

Tuning Fork Analytical Balance

HT/HTR CEN 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.

SHINKO DENSHI CO., LTD.



Preface

Thank you very much for having purchased our Tuning-Fork Electronic Analytical Balance HT/HTR CEN series.

This document describes how to operate the product.

Instructions

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- Manufacturer: SHINKO DENSHI CO., LTD.

Address:1-52-1 Itabashi, Itabashi-ku, Tokyo 173-0004 Japan

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
DANGER	Used for high risk point concerning the operations that may lead to death or severe physical injury to persons if proper precautions are not taken.
WARNING	Used for warning concerning the operations that may lead to death or severe physical injury to persons, if proper precautions are not taken.
A CAUTION	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.
Note	Used for notation for avoiding from deletion, overwrite of the weighing data or for accurate weighing and appropriate usage of the equipment.
Reference	Used for referenced information which is useful for product operation.
0	Used for "Prohibition" items
0	Used for "Mandatory" items requiring positive action
4	Used for prohibition items to avoid "Electrical shock".
Legal Metrology	This symbol indicates the operation/specification in related to the verificated balance for legal metrology.

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></message>	A message on the display is represented in angle brackets "< >".	
< <f1>>></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.
Арр	endix	Provides necessary data such as the specifications of this product.

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1 Prior to use

1-1 Operating precautions

• DANGER

■ Do not wet the AC adapter.

That may cause an electric shock, short-circuiting or failure.

■ Do not handle the balance or AC adapter with wet hands.

That may cause an electric shock, short-circuiting or failure.

■ Do not use the balance in a wet location.

That may cause an electric shock, short-circuiting or failure.

■ 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.

■ 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.

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■ 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.

■ 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.



■ Obey the MSDS.

Measuring dangerous materials such as flammable liquid could cause an explosion or fire.

• WARNING

■ 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.

■ 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.

■ 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.



■ 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.

■ 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.

■ Only use the specified power supply.

Using any power supply other than that specified could cause overheating, fire or failure.

■ Do not bring the balance by holding the windshield.

The main body could drop and break down or injury someone. Make sure to hold the main body to bring the balance.

• WARNING



■ 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.



■ Only use the dedicated AC adapter.

Use of other types of power or adapters may result in heat generation or malfunction of the balance.

A CAUTION



■ 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.



■ Handle the windshield with care.

The windshield is made of glass and care should be taken to avoid cracking due to impact when the product is used, transported or cleaned. There is also a risk of injury if you touch a broken windshield.

Note

■ 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.

■ 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.



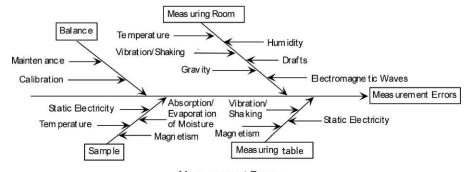
■ For proper disposal

This product including accessories may not be disposed of in domestic waste in conformance with the specific requirements in your country, such as the European Directive 2012/19/EU on waste electrical and electronic equipment(WEEE).

When you dispose of this product, please contact your local authorities or dealer and ask for the correct method of disposal.

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.



Meas urement Errors

1-2-1 Precautions related to measuring environment

Temperature/ humidity/	\rightarrow	Try to keep the room temperature constant to the extent possible in order to avoid condensation and indication drift due to change in temperature.
atmospheric pressure	\rightarrow	Low humidity is likely to cause generation of static electricity, resulting in inaccurate measurement.
•	\rightarrow	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	\rightarrow	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	\rightarrow	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	\rightarrow	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.
\rightarrow	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 →	Use of the balance on the table that is subject to magnetism or static electricity
electricity	should be avoided.

1-2-3 Precautions related to a specimen

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Static	\rightarrow	In general, synthetic resin- and glass-made specimens are high in electric insulation,
electricity		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	\rightarrow	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	\rightarrow	Measuring a moist or evaporating (vaporizing) specimen increases or decreases the
absorption/		indication value of the balance continuously. When this is the case, put the specimen
Evaporation		in a container equipped with a small mouth and closely seal the mouth before
		measurement.
Specimen	\rightarrow	Difference in temperature between the specimen and the windshield interior
temperature		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.
	\rightarrow	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.
		manas ansat, in the windownia daming moderning operation.

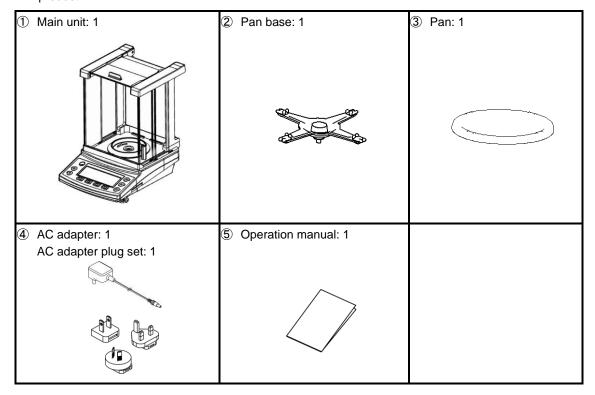
1-2-4 Precautions related to the main unit of a balance

Operating precautions	\rightarrow	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.
	\rightarrow	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.
Adjustment	\rightarrow	Calibrate the balance periodically with an external adjustment weight or internal adjustment weight. For the sake of precise calibration, use an external adjustment 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 adjustment. Adjustment 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	\rightarrow	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.

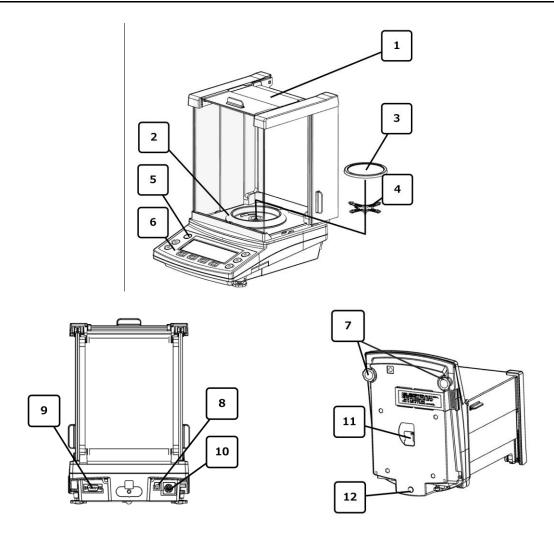
1-3 Check for the articles contained in the box

The package box contains the following;

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



1-4 Name and function of each section



1	Windshield	2 Windshield ring
3	Pan	4 Pan base
5	Level	6 Display and Operation keys
7	Adjuster (Adjustable leg)	8 AC adapter jack
9	RS-232C connector (D-sub 9 pin male)	Connector for peripheral devices 10 (DIN8P) * Replace the connector cap when not connected.
11	Cover of hanging hook	12 Fixed leg

1-5 Assembling and installation of the product

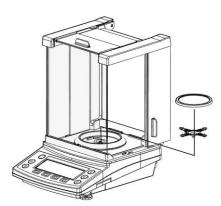
Note

After the balance has been moved, open the windshield door to allow it to adapt to the ambient temperature for stable measurement.

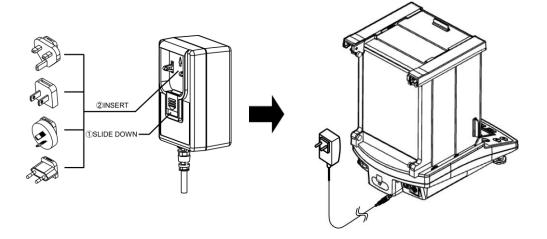
In addition, allow five minutes after turning on the power for the balance to warm up.

1-5-1 Assembling the balance

Attach the Pan base and Pan.



9 Put the AC adapter plug to the AC adapter, then connect the AC adapter.



1-5-2 Level

Release the transportation lock of the adjuster.



At the time of shipment, the adjusters provided at the two 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.

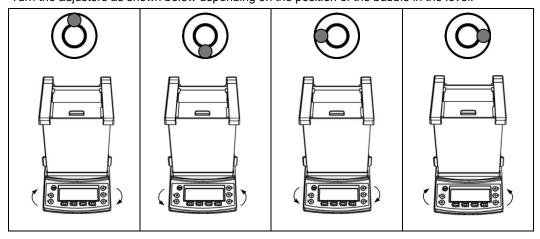




Turn the adjusters so that the bubble enters in the center circle

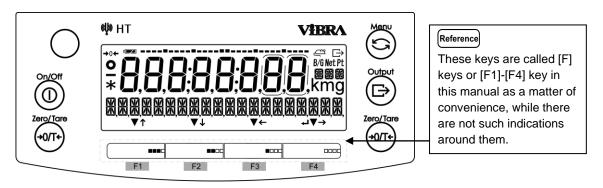
- (1) While watching the level, turn the adjusters provided on the bottom to level the main unit.
- (2) Bring the bubble enters in the center circle as shown in the figure on the left.
- (3) When having leveled the main unit, slightly push the four corners of the balance to make sure that there is no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

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



1-6 Description of the operation keys

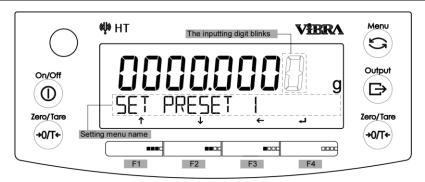
1-6-1 Basic



No	Key	Name of key	Performance	
1	On/Off	[On/Off]	Turns on and off the power for the balance. On: Push the key, Off: Push the key long	
2	Menu	[Menu]	Used for calling/exiting the setting menu. Used for canceling the setting value selection and going back to the measurering mode.	
3	orpod pd	[Output]	Use for data outputting.	
4	Zero/Tore	[Zero/Tare]	Use for zero-point adjustment/tare subtraction.	
5		[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. 	
6		[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. 	
7	■000	[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.	
8	0000	[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. 	

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

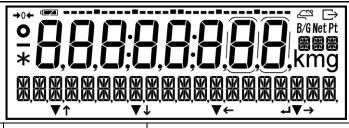


No	Key	Name of key	Performance
1	Menu	[Menu]	Cancel the input value and go back to the setting menu.
2	Zero/Tore	[Zero/Tare]	Input a decimal point < . > in the "Multiplied by Coefficient mode" and "Specific gravity mode".
3	Output	[Output]	Use for changing polarity <+/->.
4	•••	[F1] ([F] key)	< \uparrow > : Use for incrementing the numeric values. <0 \rightarrow 1 \rightarrow 2 \rightarrow \rightarrow 9 \rightarrow 0>
5	■■□C	[F2] ([F] key)	< \blacktriangleright > : Use for decrementing the numeric values. <0 \rightarrow 9 \rightarrow 8 \rightarrow \rightarrow 1 \rightarrow 0>
6	■000	[F3] ([F] key)	< ← > : Use for selecting the digit to change.
7	0000	[F4] ([F] key)	< -> : Use for entering the value.

Reference The [F] keys on which $< \uparrow >, < \downarrow >, < \rightarrow >, < \leftarrow >, < \checkmark >$ 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	0	Stable mark	 When displayed: The balance is in the stable condition. When not displayed: The balance is not in the stable condition. 		
3	→ 0 ←	Zero point	Indicates the zero point.		
4	8,	7 segment	Indicates the weight valueIndicates the simplified character.		
5		Battery mark	Display when the balance is powered by batteries.		
6	Δ	Output	Displayed when data are being output to external devices.		
7	B/G	Gross weight	Indicates gross weight.		
8	Net	Net weight	Indicates that the tare weight is being subtracted.Indicates the preset tare weight is being subtracted.		
9	Pt	Preset tared weight	Indicates the preset tare weight is being subtracted.		
10	g	Gram	Indicates the gram unit.		
11	mg	Milligram	Indicates the milligram unit.		
12		16 segment message 16 segment unit	Displays various messages.Indicates the various units.		
13	↑ → ← → → → → →	Operation of the [F] key	Displayed when the [F1] – [F4] keys are effective.		
14	•	Colon	Displayed when the date and time display.		
15	*	Asterisk	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%. Indicates the state of span adjustment / calibration with internal weight. 		
17		Auxiliary scale interval	Lights up only when the auxiliary scale interval is displayed.		

Legal Metrology

No.17 is indicated only on the verified balance.

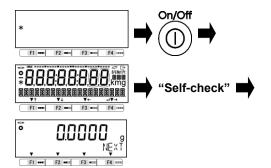
1-7-2 LCD character font

■7-segment Α В С D Ε F G Н I Κ L Μ Ν 0 S Т Q R Χ Ζ С point comma 6 5 8 9 0 space minus / hyphen ■16-segment В Α С D Ε G Н Κ Μ 0 Ν II Т Q R S U W Χ Ζ W d С g m 0 W ij Ш M 1 2 8 6 7 9 3 0 asterisk slash left arrow right arrow minus / hyphen space plus percent Degree Celsius comma point

2 Basic usage

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

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.

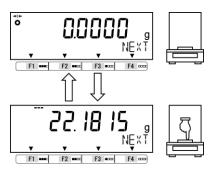
All displays on the LCD lights, followed by the self-check of the balance. During the self-check, the LCD display automatically changes.

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

Note

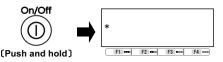
Do not push any key during the self-check.

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) 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".

Check the weighing pan.



Make sure that nothing is placed on the weighing pan.

2 Execute "Zero-point adjustment".



Push [Zero/Tare] key.

Displays become zero and the symbol

→0 ← lights.



(1) When a sample whose weight is over the "Zero-point adjustment range" is placed on the weighing pan, "tare subtraction" works instead of zero-point adjustment. (Refer to the "2-3 Weighing a sample placed on a container (tare)")

Reference

(2) Stability waiting during the Zero-point adjustment can be set using the Setting menu <17 WT STABLE>.



The setting of <17 WT STABLE> is not changeable 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) is below the lower limit, "Zero-point adjustment" is not executed. When the weighing load (gorss) exceeds the upper limit, not "Zero-point adjustment" but "Tare-subtraction" is executed.

Model	Lower limit (g)	Upper limit (g)
HT84(R)CEN	-1.2000	1.2000
HT124(R)CEN	-1.8000	1.8000
HT224(R)CEN	-3.3000	3.3000

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".

Place a container on the weighing pan.

The weight of the container is displayed.



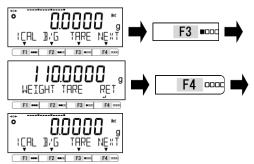
9 Perform tare subtraction



Push [Zero/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.

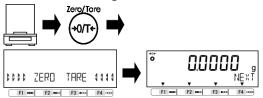
Push [F1-F3] key on which <TARE> is displayed above.

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/Tare] key.

