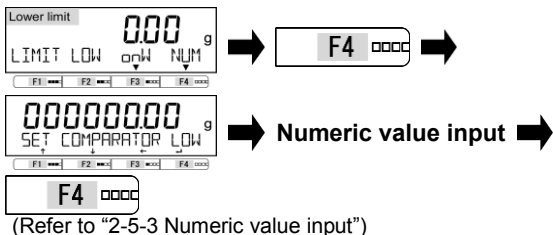
3 Set an upper limit value.



Push [F3] key to select.
 onW : Actual value
 Place a sample to be weighed that is equivalent to the upper limit value.
 Push [F4] key to fix.
 The upper limit value is recorded.

5-3-2 Numeric value setting method

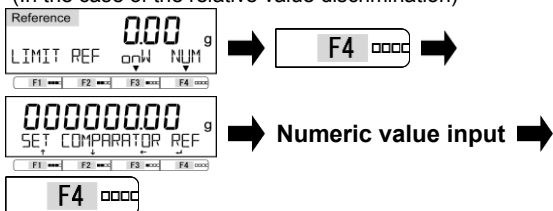
1 Set a lower limit value.



Push [F4] key to select.
 NUM : Numeric value
 Input the lower limit value.
 Push [F4] key to fix.
 The lower limit value is saved.

(Refer to "2-5-3 Numeric value input")

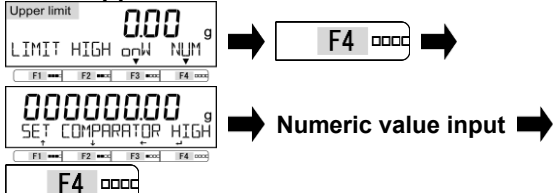
2 Set a reference value.
 (In the case of the relative value discrimination)



Push [F4] key to select.
 NUM : Numeric value
 Input the reference value.
 Push [F4] key to fix.
 The reference value is saved.

(Refer to "2-5-3 Numeric value input")

3 Set an upper limit value.



Push [F4] key to select.
 NUM : Numeric value
 Input the upper limit value.
 Push [F4] key to fix.
 The upper limit value is saved.

(Refer to "2-5-3 Numeric value input")

6 External input/output functions

This function is used for communication through the external peripheral devices. There are RS-232C (D-SUB 9P), USB (Type B) and Bluetooth v4.0 interface as standard equipment.

6-1 Hierarchy of the external input / output functions

Legal Metrology

- (1) Gray shaded items () are not indicated for verified balance.
- (2) The initial setting value of <411/421/431 ACTIVATE> are:
 - <OFF> for non-verified balance;
 - <ON> for verified balance.
- (3) <412/422/432 FORMAT> are not indicated and fixed to be <CBM> for verified balance.
- (4) The initial setting value of <413/423/433 CONDITION> are:
 - <7> for non-verified balance;
 - <2> for verified balance.
- (5) <41A/42A/43A STATUS> are:
 - Initially set to <OFF> for non-verified balance;
 - Not indicated and fixed to be <ON> for verified balance.

Note

- When connect with USB, communication setting of your PC is required. Please refer to "Appendix 5 USB communication and bus power input".

★: Initial setting value in a verified balance

External input/output functions 4 EXTERNAL I/O	RS 232 C 41 RS 232 C	Operation 411 ACTIVATE	OFF Stop ON Operation
		Communication format 412 FORMAT	6 6-digit numeric format 7 7-digit numeric format 8 8-digit numeric format CSP 6 CSP 6-digit format CSP 7 CSP 6-digit format ★ CBM Generic format
		Output conditions 413 CONDITION	OFF Output stop 1 Continuous output at all times ★ 2 Continuous output at stable times 3 Push down [Out put] key for one-time instant output 4 Auto output 5 One-time output at stable time 6 Continuous output at unstable times then one-time output at stable time 7 Push down [Out put] key for one-time output at stable time
		Comparator output setting 414 COMPARE	★ 0 As per the output setting 1 Output when discrimination result is OK or absent
		Baud rate 415 BAUD RATE	★ 1200 1 2 0 0 b p s 2400 2 4 0 0 b p s 4800 4 8 0 0 b p s 9600 9 6 0 0 b p s 19200 1 9 2 0 0 b p s 34800 3 4 8 0 0 b p s 57600 5 7 6 0 0 b p s 115.2K 1 1 5 2 0 0 b p s
		Parity 416 PARITY	★ OFF None ODD Odd number EVEN Even number
		Stop bit 417 STOP BIT	1BIT 1 b i t ★ 2BIT 2 b i t
		Unused high order digit 418 BLANK	ZERO Fill with 0 (0×30) ★ SPACE Fill with a blank space (0×20)
		Response command 419 RESPONSE	★ 1 "A00, Exx" format 2 ACK, NAK format
		Net value status 41A STATUS	OFF Not added ★ ON Append

USB 42 USB	Operation 421 ACTIVATE	★ OFF Stop ON Operation
	Communication format 422 FORMAT	6 6-digit numeric format 7 7-digit numeric format 8 8-digit numeric format CSP 6 CSP 6-digit format CSP 7 CSP 6-digit format ★ CBM Generic format
	Output conditions 423 CONDITION	★ OFF Output stop 1 Continuous output at all times 2 Continuous output at stable times 3 Push down [Out put] key for one-time instant output 4 Auto output 5 One-time output at stable time 6 Continuous output at unstable times then one-time output at stable time 7 Push down [Out put] key for one-time output at stable time
	Comparator output setting 424 COMPARE	★ 0 As per the output setting 1 Output when discrimination result is OK or absent
	Baud rate 425 BAUD RATE	★ 1200 1 2 0 0 b p s 2400 2 4 0 0 b p s 4800 4 8 0 0 b p s 9600 9 6 0 0 b p s 19200 1 9 2 0 0 b p s 34800 3 4 8 0 0 b p s 57600 5 7 6 0 0 b p s 115.2K 1 1 5 2 0 0 b p s
	Parity 426 PARITY	★ OFF None ODD Odd number EVEN Even number
	Stop bit 427 STOP BIT	1BIT 1 b i t ★ 2BIT 2 b i t
	Unused high order digit 428 BLANK	ZERO Fill with 0 (0×30) ★ SPACE Fill with a blank space (0×20)
	Response command 429 RESPONSE	★ 1 "A00, Exx" format 2 ACK, NAK format
	Net value status 42A STATUS	★ OFF Not added ON Append

Bluetooth(BLE) config 4 3 B L U E T O O T H	Operation 4 3 1 A C T I V A T E	★ OFF Stop ON Operation	
	Communication format 4 3 2 F O R M A T	6 6-digit numeric format 7 7-digit numeric format 8 8-digit numeric format CSP 6 CSP 6-digit format CSP 7 CSP 6-digit format ★ CBM Generic format	
	Output conditions 4 3 3 C O N D I T I O N	OFF Output stop ★ 1 Continuous output at all times 2 Continuous output at stable times 3 Push down [Out put] key for one-time instant output 4 Auto output 5 One-time output at stable time 6 Continuous output at unstable times then one-time output at stable time 7 Push down [Out put] key for one-time output at stable time	
	Comparator output setting 4 3 4 C O M P A R E	★ 0 As per the output setting 1 Output when discrimination result is OK or absent	
	Unused high order digit 4 3 8 B L A N K	ZERO Fill with 0 (0x30) ★ SPACE Fill with a blank space (0x20)	
	Response command 4 3 9 R E S P O N S E	★ 1 "A00, Exx" format 2 ACK, NAK format	
	Net value status 4 3 A S T A T U S	OFF Not added ★ ON Append	
	Bluetooth(BLE) initialization 4 4 B L U E T O O T H / B L E	Initialize 4 4 1 I N I T	INIT Execute

6-2 Standard RS-232C Connector terminal numbers and their functions

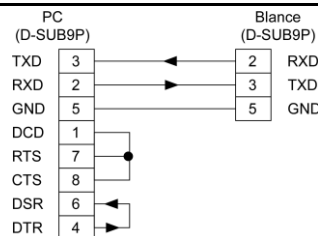
The RS-232C connector pin alignment for this product is as shown below:

	Terminal no	Signal name	Input/output	Function
	1	–	–	–
	2	RXD	Input	Receiving data
	3	TXD	Output	Transmitting data
	4	DTR	Output	HIGH (When the balance is powered ON)
	5	GND	–	Signal grounding
	6	–	–	–
	7	–	–	–
	8	–	–	–
	9	EXT. TARE	Input	External tare subtraction/zero-point adjustment

Note Use shielded RS232 crossover cable up to 15 m length.

Reference

- (1) Use the following examples as a guide to connect the balance to external devices using the cable.
- Sample connection with a PC/AT compatible machine



- (2) D-sub9P Connector can execute tare subtraction or zero-point adjustment from an external device by connecting a contact or a transistor switch between Pin 9 (EXT.TARE) and Pin 5 (GND).
When doing so, allow at least 400 ms for connection (ON) time (Maximum voltage: 15 V when the balance is turned OFF, sink current: 20 mA when it is turned ON).

6-3 Standard USB Connector terminal numbers and their functions

The USB (Type B) connector pin alignment for this product is as shown below:

	Terminal no.	Signal name	Function
	1	V _{BUS}	Bus power input Rating: 4.75 V - 5.25 V
	2	D–	Data signal
	3	D+	Data signal
	4	GND	Signal grounding

6-4 Communication format

6-4-1 Basic communication specification

Items	Description
Communication method	RS-232C: Full-duplex communication method USB: Half-duplex communication method Bluetooth V4.0
Synchronization method	Asynchronous communication method
Electrical specification	RS-232C: EIA-232-D/E USB: USB2.0 Bluetooth: Class 1
Baud rate (RS-232C, USB)	1200/2400/4800/9600/ 19200/38400/57600/115200 bps
Transmission code Composition (RS-232C, USB)	Start bit 1 bit Parity bit None/Odd number/Even number Data bit 8 bit Stop bit 1 bit/2 bit

6-4-2 Basic data output format / CSP format



These formats are not available for verified balance.

1. Data composition

- Measurement result (except specific gravity and statistics):

- 6-digit numeric format, CSP 6-digit format

Consists of 14 characters, including terminators (CR=0xDH/LF=0xAH).

1	2	3	4	5	6	7	8	9	10	11	12	13	14
P1	D1	D2	D3	D4	D5	D6	D7	U1	U2	S1	S2	CR	LF

- 7-digit numeric format, CSP 7-digit format

Consists of 15 characters, including terminators (CR=0xDH/LF=0xAH).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P1	D1	D2	D3	D4	D5	D6	D7	D8	U1	U2	S1	S2	CR	LF

- 8-digit numeric format

Consists of 16 characters, including terminators (CR=0xDH/LF=0xAH).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
P1	D1	D2	D3	D4	D5	D6	D7	D8	D9	U1	U2	S1	S2	CR	LF

- Others (Date, Time, Specific Gravity etc.):

- 6-digit numeric format, 7-digit numeric format, 8-digit numeric format

The message "M1 M2 ... Mn" is suffixed with terminators (CR=0x0D/LF=0x0A).

1	2	...	n	n+1	n+2
M1	M2	..	Mn	CR	LF

- CSP 6-digit format, CSP 7-digit format

The message "M1 M2 ... Mn" is:

prefixed with device control code (DC2=0x12); and

suffixed with terminators (CR=0x0D/LF=0x0A) and device control code (DC4=0x14).

1	2	3	...	n+1	n+2	n+3	n+4
DC2	M1	M2	...	Mn	CR	LF	DC4

Meaning of the data

Symbol		Code		Description
[P1] (one character) Indicates the polarity of data.				
+		0x2B		Zero or positive data
-		0x2D		Negative data
[D1 to D7/D8/D9] (seven or eight or nine characters) Stores numeric data.				
0 – 9		0x30 – 0x39		0 to 9(numeric) 0 is also used for zero padding.
.		0x2E		- Decimal point (floating)
(SP)		0x20		- A space at the top of a numeric value - Output to the least significant digit in the absence of a decimal point - Unused high-order digit
[U1, U2] (two characters) Indicates the unit used to show numeric data.				
M	G	0x4D	0x47	milligram
(SP)	G	0x20	0x47	gram
C	T	0x43	0x54	carat
M	O	0x4D	0x4F	momme
O	Z	0x4F	0x5A	ounce
L	B	0x4C	0x42	pound
O	T	0x4F	0x54	troy ounce
D	W	0x44	0x57	pennyweight
G	R	0x47	0x52	grain
T	L	0x54	0x4C	Hong Kong tael
T	L	0x54	0x4C	Singapore, Malaysia tael
T	L	0x54	0x4C	Taiwan tael
t	o	0x74	0x6F	tola
M	S	0x4D	0x53	mesghal
B	A	0x42	0x41	baht
P	C	0x50	0x43	parts counting
(SP)	%	0x20	0x25	% (percentage weighing)
(SP)	#	0x20	0x23	# (Multiplied by Coefficient)
[S1] (one character) Indicates the judgment result when the limit function is used.				
L		0x4C		Shortage (LOW)
G		0x47		proper (OK)
H		0x48		Over (HIGH)
(SP)		0x20		No judgment result or data type specified
e		0x65		Net weight
f		0x66		Tare weight
P		0x50		Preset tare weight
T		0x54		Total value (Accumulated value)
U		0x55		Unit weight
d		0x64		Gross
[S2] (one character) Indicates the status.				
S		0x53		Data stable
U		0x55		Date unstable
E		0x45		Data error (Indicates that data other than S2 is invalid)
(SP)		0x20		No status specified

