

VIBRA

Precision Tuning Fork Platform Scale

FMA Series

Operation Manual

IMPORTANT

- To ensure safe and proper use of the product, please read this manual carefully.
- Keep this manual for future reference after reading it thoroughly.

SHINKO DENSHI CO., LTD.

510002M21



Preface

Thank you very much for having purchased Precision Tuning Fork Platform Scale FMA series. This is an electronic scale for light and heavy industry, R&D and laboratory purpose, and for professional use only.

About this document

This document describes how to operate the product.

If the product is equipped with options/accessories, refer manuals of the respective option/accessory manuals in addition to this manual (except for the internal rechargeable battery option, of which description is included in this document).

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- Please note that product improvement or modification may cause partial discrepancy between the product and the description of this document.
- The description of this document is subject to change without notice.
- This document has been prepared carefully. In case that, however, any error or imperfection is found by any chance, please let us know.
- Documents of which pages are missing or irregularly bound will be exchanged. Please inform the store where you purchased the product.
- VIBRA and its logo mark are registered trademark of SHINKO DENSHI CO., LTD.. Other third-party brands and names are the property of their respective owners.

■Notations used in this document

This product/ The product/The scale	Refers to the product.
[KEY NAME] key	The name of an operation key located on the indicator unit is represented in square brackets "[]".
<MESSAGE>	A message on the display is represented in angle brackets "< >".
<<ITEM>>	Displayed menu item assigned to each function key is represented in double angle brackets "<< >>".
Press the key	Signifies pressing lightly an operation key once.
Press and hold the key	Signifies keeping pressing an operation key until the designated indication/operation occurs.

■ Symbols used in this document

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

Symbols	Meaning
	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.
	Used for warning concerning the operations that may lead to death or severe physical injury to persons, if proper precautions are not taken.
	Used for caution concerning operations that may lead to a light physical injury to persons if proper precautions are not taken.
	Used for notation concerning operations that may lead to damage of the products/facilities/data if proper precautions are not taken. Used for accurate weighing or appropriate usage of the equipment.
	Used for referenced information which is useful for product operation.
	Used for "Prohibition" items
	Used for "Mandatory" items requiring positive action
	Used for prohibition items to avoid "Electrical shock".
	This symbol indicates the operation/specification in related to the verified scale for legal metrology.

Precautions and disclaimers

- Potential dangers are increasing in the industrial equipment industries due to the advent of new materials, new processing methods and speeding up of machines. It is impossible to foresee all situations related to these dangers. In addition, there are so many “impossible” and “don’ts” and so writing all of them in the operation manual is impossible. Therefore, it is safe to think that what is not written in the operation manual “cannot be performed” unless the operation manual positively writes “it is possible”. When performing installation, operation, maintenance or inspection of this product, not only observe what is written or indicated in this document or on the product surface but also pay adequate consideration to safety measures.
- It should be known that this product contains potential danger. And so please be sure to observe this document when installing, operating or servicing this product.
- If the product is used in a manner not specified by the manuals or other accompanying documents, the protection provided by the product may be impaired.
- SHINKO DENSHI CO., LTD. will not take any responsibility for any injury or damage caused by the non-observance of this document or misuse or unauthorised modification of this product.
- Trouble of this product itself will be dealt with in accordance with the individual maintenance contract. Please note, however, that we will not take responsibility for consequential trouble such as discontinuation of operation caused by the product trouble.
- For any questions or further information concerning this product, please contact the store where you purchased the product.

■ Safety precautions

DANGER

	■Do not wet the AC adapter. That will cause an electric shock, short-circuiting or failure.
	■Do not expose the AC adapter to dust. That will cause an electric shock, short-circuiting or failure.
	■Do not handle the AC adapter with wet hands. That will cause an electric shock, short-circuiting or failure.
	■Do not use the scale in explosive atmosphere. That would cause explosion or fire. Please order our explosion-proof scales to weigh in such a hazardous area.
	■Obey the SDS of the measuring object. Measuring dangerous materials such as flammable should cause an explosion or fire.

WARNING

	■Do not connect to power supply in location where water or another conductive liquid may be present and is likely to cause reduced human body impedance. That may cause an electric shock.
	■Do not disassemble or modify the product. Doing so could result in injury, electric shock, fire and other accidents or failures. For repair or other services, contact the retailer from whom the product was purchased.
	■Do not move the product with objects to be measured set on the scale. That may cause the objects to fall from the weighing pan, leading to a bodily injury or destruction of the objects.
	■Do not route the cables across passages. The cables could be tripped on by a passed by and the scale or measuring object could fall or topple over, and break them or injure someone.
	■Do not use the product on an unstable table or a place that is subject to vibration. That may cause the object to fall from the weighing pan, leading to a bodily injury or destruction of the object.
	■Do not place an unstable object on the weighing pan. That may cause the object to fall or topple over, leading to a bodily injury or destruction of the object. Put an unstable object in a container (tare) before measuring it.
	■Do not use the product in an abnormal condition. If it should happen that an abnormal event such as smoking or unusual odour occurs, disconnect the power supply, stop using it immediately and 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 electric shock, fire and other accidents or malfunction of the product.
	■Carry and install properly according to this manual. This product is heavy, so improper carrying or installation may cause injury or failure.

 CAUTION

	■ Do not use the indicator unit in a wet/dusty location when AC adapter jack cover or connector covers are opened. That may cause an electric shock, short-circuiting or failure.
	■ Do not connect to the AC adapter cable or communication cable with its connector or plug being wet. That may cause an electric shock, short-circuiting or failure.

Note

	■ Do not apply excessive force to or impact the scale. Doing so could damage or result in failure of the scale. Carefully place loads on the scale.
	■ Do not use volatile solvents for cleaning anything other than the weighing pan. The key panel, dust/waterproof packing or other resin components of could deform, and the scale no longer maintains the dust/waterproofness. Wipe each unit using dry cloth or a cloth moistened with a small amount of neutral detergent.
	■ Unplug the AC adapter from the receptacle when the scale is not going to be used for a long period of time. Unplug the scale from the receptacle to save energy and prevent degradation.
	■ Connect to power supply regularly. This product has a built-in rechargeable coin cell battery for backup of the clock function. To prevent loss of date and time data due to a dead battery, it is recommended to recharge the battery by connecting the product to a power supply once every 3 months or less if it is not to be used for an extended period of time. It takes approximately 20 hours for the battery to be fully charged from a fully discharged state, but please note that this charging time may vary depending on usage conditions and environmental temperature.
	■ Follow the dustproof and waterproof instructions in the assembly and cleaning instructions in this manual. To prevent ingress of water or dust into this product and prevent and to prevent damage to the protective structure against water and dust ingress, assembling and cleaning shall be done in accordance with conditions described in this manual.