Therefore, the indication becomes zero and $\mbox{<}\mbox{\ensuremath{\text{Net}}}\mbox{\ensuremath{\text{t}}}\mbox{>}\mbox{indication disappears}.$

- (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

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

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

Reference

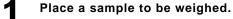
- (3) When using a tare whose tare weight is already known, the tare can be performed in advance by inputting its tare weight (preset tare). For its setting method, refer to "5 User information setting".
- (4) When turning on the power placing a tare that exceeds the initial zero adjustment range at the time of power supply, the tare subtraction is executed.

 $\begin{bmatrix}
L_{egal} \\
M_{etrology}
\end{bmatrix}$ This operation is not valid.

(5) Tare weight can be output at "Step 3 Check the tare weight" by pushing [Output] key. Check "External input/output functions" to refer the output setting.

2-4 Weighing the additional sample

Weigh the first sample and the additional sample separately.





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

Perform the tare.



Push [Zero/Tare] key.

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



Place an additional sample to be weighed.



The mass of the added sample alone is indicated.

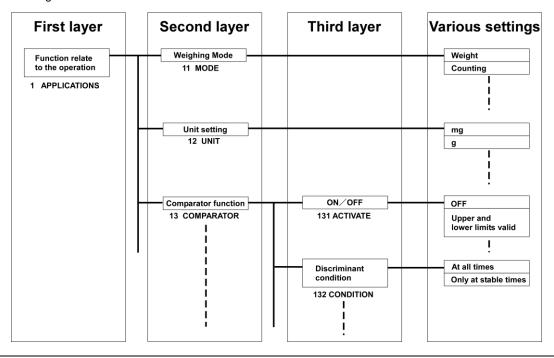
2-5 **Basic operation**



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

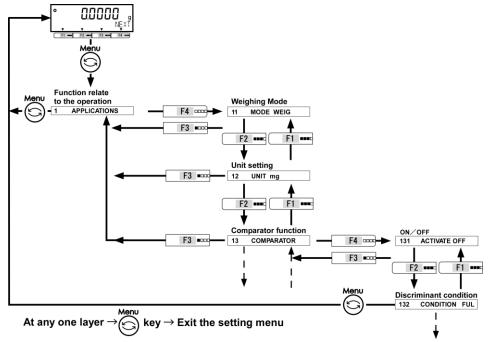
The setting menu of this product is divided into four, from the first layer to the third layer and for various settings.



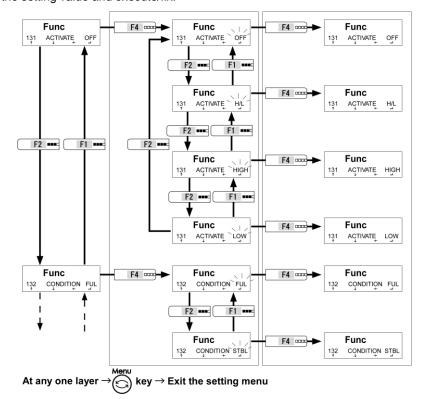
2-5-2 Operation of the setting menu

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.



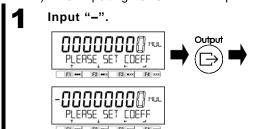
2-5-3 Numeric value input

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

Reference

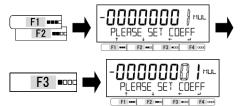
Numeric value inputting is limited to eight digits at a maximum.

Ex) When inputting "-5.4321" in "Multiplied by Coefficient mode".



Push [Output] key to change the polarity to "-".

2 Input "1".



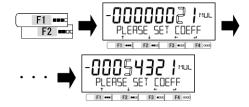
The digit for inputting is blinking.

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 [Zero/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.

The coefficient "-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.

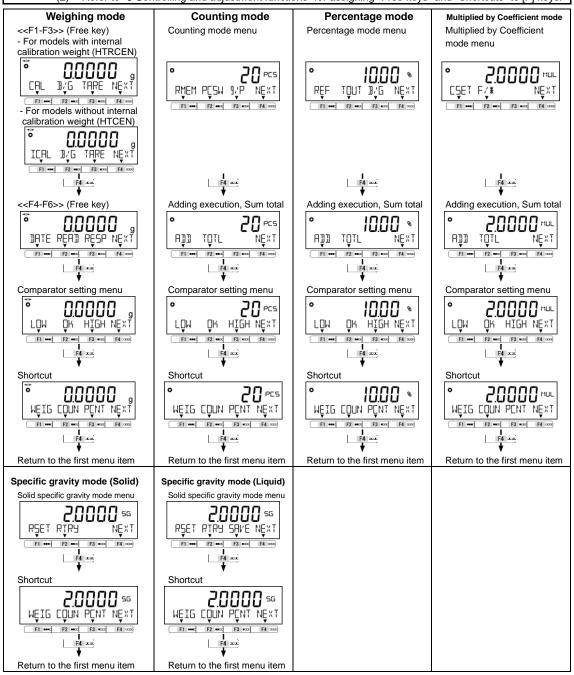
Refer to "3 Function related to the operation" for the [F1-F3] keys operation.

Legal Metrology

"Multiplied by Coefficient mode" is not available for verified balance.

Reference

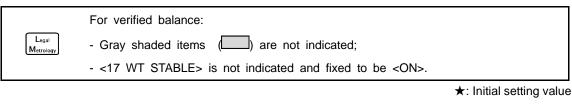
- (1) In weighing mode, <<F1-F6>> (Free keys) are assigned to [F] keys as described follow; <<F1>> and <<F4>>: [F1] key, <<F2>> and <<F5>>: [F2] key, <<F3>> and <<F4>>: [F3] key. Please take care not to confuse <<F1-F4>> to [F1-F4] keys.
- (2) Refer to "8 Controlling and adjustment functions" for assigning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

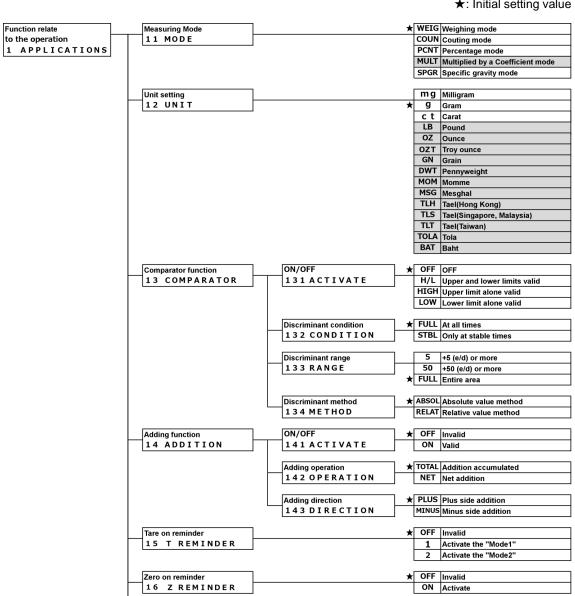


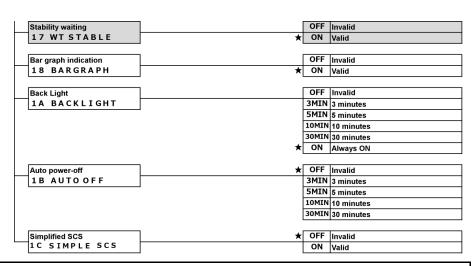
Functions related to the operation

Settings to change the balance operations.

3-1 Hierarchy of functions related to the operation







3-2 Various measuring modes of the balance

Reference

Refer to "6 External input/output functions" to output the measuring data to other devices.

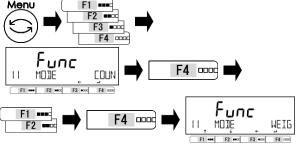
3-2-1 Weighing mode

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".

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.

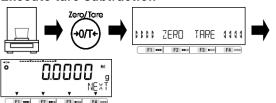
WEIG: Weighing mode Push [F4] key to fix.

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.

Place a container on the pan, execute tare-subtraction and place the sample.

The weighing result is displayed.

4 Weigh the sample.



3-2-2 **Counting mode**

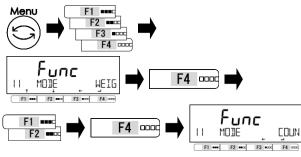
Legal Metrolo

This mode is not legal for trade.

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. There are two methods to input the unit weight:

- 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.





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.

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 <OK> is selected, go to step 6.

Push [F1/F2] key to select.

5: 5 PCS on 10: 10 PCS on on 30: 30 PCS 50: 50 PCS on

on 100: 100 PCS on VAR: 1 - 999 PCS

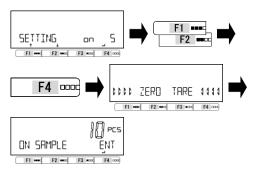
Numeric value setting method PCSWGT:

See 3-2-2(2)

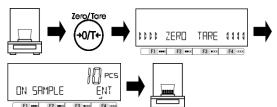
Push [F4] key to fix.

Zero-point adjustment or tare is set automatically.

Select the "number of samples mode".



Place the samples.



Place a container (tare) on the weighing pan.

Push [Zero/Tare] key.

Place the set number of samples on the weighing pan.

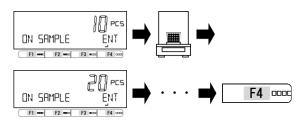
A Record the unit weight.



Push [F4] key to fix.

The unit weight is recorded.

5 Simple SCS method (When enabled).



When <1C Simple SCS> is valid and <on 5> through <on 100> or <on VAR> is selected in step 2, 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

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 PCS" 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.

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

ON SAMPLE	PCS ENT
F1 ••• F2 •••×	F3 eccc F4 cccc

Reference

<64A REEADABILIT>	Readability d (g)	SCS weight (g)
1	0.0001	0.0099
2	0.0002	0.0198
5	0.0005	0.0495
10	0.001	0.099

(3) 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.



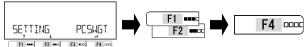
3-2-2 (2) Numeric value setting method

Input numeric value of the unit weight by key operation.

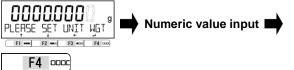
Select whether or not employ the previous recorded unit weight.



2 Select the "unit weight value input mode".



Input the unit weight.



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

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.

Push [F1/F2] key to select.

PCSWGT: Unit weight value input Push [F4] key to fix.

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

4 Put samples in place to count result.



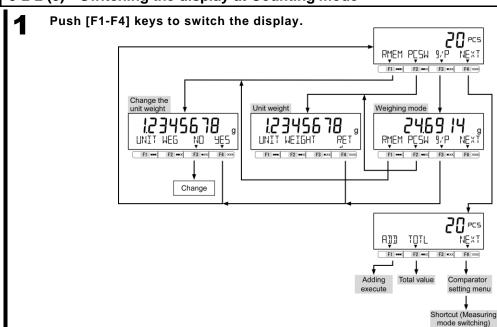
Place a container (tare) on the weight pan.

Push [Zero/Tare] key.

Place the samples.

The count result is displayed.

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



Reference

<ADD> and <TOTL> can be used when the <14 ADDITION> is "Valid".

3-3 Percentage mode

Legal Metrology

This mode is not legal for trade.

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.

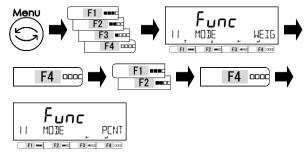
(1) The lower limit of the reference weight is 0.01 g.

(2) The minimum percent to be displayed is automatically set according to the recorded reference weight.

Reference

worght		
Readability (%)	Range of reference weight	
1	0.01 g <= Reference weight < 0.1 g	
0.1	0.1 g <= Reference weight < 1 g	
0.01	1 g <= Reference weight	

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

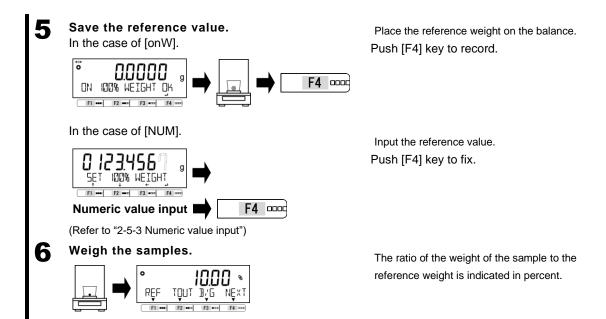
When <OK> is selected, go to step 6.

Select the method of setting the reference value.

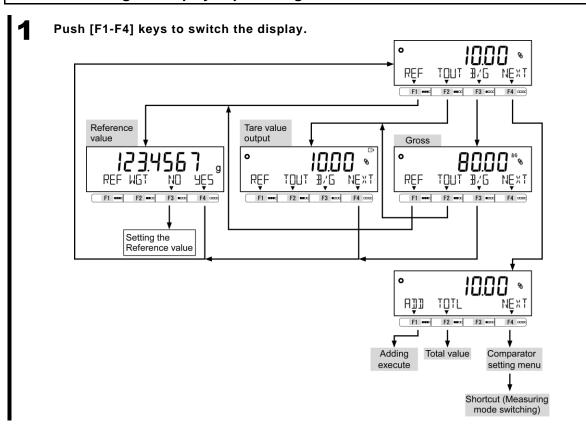


Push [F3/F4] key to select.

onW: Actual value NUM: Numeric value



3-3-1 Switching the display at percentage mode



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

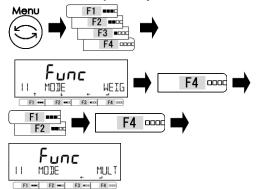
3-4 Multiplied by Coefficient mode

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

Legal Metrology

This mode is not available for verified balance.

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

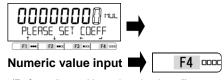
YES: Not Change

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

Input the coefficient.

Push [F4] key to fix.

Set the coefficient.



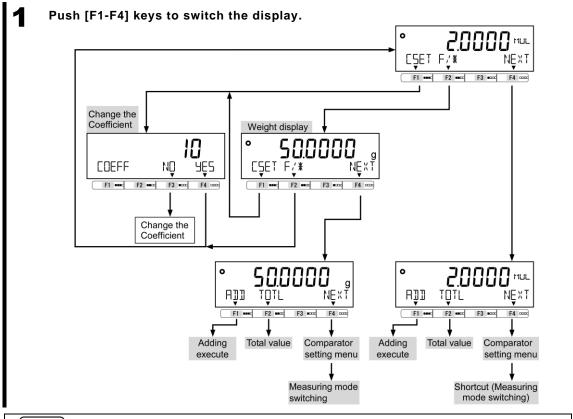
(Refer to "2-5-3 Numeric value input")

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



Reference

<ADD> and <TOTL> can be used when the <14 ADDITION> is "Valid".

3-5 Specific gravity mode

This mode is not legal for trade.

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.

When measuring the specific gravity of solid, 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.

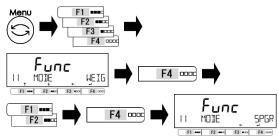
When purchased with "specific gravity measurement kit" or measuring the specific gravity of liquid, please refer to the option's manual.

3-5-1 Procedue for measuring specific gravity of the solid sample

Procedure to measure the specific gravity:

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





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.