6-4-3 Generic format

Measuring data except Specific Gravity:

Composed of 26 characters including a terminator (CR=0x0D/LF=0x0A)

1	2	3	4	5	6	7	8	9	10	11	12	13	
S1	C1	(SP)	T1	T2	T3	T4	T5	T6	D1	D2	D3	D4	(SP): space
14	15	16	17	18	19	20	21	22	23	24	25	26	
D5	D6	D7	D8	D9	D10	D11	D12	U1	U2	(SP)	CR	LF	

ERROR:

Composed of 26 characters including a terminator (CR=0x0D/LF=0x0A)

1	2	3	4	5	6	7	8	9	10	11	12	13	
*	*	(SP)	E	R	R	O	R	(SP)	*	*	*	*	(SP): space
14	15	16	17	18	19	20	21	22	23	24	25	26	
*	*	*	*	*	*	*	*	*	*	(SP)	CR	LF	

Others (Date, Time, Specific Gravity etc.):

The message "M1 M2 ... Mn" is output with a terminator (CR=0x0D/LF=0x0A)

1	2		n	12	13	
M1	M2	...	Mn	CR	LF	

Meaning of the data

Symbol	Code	Description
[S1] (1 character): Represents the status.		
(SP)	0x20	Data stable
*	0x2A	Data unstable
[C1] (1 character): Represents the result of comparator function.		
(SP)	0x20	Comparator result: Proper(OK) or No result Over(HIGH) Shortage(LOW)
H	0x48	
L	0x4C	
[T1-T6] (6 characters): Represents the type of the data.		
For non ^{Legal} Metrology:		
(SP) (SP) (SP) (SP) (SP) (SP)	0x20 0x20 0x20 0x20 0x20 0x20	Net weight (<41A STATUS>: <OFF>)
N (SP) (SP) (SP) (SP) (SP)	0x4E 0x20 0x20 0x20 0x20 0x20	Net weight (<41A STATUS>: <ON>)
P T (SP) (SP) (SP) (SP)	0x50 0x54 0x20 0x20 0x20 0x20	Preset tare weight
T (SP) (SP) (SP) (SP) (SP)	0x54 0x20 0x20 0x20 0x20 0x20	Tare weight
T O T A L (SP)	0x54 0x4F 0x54 0x41 0x4C 0x20	Total value (Accumulated value)
G (SP) (SP) (SP) (SP) (SP)	0x47 0x20 0x20 0x20 0x20 0x20	Gross weight
U N I T (SP) (SP)	0x55 0x4E 0x49 0x54 0x20 0x20	Unit weight
For ^{Legal} Metrology:		
N (SP) (SP) (SP) (SP) (SP)	0x4E 0x20 0x20 0x20 0x20 0x20	Net weight (tared)
T (SP) (SP) (SP) (SP) (SP)	0x54 0x20 0x20 0x20 0x20 0x20	Tare weight
G (SP) (SP) (SP) (SP) (SP)	0x47 0x20 0x20 0x20 0x20 0x20	Gross weight
U N I T (SP) (SP)	0x55 0x4E 0x49 0x54 0x20 0x20	Unit weight
[D1-D12] (12 characters): Numeric value data is stored.		
+	0x2B	When the data are 0 or positive
-	0x2D	When the data are negative
0 - 9	0x30 - 0x39	Numeric value (0 - 9) 0 is also used for zero padding.
.	0x2E	Decimal point (floating decimal point)
(SP)	0x20	- Spaces fill the top of the data. - Output to the least significant digit in the absence of a decimal point - Unused high-order digit

Symbol		Code		Description
[U1, U2] (2 characters): Represents the unit of numeric value data.				
For non Legal Metrology :				
m	g	0x6D	0x67	milligram
(SP)	g	0x20	0x67	gram
c	t	0x63	0x74	carat
m	o	0x6D	0x6F	momme
o	z	0x6F	0x7A	ounce
l	b	0x6C	0x62	pound
O	T	0x4F	0x54	troy ounce
d	w	0x64	0x77	pennyweight
G	R	0x47	0x52	grain
t	l	0x64	0x6C	Hong Kong tael
t	l	0x64	0x6C	Singapore, Malaysia tael
t	l	0x64	0x6C	Taiwan tael
t	o	0x74	0x6F	tola
M	S	0x4D	0x53	mesghal
B	A	0x42	0x41	baht
P	C	0x50	0x43	parts counting
(SP)	%	0x20	0x25	% (percentage weighing)
(SP)	#	0x20	0x23	# (Multiplied by Coefficient)
For Legal Metrology :				
(SP)	g	0x20	0x67	gram
(SP)	c	0x20	0x63	carat
o	z	0x6F	0x7A	ounce
l	b	0x6C	0x62	pound
g	r	0x67	0x72	grain
P	C	0x50	0x43	parts counting
(SP)	%	0x20	0x25	% (percentage weighing)

6-5 Input command

6-5-1 Transmission procedure

1 Send an input command from an external device to the balance.

The table below shows the enable/disable of input commands in each measuring mode.

Commands			
Measuring mode	Zero-point adjustment, Tare subtraction, Date/Time output	Output control, Comparator setting, Interval time setting	External contact input
Weighing	x	x	x
Counting	x	x	x
Percentage	x	x	x
Multiplied by Coefficient	x	x	x
Specific gravity	x	-	x
Statistics	x	-	x
Animal	x	-	x
Formulation	-	-	-

2 Upon successful completion of an input command, the balance will send either a normal completion response or the result data requested by the command to the external device.

- If the operation has not resulted in successful completion, or if the command is invalid (an error), the balance will transmit an error response.
- When the balance is in normal display mode, it usually sends a response to a command within one second of receiving the command. For the tare range, a response is sent after the commands are completely processed.

Note

- (1) After you have sent an input command, the balance return the response command approximately in 1 second.
- (2) Do not send another command to the balance until the external device receives a response from the balance.
- (3) If the balance receives a command when you are setting a function, when the balance is under span calibration, or the balance is busy for other reasons, the command is ignored.

Reference

In the case that <17 WT STABLE> is <ON>, the balance waits the weighing stability after receiving Tare-subtraction command/Zero-point adjustment command.



For verified balance, <17 WT STABLE> is fixed to <ON> and the balance always waits the weighing stability after receiving such a command.

6-5-2 Input command composition 1

Composed of four characters including a terminator (CR=0x0D/LF=0x0A).

1	2	3	4
C1	C2	CR	LF

6-5-2 (1) Zero-point adjustment/Tare/Output control setting command

Note

Please take care not to take alphabetical "O" for Arabic number "0".

C1	C2	Code (C1)	Code (C2)	Description	Response	
					A00/Exx format	ACK/NAK format
T	(SP)	0x54	0x20	Tare subtraction	A00: Normal response	ACK: Normal response
Z	(SP)	0x5a	0x20	Zero-point adjustment		
O	0	0x4f	0x30	Stop output.		
O	1	0x4f	0x31	Continuous output at all times		
O	2	0x4f	0x32	Continuous output at stable times (Output stop at unstable times)		
O	3	0x4f	0x33	Push down [Output] key for one-time instant output.		
O	4	0x4f	0x34	Auto output		
O	5	0x4f	0x35	One-time output at stable times (Output stop at unstable times)		
O	6	0x4f	0x36	One-time output at stable times (Continuous output at unstable times)		
O	7	0x4f	0x37	Push down [Output] key for one-time output at stable times.		
O	8	0x4f	0x38	One-time instant output		
O	9	0x4f	0x39	One-time output after stability is obtained		
O	A	0x4f	0x41	Interval function (Output once each time the output time has elapsed)		
O	B	0x4f	0x42	Interval function (Output once during stabilization, each time the output time has elapsed)		

Reference

- (1) Commands O8 and O9 are used to request data from the balance.
- (2) Once the O0 to O7 commands are executed, that state is maintained. However, the status is reset to the setting menu when the balance is turned on again.
- (3) When the OA or OB command is input, the interval function starts, and when input again, the interval function ends.
- (4) After the O8 or O9 command is executed, it returns to "O0."

6-5-2 (2) Date output request and time output request

C1	C2	Code (C1)	Code (C2)	Description	Response
D	D	0x44	0x44	Date output request	Date data
D	T	0x44	0x54	Time output request	Time data

6-5-3 Input command composition 2

Composed of 15 characters including a terminator (CR=0x0D/LF=0x0A)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C1	C2	,	C3	C3	C3	C3	C3	C3	C3	C3	C3	C3	CR	LF

Reference

- (1) 'C3' is maximum ten-digit (including the polarity +/-, comma and point) numeric data.
Example) Upper limit input 120.00g: "LA,120.00"
Preset tare input 100.00g: "PT,100.00"
Interval time input 12:34:56: "IA,12,34,56" (marked off by commas)
- (2) Make sure not input the measuring unit (g, c, etc.).
- (3) Input the command when Weighing mode, Percentage mode, Counting mode or Multiplied by Coefficient mode is operating.
If it is input while the other mode operation, the balance output an abnormal response.
- (4) If the input value is invalid, the balance output an abnormal response.
- (5) When the normal response, the preset tare value is input in <321 PRESET 1> and the balance operates Preset tare.
- (6) If the input value is "0" at Preset tare setting value command, the preset tare operation is canceled.

6-5-3 (1) Comparator setting command

C1	C2	Code (C1)	Code (C2)	Description	C3	Response	
						A00/Exx format	ACK/NAK format
L	A	0x4C	0x41	Upper limit value setting	Numeric value setting	A00: Normal response E01: Abnormal response	ACK: Normal response NAK: Abnormal response
L	B	0x4C	0x42	Lower limit value setting	Numeric value setting		
L	C	0x4C	0x43	Reference value setting	Numeric value setting		

6-5-3 (2) Preset tare value setting command



This command is invalid for verified balance.

C1	C2	Code (C1)	Code (C2)	Description	C3	Response	
						A00/Exx format	A00/Exx format
P	T	0x50	0x54	Preset tare value setting	Numeric value setting	A00: Normal response E01: Abnormal response	ACK: Normal response NAK: Abnormal response

Reference

- (1) When the normal response, the preset tare value is input in <321 PRESET 1> and the balance operates Preset tare.
- (2) If the input value is "0" at Preset tare setting value command, the preset tare operation is canceled.

6-5-3 (3) Interval (output) time setting command

C1	C2	Code (C1)	Code (C2)	Description	C3	Response	
						A00/Exx format	A00/Exx format
I	A	0x49	0x41	Interval (output) time setting	Numeric value setting	A00: Normal response E01: Abnormal response	ACK: Normal response NAK: Abnormal response

Reference

- (1) If the input value is "0" at interval time setting command, the interval output operation is canceled.
- (2) The initial setting value of interval time is "0".

6-6 Response

6-6-1 Response command format (“A00”/“Exx” format)

Consists of five characters including terminators.

1	2	3	4	5
A1	A2	A3	CR	LF

6-6-1(1) Response command

A1	A2	A3	code(A1)	code(A2)	code(A3)	Description
A	0	0	0x41	0x30	0x30	Normal response
E	0	1	0x45	0x30	0x31	Abnormal response

6-6-2 Response command format (“ACK”/“NAK” format)

Consists of one character without a terminator.

1
A1

6-6-2(1) Response command

A1	code(A1)	Description
ACK	0x06	Normal response
NAK	0x15	Abnormal response

6-7 External contact input

D-sub9P Connector can execute tare subtraction or zero-point adjustment from an external device by connecting a contact or a transistor switch between the pin for externally setting a tare range (Pin 9) and the signal ground pin (Pin 5). When doing so, allow at least 400 ms for connection (ON) time (Maximum voltage: 15 V when the balance is turned OFF, sink current: 20 mA when it is turned ON).

Reference	(1) While external contact input is selected, command input is not available. (2) There is no response command corresponding to external contact input. (3) When the load is within the zero-point adjustment range, zero-point adjustment is executed. When the load exceeds the zero-point adjustment range, tare-subtraction is executed. (Refer to “2-2-1 Zero-point adjustment range” for zero-point adjustment range)
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6-8 Communication setting

6-8-1 RS232C/USB/Bluetooth



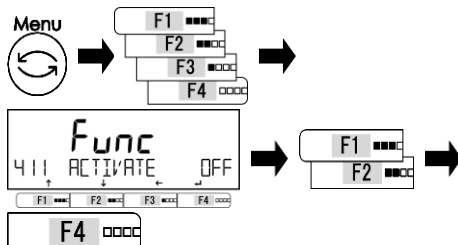
For verified balance:

- Setting menus <412/422/432 FORMAT> are not available. They are fixed to <CBM> (Generic format), and output formats <6>, <7>, <8>, <CSP6> and <CSP7> are not available;
- Output conditions <413/423/433 CONDITION 1, 3, 6> are not available;
- Setting menus <41A/42A/43A STATUS> are not available. They are fixed to <ON> and the net value status is always appended.

Reference

When connect with USB, communication setting of your PC is required.
Please refer to "Appendix 5 USB communication and bus power input".

1 Select the RS-232C communication operation.



Push [Menu] key, then push [F1-F4] keys to go to <411 ACTIVATE>.

Push [F4] key to change the setting value.

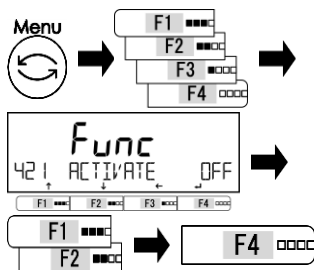
Push [F1/F2] key to select.

OFF: Stop

ON: Operation

Push [F4] key to fix.