Regulatory information

■For legal metrology

	When this product is used for legal metrology purpose, it is subject to the regulations of the metrology-related laws and regulations of your country and may be subject to initial and/or periodic verification. Please contact your local dealer for details.
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■Electromagnetic compatibility

This product is compliant with EN 61326-1:2013 and IEC 61326-1:2020 (EN IEC 61326-2021).

- Emission: Class B Group 1 equipment.
 - “Group 1 equipment” contains all equipment in the scope of CISPR 11 which is NOT classified as ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used.
 - Class B equipment is suitable for use in locations in residential environments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
- Immunity: Intended to be used in “Industrial electromagnetic environment”.

Industrial electromagnetic environment: environment existing at locations characterized by a separate power network, in most cases supplied from a high- or medium-voltage transformer, dedicated for the supply of installations feeding manufacturing or similar plants with one or more of the following conditions:

 - frequent switching of heavy inductive or capacitive loads;
 - high currents and associated magnetic fields;
 - presence of Industrial, Scientific and Medical (ISM) equipment (for example, welding machines)

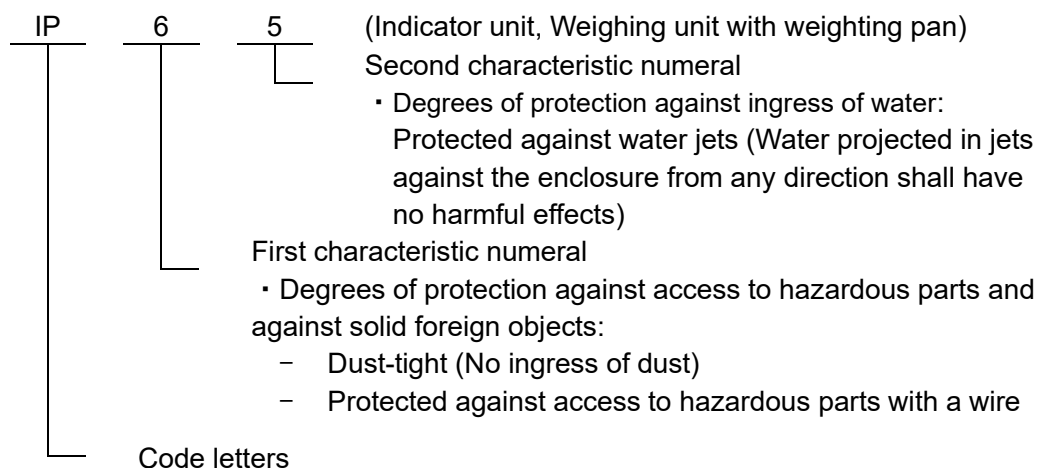
Please refer to “Appendix 1 Specifications” for the Performance Level and the Permissible Loss of Performance.

This product may subject to LOSS OF FUNCTION due to some of electromagnetic interference. Please refer to “Appendix 1 Specifications” for information on the nature of the LOSS OF FUNCTION, the electromagnetic interference that may cause it and the recovery process.

- Follow the respective instructions in this document for the connection and other conditions for EMC compliance.

■Ingress Protection

This product, except the dedicated AC adapter, complied with the following degrees of protection provided by enclosures (IP code) under proper assembly, installation, and operation as described in this document.



■Battery information

The information provided here relates to the lithium coin cell for memory back-up that come standard with this product.

For information on the optional rechargeable NiMH battery pack for power supply, see "Appendix 4 Internal rechargeable battery".

1. This appliance incorporates the following battery:

- Model number: VL1220/VCK
- Product name: Coin secondary lithium battery
(Vanadium pent-oxide lithium rechargeable battery)
- Category: Industrial
- Lot number: The lot number is stamped on the positive terminal of the battery.
- Manufacturer: Panasonic Energy Co., Ltd.
Postal address: 1-1 Matsushita Cho, Moriguchi City, Osaka 570-8511, Japan
Web address: <https://www.panasonic.com/global/energy/>



2. Safety information of the battery

2.1. Hazards identification

- | | |
|---------------------|---|
| GHS Classification: | No applicable |
| Toxicity: | Vapor generated from burning batteries, may irritate eyes, skin and throat. |
| Hazard: | Electrolyte and lithium metal are inflammable.
Risk of explosion by fire if batteries are disposed in fire or heated above 100 degrees Celsius.
Stacking or jumbling batteries may cause external short circuits, heat generation, fire or explosion. |

2.2. Composition/information on ingredients

Component	Material	CAS RN	Content (%)
Positive electrode	Vanadium pent-oxide	1314-62-1	5 - 21
Negative electrode	Lithium	7439-93-2	0.2 - 2
	Aluminium	7429-90-5	2 - 13
Electrolyte	1,2-dimethoxyethane	110-71-4	1.5 - 4.5
	Propylene Carbonate	108-32-7	4 - 10
Others	Steel	7439-89-6, 7440-47-3	53 - 87
	Polypropylene	9003-07-0	1 - 11

Lithium content per cell: 0.003 g

2.3. First aid measures (in case of electrolyte leakage from the battery and further leakage of it outside the appliance)

Eye contact: Flush the eyes with plenty of clean water for at least 15 minutes immediately, without rubbing. Get immediate medical treatment. If appropriate procedures are not taken, this may cause eye injury.

Skin contact: Wash the affected area under tepid running water using a mild soap. If appropriate procedures are not taken, this may cause sores on the skin. Get medical attention if irritation develops or persists.

Inhalation: Remove to fresh air immediately. Get medical treatment immediately.

2.4. Firefighting measures

Fire extinguishing agent: Alcohol-resistant foam and dry sand are effective.

Extinguishing method: Be sure on the windward to extinguish the fire, since vapor may make eyes, nose and throat irritate. Wear the respiratory protection equipment in some cases.

2.5. Accidental release measures (in case of electrolyte leakage from the battery and further leakage of it outside the appliance)

Take up with absorbent cloth, treat cloth as inflammable.

Keep the appliance away from the fire.

2.6. Handling and storage

Handling:

- Do not disassemble the appliance to access the battery.

The removal or replacement of the battery by the user is not permitted. Please contact your local dealer for removal or replacement of the battery.

Storage:

- Do not store the appliance in place of the high temperature.
- Please also avoid the places of high humidity. Be sure not to expose the battery to condensation or frozen condition.

2.7. Exposure controls and personal protection

Acceptable concentration: Not specified about Lithium Battery.

Facilities: Nothing in particular.

Protective Equipment (in case of electrolyte leakage from the battery and further leakage of it outside the appliance):

Respiratory Protection: For most condition no respiratory protection.