Select the measurement mode.



Push [F3/F4] key to select the measurement mode.

SOLID: Solid specific gravity mode LIQ: Liquid specific gravity mode

Select the reference liquid.

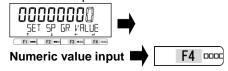


Push [F3/F4] key to select the reference liquid.

OTHER: Liquid other than water H2O: water

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

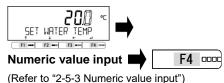
<OTHER>: Liquid other than water



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

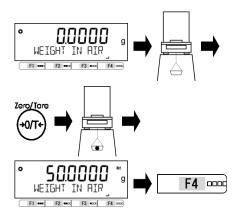
(Refer to "2-5-3 Numeric value input")

<H2O>: Water



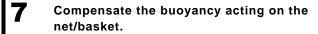
Enter the temperature of the water and push [F4] key to fix.

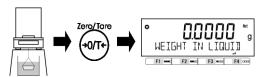
6 Measure the sample weight in the air.



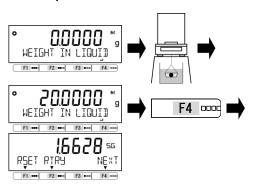
Set the net/basket on the balance and push [Zero/Tare] key.

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





8 Measure the sample weight in the water/liquid.

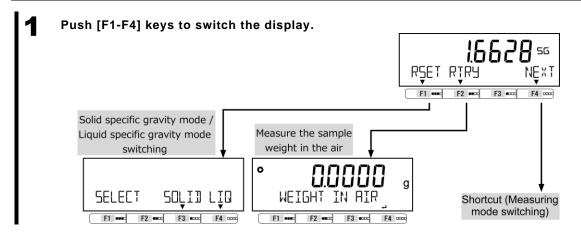


Remove the sample on the net/basket and push [Zero/Tare] key to tare, then sink the net/basket into the water/liquid. Push [Zero/Tare] key to compensate the buoyancy acting on the net/basket.

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.

Switching the display at "Specific gravity mode" 3-5-2



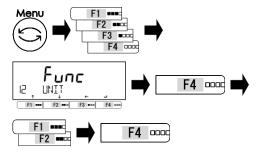
3-6 Unit setting

Various units can be selected. Please also refer to "Appendix 3 Unit conversion table" and "Appendix 4 Weighing capacity and readability by unit"

Legal Metrology

Only "mg", "g" and "ct" are available for verified balance.

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.

	Unit Setting Menu List			
	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
I	TLS: Singapore, Malaysia tael		TOLA: tola	BAT: baht

2 Exit the setting menu.



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

3-7 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.

Reference

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

3-7-1 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".

		16-segment messages				
	ΓŌΝ	₽K	HÎ₽H	NĘXT		
Discrimination	Single poir (lower	•	Single poir (upper	•	Two-point (upper and love	•
Over the upper limit	< DH >	Blinking	< H <u>I</u> []H >	Blinking	< H <u>I</u> []H >	Blinking
Appropriate amount	< □H >	Blinking	< []H >	Blinking	< OH >	Blinking
Below the lower limit	< LOW >	Blinking	< OH >	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 = 100.0000g, Lower limit value = 90.0000 g, Upper limit value = 120.0000 g

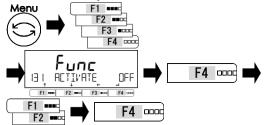
Discrimination	Reference value	Lower limit value	Upper limit value
method	100.0000 g	90.0000 g	120.0000 g
Absolute value		90.0000 g	120.0000 g
Relative value	100.0000 g	-10.0000 g	20.0000 g

3-7-2 **Comparator function setting**

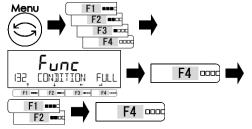
Reference

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

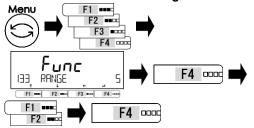
Select the comparator function.



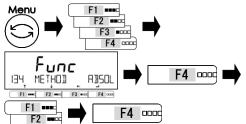
2 Select the discriminant condition.



3 Select the discriminant range.



4 Select the discriminant method.



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.

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.

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 (e/d) or more 50: +50 (e/d) or more FULL: Entire area

Push [F4] key to fix.

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.

3-8 Adding function

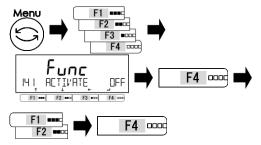
Weigh a plurality of samples to be weighed in sequence and indicates its total value. The adding function includes two ways of calculating method.

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

Reference

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

Select the adding function.



Push [Menu] key, then push [F1-F4] keys

to go to <141 ACTIVATE>

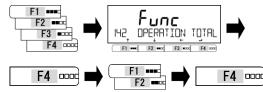
Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: Invalid
ON: Valid
Push [F4] key to fix.

Select the adding operation.

Select the adding direction.



unc

DIRECTION PLUS

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.

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

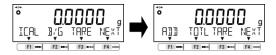
Push [F4] key to fix.

A Set the "Free key".

F3 ■000

F4 0000

F4 0000



F1 ---

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

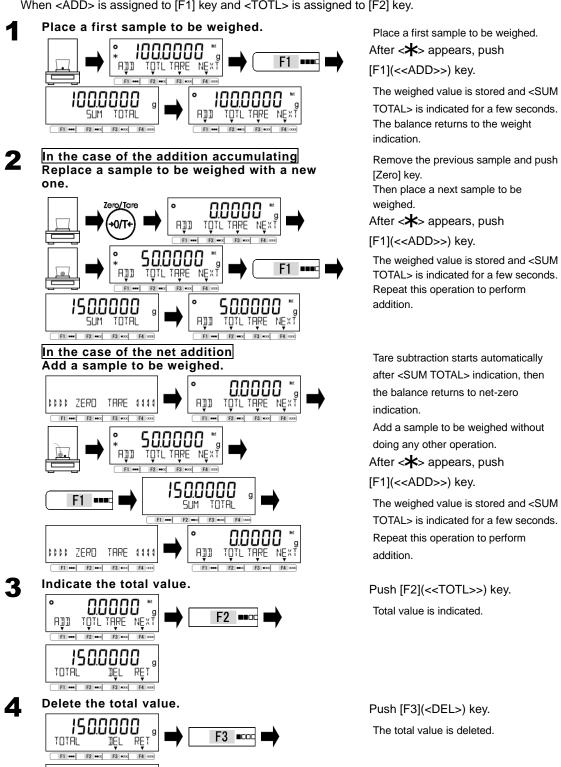
3

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

F4 0000

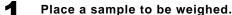
3-8-1 Weighing by means of the plus side addition

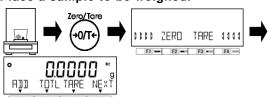
When <ADD> is assigned to [F1] key and <TOTL> is assigned to [F2] key.



3-8-2 Weighing by means of the minus side addition

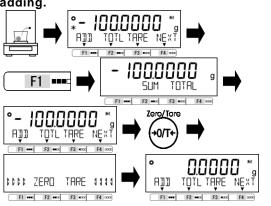
When <ADD> is assigned to [F1] key and <TOTL> is assigned to [F2] key.





Place a sample to be weighed. Push [Zero/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.

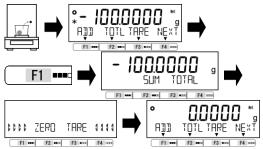
After <*>+> appears, push

[F1](<<ADD>>) key.

The weighed value is stored and <SUM TOTAL> is indicated for a few seconds. Push [Zero/Tare] key.

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.

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

Total value is indicated.

Indicate the total value.



Push [F3]() key.

The total value is deleted.

5 Delete the total value.



3-9 Tare-subtraction reminder function

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

Note

Reference

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

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

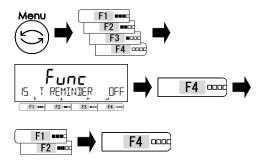
zero-point-adjustment range.

(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 $\frac{1}{2}$

negative after tare subtraction.

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.

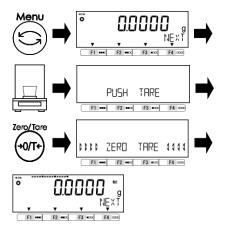
OFF: Invalid

1 : Activate the "Mode 1"

2 : Activate the "Mode 2"

Push [F4] key.

2 Exit the setting menu and operate with "tare-subtraction reminder function".



Push [Menu] key to exit the setting menu.

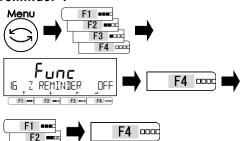
Place a tare (container) on the weighing pan, then <PUSH TARE> alert is displayed. The alert disappears after [Zero/Tare] key is pushed and tare-subtraction is completed.

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

3-10 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.

Activate the "zero-point-adjustment reminder".



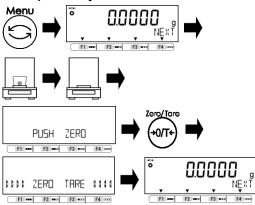
to go to <16 Z REMINDER>, and then push [F4] key to change the setting.

Push [F1/F2] key to select activate or disable the function.

Push [Menu] key, then push [F1-F4] keys

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/Tare] key is pushed and zero-point adjustment is completed.

3-11 Stabilization wait setting

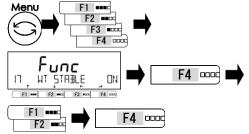
Set when to indicate the weighed value after the zero-point adjustment or tare; either after or before the weighed value stabilizes.

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.

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.

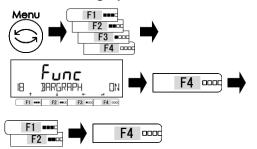
2 Exit the setting menu.



3-12 Bar graph indication

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

Select the bar graph indication.



Push [Menu] key, then push [F1-F4] keys to go to <18 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.

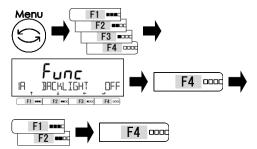


Push [Menu] key to shift to the measuring mode.

3-13 Backlight setting

Setting the backlight control.

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.



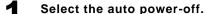
Push [Menu] key to shift to the measuring mode.

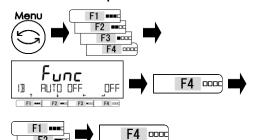
Reference

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.

3-14 Auto power-off

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





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.

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

Reference

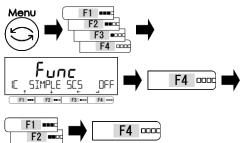
- (1) Setting menu is being displayed.
- (2) A sample is placed on the weighing pan and the display is not stable (When <**©>** is not displayed.).

3-15 "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.

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.

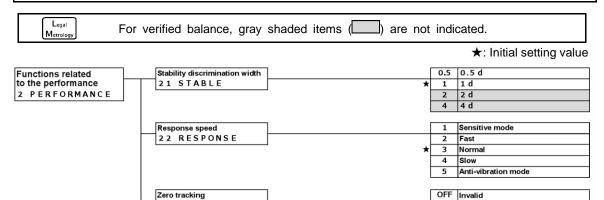


4 Functions related to the performance

Set the balance indication stability and response speed.

4-1 Hierarchy of functions related to the performance

23 ZEROTRAC



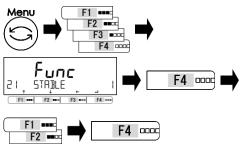
4-2 Stability discrimination width

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

Legal Matrology

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

Select the stability discrimination width.



2 Exit the setting menu.



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

0.5 0.5 d 1 1 d 2 2 d 4 4 d

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

0.5: 0.5d

1: 1.0d

2: 2.0d

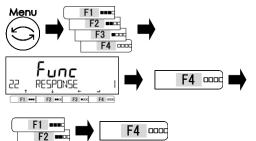
4: 4.0d

Push [F4] key to fix.

4-3 Response speed

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





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			
1 : Sensitive mode	2 : F	Fast 3	: Normal
4 : Slow	5 : A	Anti-vibration mode	

2 Exit the setting menu.



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

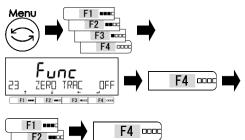
4-4 Zero tracking

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.

Legal Metrology

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

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.

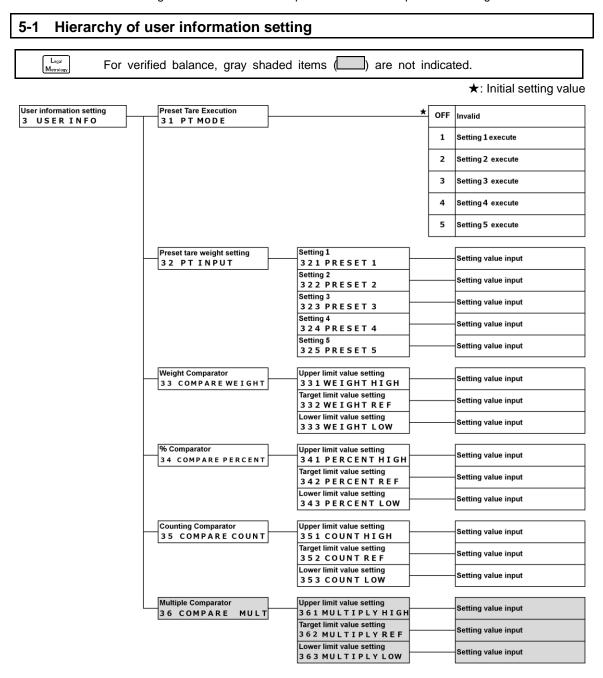
Set list		
OFF : Invalid	0.5 : 0.5d	1 : 1d
2 : 2d	4 : 4d	

2 Exit the setting menu.



User information setting

Describes about setting items related to the comparator function and preset tare weight.

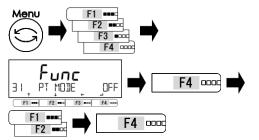


5-2 Preset tare

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.

5-2-1 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.

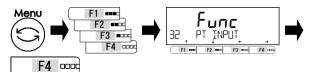
Preset tared value is displayed with <Net Pt> indication when preset tare value is available.

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

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

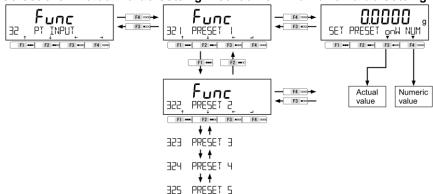
- Actual value setting method: Weighing a sample with a balance and then making it a setting value.
- Numeric value setting method: Inputting a setting value directly via key operation.





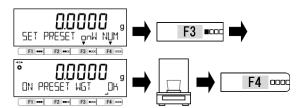
Push [Menu] key, then push [F1-F4] keys to go to <32 PT INPUT>.
Push [F4] key.

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



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

Set a preset tare weight value.



Exit the setting menu.



Push [F3] key to select.

onW: Actual value

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

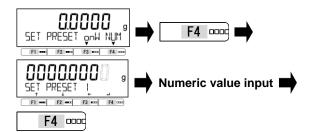
Push [F4] key to fix.