Select the USB communication operation.



Push [Menu] key, then push [F1-F4] keys to go to <421 ACTIVATE>.

Push [F4] key to change the setting value.

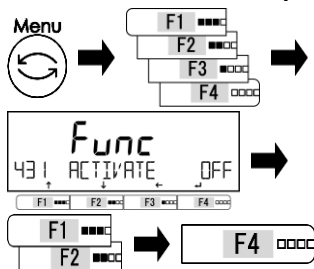
Push [F1/F2] key to select.

OFF: Stop

ON: Operation

Push [F4] key to fix.

Select the Bluetooth operation.



Push [Menu] key, then push [F1-F4] keys to go to <431 ACTIVATE>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: Stop

ON: Operation

Push [F4] key to fix.

2

Select the communication setting.

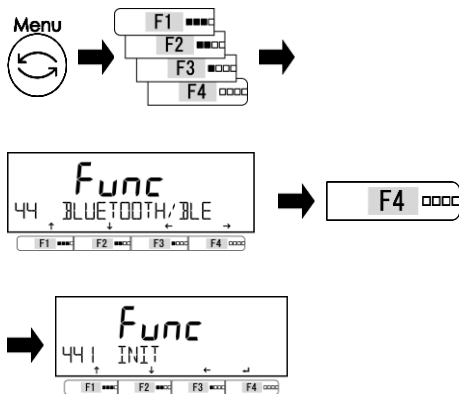
Refer to the step 1 to key operation for setting.

Select the output format.		
412 FORMAT / 422 FORMAT / 432 FORMAT		
Set list		
6 : 6-digit numeric format	7 : 7-digit numeric format	8 : 8-digit numeric format
CSP6 : CSP 6-digit format	CSP7 : CSP 7-digit format	CBM : Generic format
Select the output conditions.		
413 CONDITION / 423 CONDITION / 433 CONDITION		
Set list		
0 : Output stop	1 : Continuous output at all times	2 : Continuous output at stable times (Output stop at unstable times)
3 : Push down [Output] key for one-time instant output	4 : Auto output (One-time output when the balance is loaded and stabilized. The next output for another sample loading is executed once the indication becomes stabilized at less than or equal to zero by unloading, zero-point adjustment or tare-subtraction.)	5 : One-time output at stable times (Output stop at unstable times)
6 : One-time output at stable times (Continuous output at unstable times)	7 : Push down [Output] key for one-time output at stable times	
Select the comparator output.		
414 COMPARE / 424 COMPARE / 434 COMPARE		
Set list		
0 : As per the output setting	1 : Output when discrimination result is OK or absent	
Select the baud rate.		
415 BAUD RATE / 425 BAUD RATE		
Set list		
1200 : 1200 bps	2400 : 2400 bps	4800 : 4800 bps
9600 : 9600 bps	19200 : 19200 bps	38400 : 38400 bps
57600 : 57600 bps	115.2 k : 115200 kbps	
Select the parity bit.		
416 PARITY / 426 PARITY		
Set list		
OFF : None	ODD : Odd number	EVEN : Even number
Select the stop bit.		
417 STOP BIT / 427 STOP BIT		
Set list		
1BIT : 1 bit	2BIT : 2 bit	
Select unused high order digit.		
418 BLANK / 428 BLANK / 438 BLANK		
Set list		
ZERO : Fill with 0 (0x30)	SPACE : Fill with a blank space (0x20)	
Select the response command format.		
419 RESPONSE / 429 RESPONSE / 439 RESPONSE		
Set list		
1 : "A00/Exx" format	2 : "ACK/NAK" format	
Select the net value status.		
41A STATUS / 42A STATUS / 43A STATUS		
Set list		
OFF : Not append	ON : Append	

6-8-2 Bluetooth initialization

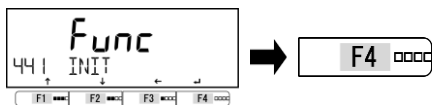
This function is used to initialize pairing with external Bluetooth device.

1 Select Bluetooth initialization



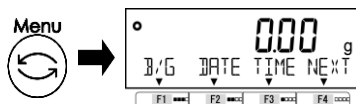
Push [Menu] key, then push [F1-F4] keys to go to <44 BLUETOOTH/BLE>, then push [F4] key to go to <441 INIT>.

2 Initialize Bluetooth pairing



Push [F4] key to execute initialization of Bluetooth pairing.

3 Exit the setting menu.

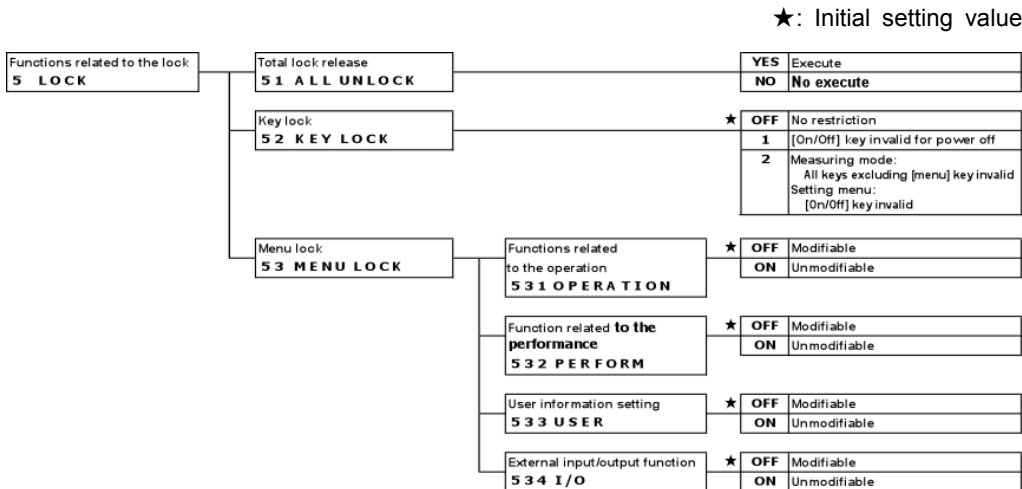


Push [Menu] key to shift to the measuring mode.

7 Functions related to the lock

Impose limitations on key operation and accessing the menu items, etc.

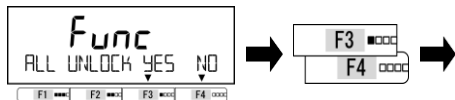
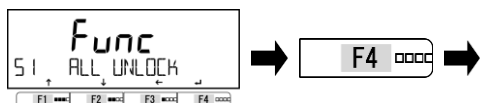
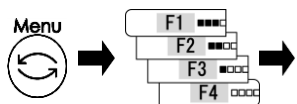
7-1 Hierarchy of functions related to the lock



7-2 Total lock release

All locks that have been set can be released.

1 Select the total lock release.



Push [Menu] key, then push [F1-F4] keys to go to <51 ALL UNLOCK>.

Push [F4] key.

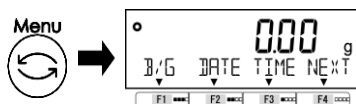
Push [F1/F2] key to select.

YES: Execute

NO: NO execute

Unlock all the settings.

2 Exit the setting menu.

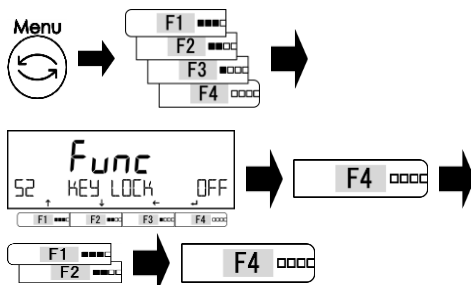


Push [Menu] key to shift to the measuring mode.

7-3 Key lock function

Key operation can be locked.

1 Select the key lock function.



Push [Menu] key, then push [F1-F4] keys to go to <52 KEY LOCK>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: No restriction

1: [On/Off] key invalid for power off

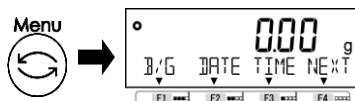
2: Measuring indication:
All keys excluding [Menu] key invalid

Setting menu:

[On/Off] key invalid

Push [F4] key to fix.

2 Exit the setting menu.

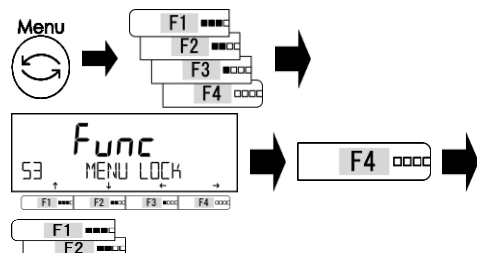


Push [Menu] key to shift to the measuring mode.

7-4 Menu lock function

Various setting menus can be locked.

1 Select the menu lock function.



Push [Menu] key, then push [F1-F4] keys to go to <53 MENU LOCK>.

Push [F4] key to change.

Push [F1/F2] key to select.

Refer to Set List.

Set list

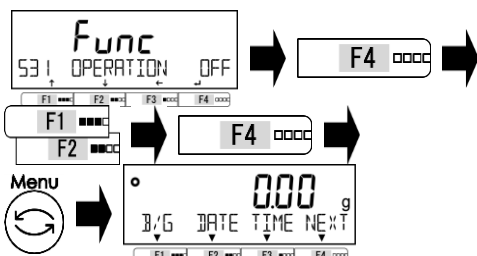
531 OPERATION : Function related to the operation
<1 APPLICATIONS>

532 PERFORM : Function related to the performance
<2 PERFORMANCE>

533 USER : User information setting
<3 USER INFO>

534 I/O : External input/output functions
<4 EXTERNAL I/O>

2 Select modifiable/unmodifiable of each menu.



Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: Modifiable

ON: Unmodifiable

Push [F4] key to fix.

Push [Menu] key to shift to the measuring mode.

8 Controlling and adjustment functions

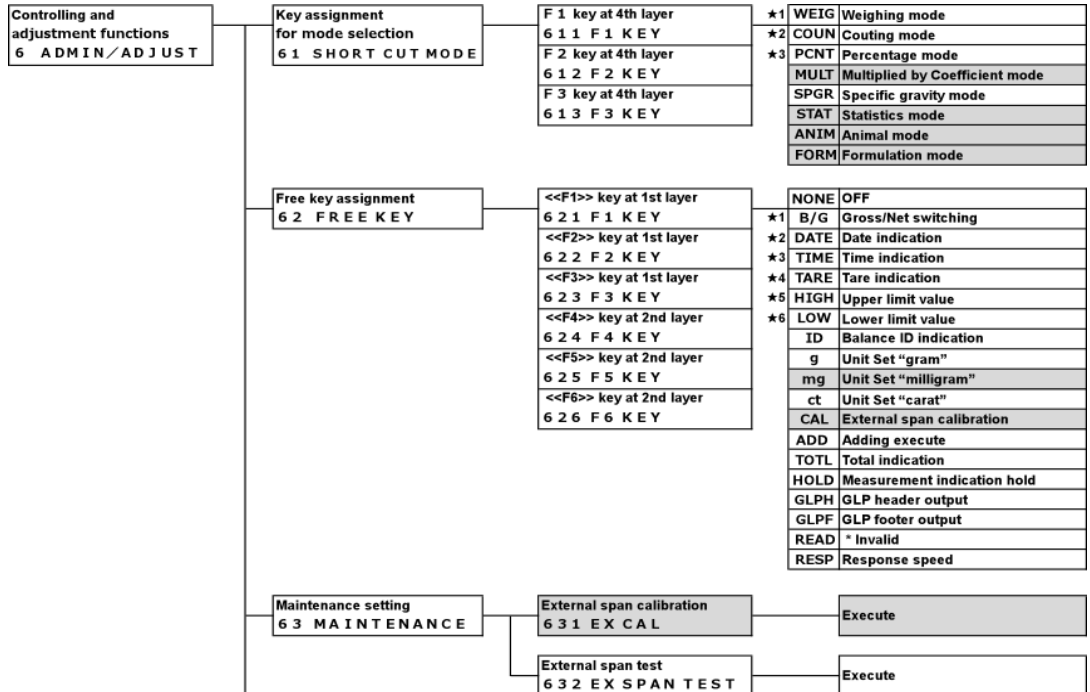
Perform setting of the Balance ID (Scale ID), the span calibration/test and the date and time.

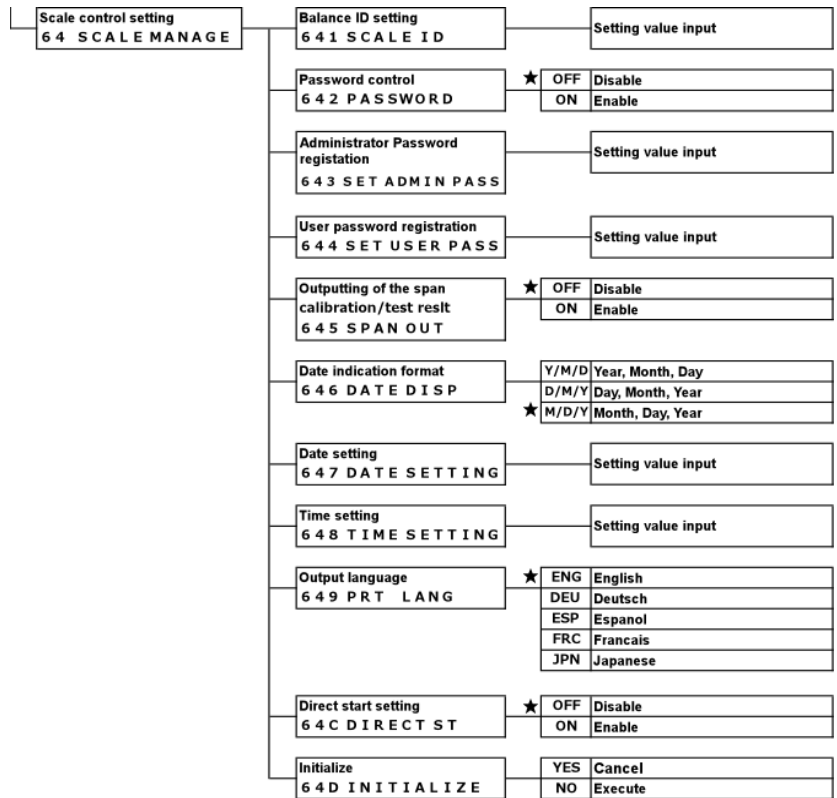
8-1 Hierarchy of controlling and adjustment functions



For verified balance, gray shaded items () are not available.