Hand Protection: Safety gloves.

Eye Protection: Safety goggle

2.8. Stability and reactivity

Since batteries utilise a chemical reaction, the performance will deteriorate over time even if stored for a long period of time without being used. In addition, the various usage conditions such as ambient temperature are not maintained within the specified ranges the life expectancy of the battery may be shortened or device in which the battery is used may be damaged by electrolyte leakage.

■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.

■Packaging waste

Dispose of all the product packaging in accordance with your local regulations, if any.

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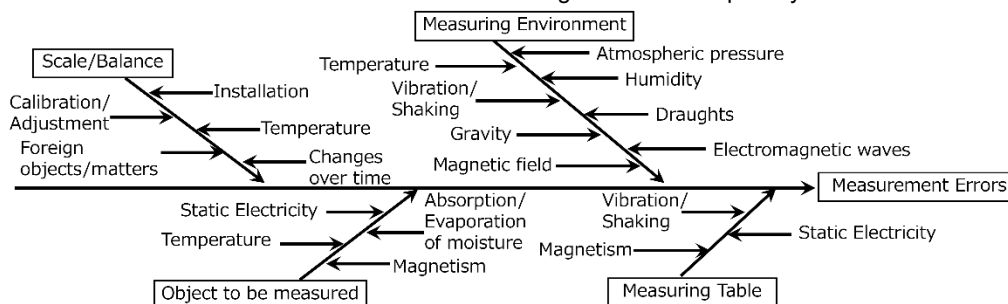
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1 Prior to use

1-1 For more accurate and precise measurement

To make more accurate and precise 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 scale itself but also the nature and condition of the object to be measured, measuring environment (vibration, temperature, humidity, etc.) and the like. These factors will directly or indirectly affect measurement result in the case of a scale with high resolution capability.



Cause and effect diagram of measurement errors

1-1-1 Precautions related to measuring environment

- | | |
|--|--|
| <p>Temperature/
Humidity/
Atmospheric
pressure</p> | <p>→ Use the scale within the operating temperature and humidity range and in an environment where the temperature and humidity are as stable as possible. Avoid direct sunlight as it causes rapid temperature changes.</p> <ul style="list-style-type: none"> - Metrological performance outside the operating temperature and humidity range is not guaranteed. - In an environment with rapid temperature changes, there will be a gap between the temperature tracking of the mechanism and sensor and the temperature measured by the temperature sensor mounted on the instrument, resulting in temperature compensation not working properly and causing errors in the measured value. - Accurate measurement may not be possible if condensation occurs due to a sudden drop in temperature. <p>→ Avoid low-humidity environments if possible. If measurements are to be made in a low-humidity environment, take appropriate anti-static measures.</p> <ul style="list-style-type: none"> - Low humidity increases the risk of measurement errors because the scale, the object to be measured and the operator are more likely to be charged with static electricity. <p>→ If there are large fluctuations in temperature, air pressure and/or humidity, perform zero setting (and if tare is used, tare weighing) each time, and compensate the buoyancy by air for the object to be measured according to its volume as appropriate.</p> <ul style="list-style-type: none"> - Changes in air density due to changes in temperature, air pressure and humidity cause changes in buoyancy due to air on the mechanism, measuring object and tare, resulting in differences in measured values. Zero-point fluctuations due to the effect of buoyancy changes on the mechanism and tare can be eliminated by performing zero setting and tare weighing each time. If the effect of buoyancy changes on the object to be measured cannot be ignored, compensate accordingly by calculation according to the volume of the object to be measured. |
|--|--|

Vibration/ Shaking	→ Use the scale in a vibration-free environment as far as possible. Avoid environments where vibration sources such as machine tools are nearby and measurement rooms with unstable floors. The ground floor or basement is the preferred location for the measurement room; the higher the floor, the greater the vibration and shaking, making it unsuitable for measurement. Rooms on railway tracks or roadsides should also be avoided. - Vibration may cause unstable readings and inaccurate and imprecise measurement.
Air draught	→ Places exposed to air draught cause unstable readings and inaccurate and imprecise measurements, and therefore, should be avoided.
Gravity	→ The gravity acting on the object to be measured varies depending on the latitude and altitude of the measurement location, resulting in different weight readings for the same object in different locations.
Electromagnetic wave	→ At a location where a strong electromagnetic wave generating object is in the proximity of a scale, the scale is affected by the electromagnetic wave, making the scale unable to indicate accurate and precise weight, and therefore, such a location should be avoided.
Magnetic field	→ At a location where a strong magnetic field generating devices, such as motors, generators, magnetic stirrers and electromagnetic feeders, is in the proximity of a scale, the scale is affected by the magnetic field, making the scale unable to indicate accurate and precise weight, and therefore, such a location should be avoided.

1-1-2 Precautions related to measuring table

Vibration/ Shaking	→ Use a measuring table that is robust and unaffected by vibration (a table with an anti-vibration structure or one made of concrete or stone is suitable). The measuring table should also be installed in a location as unaffected by vibration as possible. Corner locations are more suitable for installation than the centre of the room, as vibration is often lower there. - Vibration may cause unstable readings and inaccurate and imprecise measurement.
Magnetism/ Static electricity	→ Avoid a measuring table that is susceptible to magnetism or static electricity. - Magnetic or electrostatic effects on the scale from the measuring table may result in inaccurate and imprecise measurement.

1-1-3 Precautions related to objects to be measured

Static electricity	→ If the object is electrostatically charged, neutralise the static charge. - If the object is charged, it will create an attractive or repulsive force with its surroundings and may result in inaccurate and imprecise measurements. Reproducibility is also impaired by the amount of charge or discharge. In general, objects made of synthetic resins or glass are highly electrically insulating and easily become charged with static electricity.
Magnetism	→ When measuring a magnetic object, demagnetise the object or use a platform on the weighing pan to keep the object away from the scale to a distance where it is not affected by magnetism. - If the object is magnetised, an attractive force may be generated between the object and the scale and may result in inaccurate measurements. In addition, the magnetic attraction may differ depending on the position of the object on the weighing pan, resulting in poor reproducibility.
Moisture absorption/ Evaporation	→ When measuring an object that have absorbed moisture or have evaporated or volatilised, place the object in a container and seal it with a lid. - If the weight of the object changes due to moisture absorption or evaporation, accurate measurement will not be possible.
Temperature	→ If the temperature of the object is extremely high or low, allow it to acclimatise to room temperature before measurement. - If the temperature of the object differs from that of the surrounding air, air convection around the object may occur, resulting in measurement errors.