The preset tare weight value is stored.

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

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

Set a preset tare weight value.



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

Exit the setting menu.



Push [F4] key to select.

NUM: Numeric value Input the preset tare value.

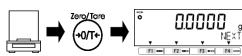
Push [F4] key to fix.

The preset tare weight value is stored.

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

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

To exit the preset tare mode.



Make sure that nothing is placed on the weighing pan.

Push [Zero/Tare] 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.

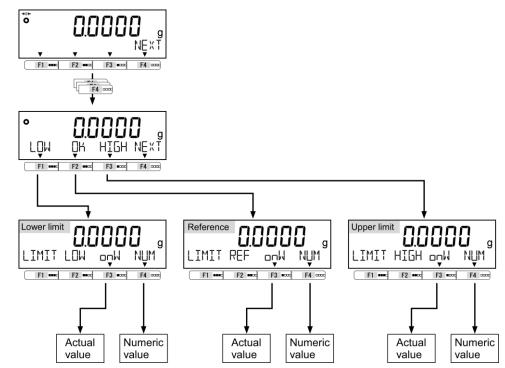
The discrimination is performed according to the following criteria:

- 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 = 100.0000g, Lower limit value = 90.0000 g, Upper limit value = 120.0000 g

Discrimination	Reference value	Lower limit value	Upper limit value
method	100.0000 g	90.0000 g	120.0000 g
Absolute value		90.0000 g	120.0000 g
Relative value	100.0000 g	-10.0000 g	20.0000 g

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



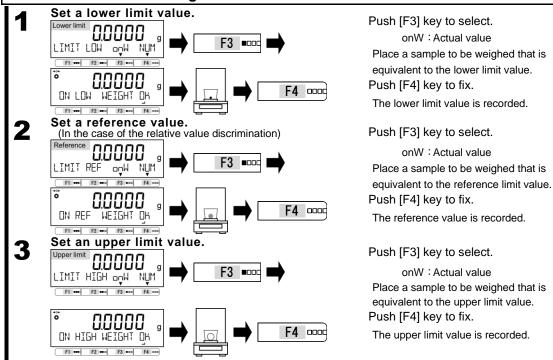
- (1) Reference value, Lower limit value and Upper limit value can be set also via Setting menu below.
- Comparator setting for Weighing mode: 33 COMPARE WEIGHT

- Comparator setting for Percentage mode: 34 COMPARE PERCENT

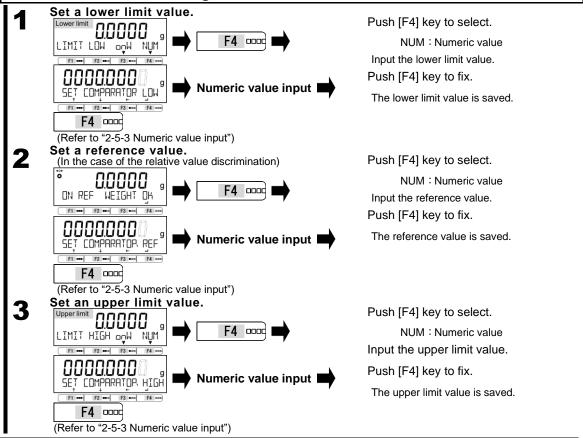
- Comparator setting for Counting mode: 35 COMPARE COUNT
- Comparator setting for Multiplied by Coefficient mode: 36 COMPARE MULT
- (2) Comparator function is available in Weighing mode, Percentage mode, Counting mode and Multiplied by Coefficient mode.

Reference

5-3-1 Actual value setting method

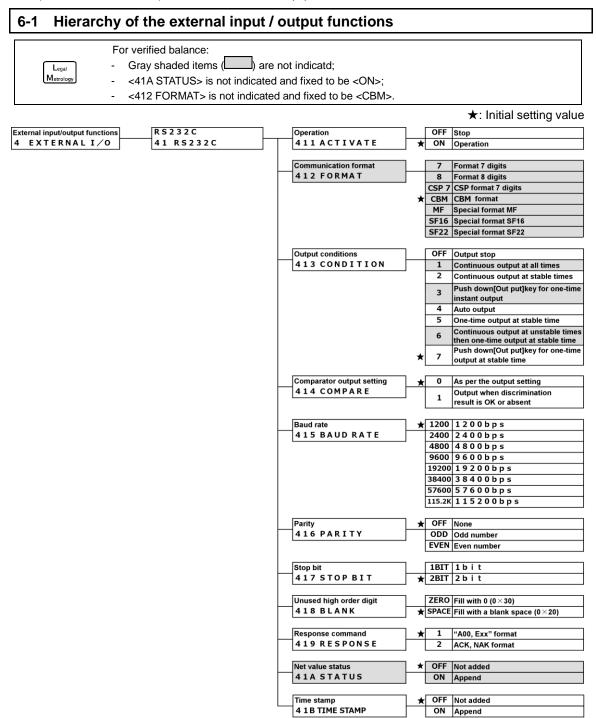


5-3-2 Numeric value setting method



6 External input/output functions

This function is used for communication through the external peripheral devices. There are RS-232C (D-SUB 9P and DIN8P) interface as standard equipment.



6-2 Connector terminal numbers and their functions

D-SUB9P Connector 6-2-1

Terminal No.	Signal name	Input/output	Function
1	_	_	_
2	RXD	Input	Receiving data
3	TXD	Output	Transmitting data
			HIGH (When the
4	DTR	Output	balance is powered
			ON)
5	GND	_	Signal grounding
6	_	_	_
7	_	_	
8	_	_	_
9	_	_	_

Note

Reference

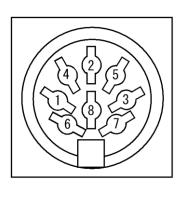
Use shielded RS232 crossover cable up to 15 m length.

Use the following examples as a guide to connect the balance to external devices using the cable.

- Sample connection with a PC with D-SUB9P connector.

PC (D-SUB9P) Blance (D-SUB9P) TXD 3 2 RXD RXD 2 3 TXD GND 5 5 GND DCD 1 RTS CTS 8 6 DTR 4

6-2-2 **DIN8P Connector**



Terminal No.	Signal name	Input/output	Function
			Tare subtraction /
1	EXT. TARE	Input	Zero-point adjustment
			from external device
2	_	_	_
3	_	_	_
4	TXD	Output	Transmitting data
5	GND	_	Signal grounding
6	_	_	_
7	_	_	_
8	_	_	_

Note

Use shielded cable up to 15 m length.

Reference

DIN8P Connector can execute tare subtraction or zero-point adjustment from an external device by connecting a contact or a transistor switch between the pin 1 (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 Communication format

6-3-1 Basic communication specification

Items		Description
Transmission system		Serial transmission, Start-stpp synchtonization
		- DSUB9P: bidirectional
		- DIN8P: unidirectional from the balance to peripherals
Signal level		Equivalent to EIA RS-232C.
		HIGH level (data logic 0) +5 to +15 V
		Low level (data logic 1) -5 to -15 V
Baud rate		1200/2400/4800/9600/
		19200/38400/57600/115200bps
Transmission code	Start bit	1 bit
Composition	Parity bit	None/Odd number/Even number
	Data bit	8 bit
	Stop bit	1 bit/2 bit

6-3-2 Basic data output format / CSP format

Legal Metrology

These formats are not available for verified balance.

1. Data composition

- · Measurement result (except specific gravity):
 - 7-digit numeric format, CSP 7-digit format

Consists of 15 characters, including terminators (CR=0x0D/LF=0x0A).

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=0x0D/LF=0x0A).

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.):
 - 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 7-digit format

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

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

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

						n+4
DC2	M1	M2	 Mn	CR	LF	DC4

2. Meaning of the data

bol	Co	de		Description						
characte	r) Indicate	s the pola	rity of da	ata.						
				r positive data						
	0x	2D		ve data						
/D10] (nir	ne or ten c	haracters)		numeric data.						
9	0x30 -	-0x39		(numeric)						
				so used for zero padding.						
				cimal point (floating)						
P)	0x	20		pace at the top of a numeric value						
				tput to the least significant digit in the absence of a						
				cimal point						
	Οv	25		used high-order digit ter to be inserted to the left of the auxiliary-scale-interval						
	UX	2 Γ		ter to be inserted to the left of the auxiliary-scale-interval						
two char	actors) Inc	licates the		ad to show numeric data						
		:		(milligram)						
				(gram)						
				(carat)						
				(momme)						
				(ounce)						
				(pound)						
				(troy ounce)						
W				(pennyweight)						
R		0x52		(grain)						
L	0x54	0x4C	tlH	(Hong Kong tael)						
L	0x54	0x4C	tIS	(Singapore, Malaysia tael)						
L	0x54	0x4C	tlΤ	(Taiwan tael)						
0	0x74	0x6F	to	(tola)						
S	0x4D	0x53	MSG	(mesghal						
Α	0x42	0x41	BAt	(baht)						
С	0x50	0x43	PCS	(parts counting)						
%	0x20	0x25	%	(percentage weighing)						
			#	(Multiplied by Coefficient)						
characte										
				ge (LOW)						
				<u> </u>						
<u></u>				gment result or data type specified						
				tare weight alue (Accumulated value)						
			Unit weight							
T T			tus. Data stable							
			Date unstable							
			Data error (Indicates that data other than S2 is invalid and							
				should be ignored.)						
(SP) 0x20				No status specified						
	characte /D10] (nir 9 characte /D10] (nir 9 characte	Character Indicate	character) Indicates the polar 0x2B 0x2D /D10] (nine or ten characters) 9 0x30 − 0x39 0x30 − 0x39 0x2E 0x2D 0x2D 0x2D 0x2D 0x4D 0x4D 0x47 G 0x20 0x47 T 0x43 0x54 O 0x4D 0x4F Z 0x4F 0x5A B 0x4C 0x42 T 0x4F 0x5A B 0x4C 0x42 T 0x4F 0x54 W 0x44 0x57 R 0x47 0x52 L 0x54 0x4C L 0x54 0x4C L 0x54 0x4C 0 0x74 0x43 % 0x20 0x23 character) Indicates the judge 0x4C 0x4C 0x47 0x48 0x 0x65 0x66	Ox2B						

6-3-3 CBM data output format

1. Data composition

Measurement result (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	Т3	T4	T5	T6	D1	D2	D3	D4	(SP): space
14	15	16	17	18	19	20	21	22	23	24	25	26	(SP). space
D5	D6	D7	מח	Dα	D10	D11	D12	111	112	(SP)	CR	IF	

· Error message:

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)	Е	R	R	0	R	(SP)	*	*	*	*
14	15	16	17	18	19	20	21	22	23	24	25	26
*	*	*	*	*	*	*	*	*	*	(SP)	CR	LF

(SP): space

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

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

2. Meaning of the data

Symbol	Code	Description		
[S1] (1 character) Represent	s the status.			
(SP)	0x20	Data stable		
*	0x2A	Data unstable		
[C1] (1 character) Represent	s the result of comparator function.			
(SP)	0x20	Comparator Proper(OK) or result: No result		
Н	0x48	Over(HIGH)		
L	0x4C	Shortage(LOW)		
[T1-T6] (6 characters) Repre	sents the type of the data.			
(SP) (SP) (SP) (SP) (SP)	0x20 0x20 0x20 0x20 0x20 0x20	Net weight (<41A STATUS>: <off>)</off>		
N (SP) (SP) (SP) (SP) (SP)	0x4E 0x20 0x20 0x20 0x20 0x20	Net weight (<41A STATUS>: <on>)</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		
[D1-D12] (12 characters) Nu	meric value data is stored.			
+	0x2B	Zero or positive data		
-	0x2D	Negative data		
0 – 9	0x30 - 0x39	0 to 9 (numeric)		
		0 is also used for zero padding.		
<u>-</u>	0x2E	Decimal point (floating decimal point)		
<u> </u>	0x5B	The number surrounded by '['and		
]	0x5D	']' means auxiliary indication		
(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		

Syn	nbol	Cod	le	Description
[U1, U2] (2 ch	aracters) Repre	sents the unit of nun	neric value data.	
m	g	0x6D	0x67	milligram
(SP)	g	0x20	0x67	gram
С	t	0x63	0x74	carat
m	0	0x6D	0x6F	momme
0	Z	0x6F	0x7A	ounce
I	b	0x6C	0x62	pound
0	Т	0x4F	0x54	troy ounce
d	W	0x64	0x77	pennyweight
G	R	0x47	0x52	grain
t	l	0x74	0x6C	Hong Kong tael
t	I	0x74	0x6C	Singapore, Malaysia tael
t	I	0x74	0x6C	Taiwan tael
t	0	0x74	0x6f	tola
М	S	0x4D	0x53	mesghal
В	Α	0x42	0x41	baht
Р	С	0x50	0x43	parts counting
(SP)	%	0x20	0x25	% (percentage weighing)
(SP)	#	0x20	0x23	# (Multiplied by Coefficient)

(SP): space

6-3-4 Special format MF

L_{egal} Metrology

This format is not available for verified balance.

Reference

- (1) Unused high-oder digits are filled with space (0x20) regardless of the setting of <418 BLANK>.
 - 2) Net value status is not appended regardless of the setting of <41A STATUS>.

1. Data composition

· Measurement result (except specific gravity):

Composed of 18-21 characters including a terminator (CR=0x0D/LF=0x0A)

1	2	3	4	5	6	7	8	9	10	11
S1	S2	S3	S4	(SP)	D1	D2	D3	D4	D5	D6
12	13	14	15	16	17	18	19	20	21	<u>-</u>
D7	D8	D9	D10	(SP)	U1	U2	U3	CR	LF	

· Error messages:

Composed of 5 characters including a terminator (CR=0x0D/LF=0x0A)

1 2 3 4 5 S1 (SP) E1 CR LF (SP): space

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

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

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

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

1 2 ··· n+1 n+2 n+3 n+4 (DC2) M1 ··· Mn CR LF (DC4)

2. Meaning of the data (Measurement result)

	Syr	nbol	,		C	ode		Description		
[S1-S4]] (3-4 cha	racter	rs) Represer	nts the statu	s or type o	of the dat	a.			
S	(SP)	S		0x53	0x20	0x53	3	Data stable		
S	(SP)	D		0x53	0x20	0x44	,	Data unstable		
Т	(SP)	Α		0x54	0x20	0x41		Tare weight		
Т	Α	(SP	P) A	0x54	0x41	0x20	0x4	1 Preset tare weight		
[D1-D1	0] (10 ch	aracte	ers right-justi	fied) Numer	ic value da	ata is sto	red.			
		_			0>	x2D		Negative data		
	0 -	- 9			0x30	- 0x39		0 to 9 (numeric)		
					0)	x2E		Decimal point (floating decimal point)		
	(6	·D\			0.			Spaces fill the top of the data.		
	(5	P)			U)	x20		Unused high-order digit		
		[0	x5B		The number surrounded by '['and ']'		
]			0>	x5D		means auxiliary indication		
[U1-U3] (1-3 cha	aracte	rs) Represer	nts the unit o	of numeric	value da	ta.			
m	g			0x6D	0)	x67		milligram		
g				0x67				gram		
С	t			0x63	0)	x74		carat		
m	m o m				0)	x6F	0x6D	momme		
Р	P C S			0x50	0)	x43	0x53	parts counting		
%				0x25				% (percentage weighing)		
(SP)				0x20				No unit (Multiplied by Coefficient)		

3. Meaning of the data (Error messages)

Symbol	Code	Description
[S1] (1 character)		
S	0x53	Fixed to "S"
[E1] (1 character) Represents the	type of error	
		OVER ERROR:
_	0x2B	In excess of the maximum capacity
'	UNZD	or maximum number of displayable
		digits.