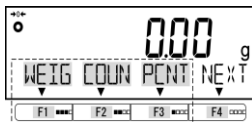
★: Initial setting value





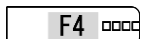
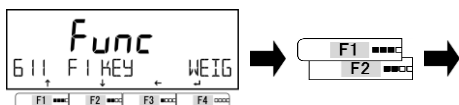
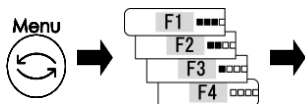
8-2 Shortcut setting for accessing various measuring modes

Shortcuts for various measuring mode can be assigned to <<F1-F3>> which are displayed above [F1-F3] key.



For verified balance, <MULT>, <STAT>, <ANIM> and <FORM> are not available.

1 Select <<F1-F3>>.



Push [Menu] key, then push [F1-F4] keys to go to <611 F1 KEY>.

Push [F4] key to change.

Push [F1/F2] key to select.

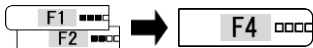
611 F1 KEY: <<F1>> above [F1] key

612 F2 KEY: <<F2>> above [F2] key

613 F3 KEY: <<F3>> above [F3] key

Push [F4] key to fix.

2 Select the measuring modes.



Push [F4] key to change the setting value.

Push [F1/F2] key to select.

Refer to Set List.

Push [F4] key to fix.

Set list

WEIG : Weighing mode	COUN : Counting mode	PCNT : Percentage mode
MULT : Multiplied by Coefficient mode	SPGR : Specific gravity mode	STAT : Statistics mode
ANIM : Animal mode	FORM : Formulation mode	

3 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

8-3 Free key setting

Reference

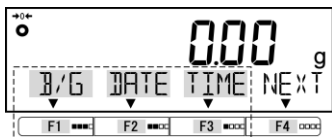
Free key setting is valid only in the weighing mode.



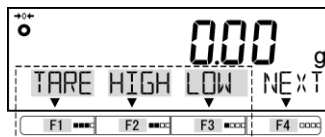
For verified balance:

- <mg>, <CAL>, <ADD>, <TOTL> and <HOLD> are not available;
- <ct> is available only on MG-S322.

Various function can be assigned to the <<F1-F6>> (Free key), which are displayed above the [F1-F3] keys.



Display1 (<<F1-F3>>)



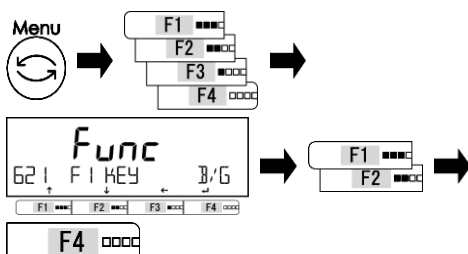
Display2 (<<F4-F6>>)

1 Select the <<F1-F6>> setting menu.

Push [Menu] key, then push [F1-F4] keys to go to <621 F1 KEY>.

Push [F1/F2] key to select each Free key setting menu.

Refer to "Free key setting menu list".



Free key setting menu list		
621 F1 KEY : <<F1>>	622 F2 KEY : <<F2>>	623 F3 KEY : <<F3>>
624 F4 KEY : <<F4>>	625 F5 KEY : <<F5>>	626 F6 KEY : <<F6>>

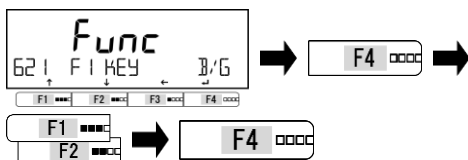
2 Select the function to assign to the Free key.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

Refer to Set List.

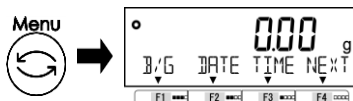
Push [F4] key to fix.



Set list		
NONE : OFF	B/G : Gross/Net	Date : DAtE indication
TIME : Time indication	TARE : Tare value indication	HIGH : Upper limit value
LOW : Lower limit value	ID : Balace ID indication	g : Unit set "gram"
mg : Unit set "milligram"	ct : Unit set "carat"	CAL : External span calibration
ADD : Adding execute	TOTL : Total value indication	HOLD : Measurement indication hold
GLPH : GLP header output	GLPF : GLP footer output	READ : * Invalid item
RESP : Response speed setting		

3 Exit the setting menu.

Push [Menu] key to shift to the weighing mode.



8-4 Maintenance settings

8-4-1 Span calibration and span test

Span calibration is to “decrease” the difference between an indicated value and the true value (mass), and span test is to “check” the difference between an indicated value and the true value.

This must be performed without fail in the case of doing high-accuracy weighing work.

Because an electronic balance is affected by the acceleration of gravity, calibration/test is needed at every weighing location. The calibration/test is also needed when (1) using a long period and (2) an accurate indication does not appear any longer.

Note

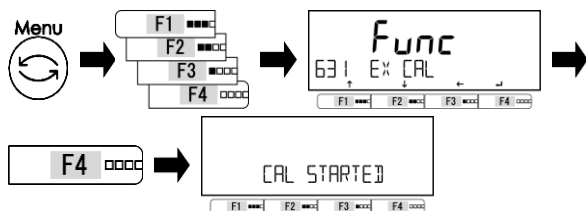
- (1) An external weight used for the span calibration shall be the one equivalent to the OIML F1 class.
- (2) The span calibration significantly affects the weighing accuracy. Please read this procedure carefully before getting to the calibration.

8-4-1(1) Span calibration with external weight

Legal
Metrology

- (1) This mode is not available for verified balance.
- (2) <SELECT MIN 1> shall be selected at span calibration during the verification.

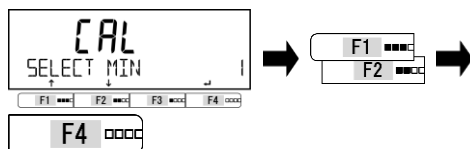
1 Select the span calibration with external weight.



Push [Menu] key, then push [F1-F4] keys to go to <631 EX CAL>.

Push [F4] key to execute.

2 Select the minimum interval for rounding the weight of the external weight.

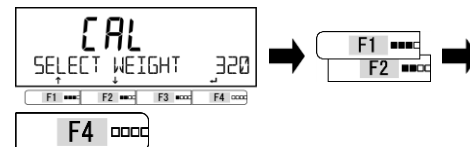


Push [F1/F2] key to select

- 1: 1d
- 2: 2d
- 5: 5d
- 10: 10d

Push [F4] key to fix.

3 Select a weight used for the span calibration.

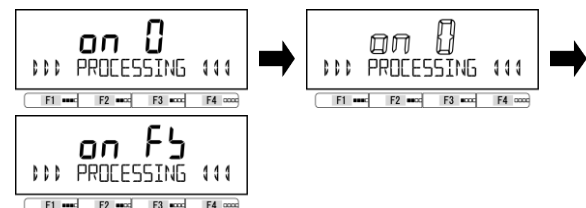


Push [F1/F2] key and select a weight used for the span calibration.

(Refer to List of “weights used for the span calibration by model”)

Push [F4] key to fix.

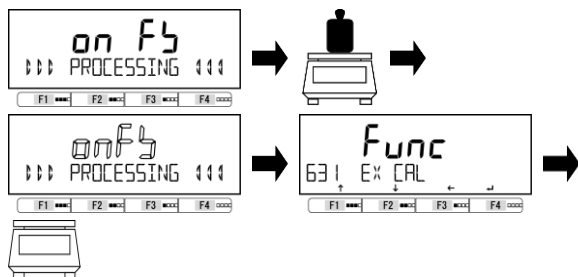
4 Zero-point adjustment starts.



Display changes to the order of <on 0> → “blinking of <on 0>”.

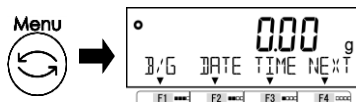
On completion of the zero-point adjustment, the display automatically changes to <on FS>.

5 The span calibration starts.



Place the weight in the center of the weighing pan.
 Display changes to the order of <on FS> → “blinking of <on FS>”.
 Start of the span calibration.
 On completion of the span calibration, the display automatically changes to <631 EX CAL>.
 Unload the weight from the weighing pan.

6 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

Reference

(1) List of weights used for the span calibration by model (Unit: g).

Model	MG-S322	MG-S1501	MG-S8200
Selectable weight on the menu	320	1500	8200
	300	1000	8200
	200	1000	5000
	100	500	5000
	50	200	2000
	5	20	200
VAR set	1 to 320	1 to 1500	1 to 8200

(2) The span calibration by the use of a weight less than the weighing capacity may possibly indicate <UC> on the display. When this is the case, the weighing accuracy is not guaranteed.

Conditions under which <UC> is indicated when:

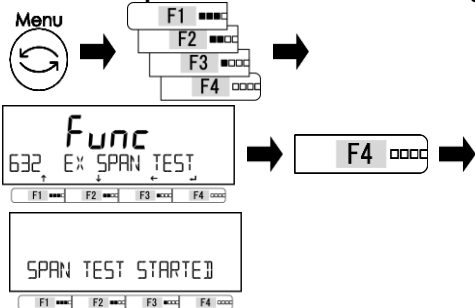
- A sample that is more than two times heavier than the weight that was used for the span calibration is weighed; and/or
- Other than <1> is selected at <SELECT MIN>.



8-4-1(2) Span test with external weight

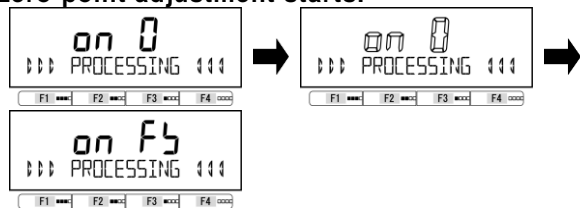
Note Make sure to use the external weight which is equal to the weighing capacity of each model.

1 Select the span test with external weight.



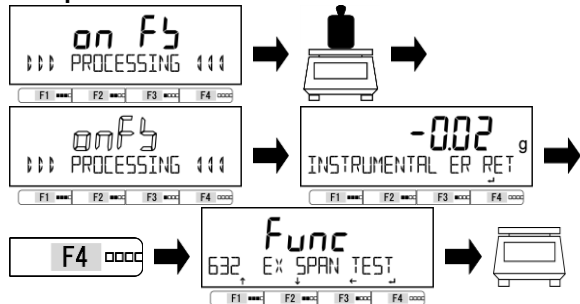
Push [Menu] key, then push [F1-F4] keys to go to <632 EX SPAN TEST>. Push [F4] key to execute.

2 Zero-point adjustment starts.



Display changes to the order of <on 0> → “blinking of <on 0>”. On completion of the zero-point adjustment, the display automatically changes to <on FS>.

3 The span test starts.



Place the weight in the center of the weighing pan. Display changes to the order of <on FS> → “blinking of <on FS>”. Start of the span test. On completion of the span test, the display automatically changes to < INSTRUMENTAL ER> and the instrumental error of the balance is displayed. Push [F4] key. <632 EX SPAN TEST> is displayed. Unload the weight from the weighing pan.

4 Exit the setting menu.



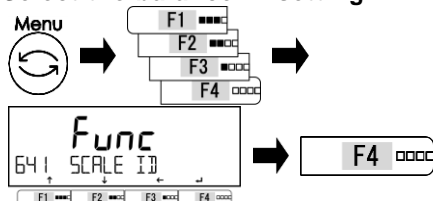
Push [Menu] key to shift to the measuring mode.

8-5 Balance control setting

8-5-1 Balance ID setting

A balance ID (Scale ID) can be set to discriminate the balance. The balance ID is output with GLP header output and external span calibration/test result output. Balance ID is checked by free key <<ID>>.

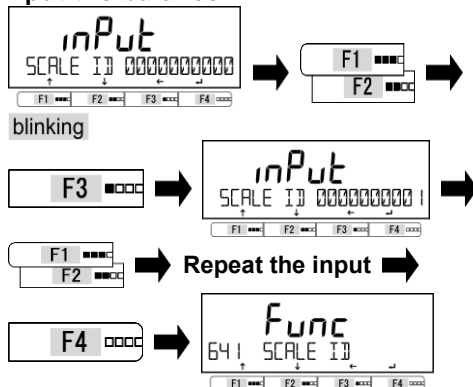
1 Select the balance ID setting.



Push [Menu] key, then push [F1-F4] keys to go to <641 SCALE ID>.

Push [F4] key.

2 Input the balance ID.



The digit for inputting is blinking.

Push [F1/F2] key to increment/decrement the digit to select.