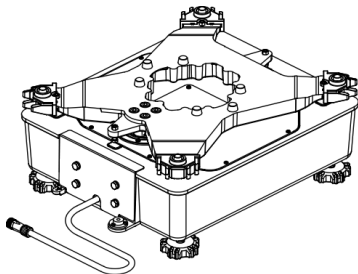
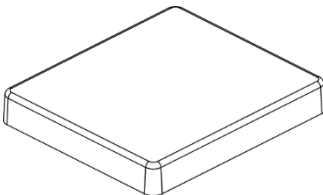
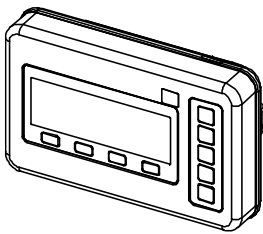
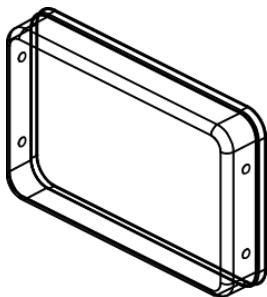
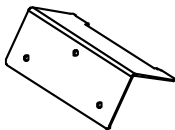
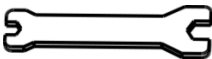
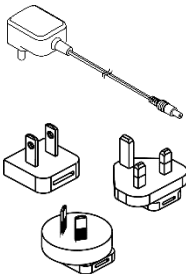
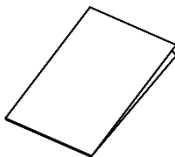
1-1-4 Precautions related to the scale

Changes over time	→ To minimise the effects of ageing since power-on, energise the instrument for at least 30 minutes and apply a load equivalent to the weighing capacity several times before measurement. Also, periodically check the instrumental error and adjust the span as necessary.
Calibration and adjustment of the span	→ Calibration or adjustment of the span is needed in the following cases: - When using the scale for the first time, - When using the scale 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. → The accuracy of the calibration/adjustment of the span is very important as it has a significant influence on the measurement accuracy. The factors relating to measurement errors and their countermeasures described in this chapter need to be taken into account in calibration/adjustment as well. Please also read the relevant chapter of this manual carefully to ensure accurate calibration/adjustment.
Installation	→ Ensure that the scale is levelled without rattling before starting measurement. Avoid placing soft cloth or paper under the scale to prevent it from shaking and remaining level. - Failure to ensure levelling leads to a reduction in measurement accuracy, and rattling leads to reduction in reproducibility.
Temperature	→ Allow the scale to acclimatise to room temperature (at least 2 hours recommended) before measurement while maintaining a constant room temperature. - If the temperature of the scale and the surrounding environment are different, temperature changes in the mechanism may cause a drift in the measured value, and also air convection around the instrument may cause errors.
Foreign objects/matters	→ Attachment of foreign objects/matters 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 scale is required.

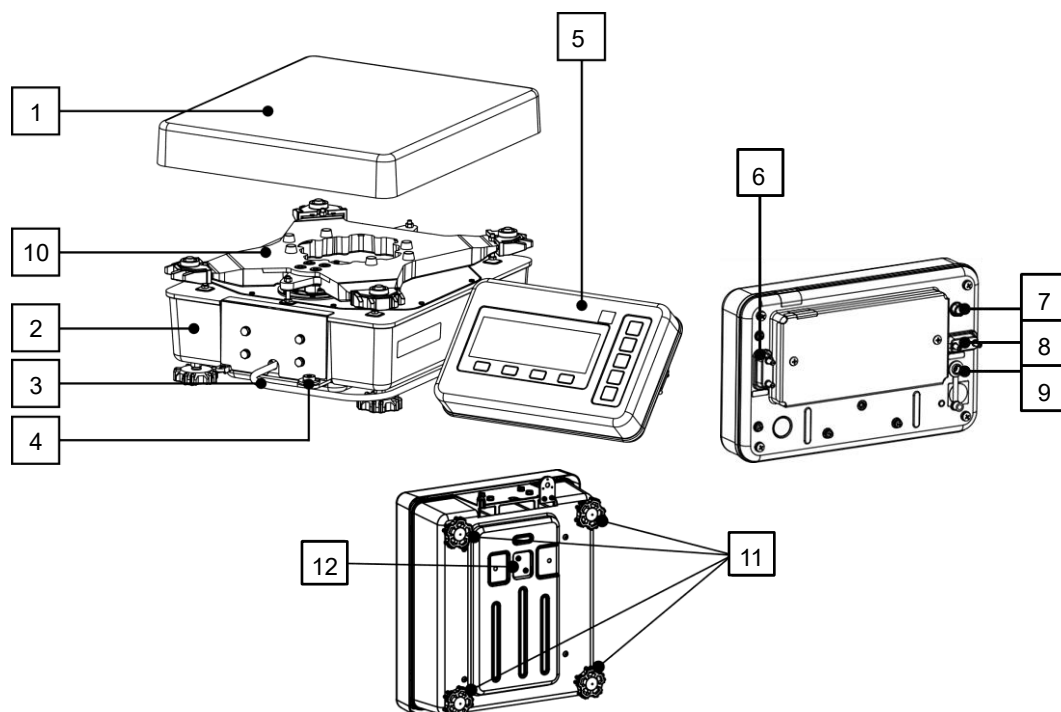
1-2 Scope of delivery

The package box contains the followings.

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

1 Weighing unit: 1 	2 Weighing pan: 1 	3 Indicator unit: 1 
4 Dust cover: 1 (Temporarily fitted to the indicator unit.) 	5 Indicator stander: 1 	6 Thumbscrew: 1 
7 Spanner: 1 	8 AC adapter: 1 AC adapter plug set: 1 	9 Operation manual: 1 

1-3 Name of each section



1 Weighing Pan	2 Weighing unit
3 Scale cable	4 Level
5 Indicator unit	6 9-pin D-SUB connector for peripheral devices (male) * For protection against dust and water, mount the connector cover when not connected. * Note that although this connector is labelled "PRINTER", it can also be used for connection to other peripherals, not just printers.
7 Scale cable connector	8 9-pin D-SUB connector for RS232C I/O (male) * For protection against dust and water, mount the connector cover when not connected.
9 AC adapter jack * For protection against dust and water, mount the cover when not connected.	10 Pan base
11 Adjusters (Levelling legs)	12 Cover of hanging measurement hole (The hanger fitting for hanging measurement is an option. For more information, refer to the instruction manual of the hanger fitting.) * For protection against dust and water, close the cover when not in use.

1-4 Assembling and installation of the product



DANGER

The AC adapter is not waterproof nor dustproof. Be sure to install the AC adapter in a location where it will not be exposed to water or dust.



WARNING

Due to the heavy weight of this product, lifting and carrying during assembly and installation must be carried out by two or more persons.