(SP): Space

6-3-5 Special format SF16/SF22

Legal Metrology

These formats are not available for verified balance.

Reference

(1) Unused high-oder digits are filled with space (0x20) regardless of the setting of <418 BLANK>.

(SP): Space

) Net value status is not appended regardless of the setting of <41A STATUS>.

1. Data composition

- · Measurement result (except specific gravity):
 - Special format SF16

Consists of 16 characters, including terminators (CR=0x0D/LF=0x0A).

When auxiliary scale interval is available:

1	2	3	4	5	6	7	8
P1	D1	D2	D3	D4	D5	D6	D7
9	10	11	12	13	14	15	16
D8	D9	D10	U1	U2	U3	CR	LF

When auxiliary scale interval is not available:

1	2	3	4	5	6	7	8
P1	(SP)	D1	D2	D3	D4	D5	D6
9	10	11	12	13	14	15	16
D7	D8	(SP)	U1	U2	U3	CR	LF

- Special format SF22

Consists of 22 characters, including terminators (CR=0x0D/LF=0x0A).

When auxiliary scale interval is available:

1	2	3	4	5	6	7	8	9	10	11
T1	T2	T3	T4	T5	T6	P1	D1	D2	D3	D4
12	13	14	15	16	17	18	19	20	21	22
D5	D6	D7	D8	D9	D10	U1	U2	U3	CR	LF

When auxiliary scale interval is not available:

1	2	3	4	5	6	7	8	9	10	11
T1	T2	T3	T4	T5	T6	P1	(SP)	D1	D2	D3
12	13	14	15	16	17	18	19	20	21	22
D4	D5	D6	D7	D8	(SP)	U1	112	U3	CR	IF

• Error messages:

- Special format SF16

Consists of 16 characters including a terminator (CR=0x0D/LF=0x0A)

1	2	3	4	5	6	/	8	
(SP)	(SP)	(SP)	(SP)	(SP)	E1	E2	E3	(SP): Space
9	10	11	12	13	14	15	16	(SP). Space
E4	(SP)	(SP)	(SP)	(SP)	(SP)	CR	LF	

- Special format SF22

Consists of 22 characters including a terminator (CR=0x0D/LF=0x0A)

1	2	3	4	5	6	7	8	9	10	11	
T1	T2	T3	T4	T5	T6	(SP)	(SP)	(SP)	(SP)	(SP)	(SP): Space
12	13	14	15	16	17	18	19	20	21	22	(SP). Space
E1	E2	E3	E4	(SP)	(SP)	(SP)	(SP)	(SP)	CR	LF	

- · Others (Date, Time, Specific Gravity etc.):
 - Special format SF16, Special format SF22

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

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

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

1 2 ··· n+1 n+2 n+3 n+4 (DC2) M1 ··· Mn CR LF (DC4) 2. Meaning of the data (Measurement result)

		Syn	nbol					Co	de			Description
[T1-	T6] (6	chara	cters)	Repre	esents	the typ	e of the	data.				
Ν	(SP)	(SP)	(SP)	(SP)	(SP)	0x4E	0x20	0x20	0x20	0x20	0x20	Net weight
G	#	(SP)	(SP)	(SP)	(SP)	0x47	0x23	0x20	0x20	0x20	0x20	Gross weight
Т	(SP)	(SP)	(SP)	(SP)	(SP)	0x54	0x20	0x20	0x20	0x20	0x20	Tare weight
Т	1	(SP)	(SP)	(SP)	(SP)	0x54	0x31	0x20	0x20	0x20	0x20	Preset tare weight
Q	n	t	(SP)	(SP)	(SP)	0x51	0x6E	0x74	0x20	0x20	0x20	Parts counting
w	R	е	f	(SP)	(SP)	0x77	0x52	0x65	0x66	0x20	0x20	Unit weight
P r c (SP) (SP) (SF				(SP)	0x50	0x72	0x63	0x20	0x20	0x20	Percentage weighing	
S u m (SP) (SP) (SF				(SP)	0x53	0x75	0x6D	0x20	0x20	0x20	Total value (Accumulated value)	
R	е	s	(SP)	(SP)	(SP)	0x52	0x65	0x73	0x20	0x20	0x20	Multiplied by Coefficient
Н	0	I	d	(SP)	(SP)	0x48	0x6F	0x6C	0x64	0x20	0x20	Holded value
[P1]	(1cha	racter) Indic	ate the	e pola	rity of th	ne data				•	
		-	+					0x	2B		Zero or positive data	
	- -											
			-					0x:	2D			Negative data
[D1	-D8] (8	chara	- acters)	Nume	eric va	lue data	a is stor		2D			Negative data
[D1	-D8] (8		- acters) - 9	Nume	eric va	llue data	a is stor					Negative data 0 to 9 (numeric)
[D1-	-D8] (8			Nume	eric va	lue data	a is stor	ed.	· 0x39			
[D1-	-D8] (8	0		Nume	eric va	lue data	a is stor	ed. 0x30 -	- 0x39 2E			0 to 9 (numeric)
[D1	-D8] (8	0 ·	- 9 -	Nume	eric va	lue data	a is stor	0x30 -	- 0x39 2E 20			0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data.
[D1-	-D8] (8	0 ·	- 9 iP)	Nume	eric va	llue data	a is stor	0x30 - 0x 0x	- 0x39 2E 20 5B			0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit
		(S	- 9 - :P) [0x30 - 0x 0x 0x 0x 0x	- 0x39 2E 20 5B	a or the	status	0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']'
[U1-		(S	- 9 - :P) [Repre		s the un		0x30 - 0x 0x 0x 0x 0x	- 0x39 2E 20 5B 5D		status 20	0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication
[U1- (\$	-U3] (3	(S	- 9 :P) []	Repre	esents	s the un	it of nur	ox30 · Ox Ox Ox Ox Ox Ox	0x39 2E 20 5B 5D ilue data	0x		0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication of the data.
[U1-	-U3] (3 SP)	(S	- 9	Repre	esents	s the un	it of nur 20 6D	0x30 - 0x 0x 0x 0x 0x 0x 0x 0x 0x	- 0x39 2E 20 5B 5D Ilue data 20	0x 0x	20	0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication of the data. Data unstable
[U1-	-U3] (3 SP) m	(S	- 9 - P) [] acters)	Repre (S (S	esents P)	s the un 0x 0x 0x	it of nur 20 6D	0x30 - 0x	- 0x39 2E 20 5B 5D due data 20 67	0x 0x 0x	20 20	0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication of the data. Data unstable milligram
[U1-	-U3] (3 SP) m	(S)	- 9 9 1	Repre (S (S	esents P) P) P)	s the un 0x 0x 0x	it of nur 20 6D 67	ox30 - Ox O	0x39 2E 20 5B 5D Ilue data 20 67 20	0x 0x 0x	20 20 20 20 20	O to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication of the data. Data unstable milligram gram
[U1-	-U3] (3 SP) m g	(S) (S) (S) (S) (S) (S) (S) (S)	- 9	Repre (S (S (S	esents P) P) P)	os the un 0x 0x 0x 0x 0x	it of nur 20 6D 67	0x30 - 0x	0x39 2E 20 5B 5D Ilue data 20 67 20 74	0x 0x 0x 0x	20 20 20 20 20	0 to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication of the data. Data unstable milligram gram carat
[U1· (\$	-U3] (3 SP) m g c	(S)	- 9	Repression (S) (S) (S) (S) (S) (S) (S)	esents P) P) P)	ox ox ox ox ox	it of nur 20 6D 67 63 6D	ox30 - Ox	0x39 2E 20 5B 5D Ilue data 20 67 20 74 6F	0x 0x 0x 0x 0x	20 20 20 20 20 6D	O to 9 (numeric) Decimal point (floating decimal point) Spaces fill the top of the data. Unused high-order digit The number surrounded by '['and ']' means auxiliary indication of the data. Data unstable milligram gram carat momme

3. Meaning of the data (Error messages)

Sy	Symbol					Co	ode		Description		
[T1-T6] (6 characters) Represents the type of the data.											
S t A	Т	(SP)	(SP)	0x53	0x74	0x61	0x74	0x20	0x20	Error status	
[E1-E4] (4 char	acters)) Repr	resents	the type	e of the	error.					
(SP) H	(SF	P) ((SP)	0x20	С)x48	0x20	(0x20	OVER ERROR: In excess of the maximum capacity or maximum number of displayable digits.	

6-4 Input command

Note

Commands input during the balance being busy (function setting, zero-point adjustment, tare subtraction, calibration etc.) are not accepted.

Reference

Inputting command is available only through D-sub9P connector.

6-4-1 Transmission procedure

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	Zero-point adjustment,	External contact input											
mode	Tare subtraction,												
	node Tare subtraction, Comparator setting, Date/Time output Preset tare setting,												
Weighing	Х	Х	Х										
Counting	Х	Х	X										
Percentage	Х	Х	Х										
Multiply	Х	Х	Х										
Specific gravity	X	-	X										

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 subtraction and zero-point adjustment, a response is sent after the commands are completely processed.

(1) After you have sent an input command, the balance return the response command approximately in 1 second.

Note

- (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 adjustment, 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, so the balance may need additional response time.

Legal Metrology

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

6-4-2 Input command composition 1

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

1	2	3	4
C1	C2	CR	LF

6-4-2 (1) Zero-point adjustment/Tare/Output control setting command

Note

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

		Code	Code		Resp	onse
C1	C2	(C1)	(C2)	Description	A00/Exx	ACK/NAK
		(01)	(02)		format	format
Т	(SP)	0x54	0x20	Zero-point adjustment/Tare subtraction		
Z	(SP)	0x5a	0x20	Zero-point adjustment		
0	0	0x4f	0x30	Stop output.		
0	1	0x4f	0x31	Continuous output at all times		
0	2	0x4f	0x32	Continuous output at stable times		
				(Output stop at unstable times)		
0	3	0x4f	0x33	Push down [Output] key for one-time		
				instant output.	A00:	ACK:
0	4	0x4f	0x34	Auto output	Normal	Normal
0	5	0x4f	0x35	One-time output at stable times	response	response
				(Output stop at unstable times)		
0	6	0x4f	0x36	One-time output at stable times		
				(Continuous output at unstable times)	E01:	NAK:
0	7	0x4f	0x37	Push down [Output] key for one-time	Abnormal	Abnormal
				output at stable times.	response	response
0	8	0x4f	0x38	One-time instant output		
0	9	0x4f	0x39	One-time output after stability is obtained		
0	Α	0x4f	0x41	Interval function (Output once each time the		
				output time has elapsed)		
0	В	0x4f	0x42	Interval function (Output once during		
				stabilization, each time the output time has		
				elapsed)		

(1) Commands O8 and O9 are used to request data from the balance.

Reference

- (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."

6-4-2 (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	Т	0x44	0x54	Time output request	Time data

Reference

6-4-3 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	СЗ	СЗ	C3	C3	C3	C3	СЗ	СЗ	СЗ	CR	LF	

(1) 'C3' is maximum ten-digit (including the polarity +/-, comma and point) numeric data. Example) Upper limit input 120.0000g: "LA,120.0000"

Preset tare input 100.0000g: "PT,100.0000"

Interval time input 12:34:56: "IA,12,34,56" (marked off by commas)

- (2) Make sure not input the measuring unit (mg, g, ct, 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.

6-4-3 (1) Comparator setting command

		Code	Code			Re	sponse
C1	C2	(C1)	(C2)	Description	C3	A00/Exx	ACK/NAK
		(01)	(02)			format	format
L	Α	0x4C	0x41	Upper limit	Numeric		
				value setting	value setting	A00:	ACK:
L	В	0x4C	0x42	Lower limit	Numeric	Normal response	Normal response
				value setting	value setting	E01:	NAK:
L	C	0x4C	0x43	Reference	Numeric	Abnormal response	Abnormal response
				value setting	value setting		

6-4-3 (2) Preset tare value setting command

		Code	Code			Response		
C1	C2	(C1)	(C2)	Description	C3	A00/Exx format	A00/Exx format	
Р	Т	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.

6-4-3 (3) Interval (output) time setting command

		Code	Code			Re	sponse
C1	C2	(C1)	(C2)	Description	C3	A00/Exx	A00/Exx
		(01)	(02)	-		format	format
I	Α	0x49	0x41	Interval (output) time setting	Numeric value setting	A00: Normal response E01: Abnormal response	ACK: Normal response NAK: Abnormal response

6-5 Response

6-5-1 Response command format ("A00"/"Exx" format)

Consists of five characters including terminators.

1	2	3	4	5
A1	A2	А3	CR	LF

6-5-1(1) Response command

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

6-5-2 Response command format ("ACK"/"NAK" format)

Consists of one character without a terminator.

1 A1

6-5-2(1) Response command

A1	code(A1)	Description
ACK	0×06	Normal response
NAK	0×15	Abnormal response

6-6 External contact input

DIN8P Connecter can execute tare subtraction or zero-point adjustment from an external device by connecting a contact or a transistor switch between the pin for tare subtraction (DIN8P Pin 1) 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).

(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)

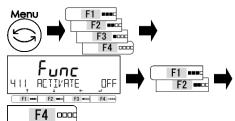
6-7 Communication setting

For verified balance:



- Setting menu <412 FORMAT> is not available. That is fixed to <CBM> (Gereric format) and output formats <6>, <7>, <8>, <CSP6> and <CSP7> are not available;
- Output conditions <413 CONDITION 1, 3, 6> are not available;
- Setting menus <41A STATUS> is not available. That is fixed to <ON> and the net value status is always appended.

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 communication setting.