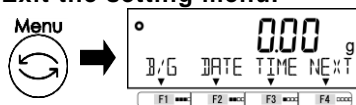
Push [F3] key to input the next digit.

Push [F1/F2] key.

Repeat the input by the procedure above.

Push [F4] key to fix the balance ID and shift to <641 SCALE ID>.

3 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

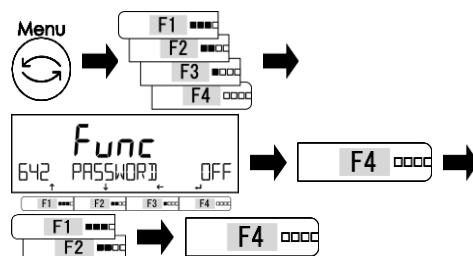
8-5-2 Password control

Enable/disable the password protection.

Reference

- (1) Refer to "8-5-2(1) Administrator password registration" and "8-5-2(2) User password registration" for password registration/changing.
- (2) Refer to "Appendix 6 Balance operation with password control function" for using the balance with password control.

1 Enable/disable the password protection.



Push [Menu] key, then push [F1-F4] keys to go to <642 PASSWORD>.

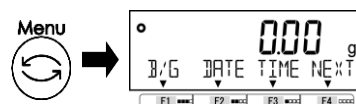
Push [F4] key to change.

Push [F1/F2] keys to select;

OFF : Disable
ON : Enable

Push [F4] key to fix.

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

Password input display appears from next power on.

8-5-2 (1) Administrator password registration

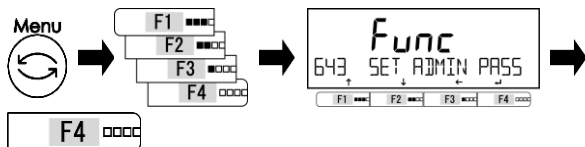
Note

- (1) Make sure not to forget the administrator password.
- (2) In case that the administrator password is lost, please contact the store where you purchased the product.

Reference

- (1) Only one password can be set for administrator.
- (2) The initial administrator password is "0000".

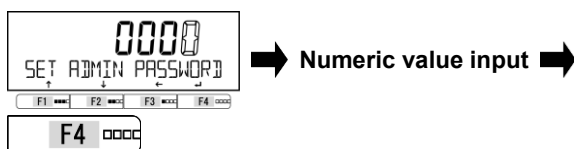
1 Select the Administrator password registration.



Push [Menu] key, then push [F1-F4] keys to go to <643 SET ADMIN PASS>.

Push [F4] key to input the password.

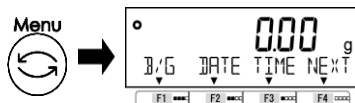
2 Input the password to register.



Input to set the password.
Four digits of 0-9 can be selected.
Push [F4] key to fix.

(Refer to "2-5-3 Numeric value input")

3 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

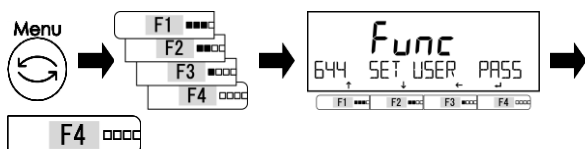
8-5-2 (2) User password registration

Administrator can register the user password for each user(operator).

Reference

- (1) Refer to "Appendix 6 Balance operation with password control function" for setting each user's authority.
- (2) User password can be set only for User 1 and User 2.
- (3) The initial user password is "0000".

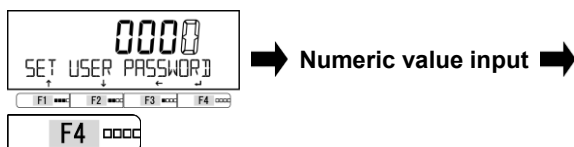
1 Select the User password registration.



Push [Menu] key, then push [F1-F4] keys to go to <644 SET USER PASS>.

Push [F4] key to input the password.

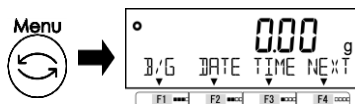
2 Input the password to register.



Input to set the password.
Four digits of 0-9 can be selected.
Push [F4] key to fix.

(Refer to "2-5-3 Numeric value input")

3 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

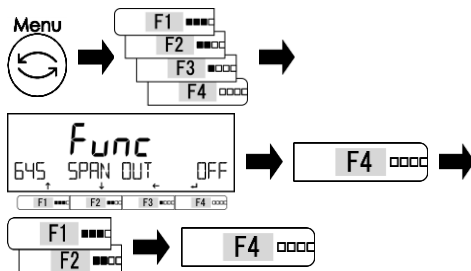
8-5-3 Outputting of the span calibration/ test result

After span calibration/test, the result can be output automatically.

Reference

Make sure to activate <41 RS232C> and/or <42 USB> and/or <43 BLUETOOTH> to output the data.

1 Select the outputting.



Push [Menu] key, then push [F1-F4] keys to go to <645 SPAN OUT>.

Push [F4] key to change the setting menu.

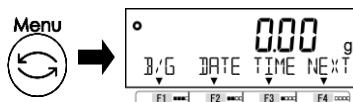
Push [F1/F2] key to select.

OFF: Disable

ON: Enable

Push [F4] key to fix.

2 Exit the setting menu.

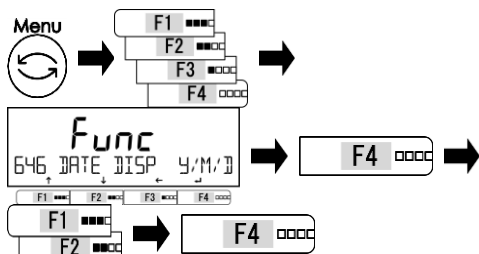


Push [Menu] key to shift to the measuring mode.

8-5-4 Date indication format

Date indication format can be selected.

1 Select the Date indication format.



Push [Menu] key, then push [F1-F4] keys to go to <646 DATE DISP>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

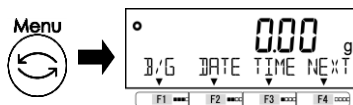
Y/M/D: Year, Month, Day

D/M/Y: Day, Month, Year

M/D/Y: Month, Day, Year

Push [F4] key to fix.

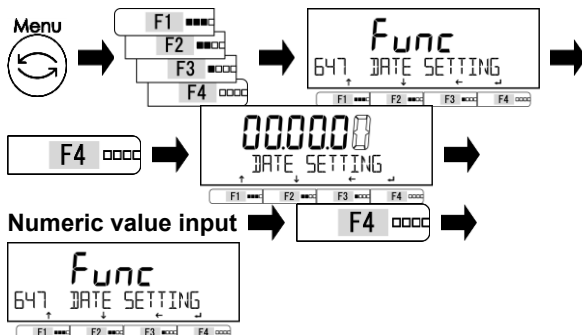
2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

8-5-5 Date setting

1 Select the date setting.



Push [Menu] key, then push [F1-F4] keys to go to <647 DATE SETTING>.

Push [F4] key to change the setting value.

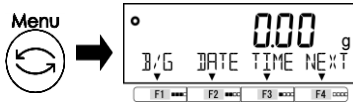
The digit for inputting is blinking.

Input the date.

Push [F4] key to fix the date setting.

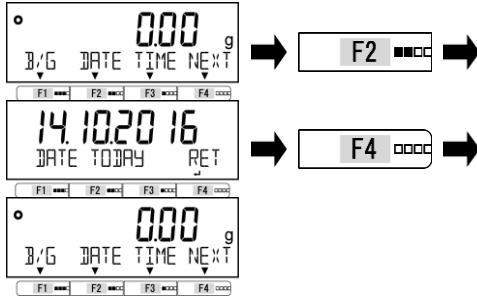
(Refer to "2-5-3 Numeric value input")

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

3 Indication of the date.



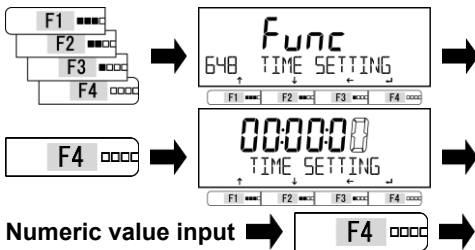
Push [F2] (<<DATE>>) key.

The date is indicated.

Push [F4] key to return to the measuring mode.

8-5-6 Time setting

1 Select the time setting.



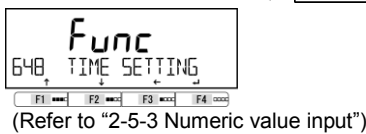
Push [Menu] key, then push [F1-F4] keys to go to <648 TIME SETTING>.

Push [F4] key to change the setting menu.

The digit for inputting is blinking.

Input the time.

Push [F4] key to fix the time setting.

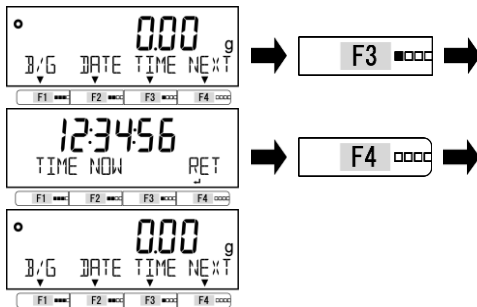


2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

3 Indication of the time.



Push [F3] (<<TIME>>) key.

The time is indicated.

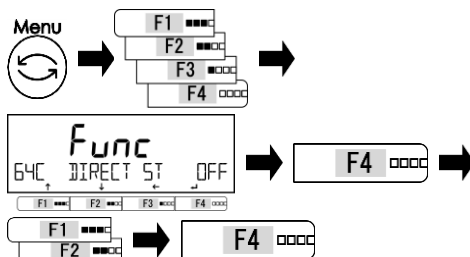
Push [F4] key to return to the measuring mode.

8-5-7 Direct start setting

This is a function to turn on the balance automatically without pushing [On/Off] key when it is connected to the AC power or USB bus powered from PC. You can use this function when the balance is used in conjunction with other devices.

Reference This function does not operate when the balance is power-supplied ONLY from dry-cell batteries.

1 Select the direct start.



Push [Menu] key, then push [F1-F4] keys to go to <64C DIRECT ST>.

Push [F4] key to change the setting value.

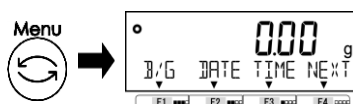
Push [F1/F2] key to select.

OFF: Disable

ON: Enable

Push [F4] key to fix.

2 Exit the setting menu.

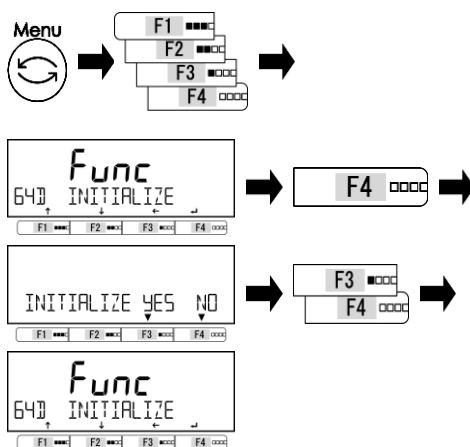


Push [Menu] key to shift to the measuring mode.

8-5-8 Initialize

This function is to initialize the balance to the factory settings except span calibration, Bluetooth pairing, the date and time setting.

1 Select the initialize.



Push [Menu] key, then push [F1-F4] keys to go to <64D INITIALIZE>.

Push [F4] key.

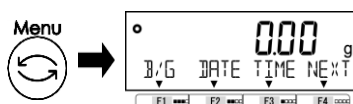
Push [F3/F4] key to select.

NO: Cancel

YES: Execute

<64D INITIALIZE> is displayed.

2 Exit the setting menu.



Push [Menu] key to shift to the measuring mode.

9 Troubleshooting

Reference

If the trouble persists after following the procedures below, please contact the store you purchased.

9-1 Error message

Error Message/ Error Code	Cause	Coping method
OVER ERROR	<ul style="list-style-type: none"> - The weight of the sample to be weighed is in excess of the maximum capacity. - The addition result or calculation result has exceeded the maximum display digit. 	<ul style="list-style-type: none"> - Split the sample into several pieces and weigh them. - Replace the tare with a lighter one. - Clear the calculation result, and then re-execute the addition/computation while being careful of the display digit.
UNDER ERROR	The negative load is below the lower limit.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. Use the dedicated weighing pan and pan base only.
UC	The weighing accuracy is not guaranteed because of span calibration setting.	<ul style="list-style-type: none"> - Select <SELECT MIN 1> at span calibration. - Select the external calibration weight which is 1/2 times heavier than the weighing sample.
DATA MAX ERROR	Number of the data is over the memory	Clear the data
DISPLAY ERROR / DSP OVER	The calculation result has exceeded the maximum display digit.	Clear the calculation result, and then reexecute the computation while being careful of the display digit.
LOWER ERROR	The unit/reference weight in Counting/Percentage mode is below the lower limit.	Choose the samples of which unit weight/reference weight is larger than the lower limit.
ERR001~ ERR099	System error	Record the error code and notify the store where you purchased the product.
ERR703	<ul style="list-style-type: none"> - The operation key was pushed at the time of starting from the standby status. If the error message is displayed nevertheless the operation key wasn't pushed, there is something wrong with the hardware. 	Do not push the operation key while the balance is in the process of starting from the standby status.
ERR705	Initial zero adjustment error. The initial zero adjustment was not completed in the process of starting from the standby status because of the unstable load.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR706	The load is out of the initial zero adjustment range.	Do not put any load on the weighing pan at the power-on of the balance.
ERR709 ERR710 ERR711	<ul style="list-style-type: none"> - The load is unstable at the zero adjustment/tare subtraction. - Span calibration time-out error. 	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR717	The mass of the calibration weight is 1% differ from the designated mass at the external span calibration.	Check the calibration value of the weight and use the proper calibration weight.
ERR718	The mass of the calibration weight is under 50% of the maximum capacity at "span calibration" by external calibration weight.	Use the calibration weight of which weight is equal to the maximum capacity.
ERR719	The adjust value by "external span calibration" is over 1% of the maximum capacity.	Check the mass of the weight used for the external span calibration.
ERR722	Tare key is pushed during the Preset tare operation.	Do not push the Tare key during the Preset tare operation.