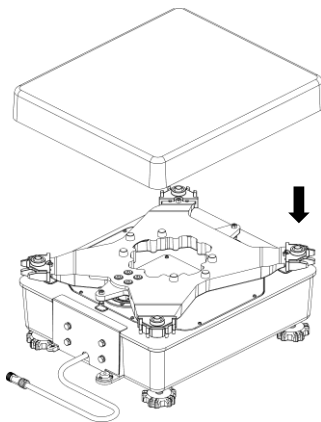
Note

- (1) Ensure that the indicator unit and the weighing unit have the same serial number. Connecting units with different serial numbers will result in inaccurate measurements.
- (2) To prevent malfunctions and measurement errors due to the effects of electromagnetic noise, the indicator and weighing unit must be installed so that their enclosures are electrically isolated from the room, facilities and other equipment to which they are installed or mounted.
- (3) To prevent malfunctions and measurement errors due to the effects of electromagnetic noise, the scale cable must not be rolled.
- (4) Ensure that the scale cable is not touching the weighing pan.

1-4-1 Procedure for assembling

1

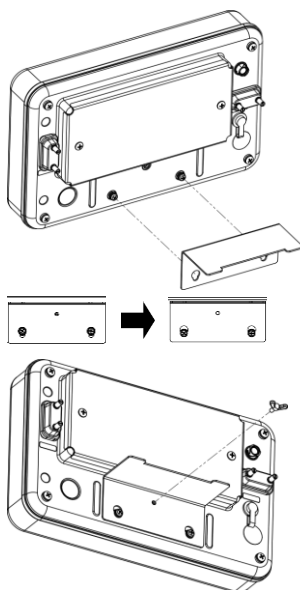
Place the weighing pan on the pan base.



Attach the weighing pan along the rubber guides at the four corners of the pan base.

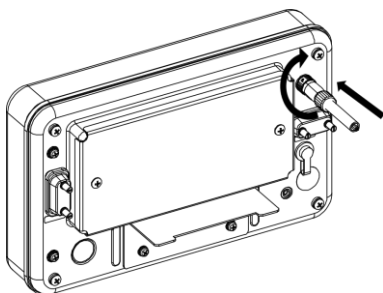
2

Attach the indicator stander if necessary.



Attach the indicator stander and secure it with a thumbscrew included.

3 Connect the scale cable to the indicator unit.



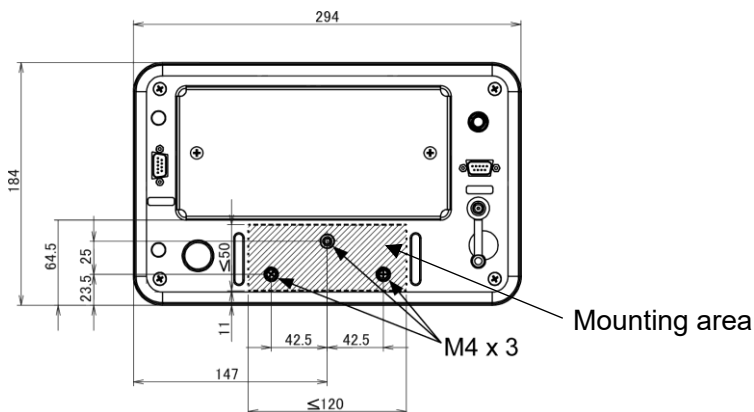
Insert the plug of the scale cable into the connector located on the rear of the indicator unit and secure it by hand-tightening the coupling nut on the plug.

Note

Tighten the coupling nut securely for protection against dust and water.
To prevent damage to the connector, do not use tools when tightening the coupling nut.

Note

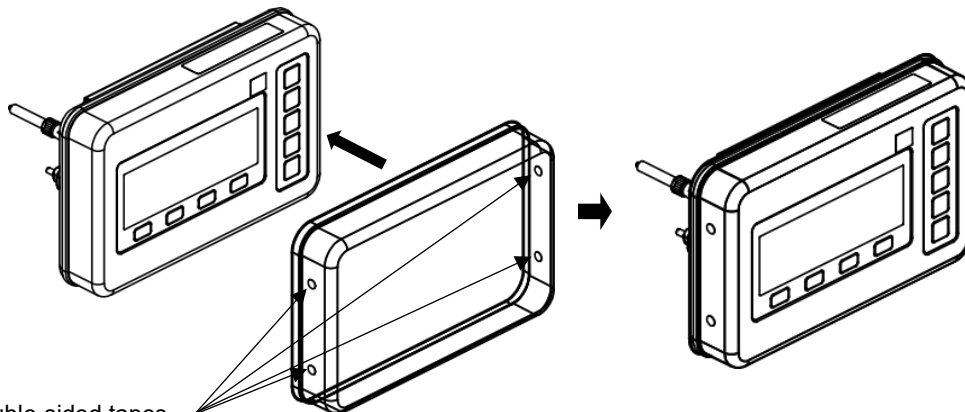
When fixing the unit directly to the user's facilities or equipment, only use the three screw holes on the underside of the rear as shown below.



In this case, ensure that the display unit enclosure does not electrically conduct with other facilities, equipment or earth.

1-4-2 Fitting the dust cover to the indicator unit

If necessary, such as when the scale is used in a harsh environment, the dust cover supplied can be fitted to the indicator unit to prevent deterioration and damage to the operation keys and display panel.



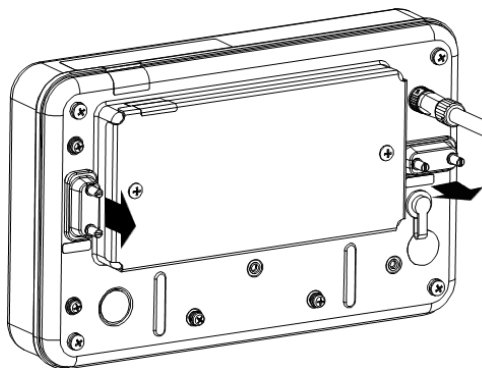
Double-sided tapes
(Remove the backing film.)

1-4-3 Procedure for connection with AC adapter and peripherals

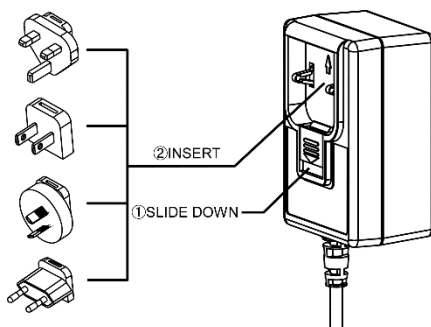
Note

- (1) When not connected, be sure close the covers of the AC adapter jack and 9-pin D-SUB connectors to prevent water and dust from entering the interior.
- (2) To ensure IP65 when connecting peripheral devices, specified serial cables with the water-/dust-proof-type connector is required. Please contact to your local dealer for the specified cable.