Refer to the step 1 to key operation	<u> </u>	
Select the communication co	endition.	
Set list		
7 : Shinko format 7 digits	8 : Shinko format 8 digits	CSP 7: CSP 7-digit format
CBM : CBM format	MF : Special format MF	SF16 : Special format SF16
SF22: Special format SF22		, , , , , , , , , , , , , , , , , , , ,
Select the output conditions.		
Set list	I d . O antinuo a autoritat all	Lo Continuo o otro de de deble dine
0 : Output stop	Continuous output at all times	 2 : Continuous output at stable time (Output stop at unstable times)
3 : Push down [Output] key for	4 : Auto output	5 : One-time output at stable times
one-time instant output. 6 : One-time output at stable		(Output stop at unstable times)
6 : One-time output at stable	7 : Push down [Output] key for	
times (Continuous output at unstable times)	one-time output at stable times	
Select the comparator output.		
4 14 COMPARE		
Set list		
0 : As per the output setting	1 : Output when discrimination	result is OK or absent
, ,		
Select the baud rate.		
415 3AU3 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	00 100 1 00 100 550
0,000 : 0,000 550	110.2 K : 110200 Rbp0	
Select the parity bit.		
416 PARITY		
Set list		
OFF: None	ODD: Odd number	EVEN : Even number
OFF. NOTE	ODD . Odd Hullibel	LVLIN . EVEITIUIIDEI
Select the stop bit.		
417 STOP BIT		
Set list		
1BIT: 1 bit	2BIT: 2 bit	
Select unused high order digit		

Select unused high order digit.					
418]]LANK					
Set list					
ZERO: Filled with 0 (0x30)	SPACE: Filled with a blank space (0x20)				

Select the response command format.						
4 19 RÉSPONSE						
Set list						
1 : "A00/Exx" format	2 : "ACK/NAK" format					

Select the net value status.								
Set list								
OFF: Not append	ON: Append							

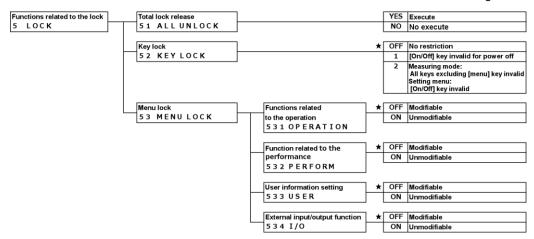
Select the time stamp setting.			
413 TIME STAMP			
Set list			
OFF: Not append	ON: Append		

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

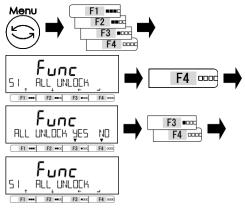
★: Initial setting value



7-2 Total lock release

All locks that have been set can be released.

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.

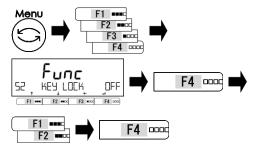
2 Exit the setting menu.



7-3 Key lock function

Key operation can be locked.

Select the key lock function.



2 Exit the setting menu.



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 Measuring indication:
 - All keys excluding [Menu] key invalid
 - Setting menu:

[On/Off] key invalid

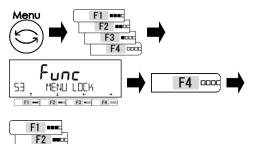
Push [F4] key to fix.

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

7-4 Menu lock function

Various setting menus can be locked.

Select the menu lock function.



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

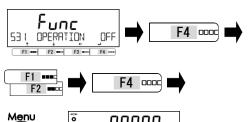
Push [F4] key to change.

Push [F1/F2] key to select.

Refer to Set List.

Set list			
531 OPERATION	: Function related to the operation	532 PERFORM	: Function related to the performance
	<1 APPLICATIONS>		<2 PERFORMANCE>
533 USER	: User information setting	534 I/O	: External input/output functions
	<3 USER INFO>		<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.

Controlling and adjustment functions 8

Perform setting of the balance ID, the span adjustment/test and the date and time.

8-1 Hierarchy of controlling and adjustment functions

(1) <ICAL > of <61* F* KEY>, <633 INT CAL>, <634 INT SPAN TEST>, <635 ARM>, <636 REF CAL>, <637 REF CAL RESTORE>, <AUTO> of <638 ADVICE CAL> and <64B START CAL> are available only on the models with internal calibration weight Reference

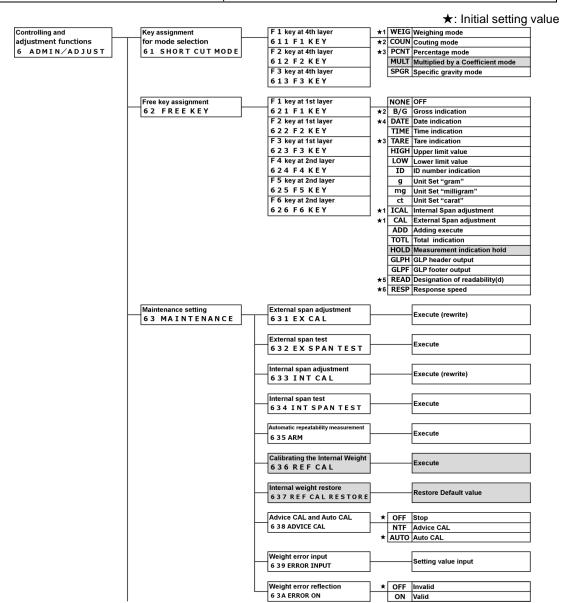
(2) (HTRCEN).

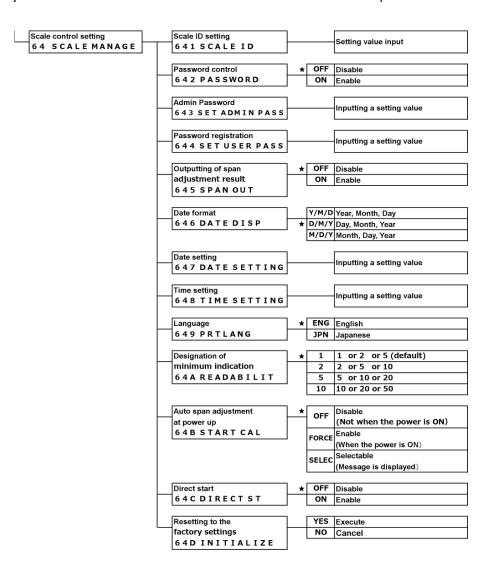
The initial setting value of <621 F1 KEY> / <638 ADVICE CAL > is:

- <CAL> / <OFF> for model without internal calibration weight (HTCEN);
- <ICAL> / <AUTO> for model with internal calibration weight (HTRCEN).

Legal

- (1) For verified balance, gray shaded items (are not indicated.
- (2) <CAL> of <62* F* KEY> and <631 EX CAL> may not be available for verified balance in several countries in compliance with the national raw.





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.

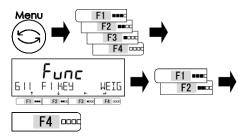




For verified balance, only Weighing mode <WEIG>, Counting mode <COUN>, Percentage mode <PCNT> and Specific gravity mode <SPGR> can be selected.

Multiplied by Coefficient mode <MULT> cannot be selected.

◀ Select <<F1-F3>>.



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

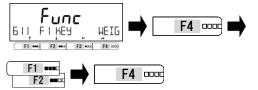
Push [F4] key to change.

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.

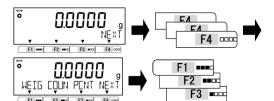
Set list		
WEIG: Weighing mode	COUN: Counting mode	PCNT: Percentage mode
MULT: Multiplied by	SPGR: Specific gravity mode	
Coefficient mode		

3 Exit the setting menu.



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

4 Use shortcut



Push [F4] key several times to shift to the shortcut display.

Push [F1], [F2] or [F3] key to shift to each measuring mode.

8

8-3 Free key setting



- (1) Free key setting is valid only in the weighing mode.
- (2) <ICAL>, <GLPH> and <GLPF> are available only on the models with internal calibration weight (HTRCEN).



- (1) <CAL> may not be available for verified balance in several countries in compliance with the national raw.
- (2) <HOLD> cannot be selected for verified balance.

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

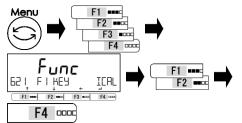


Display1 (<<F1-F3>>)



Display2 (<<F4-F6>>)

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>></f1>	622 F2 KEY : < <f2>></f2>	623 F3 KEY: < <f3>></f3>
624 F4 KEY : < <f4>></f4>	625 F5 KEY : < <f5>></f5>	626 F6 KEY : < <f6>></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.

Func 62 FI FEY I I I I I I I I I I I I I I I I I I I	F4 0000
F1 •••• F2 •••••	F4 0000

Set list			
NONE	: OFF	B/G	: Gross indication
DATE	: Date indication	TIME	: Time indication
TARE	: Tare value indication	HIGH	: Upper limit value
LOW	: Lower limit value	ID	: ID number indication
g	: Unit set "gram"	mg	: Unit set "milligram"
ct	: Unit set "carat"	ICAL	: Internal span adjustment
CAL	: External span adjustment	ADD	: Adding execute
TOTL	: Total indication	HOLD	: Measurement indication hold
GLPH	: GLP header output	GLPF	: GLP footer output
READ	: Designation of readability(d)	RESP	: Response speed

3 Exit the setting menu.



8-4 Maintenance settings

8-4-1 Span adjustment and span test

Span adjustment 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, adjustment/test is needed at every weighing location. The adjustment/test is also needed when (1) using a long period and (2) an accurate indication does not appear any longer.

When "Advice CAL" is activated, the balance generates an alarm when calibration is needed.



- (1) An external weight used for the span adjustment shall be the one equivalent to the OIML E2 class.
- (2) The span adjustment significantly affects the weighing accuracy. Please read this procedure carefully before getting to the adjustment.

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

Legal Metrology This mode may be unavailable for verified balance in accordance with the regulation of your country. When span adjustment by external weight is prohibited even for Class I balance, the error indication appears if you try to execute this function.

Reference

Free key <<CAL>> (span adjustment with external weight) is assigned to <<F1>> on the models without internal calibration weight (HTCEN).

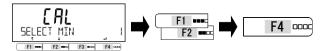
Select the span adjustment with external weight.



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: 0.0001 g

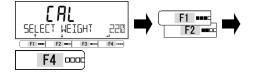
2: 0.0002 g

5: 0.0005 g

10: 0.001 g

Push [F1/F2] key to fix.

3 Select a weight used for the span adjustment.

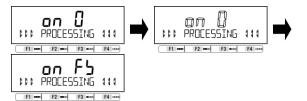


Push [F1/F2] key and select a weight used for the span adjustment.

(Refer to List of "weights used for the span adjustment by model")

Push [F4] key to fix.

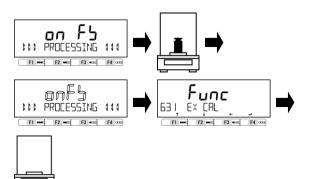
Zero-point adjustment starts.



Display changes to the order of < 0> \rightarrow "blinking of < 0>".

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

The span adjustment starts.



Place the weight in the center of the weighing pan.

Display changes to the order of <on FS>

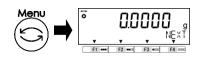
 \rightarrow "blinking of <on FS>".

Start of the span adjustment.

On completion of the span adjustment, 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.

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

Mod	del	HT84(R)CEN	HT124(R)CEN	HT224(R)CEN
Selec	table			
weigh	nt on	80	120	220
the m	enu			
VA	R	1	1	1
se	et	to 80	to 120	to 220

(2) The span adjustment 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;

Reference

- When a sample that is more than two times heavier than the weight that was used for the span adjustment is weighed, and
- When the readability (minimum indication) setting <64A READABILIT>, which is finer than the minimum interval for rounding setting <SELECT MIN> selected for the span adjustment, is performed.



(3) When the external calibration weight has error in mass, it is preferred to calibrate the balance with the corrected mass.

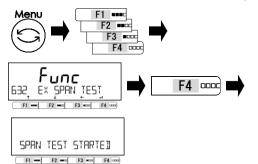
Please refer to "8-4-6 Correction of the external calibration weight".

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

Note

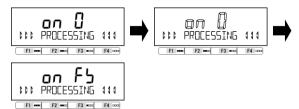
Make sure to use the external weight which is equal to the weighing capacity of each model.

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.

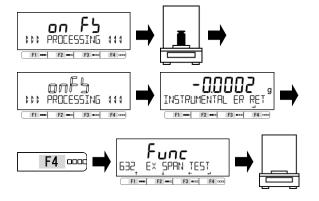
Zero-point adjustment starts.



Display changes to the order of < on $0> \rightarrow$ "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 $\langle on FS \rangle \rightarrow$ "blinking of $\langle on FS \rangle$ ".

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.

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

4 Exit the setting menu.



Reference

When the external calibration weight has error in mass, it is preferred to execute span test with the corrected mass.

Please refer to "8-4-6 Correction of the external calibration weight".

٤

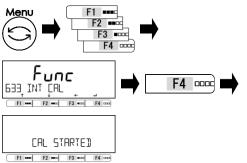
8-4-1(3) Semi-Automatic Span adjustment with internal weight

Note

Do not power-off the balance while this function is operating.

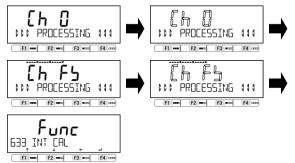
Reference

- (1) This function is available only on models with internal calibration device (HTRCEN).
- (2) Free key <<ICAL>> (span adjustment with internal weight) is assigned to <<F1>> on the models with internal calibration weight (HTRCEN).
- Select the span adjustment with internal weight.



Push [Menu] key, then push [F1-F4] keys to go to <633 INT CAL>.
Push [F4] key to execute.

The span adjustment starts.



Display changes to the order of <Ch 0> \rightarrow "blinking of <Ch 0>" \rightarrow <Ch FS> \rightarrow "blinking of <Ch FS>" \rightarrow <633 INT CAL>.

3 Exit the setting menu.



8-4-1(4) Span test with internal weight

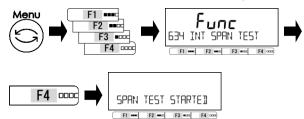
Note

Do not power-off the balance while this function is operating.

Reference

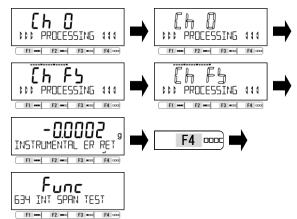
This function is available only on models with internal calibration device (HTRCEN).

Select the span test with internal weight.



Push [Menu] key, then push [F1-F4] keys to go to <634 INT SPAN TEST>. Push [F4] key to execute.

2 The span test starts.



Display changes to the order of <Ch 0>

→ "blinking of <Ch 0>" → <Ch FS> →

"blinking of <Ch FS>" →

< INSTRUMENTAL ER> and the

< INSTRUMENTAL ER> and the instrumental error of the balance is displayed.

Push [F4] key.

<634 INT SPAN TEST> is displayed.

3 Exit the setting menu.



8-4-2 Automatic Repeadability Measurement (ARM)

This is a function to calculate a standard deviation by loading and unloading the built-in weight for 10 times.

Note

Do not power-off the balance while this function is operating.

Reference

This function is available only on models with internal calibration device (HTRCEN).