Error Message/ Error Code	Cause	Coping method
ERR723	Out of Zero adjustment range (1.5% of the maximum capacity)	Make sure nothing on the weighing pan while executing zero adjustment.
ERR724	Out of Tare subtraction range (0g to the maximum capacity)	Choose the tare of which weight is within the tare subtraction range.
ERR734	Weight of the sample is out of the importing range at actual value setting method at Percent weighing mode (lower limit to maximum capacity).	Load the sample of which weight is within the importing range.
ERR735	Time-out error of importing the sample weight in the actual value setting method at Percent weighing mode.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR736	The setting value is out of the setting range at numeric value setting method at Percent weighing mode (lower limit to maximum capacity).	Set the value within the range.
ERR737	<ul style="list-style-type: none"> - Sample weight in the air is out of the importing range at specific gravity mode (over 0g to maximum capacity). - Sample weight in the water/liquid is out of the importing range at specific gravity mode ("0 – maximum capacity" to "maximum capacity"). 	<ul style="list-style-type: none"> - Divide the sample so as to its weight in the air is within the importing range. - Divide the sample so as to its weight in the air is within the importing range.
ERR738	Time-out error of importing the sample weight in the water/liquid at specific gravity mode.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR739	Time-out error of importing the sample weight in the actual value setting method at Preset tare setting.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR740	The setting value is out of the setting range at numeric value setting method or actual value setting method at Preset tare setting (0g to maximum capacity).	Set the tare of which weight is within the tare subtraction range.
ERR746	Invalid date or time was input at <647 DATE SETTING> or <648 TIME SETTING>.	Set the date and time correctly.
ERR747	Time-out error of importing the sample weight in the actual value setting method at Comparator function.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR748	The setting value is out of the setting range at numeric value setting method or actual value setting method at Comparator mode ("0 – maximum capacity" to "maximum capacity").	Set the value within the range.
ERR749	Time-out error of importing the sample weight in the actual value setting method at Adding function.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR750	<ul style="list-style-type: none"> - Weight of the sample to add is out of the importing range ("0 – maximum capacity" to "maximum capacity"). - The total value has exceeded the maximum display digit. 	<ul style="list-style-type: none"> - Choose the sample of which weight is within the importing range. - Clear the total value.
ERR751	The unit weight of the samples is lighter than the minimum piece weight (MPW) of the balance at Counting mode.	Choose the samples of which unit weight is larger than the Minimum Piece Weight (MPW) of the balance.

Error Message/ Error Code	Cause	Coping method
ERR752	The unit weight of the samples is 0g and under at Counting mode.	<ul style="list-style-type: none"> - Choose the samples of which unit weight is larger than the minimum interval of the balance. - Counting mode cannot operate subtractive counting.
ERR753	Time-out error of importing the unit weight at Counting mode.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR754	Deleted the latest data then executed deleting operation of the second latest data at statistics mode.	<ul style="list-style-type: none"> - Only the latest data can be deleted. - Select <ALL> to delete all the other data.
ERR755	Time-out error of importing the sample weight at Statistics/Formulation mode.	<ul style="list-style-type: none"> - Improper setting of the weighing pan or pan base is suspected. - Check for contact with other object. - Check for any wind or vibration.
ERR756	Weight of the sample is out of the importing range at Statistics/Formulation mode (0g to maximum capacity).	Choose the sample of which weight is within the importing range.
ERR757	Bluetooth connection error.	Disconnect and then reconnect the Bluetooth communication.
ERR758	Bluetooth hardware error.	Contact the store where you purchased the product.
ERR763	The calculation error of the specific gravity of the sample at specific gravity mode.	Re-execute the specific gravity function.
ERR764	External weight used for <631 EX CAL> is different from the selected weight range at <SELECT WEIGHT>.	Use the external weight of which weight is within the selected range.

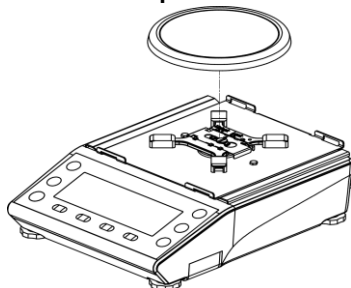
10 How to maintain

CAUTION Take care that no dust or liquid gets in the balance.

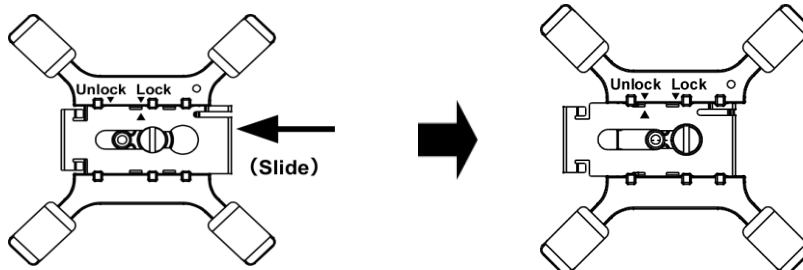
10-1 Simple Method for Maintenance (Round pan type MG-S322)

- 1 Remove the windshield.**
 (1) Refer to “Appendix 7 Windshield assembly instructions” to remove the windshield.

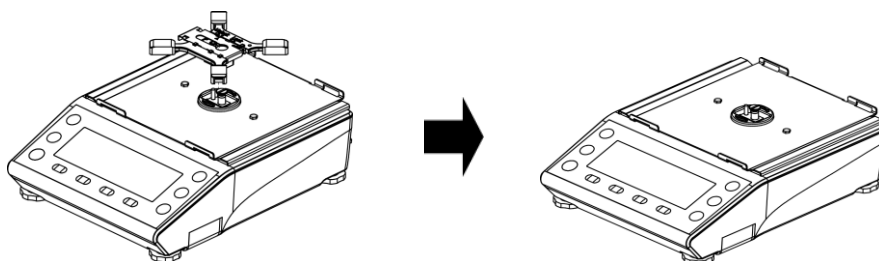
- 2 Remove the round pan.**



- 3 Move the slider to “Unlock” side.**

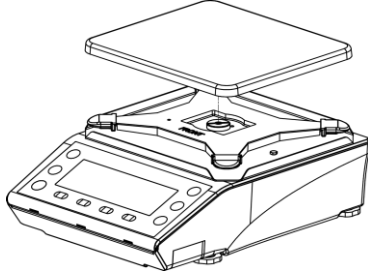
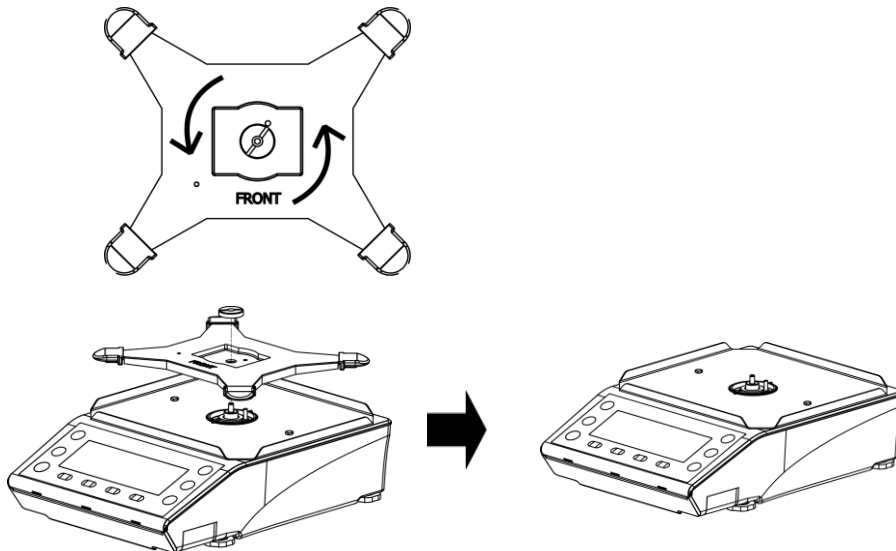


- 4 Remove the pan-base.**



- 5 Maintenance method.**

- (1) Wipe dirt from the balance with dry and soft cloth.
 (2) In the case of heavy soil, dismount the weighing pan and/or the pan-base and clean them with a piece of cloth slightly wet with neutral detergent or solvent.

10-2 Simple Method for Maintenance (Square pan type MG-S1501, MG-S8200)**1 Remove the square pan.****2 Remove the pan-base.****3 Maintenance method.**

- (1) Wipe dirt from the balance with dry and soft cloth.
- (2) In the case of heavy soil, dismount the weighing pan and/or the pan-base and clean them with a piece of cloth slightly wet with neutral detergent or solvent.

Appendix

Appendix 1 Specification

Appendix 1-1 Basic Specification

Reference

MPW: Minimum individual piece weight for counting mode

MSS: Minimum sample size in pieces for counting mode


For non




Model	Capacity	d	MPW	MSS	Indication limit	Windshield	Span calibration
MG-S322	320 g	0.01 g	0.01 g	1 PC	320.09 g	X	External
	1600 ct	0.1 ct	0.1 ct		1600.9 ct		
	0.7 lb	0.0001 lb	0.0001 lb		0.7009 lb		
	11 oZ	0.001 oZ	0.001 oZ		11.009 oZ		
	10 oZt	0.001 oZt	0.001 oZt		10.009 oZt		
	4900 GN	1 GN	1 GN		4909 GN		
	200 dwt	0.01 dwt	0.01 dwt		200.09 dwt		
	85 mom	0.01 mom	0.01 mom		85.09 mom		
	69 MSG	0.01 MSG	0.01 MSG		69.09 MSG		
	8.5 tH	0.001 tH	0.001 tH		8.509 tH		
	8.4 tS	0.001 tS	0.001 tS		8.409 tS		
	8.5 tT	0.001 tT	0.001 tT		8.509 tT		
	27 to	0.001 to	0.001 to		27.009 to		
	21 BAt	0.001 BAt	0.001 BAt		21.009 BAt		
320000 mg	10 mg	10 mg	320090 mg				
MG-S1501	1500 g	0.1 g	0.1 g	1 PC	1500.9 g	-	External
	7500 ct	1 ct	1 ct		7509 ct		
	3.3 lb	0.001 lb	0.001 lb		3.309 lb		
	52 oZ	0.01 oZ	0.01 oZ		52.09 oZ		
	48 oZt	0.01 oZt	0.01 oZt		48.09 oZt		
	23000 GN	10 GN	10 GN		23090 GN		
	960 dwt	0.1 dwt	0.1 dwt		960.9 dwt		
	400 mom	0.1 mom	0.1 mom		400.9 mom		
	320 MSG	0.1 MSG	0.1 MSG		320.9 MSG		
	40 tH	0.01 tH	0.01 tH		40.09 tH		
	39 tS	0.01 tS	0.01 tS		39.09 tS		
	40 tT	0.01 tT	0.01 tT		40.09 tT		
	120 to	0.01 to	0.01 to		120.09 to		
	98 BAt	0.01 BAt	0.01 BAt		98.09 BAt		
1500000 mg	100 mg	100 mg	1500900 mg				
MG-S8200	8200 g	1 g	1 g	1 PC	8209 g	-	External
	41000 ct	10 ct	10 ct		41090 ct		
	18 lb	0.01 lb	0.01 lb		18.09 lb		
	280 oZ	0.1 oZ	0.1 oZ		280.9 oZ		
	260 oZt	0.1 oZt	0.1 oZt		260.9 oZt		
	120000 GN	100 GN	100 GN		120900 GN		
	5200 dwt	1 dwt	1 dwt		5209 dwt		
	2100 mom	1 mom	1 mom		2109 mom		
	1700 MSG	1 MSG	1 MSG		1709 MSG		
	210 tH	0.1 tH	0.1 tH		210.9 tH		
	210 tS	0.1 tS	0.1 tS		210.9 tS		
	210 tT	0.1 tT	0.1 tT		210.9 tT		
	700 to	0.1 to	0.1 to		700.9 to		
	5440 BAt	0.1 BAt	0.1 BAt		5440.9 BAt		
8200000 mg	1000 mg	1000 mg	8209000 mg				

For 

Model	Capacity	e	d	MPW	MSS	Indication limit	Accuracy Class	Windshield	Span calibration
MG-S322	320 g	0.01 g	0.01 g	0.03 g	10 PC	320.09 g	II	X	
	1600 c	0.1 c	0.1 c	0.3 c		1600.9 c	II		
	0.7 lb	0.0001 lb	0.0001 lb	0.0003 lb		0.7009 lb	II		
	11 oz	0.001 oz	0.001 oz	0.003 oz		11.009 oz	II		
4900 gr	1 gr	1 gr	3 gr	4909 gr		II			
MG-S1501	1500 g	0.1 g	0.1 g	0.3 g		1500.9 g		II	
	7500 c	1 c	1 c	3 c		7509 c		II	
	3.3 lb	0.001 lb	0.001 lb	(0.003 lb)*		3.309 lb		III	
	52 oz	0.01 oz	0.01 oz	0.03 oz		52.09 oz	II		
MG-S8200	8200 g	1 g	1 g	3 g		8209 g	II		
	18 lb	0.01 lb	0.01 lb	(0.03 lb)*	18.09 lb	III			
	280 oz	0.1 oz	0.1 oz	(0.3 oz)*	280.9 oz	III			

 (1) Span calibration by external weight is available only before verification.
 (2) * The counting feature is not legal for trade for class III units.