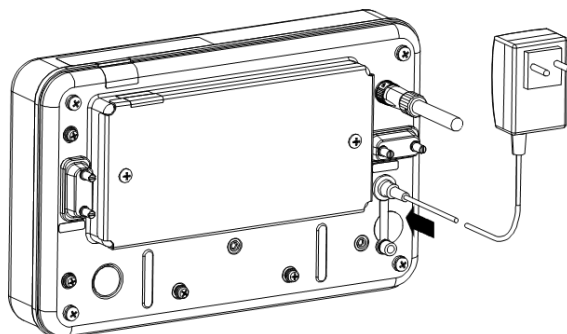
1 Detach the covers for 9-pin D-SUB connectors and connect serial cables when necessary.



2 Attach the AC adapter plug to the AC adapter.



3 Detach the cover for AC adapter jack and connect AC adapter.

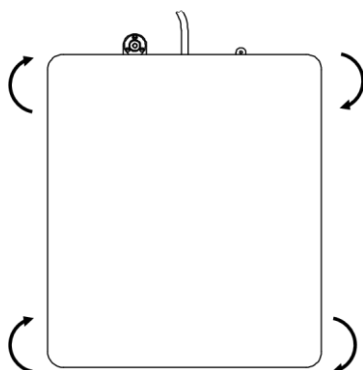


1-4-4 Levelling

Reference

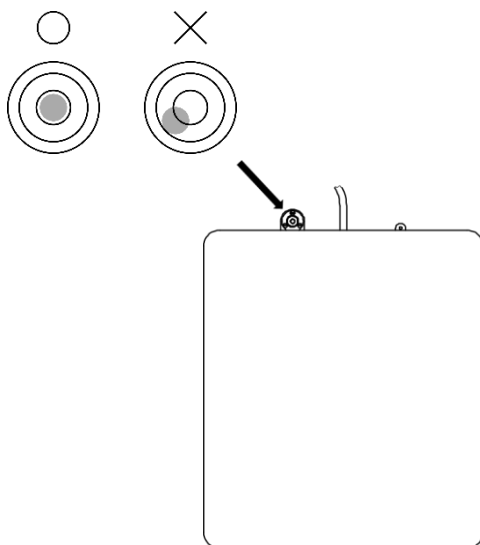
Normally, the adjusters can be adjusted by turning their rubber sections. However, if the adjuster screw becomes stuck, the rubber part of the adjuster may spin freely and prevent adjustment. In such cases, bring the lock nut into contact with the rubber part and use the included spanner to further rotate the lock nut. This will release the stuck condition. Once released, turn the rubber part to adjust the level as usual.

1 Release the transportation lock of the adjusters.



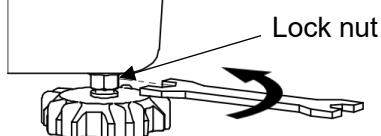
At the time of shipment, the adjusters provided at the four corners of the bottom are locked. Turn them in the direction shown in the figure on the left to loosen them.

2 Level the weighing unit.



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

3 Secure the adjusters.



Tighten the lock nut on the adjusters with the included spanner to secure the adjusters.

1-5 Lifting and carrying instructions



WARNING

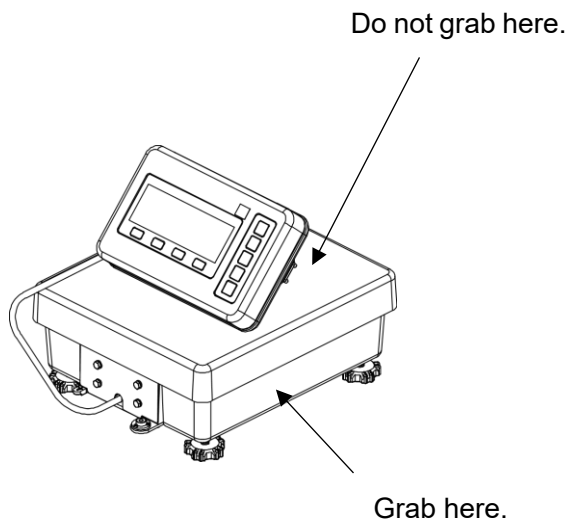
- (1) Due to the heavy weight of this product, lifting and carrying must be carried out by two or more persons.
- (2) Make sure not to carry the scale with the cable hanging.
- (3) Make sure not to carry the scale with weighing object on the weighing pan.
- (4) Wearing the safety shoes and work gloves is highly recommended.

Note

Be careful not to apply excessive force to or impact the scale.

1. Unplug AC adapter and interface cables.
2. Bundle or fold the scale cable not to hang on the floor.
3. Holding position to lift up and carry: Bottom surface of the weighing unit.

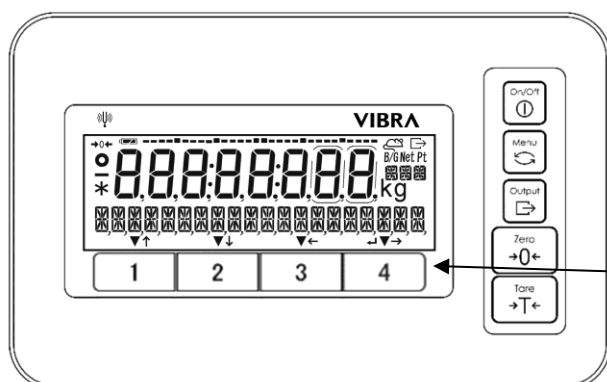
Do not grab the weighing pan, pan base, and indicator unit.



4. Using a hand truck trolley is highly recommended. When using it, lay cushioning material on it to prevent impact to the scale.

1-6 Description of the operation keys

1-6-1 Operation keys for measuring mode and setting menu



Reference

These keys are collectively called “function keys” in this manual as a matter of convenience.

No	Key	Name of key	Performance
1		[On/Off]	Turns on and off (standby) the scale. - Press the key to turn on. - Press and hold the key to turn to standby (when AC adapter operated) or off (when battery operated).
2		[Menu]	Used for calling/exiting the setting menu. Used for cancelling the setting value selection/input and going back to the measuring mode.
3		[Output]	Used for data outputting in measuring mode.
4		[Zero]	Used for zero setting in measuring mode.
5		[Tare]	Used for tare weighing in measuring mode.
6		Function keys	[1] < ▼ >: Used for selecting the item indicated above < ▼ > in measuring mode. < ↑ >: Used for menu/item selections in setting menu or in configuration sequences of some measuring modes.
7			[2] < ▼ >: Used for selecting the item indicated above < ▼ > in measuring mode. < ↓ >: Used for menu/item selections in setting menu or in configuration sequences of some measuring modes.
8			[3] < ▼ >: Used for selecting the item indicated above < ▼ > in measuring mode. < ← >: Used for moving to the upper menu layer in setting menu.
9			[4] < ▼ >: Used for selecting the item indicated above < ▼ > in measuring mode. < → >: Used for moving to the lower menu layer, in setting menu. < ↵ >: Use for confirmation, entry or return.