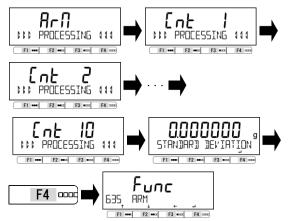
Select the span test with internal weight.



Push [Menu] key, then push [F1-F4] keys to go to <635 ARM>.

Push [F4] key to execute.

2 Automatic repeadability measurement starts.



Display changes to the order of <ArM> \rightarrow <Cnt 1> \rightarrow <Cnt 2> \rightarrow ... \rightarrow <Cnt 10>, then the standard deviation is displayed. Push [F4] key.

<635 ARM > is displayed.

3 Exit the setting menu.



8-4-3 Calibrating the internal weight

Use this function to calibrate the internal weight by external weight.



This function is not available for verified balance.

- (1) To calibrate more accurately, use a weight that is equivalent to the weighing capacity (Max).
- (2) An external weight used for the span adjustment shall be the one equivalent to the OIML E2 class.

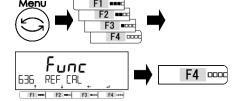
Note

- (3) The calibrating the internal weight significantly affects the weighing accuracy. Please read this procedure carefully before getting to the adjustment.
- (4) Do not power-off the balance while this function is operating.

Reference

This function is available only on models with internal calibration device (HTRCEN).

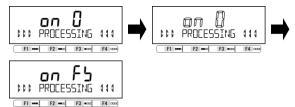
Select the calibration of the internal weight.



Push [Menu] key, then push [F1-F4] keys to go to <636 REF CAL>.

Push [F4] key to execute.

Zero-point adjustment starts.

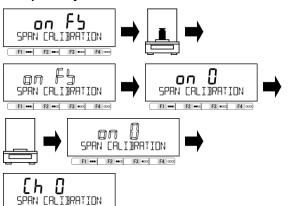


Display changes to the order of $\langle 00 \rangle \rightarrow$ "blinking of $\langle 00 \rangle$ ".

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

3 The span adjustment starts.

F1 ••• F2 ••• F3 ••• F4 •••



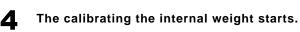
Place the weight in the center of the weighing pan.

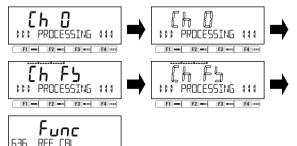
Display changes to the order of <on FS> → "blinking of <on FS>".

Start of the span adjustment.

On completion of the span adjustment, the display automatically changes to <on 0>. Unload the weight from the weighing pan. Display automatically changes to "blinking of <on 0>" and zero-point adjustment starts.

On completion of the zero-point adjustment, the display automatically changes to "blinking of <Ch 0>".





Display changes to the order of "blinking of

<Ch 0>" \rightarrow <Ch FS> \rightarrow "blinking of <Ch FS>.

On completion of the calibrating the internal weight, the display automatically changes to <636 REF CAL>.

5 Exit the setting menu.



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

8-4-4 Restore the internal weight calibration value to default

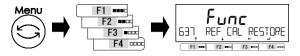
L_{egal} Metrology

This function is not available for verified balance.

Reference

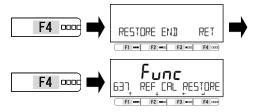
This function is available only on models with internal calibration device (HTRCEN).

Select the restore.



Push [Menu] key, then push [F1-F4] keys to go to <637 REF CAL RESTORE>.

2 Execute the restore.



Push [F4] key to execute.

The internal weight calibration value is restored to default (factory setting). Push [F4] key.

<637 REF CAL RESTORE> is displayed.

3 Exit the setting menu.



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

Note

For accurate calibration, please execute calibration of internal weight by refering '8-4-3 Calibrating the internal weight '

8-4-5 Advice CAL and Automatic span adjustment

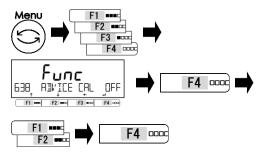
8-4-5(1) Advice CAL

The balance generates an alarm when calibration is needed.



For models without internal calibration device (HTCEN), this function is not available in several countries where the span adjustment with external weight is prohibited even for Class I balances.

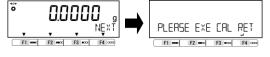
Select the Advice CAL.



2 Exit the setting menu.



Message appears when span adjustment is needed.



Push [Menu] key, then push [F1-F4] keys to go to <638 Advice CAL >, and then push [F4] key to change the setting.

Push [F1/F2] key to select <NTF>.

OFF: Disable
NTF: Advice CAL
AUTO: Auto CAL
Push [F4] key to fix.

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

A message appears when time passed since power-on or last span adjustment, or temperature / atmospheric pressure changed.

4 Return to the weighing mode and execute span adjustment.



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

or

8-4-1(3)Semi-automatic span adjustment with internal weight

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

Then execute span adjustment with external weight (8-4-1(1)) or semi-automatic span adjustmet with internal weight (8-4-1(3)).

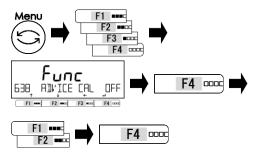
8-4-5(2) Automatic Span Adjustment

When the automatic span adjustment is activated, the balance automatically starts span adjustment by detecting temperature change or time course.

Note

This function is available only on models with internal calibration device (HTRCEN).

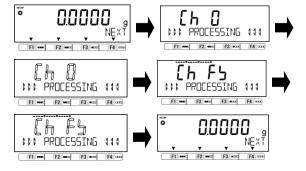
Select the Advice CAL.



2 Exit the setting menu.



After time passed or the environment changed, internal span adjustment starts auomatically.



Push [Menu] key, then push [F1-F4] keys to go to <638 Advice CAL >, and then push [F4] key to change the setting.

Push [F1/F2] key to select <AUTO>.

OFF: Disable

NTF: Advice CAL

AUTO: Auto CAL

Push [F4] key to fix.

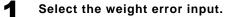
Push [Menu] key to shift to the measuring mode.

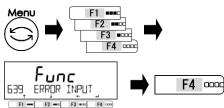
Span adjustment with internal calibration weight starts automatically when:

- Time passed, temperature changed or atmospheric pressure changed;
 and
- There is no load on the pan and weight indication is stable for 10 minutes.

8-4-6 Correction of the external calibration weight

The error of the external reference weight used for span adjustment/span test can be inputted.

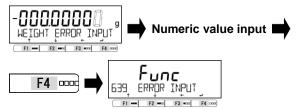




Push [Menu] key, then push [F1-F4] keys to go to <639 ERROR INPUT>.

Push [F4] key.

2 Input the error of the external reference weight.



Input the unit weight by using [F1-F3] keys.

Push [F4] key to fix.

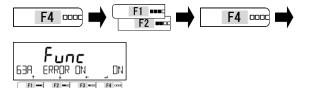
(Refer to "2-5-3 Numeric value input")

3 Select the weight error reflection.



Push [F1-F4] keys to go to <63A ERROR ON>.

4 Activate the weight error reflection.



Push [F4] key then push [F1/F2] key to select <ON>.

OFF: Invalid ON: Valid Push [F4] key to fix.

5 Excecute span adjustment/test with external weight

(Refer to "8-4-1(1) Span adjustment with external weight" and "8-4-1(2) Span test with external weight".)

Note

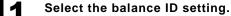
The input range of the error of external calibration weight must be between -100 mg and +100 mg.

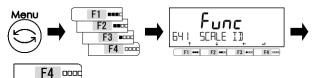
8

8-5 Balance control setting

8-5-1 Balance ID setting

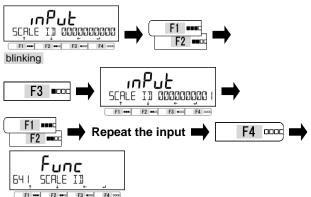
A balance ID (Balance ID) can be set to discriminate the balance. The balance ID is output with GLP header output and external span calibration/test result output. Balance ID is checked by free key <<ID>>.





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

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 BALANCE ID>.

3 Exit the setting menu.



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

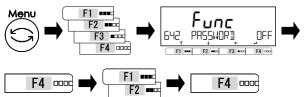
8-5-2 Password control

Enable/disable the password protection.



- (1) Refer to "8-5-2 Administrator password registration" and "8-5-3 User password registration" for password registration/changing.
- (2) Refer to "Appendix 8 Balance operation with password control function" for using the balance with password control.

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.

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

Password input display appears from next power on.

2 Exit the setting menu.



8-5-2 (1) Administrator password registration

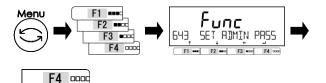
Note

- (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

Only one password can be set for administrator.

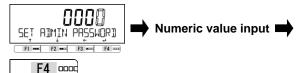
■ Select the Administrator password registration.



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

Push [F4] key to input the password.

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")

2 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) Two users (User 1 and User 2) can be registered.
- (3) User 0 (guest) cannot be assigned a password.

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.

F4 0000



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")

Exit the setting menu.

F4 0000



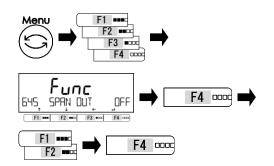
8-5-3 Outputting of the span adjustment / test result

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

Reference

Make sure to activate <41 RS232C> to output the data.

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.

Exit the setting menu.

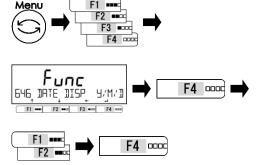


Push [Menu] key to shift to the measuring mode.

Date indication format 8-5-4

Date indication format can be selected.

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.

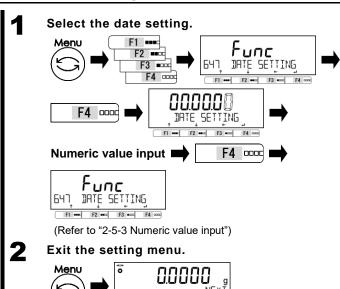
Push [F1/F2] key to select.

Y/M/D: Year, Month, Day D/M/Y: Day, Month, Year M/D/Y: Month, Day, Year Push [F4] key to fix.

Exit the setting menu.



8-5-5 **Date setting**



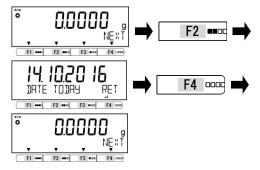
Push [Menu] key, then push [F1-F4] keys to go to <647 DATE SETTING>. Push [F4] key to change the setting value.

The digit for inputting is blinking. Input the date.

Push [F4] key to fix the date setting.



3 Indication of the date.



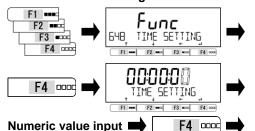
Push [Menu] key to shift to the measuring mode.

Push [F2] (<DATE>) key.

The date is indicated. Push [F4] key to return to the measuring mode.

8-5-6 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.

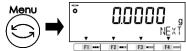
Input the time.

Push [F4] key to fix the time setting.



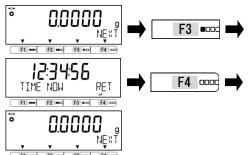
(Refer to "2-5-3 Numeric value input")

2 Exit the setting menu.



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

Indication of the time.



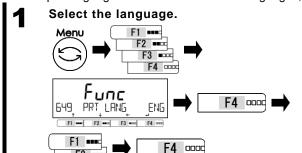
Push [F3] (<TIME>) key.

The time is indicated.

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

8-5-7 Output language

Output language can be select from two languages; English or Japanese.



Push [Menu] key, then push [F1-F4] keys to go to <649 PRT LANG>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

ENG: English JPN: Japanese Push [F4] key to fix.

2 Exit the setting menu.

F2 •••



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

Reference

Refer to "6 External input/output functions" for setting to communicate with other devices.

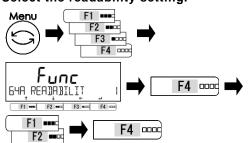
8-5-8 Readability Setting

The larger the readability becomes, the less the balance is affected by external influences. In addition, it takes less time for the balance reading to stabilize.

Reference

Refer to "Appendix 1-1 Basic spacification" and "Appendix 4 Weighing capacity and readability by unit" for the default readability of each unit.

Select the readability setting.



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

Push [F4] key to change the setting value. Push [F1/F2] key to select.

		The default readability				
	1 2 5					
	1:	1(default)	2(default)	5(default)		
Set	2:	2	5	10		
value	5:	5	10	20		
	10:	10	20	50		

Push [F4] key to fix.

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

2 Exit the setting menu.

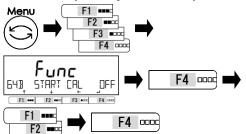


8-5-9 Span adjustment with internal weight at power-on

Reference

- (1) This function is available only on models with internal calibration device HTRCEN.
- (2) "Span adjustment with internal weight at power-on" operates first powe-on after connection of AC adapter.

Select the span adjustment at power-on.



Push [Menu] key, then push [F1-F4] keys to go to <64B START CAL>.

Push [F4] key to change the setting value.

Push [F1/F2] key to select.

OFF: Disable FORCE: Enable

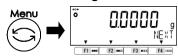
Always when the power is ON.

SELEC: Selectable

Message is displayed.

Push [F4] key to fix.

2 Exit the setting menu.



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

3 Operate span adjustment at power-on.



Push [On/Off] key to turn on the balance. When <SELEC> is selected at step 1, select whether or not execute span adjustment by pushing [F3/F4] key.

YES: Execute NO: Not execute

The balance executes span adjustment by internal weight and then shifts to measuring mode.

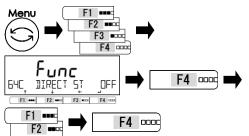
Note

Do not power-off the balance while span adjustment is operating.

8-5-10 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. You can use this function when the balance is used in conjunction with other devices.

Select the direct start.



2 Exit the setting menu.



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.

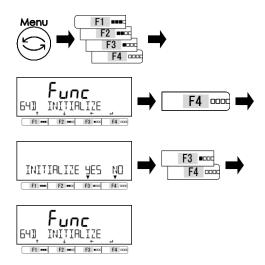
OFF: Disable ON: Enable Push [F4] key to fix.

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

8-5-11 Initialize

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

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.



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	 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 number of displayable digits. 	 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.	 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.
DISPLAY ERROR / DSP OVER	The addition result or calculation result has exceeded the maximum display digit.	Clear the calculation result, and then re-execute the addition/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	 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.	 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	The load is unstable at the zero adjustment/tare subtraction.Span adjustment time-out error.	 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 adjustment.	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 adjustment" or "internal span adjustment weight adjustment" by external calibration weight.	Use the calibration weight of which weight is equal to the maximum capacity.