Appendix 1-2 Functional specification

 Items surrounded by double brackets "[[]]" are not available for verified balance.

Item	Description
Weighing system	Tuning-fork vibration method
Measuring mode	Weighing/Counting/Percentage/[Multiplied by Coefficient] /Specific gravity (solid) /[[Statistics]] /[[Animal]]/[[Formulation]]
Function	- Function related to the operation Unit setting/Comparator/[Adding]/Tare-subtraction reminder/ Zero-point adjustment reminder/[Stabilization wait setting]/Bar graph/ Backlight/Auto power-off/Simple SCS
	- Function related to the performance Stability discrimination width/Response speed/Zero tracking
	- User information setting [[Preset tare]]/Weight Comparator/Percentage Comparator/Counting Comparator/ [[Multiplied by Coefficient Comparator]]
	- Functions related to the lock Total lock release/Key lock/Menu lock
	- Controlling and adjustment functions Shortcut/Free key/[Span calibration]/Span test/Balance ID/Password/ Output language (English, German, Spanish, French, Japanese)/Date setting/ Time setting/[Readability setting]/Direct start/Initialize
	- Other functions which can be assigned to free keys GLP footer, header output/Gross-Net switching/Tare indication/Date indication/ Time indication/Balance ID indication/[Hold]]

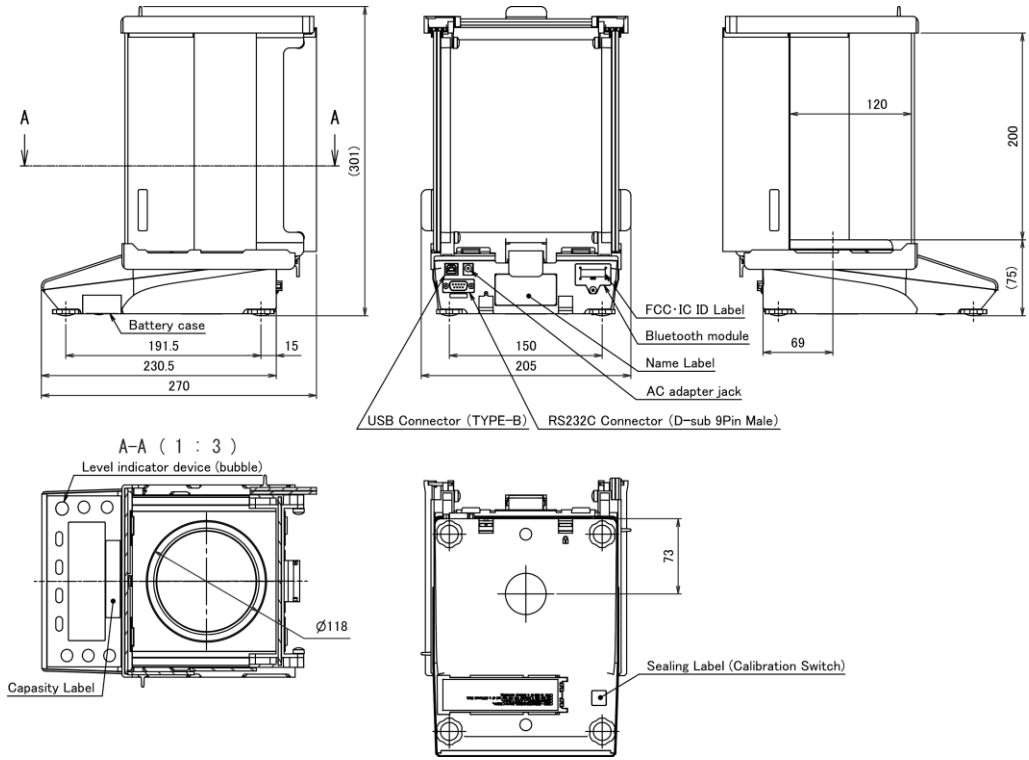
Item	Description
Display	LCD with backlight 7-segment : Maximum 8-digit/Segment height up to 16.5mm 16-segment : Maximum 20-digit/Segment height up to 8.5mm Bar graph : 30-step
Tare range setting	Actual weight subtraction with [Tare] key
Zero tracking	Provided (Can be disabled via setting)
Display when overloaded	When indication limit is exceeded, <OVER ERROR> is indicated. (See Appendix 1-1 "Basic Specification".)
Output	RS-232C compliant output is equipped as standard (D-sub9P Male connector) USB (Type B connector) Bluetooth v4.0 (Class 1)
Percentage mode Weight limit	MG-S322 : 0.1 g MG-S1501 : 1 g MG-S8200 : 10 g
Power	Dedicated AC adapter (100-240VAC / 50-60Hz) 4 AA Dry cell batteries USB bus power: Connected with PC in which the driver is installed
Ratings	AC adapter jack : 4-6VDC 0.3A Battery box (4 AA batteries) : 4-6VDC 0.3A USB bus power : 5VDC 0.3A (Maximum current consumption)
Dimensions of the weighing pan	MG-S322 : ϕ 118mm MG-S1501, MG-S8200 : 160 x 180mm
Weight of the balance (NET) (Approximately)	MG-S322 : 2.6 kg MG-S1501, MG-S8200 : 2.7 kg
Operating condition	Temperature : 5-35°C : Humidity : 85% RH or lower (no condensation) Pollution degree : 2 Altitude : 2000m or less above sea level location of use : Indoor use only
Option	Specific gravity measurement kit (MG-S322), Underweighing-hook (MG-S322 / MG-S1501 and MG-S8200)



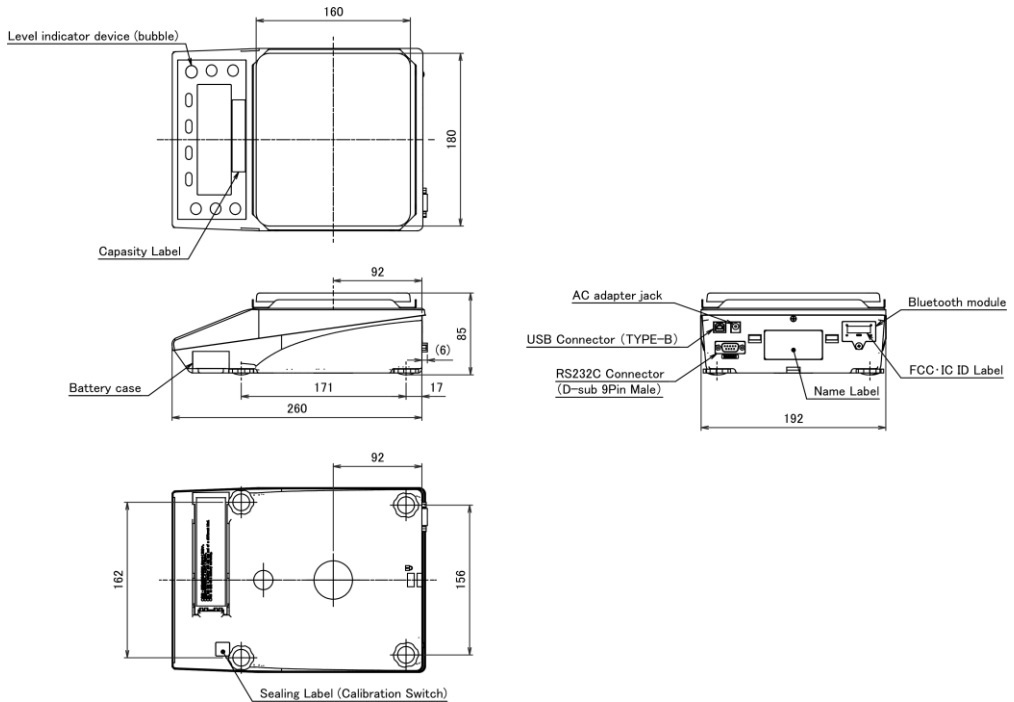
Specific gravity measurement kit and Underweighing-hook option is not legal for trade.

Appendix 2 Dimensional outline drawing



■ MG-S322



■ MG-S1501, MG-S8200



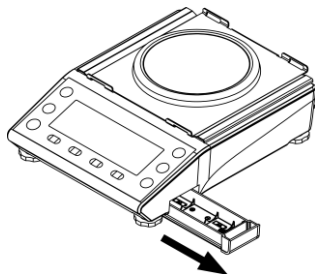
Appendix 3 Unit indication and conversion table

Unit	indication		Conversion coefficient
	For non 	For 	
gram	g	g	1.00000000E+00
carat	ct	c	5.00000000E+00
pound	lb	lb	2.2046226E-03
ounce	oz	oz	3.5273961E-02
troy ounce	ozt		3.2150746E-02
grain	gr	gr	1.5432358E+01
pennyweight	dwt		6.4301493E-01
momme	mom		2.6666667E-01
mesghal	MSG		2.16999761E-01
Hong Kong tael	t:H		2.6717251E-02
Singapore, Malaysia tael	t:S		2.6455471E-02
Taiwan tael	t:T		2.6666667E-02
tola	to		8.5735324E-02
baht	BAt		6.59630607E-02
milligram	mg		1.00000000E+03

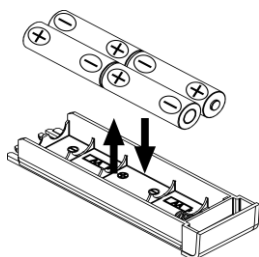
Appendix 4 Installation of batteries

This product can operate with four AA batteries.
Alkaline, manganese, Nickel-metal hydride batteries can be used.

1 Pull out the battery case.

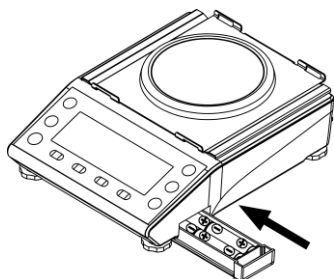


2 Put four AA batteries.







Make sure insert batteries with the positive and negative poles correctly inserted.

3 Insert the battery case.



Insert the battery case until it clicks in place.

When the balance is battery-operated,  is displayed. It changes in accordance with the remaining battery capacity.

Mark	Description
	The battery level is sufficient.
	The battery level is low.
	The batteries have run down. Replace them with new ones.

Reference

Continuous battery runtime: About 150 hours (Alkaline batteries. Backlight and external output: off).

Appendix 5 USB communication and bus power input

This product can communicate/power supplied through USB.

1 Download the USB driver on your PC.

Go to the Website below and download the USB driver.

<http://www.star-m.jp/prjump/000082.html>

2 Install the USB driver on your PC.

Install the USB driver by referring to the Website.

3 Connect the balance to the PC.

Connect the balance with the PC.

4 Set the USB power setting of the PC to avoid unexpected shutting down of the balance.

For Windows 7 and Windows 10:

1) Open the "Device Manager Window".

1-1) How to open the "Device Manager Window"

For Windows 7:	For Windows 10:
Go to "Start Menu"	Right click the "Start button"
> Right click the "Computer"	> Go to "Device Manager"
> "Properties"	
> "Device Manager"	

2) Click the "Port (COM and LPT)" to open the thread and double click the "STAR MG-S****(COM*)" to open the properties window.

3) Go to the "Power Management" tab of the "Star MG-S****(COM*)" properties window.

4) Uncheck the checkbox of "Allow the computer to turn off this device to save power", then click the OK button.

5 Set the communication setting of the PC.

Launch a communication software on your PC and input the communication setting in accordance with the communication settings of the balance (See "6 External input/output functions").

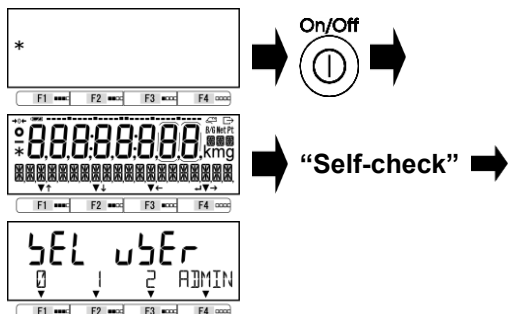
6 Power on the balance.

Appendix 6 Balance operation with password control function

This chapter describes how to use the balance with "8-5-2 Password control". This function is useful for setting different authority for each user/guest.

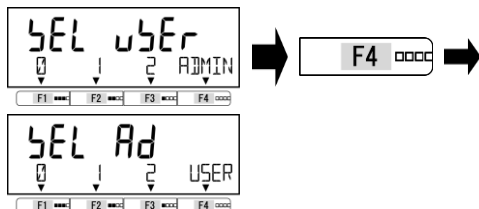
Appendix 6-1 User's authority setting

1 Power on the balance.



Enable the <642 PASSWORD> and register the administrator password in <643 SET ADMIN PASS>, then power-off the balance. Push [On/Off] key, then the balance shifts to User login mode after start-up operation.

2 Go to the Administrator login mode.



Push [F4] key to go to "Administrator login mode".

< SEL Ad > is indicated on the 7-segment display.