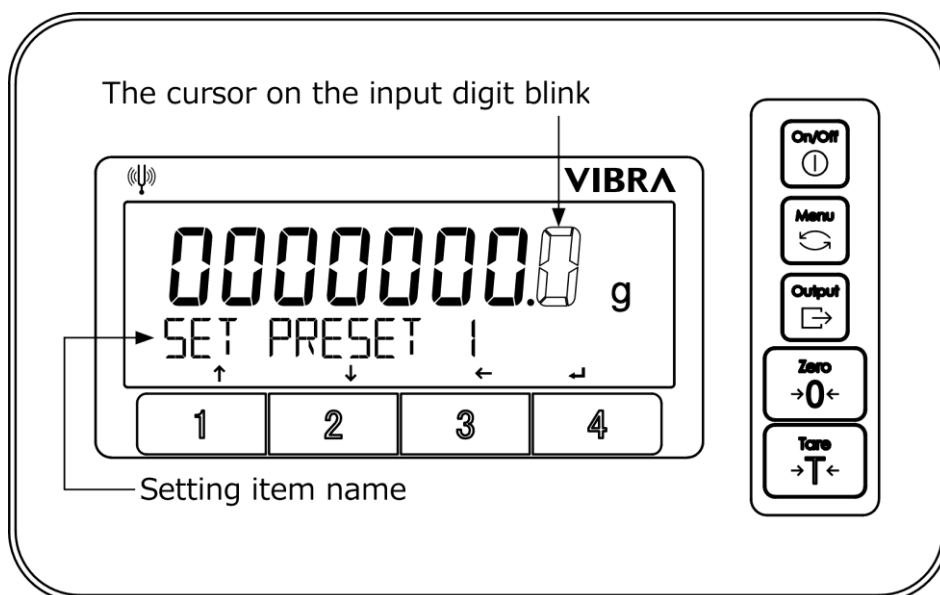
Reference

(1) The function keys with < ↑ >, < ↓ >, < → >, < ← >, < ↵ > or < ▼ > displayed above are active.

(2) Unlike the pictogram on the [On/Off] key, pressing and holding the [On/Off] key puts the scale in standby mode instead of switching off when the power is supplied by the AC adapter.

(3) Unlike the pictogram on the [Menu] key, pressing the [Menu] key does not cause any kind of switching.

1-6-2 Operation keys for keying in of numeric values



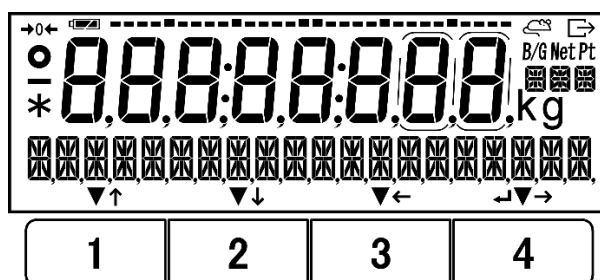
No	Key	Name of key	Performance
1		[Menu]	Used to cancel the entry midway through and go back to the setting menu or measuring mode.
2		[Output]	Used to change the polarity "+/-".
3		[Tare]	Used to input a decimal point "." in the "Multiply mode"
4		[1]	< ↑ >: Used to increment the numeric values. 0 → 1 → 2 → ... → 9 → 0
5		[2]	< ↓ >: Used to decrement the numeric values. 0 → 9 → 8 → ... → 1 → 0
6		[3]	< ← >: Used to move the cursor to the left.
7		[4]	< ↵ >: Used to confirm the entry and move on to the subsequent step or return to the setting menu.

Reference

Unlike the pictogram on the [Menu] key, pressing the [Menu] key does not cause any kind of changeover/switching.

1-7 How to interpret the display

1-7-1 Description of the display symbols



No	Mark	Name	Description
1	—	Minus sign	Used to display negative values in numeric value input or when all 7-segment display digits are filled.
2	○	Circle symbol	Indicates that readout is in stable equilibrium. Legal Metrology - Lights up during the start-up sequence in verified scale to indicate that the scale is verified product.
3	→0←	Zero-point symbol	Indicates that the load is near the net zero or gross zero point (deviation from zero point is within 1/4 of the actual scale interval).
4	8	7-segment display	- Indicates measurement value. - Used to display the value being entered and the value entered. - Displays various messages.
5		Battery indicator	Displayed when the scale is powered by batteries. Remaining battery time is indicated in three levels.
6		Output mark	Indicates that data is being output.
7	B/G	Gross value symbol	Indicates that gross value is displayed.
8	Net	Net value symbol	Indicates that the tare value has been subtracted and net value is displayed.
9	Net Pt	Preset tared weight symbol	Indicates that the preset tare value has been subtracted and net value is displayed.
10	g	gram	Indicates the gram unit.
11	kg	kilogram	Indicates the kilogram unit.
12		16-segment display (in lower line)	- Displays various messages. - Displays the items that can be selected with the function keys.
13		16-segment display (in middle right)	- Used to indicate various units of measurement. - Used in some modes/functions.
14			Displayed when the function keys are activated. Refer to "1-6-1 Operation keys for measuring mode and setting menu" and "1-6-2 Operation keys for keying in of numeric values".
15	:	Colon	Separators for time display.
16	*	Asterisk	- Lights in the standby status. - Indicates addition-feasible status when the addition function is used.
17	-----	Bar graph meter	- Indicates the rate of gross value of the load to the maximum capacity (Max). - Indicates the state of span adjustment/test with internal weight.
18		Differentiated scale division	Lights up when the actual scale interval less than the verification scale interval is displayed on verified scale.



No.18 is indicated only on the verified scale.

1-7-2 LCD character font

■ 7-segment

A	b	C	d	E	F	G	h	i	J	K	L	M	n	o
P	Q	r	S	t	u	V	W	X	Y	Z	c	comma	point	
1	2	3	4	5	6	7	8	9	0	space	minus / hyphen			

■ 16-segment in lower line

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	c	g	t	
1	2	3	4	5	6	7	8	9	0					
asterisk	slash	left arrow	right arrow	space	plus	minus / hyphen								
point	percent													

■ 16-segment in middle right

b	C	c	D	d	H	L	I	M	m	o	P	S	T	t
U	w	Z	percent											

2 Basic operations

2-1 Turning on/off the power and preparing measurements

Note For accurate and precise measurements, allow the scale to acclimatise to the ambient temperature (at least 2 hours recommended) if the scale has been moved or the ambient temperature has changed.