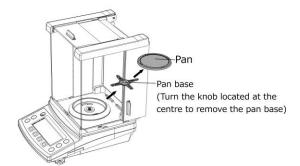
9 Troubleshooting

Error Message/ Error Code	Cause	Coping method
ERR719	The adjust value by "external span adjustment" or "internal span adjustment" is over 1% of the maximum capacity.	 Execute <637 REF CAL RESTORE>, then execute internal span adjustment. Check the mass of the weight used for the external span adjustment. Execute <636 REF CAL>.
ERR722	- Tare key is pushed during the Preset tare operation.	Do not push the Tare key during the Preset tare operation.
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)	Chose 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.	 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	 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"). 	 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.	 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.	 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.
ERR741	<631 EX CAL> is executed while the external span adjustment function is disabled.	Contact the store where you purchased the product.
ERR742	Internal span adjustment device is out of working order.	Contact the store where you purchased the product.
ERR743	Battery power supply is lacking to execute <633 INT CAL> or <634 INT SPAN TEST> or <636 REF CAL>.	Replace batteries to new ones.
ERR746	Invalid date or time was input at <647 DATE SETTING" or <648 TIME SETTING>.	Set the date and time correctly.

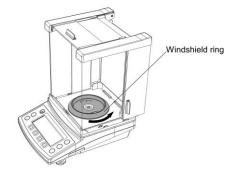
Error Message/ Error Code	Cause	Coping method
ERR747	Time-out error of importing the sample weight in the actual value setting method at Comparator function.	 Improper setting of the weighing pan or pan base is suspected. Check for contact with other object. Check for any wind or vibration.
ERR748	The setting value is out of the setting range at numeric value setting method or actual value setting method at Comparator mode ("0 – maximum capacity").	Set the value within the range.
ERR749	Time-out error of importing the sample weight in the actual value setting method at Adding function.	Improper setting of the weighing pan or pan base is suspected.Check for contact with other object.Check for any wind or vibration.
ERR750	 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. 	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 interval of the balance at Counting mode.	Choose the samples of which unit weight is lager than the minimum interval of the balance.
ERR752	The unit weight of the samples is 0g and under at Counting mode.	 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.	 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.	Only the latest data can be deleted. Select <all> to delete all the other data.</all>
ERR760	Adding operation is executed while the Adding function is disabled.	Set <141 ACTIVATE> ON then execute the adding operation.
ERR761	An error occurred at <636 REF CAL>.	Re-execute <636 REF CAL>.
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="">.</select>	Use the external weight of which weight is within the selected range.
ERR768	The setting value is out of the range at <639 ERROR INPUT>.	Use the external calibration weight whose error is ±100mg and under.
ERR769	Calculation error of solid specific gravity.	Re-execute specific gravity measurement.
ERR770	Calculation error of liquid specific gravity.	Re-execute specific gravity measurement.

How to maintain 10

Remove the pan and pan base.



Turn the windshield ring counterclockwise until it stops.



Pull the windshield straight up to remove it.





When the windshield is removed, take care that no dust or liquid gets in the balance.

- 4 Maintenance method.
 - (1) Wipe dirt with dry and soft cloth to the balance.
 - (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.



Do not use items such as chemical agents, solvents, or wipes that could damage the resin or rubber parts.

Appendix

Appendix 1 Specification

Appendix 1-1 Basic Specification

	Legal
For non	Metrology

Model	Max	d	Indication limit	Counting mode minimum unit weight	Percentage mode weight limit	Dimensions of the pan	Span adjustment
HT84CEN	80000 mg 80 g 400 ct	0.1 mg 0.0001 g 0.0005 ct	80009.0 mg 80.0090 g 400.090 ct	0.0001 g	0.01 g		
HT124CEN	120000 mg 120 g 600 ct	0.1 0.0001 0.0005	120009.0 120.0090 600.090	0.0001 g	0.01 g		External
HT224CEN	220000 mg 220 g 1100 ct	0.1 mg 0.0001 g 0.001 ct	220009.0 mg 220.0090 g 1100.090 ct	0.0001 g	0.01 g		
HT84RCEN	80000 mg 80 g 400 ct	0.1 mg 0.0001 g 0.0005 ct	80009.0 mg 80.0090 g 400.090 ct	0.0001 g	0.01 g	φ80 mm	
HT124RCEN	12000 mg 120 g 600 ct	0.1 0.0001 0.0005	120009.0 120.0090 600.090	0.0001 g	0.01 g		Internal and External
HT224RCEN	220000 mg 220 g 1100 ct	0.1 mg 0.0001 g 0.001 ct	220009.0 mg 220.0090 g 1100.090 ct	0.0001 g	0.01 g		

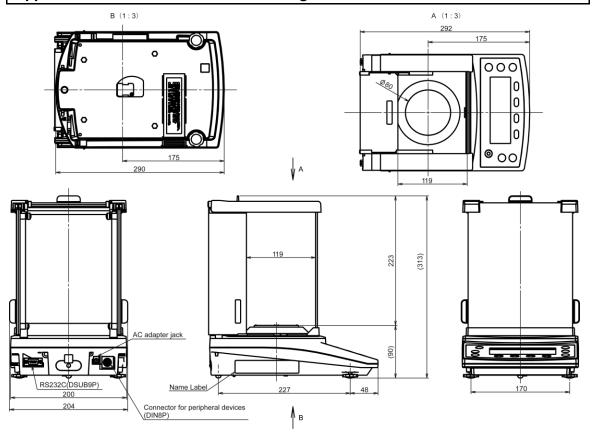
For Legal Metrology

For (Metrology)										
Model	Max	Min	e	d	Indication limit	Accuracy Class		weight	Dimensions of the pan	Span adjustment
HT84CEN	80000 mg 80 g 400 ct	10 mg 0.01 g 0.02 ct	1 mg 0.001 g 0.01 ct	0.1 mg 0.0001 g 0.001 ct	80009.0 mg 80.0090 g 400.090 ct		0.0001 g	0.01 g		
HT124CEN	120000 mg 120 g 600 ct	10 mg 0.01 g 0.1 ct	1 mg 0.001 g 0.01 ct	0.1 mg 0.0001 g 0.001 ct	120009.0mg 120.0090 g 600.090 ct	l l l	0.0001 g	0.01 g		External
HT224CEN	220000 mg 220 g 1100 ct	10 mg 0.01 g 0.1 ct	1 mg 0.001 g 0.01 ct	0.1 mg 0.0001 g 0.001 ct	220009.0 mg 220.0090 g 1100.090 ct		0.0001 g	0.01 g		
HT84RCEN	80000 mg 80 g 400 ct	10 mg 0.01 g 0.02 ct	1 mg 0.001 g 0.01 ct	0.1 mg 0.0001 g 0.001 ct	80009.0 mg 80.0090 g 400.090 ct	I I II	0.0001 g	0.01 g	φ80 mm	
HT124RCEN	120000 mg 120 g 600 ct	10 mg 0.01 g 0.1 ct	1 mg 0.001 g 0.01 ct	0.1 mg 0.0001 g 0.001 ct	120009.0 mg 120.0090 g 600.090 ct		0.0001 g	0.01 g		Internal and External
HT224RCEN	220000 mg 220 g 1100 ct	10 mg 0.01 g 0.1 ct	1 mg 0.001 g 0.01 ct	0.1 mg 0.0001 g 0.001 ct	220009.0 mg 220.0090 g 1100.090 ct	l I	0.0001 g	0.01 g		

Appendix 1-2 Functional specification

Item	Description				
Weighing system	Tuning-fork vibration method				
Measuring mode	Weighing/Counting/Percentage/Multiplied by Coefficient/Specific gravity (solid/liquid)				
Function	- Function related to the operation				
	Comparator/Adding/Tare-subtraction reminder/Zero-point adjustment reminder/Stability				
	waiting/Bar graph/Bac	cklight/Auto power-off/Simple SCS			
	- Function related to the	he performance			
	Stability discrimination	Stability discrimination width/Response speed/Zero tracking			
	- User information setting				
	Preset tare/Weight/Pe	Preset tare/Weight/Percentage/Counting/ Multiplied by Coefficient/ Comparator			
	- Functions related to	the lock			
	Total lock release/Key	lock/Menu lock			
	- Controlling and adju-	stment functions			
	Shortcut/Free key/bal	ance ID/Password/Output language (English, Japanese)/Date/Time			
		minimum indication/Span adjustment at power on/Direct start/Initialize			
	- Other functions which	ch can be assigned to free keys			
	GLP footer, header ou	utput/Date indication/Time indication/Balance ID indication			
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 steps			
Tare range setting	Actual weight subtraction with [Zero/Tare] key (Stability waiting: yes/no selectable)				
Zero tracking	Provided (Can be disa	abled via setting)			
Display when		is exceeded, <over error=""> is indicated.</over>			
overloaded	(See Appendix 1-1 "B				
Output	connector)	utput is equipped as standard (D-sub9P Male connector, DIN8P			
Compatible printer	CBM-910II				
Calibration	HTRCEN Type:	- Semi-automatic/automatic span adjustment/test by internal			
		calibration device			
		- Semi-automatic span adjustment/test with external weight			
		- Advice CAL			
	HTCEN Type:	- Semi-automatic span adjustment/test with external weight			
Power	- Advice CAL Dedicated AC adapter (100-240VAC / 50-60Hz)				
Ratings	AC adapter jack:	12VDC 0.9VA (Maximum power consumption)			
Weight of the	HTCEN Type:	Approximately 3.0 kg			
balance (NET)	HTRCEN Type:	Approximately 3.4 kg			
Operating condition					
	Humidity: 80% RH or lower (no condensation) Pollution degree: 2				
	Altitude: 2000m or less above sea level				
	Location of use:	Indoor use only			
Option	Specific gravity meas				
	1				

Appendix 2 Dimensional outline drawing



Appendix 3 Unit conversion table

	Unit inication	Conversion coefficient
1 g	(gram)	1.0000000E+00
1 = t	(carat)	5.0000000E+00
1 : ኤ	(pound)	2.2046226E-03
1 07	(ounce)	3.5273961E-02
1 <u>0</u> 7t	(troy ounce)	3.2150746E-02
1 5%	(grain)	1.5432358E+01
1 4,44	(pennyweight)	6.4301493E-01
1 mpm	(momme)	2.6666667E-01
1 1155	(mesghal)	2.16999761E-01
1 + :}-{	(Hong Kong tael)	2.6717251E-02
1 +:5	(Singapore, Malaysia tael)	2.6455471E-02
1 t : T	(Taiwan tael)	2.6666667E-02
1 t o	(tola)	8.5735324E-02
1 B Rt	(baht)	6.59630607E-02
1 mg	(milligram)	1.0000000E+03

Appendix 4 Weighing capacity and readability by unit

For NON Legal Metrology

For NON (Metrology)	Model					
Unit	HT84(R)CEN	HT124(R)CEN	HT224(R)CEN			
g	80	120	220			
gram	0.0001	0.0001	0.0001			
二七	400	600	1100			
carat	0.0005	0.0005	0.001			
: b	0.17	0.26	0.48			
pound	0.000001	0.000001	0.000001			
07	2.8	4.2	7.7			
ounce	0.000005	0.000005	0.000005			
07t	2.5	3.8	7			
troy ounce	0.000005	0.000005	0.000005			
5 N	1200	1800	3300			
grain	0.002	0.002	0.002			
₫ ⊬ ч ቲ	51	77	140			
pennyweight	0.0001	0.0001	0.0001			
mom	21	32	58			
momme	0.00005	0.00005	0.00005			
1155	17	26	47			
mesghal	0.00005	0.00005	0.00005			
÷ ; }-{	2.1	3.2	5.8			
Hong Kong tael	0.000005	0.000005	0.000005			
t:5	2.1	3.1	5.8			
Singapore / Malaysia tael	0.000005	0.000005	0.000005			
t: T	2.1	3.2	5.8			
Taiwan tael	0.000005	0.000005	0.000005			
to	6.8	10	18			
tola	0.00001	0.00001	0.00001			
]] Ht	5.2	7.9	14			
baht	0.00001	0.00001	0.00001			
mg	80000	120000	220000			
milligram	0.1	0.1	0.1			

For Legal

Unit		Model			
		HT84(R)CEN	HT124(R)CEN	HT224(R)CEN	
mg milligram	Max	80000	120000	220000	
	Min	10	10	10	
	e	1	1	1	
	d	0.1	0.1	0.1	
	Class	I	I	I	
g gram	Max	80	120	220	
	Min	0.01	0.01	0.01	
	e	0.001	0.001	0.001	
	d	0.0001	0.0001	0.0001	
	Class	I	I	l	
carat	Capacity	400	600	1100	
	Min	0.02	0.1	0.1	
	е	0.01	0.01	0.01	
	d	0.001	0.001	0.001	
	Class	II	1	1	

Appendix 5 Hanging measurement

The balance is equipped with a hanging hook to suspend a hanging pan for weighing. Perform hanging measurements when weighing electromagnetic, electrostatic, or high-temperature samples that cannot be accurately weighed on the normal pan.



 Be sure to close the cover of the hanging hook when not in use to prevent dust from entering the balance.

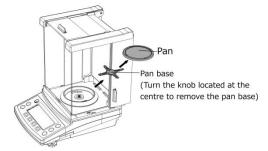


Hanging measurement is not legal for trade.



Tools (hanging pan etc.) suspended from the hook are regarded as a *tare* (container). Weights equal to the weighing capacity cannot be measured.
 Measurable weight = Weighing capacity + Weight of the pan - Total weight of tools suspended

- Disconnect the AC adapter.
- Detach the pan and pan base.



Turn the windshield ring counterclockwise until it stops.

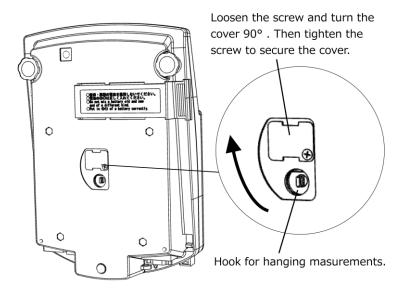


4 Pull the windshield straight up to detach it.



5 Open the cover of hanging hook.

Gently tilt the balance backward then open the cover.



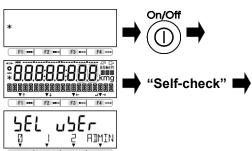
- 6 Undo the tilting and reassemble the detached components.
- Hang a pan from a wire on the hook.
 Wire and measuring pan are not supplied with this product. You need to provide them yourself.

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

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".

<5EL Ad> is indicated on the 7-segment display.

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

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 [Output] 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

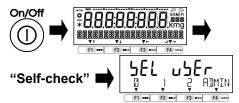
<5 LOCK> and <6 ADMIN/ADJUST> are displayed only for the administrator. When to authorize each user to operate "Span adjustment with internal/external weight", "Adding function", etc., please assign the functions to <<F1-F6>> (Free key). (Refer to "8-3 Free key settings".)

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

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 ພ່ງEr> is indicated on the 7-segment display.

Select the user number.

PLEASE_ENTER PASSWI



Input the user password.

Select the user (operator) number;

0: Guest user

1: User 1

2: User 2

ADMIN: Shift to the Administrator login mode

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 [Output] key.

When the password is authenticated, the balance starts up.

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

F3 ■□

Lock setting configured by administrator is reflected.

Reference

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