3 Select the user to set the authority.



Select the user

- 0 : Guest user
- 1 : User 1
- 2 : User 2

USER : Shift to the User login mode

4 Input the administrator password.

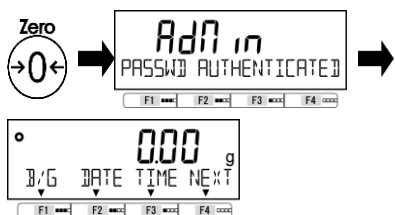


Input the administrator password by pushing [F1-F4] keys.

Each digit increments as "0, 1, ..., 8, 9, 0" by pushing each [F] key.

- First digit from the left : [F1] key
- Second digit from the left : [F2] key
- Third digit from the left : [F3] key
- Fourth digit from the left : [F4] key

5 Start up the balance.



Push [Zero] key.

When the password is authenticated, the balance starts up.

6 Register the user password.

Refer to "8-5-2(2) User password registration".

- Reference**
- (1) The user password of which selected in Step 3 is registered.
 - (2) When "0: Guest user" is selected at step 3, skip this step.

7 Set the functions and setting values which are intended to be fixed.

Refer to “3 Functions related to the operation”, “4 Functions related to the performance”, “5 User information setting”, “6 External input/output functions” and “8 Controlling and adjustment functions” to set functions/setting values to be fixed.

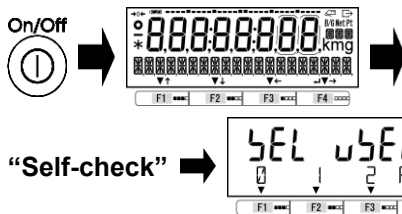
Reference <5 LOCK> and <6 ADMIN/ADJUST> are displayed only for the administrator. When to authorize each user to operate “Span calibration with external weight”, “Adding function”, etc., please assign the functions to <<F1-F6>> (Free key). (Refer to “8-3 Free key settings”).

8 Set the user’s authority (Lock setting).

Refer to “7 Functions related to the lock” to set user’s authority for key operation and/or accessing to setting menus.

Appendix 6-2 User/guest login

1 Power on the balance and go to the User login mode.



Push [On/Off] key, then the balance shifts to User login mode after start-up operation. <5EL 5Er> is indicated on the 7-segment display.

2 Select the user number.



Select the user (operator) number;
 0: Guest user
 1: User 1
 2: User 2
 ADMIN: Shift to the Administrator login mode

3 Input the user password.



Input the user password by pushing [F1-F4] keys.
 Each digit increments as “0, 1, ..., 8, 9, 0” by pushing each [F] key.
 First digit from the left : [F1] key
 Second digit from the left : [F2] key
 Third digit from the left : [F3] key
 Fourth digit from the left : [F4] key

4 Start up the balance.



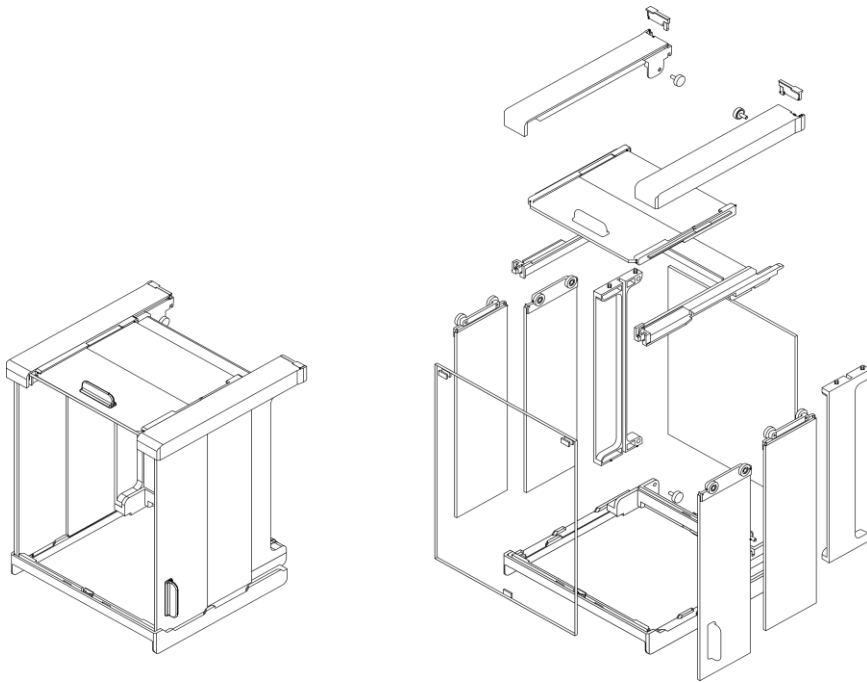
Push [Zero] key.
 When the password is authenticated, the balance starts up.

5 Use the balance with the user’s/guest’s authority.

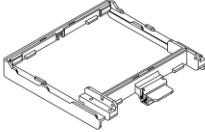
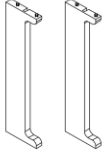
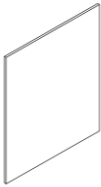
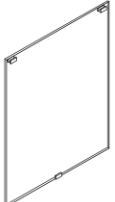
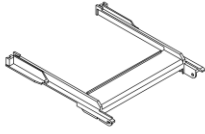



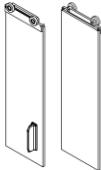
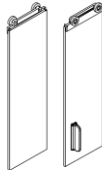
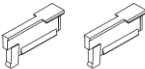

Lock setting configured by administrator is reflected.

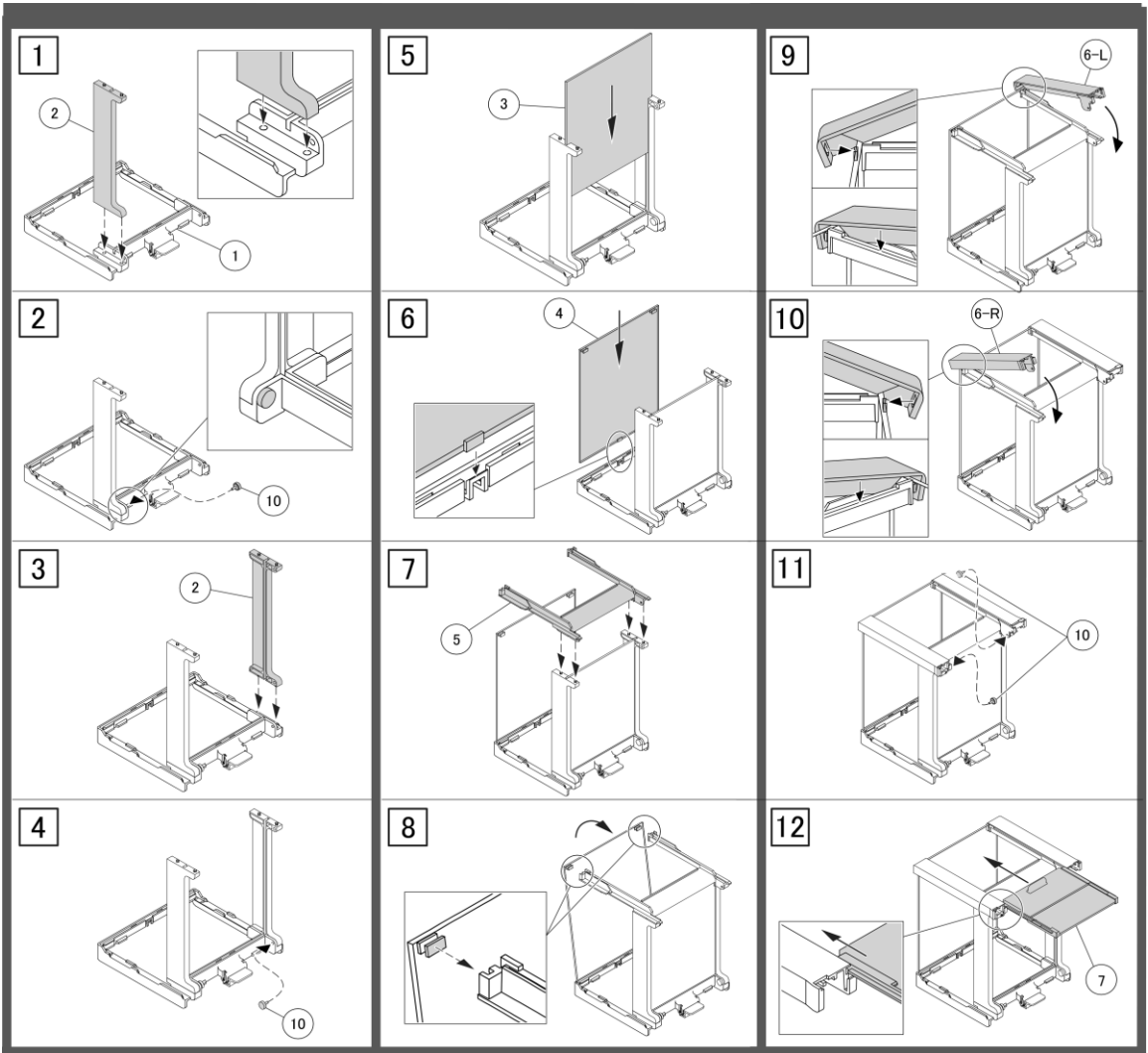
Reference When “0: Guest user” is selected at step 2, step 3 and 4 are skipped.

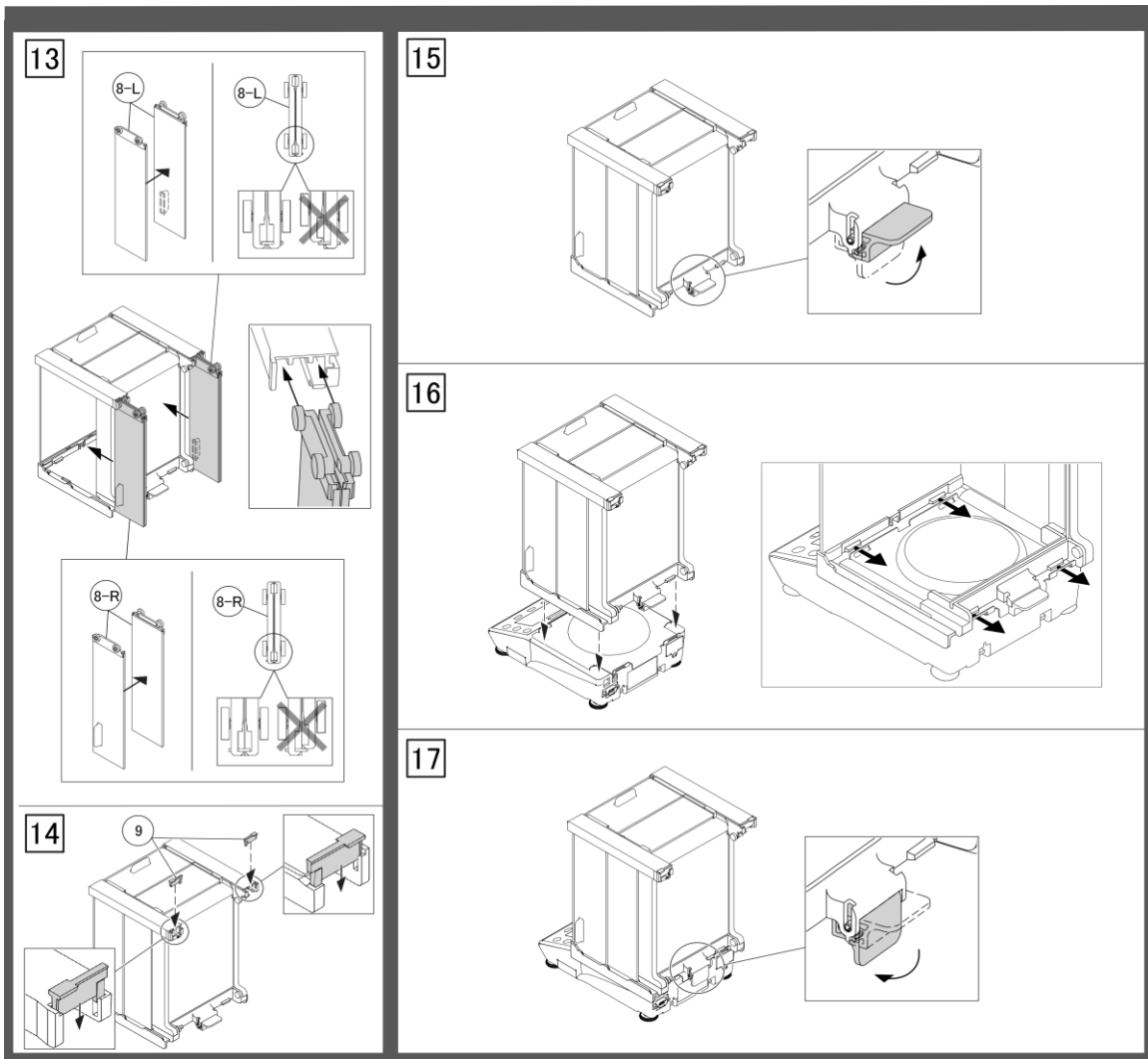
Appendix 7 Windshield assembly instructions



Parts List

<p>1</p> 	<p>2</p> 	<p>3</p> 	<p>4</p> 
<p>5</p> 	<p>6-L</p> 	<p>6-R</p> 	<p>7</p> 
<p>8-L</p> 	<p>8-R</p> 	<p>9</p> 	<p>10</p> 





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