1

■For Legal Metrology

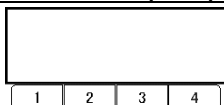
Ensure that there is no object on the weighing pan.



2

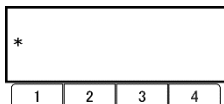
Turn on the power for the scale.

■When AC adapter operated:

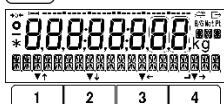


(Power off status) ➡

Connect to the external power supply ➡



(Standby status) ➡



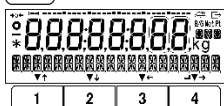
(Start-up sequence)

■When optional internal rechargeable battery operated (cf.

“Appendix 4 Internal rechargeable battery”):



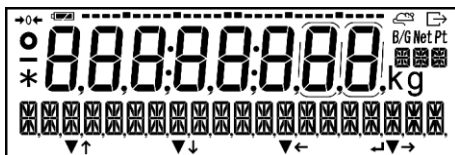
(Power off status) ➡



(Start-up sequence)

3

Check for indications.



Reference

When <63C DIRECT ST> (Direct start) is set to “ON” (Enabled), the scale starts up without going through standby and pressing [On/Off] key when the scale is connected to an external power supply.

(cf. “7-5-2 Direct start function”)

All indications on the display lights for few seconds.

- Check the display and compare it with the image on the left to ensure there are no missing indications.

4 Self-check and indication of device information.

TYPE FMA62KQ IRS (Model name (not type name)) ➡

M/N 0 123456 (Internal control number) ➡

S/N 0 12345678 (Serial number) ➡

CRC 600B (Software identification (CRC16 checksum)) ➡

nFNR01 PROGRAM NO (Program number)

After all indications display, the scale goes to self-check sequence and indication of the device information.

Note

- (1) Do not press any key during self-check.
- (2) The mode name is prefaced by the word "TYPE". Be careful not to confuse it with the Type name.

Legal Metrology

For verified scale, <O> symbol also lights during this step.

Reference

These displayed items are for service or inspection purpose.

5 ■For non Legal Metrology

Initial zero-setting/tare-subtraction and completion of start-up sequence.

INITIAL ZERO ADJ (Initial zero-setting or initial tare-subtraction) ➡

or

00 g NEXT

After completion of self-check sequence, either initial zero setting or initial tare subtraction is carried out, depending on the load on the weighing pan.

Indication becomes zero, and <→0←> symbol lights, which indicates that the deviation from the zero point is within 1/4 of the actual scale interval.

When initial tare subtraction has carried out, <Net> symbol also appears.

■For Legal Metrology

Initial zero-setting and completion of start-up sequence.

INITIAL ZERO ADJ (Initial zero-setting) ➡

00 g NEXT

Legal Metrology

For verified scale, initial tare-subtraction function is not available.

Ensure that no objects are on the weighing pan when the power is switched on. Otherwise, initial zero setting cannot be carried out and the scale cannot be started up.

Note

- (1) Do not press any key during initial zero-setting/tare-subtraction.
- (2) Although displayed as <INITIAL ZERO ADJ>, the initial tare-subtraction may be executed instead of initial zero-setting, depending on the initial load. By checking whether the <Net> symbol is displayed, it is possible to determine whether initial tare-subtraction or initial zero-setting has been carried out.
- (3) When initial tare-subtraction is carried out, the stored tare value (which can be displayed or output) may not be accurate.

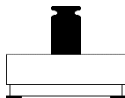
6 (Recommended) Warm-up the scale.

For more accurate and stable measurements, a warm-up period of at least 30 minutes with the scale switched on is recommended.

Note

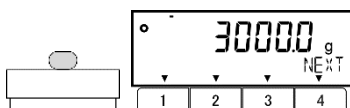
Ensure that <1C AUTO OFF > (Auto power-off) is set to "0" (Disabled) before warming-up. (cf. "7-5-1 Auto power-off")

7 (Recommended) Preload the scale.



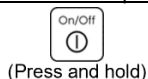
8 (Recommended) Perform span test or span adjustment.

9 Perform measurement operations.

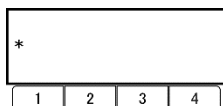


10 Turn off the power for the scale.

■When AC adapter operated:



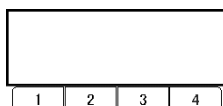
(Press and hold)



(Standby status)



Disconnect from the external power supply

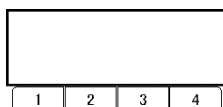


(Power off status)

■When optional internal rechargeable battery operated (cf. "Appendix 4 Internal rechargeable battery"):



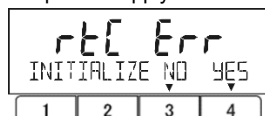
(Press and hold)



(Power off status)

Note

If the following display appears, the internal date and time data has been lost because the built-in rechargeable coin cell battery for backup of the clock function has run out due to not being connected to the power supply for an extended period of time.



For information on how to recover from the error, refer to "9-2 How to restore the internal clock function".

Reference

- (1) Pressing and holding [On/Off] key obtains the standby (or power off) status from any operation status.
- (2) The scale starts up in the last measuring mode before it was switched off.



Verified scale always starts up in weight mode.

- (3) When the account control function is enabled, log in display appears after "Self-check and indication of device information" (Step 4) and before "Initial zero-setting/tare-subtraction and completion of start-up sequence" (Step 5).
(cf. "7-3-2 User login")
- (4) When initial span adjustment function is enabled, span adjustment with internal weight is performed after initial zero setting.
This function is available only on the models with internal calibration mechanism.
(cf. "6-4 Initial span adjustment at power-on")
- (5) When "Save tare weight function" is enabled, the last tare value at the time the scale is powered off is recalled to tare-subtract when turning on the scale, instead of initial zero-setting or initial tare subtraction.
In this case, the indication does not necessarily become zero.
(cf. "3-9 Save tare weight function")



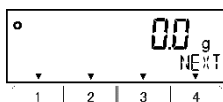
Save tare weight function is not available on verified scale.

2-2 Weigh the mass of the object (Weight mode)

- 1 Check that nothing is loaded on the weighing pan.



- 2 Check the zero point and perform zero setting as appropriate.

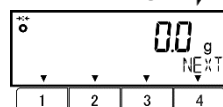


(Outside the zero-point deviation limit) ➡

- Ensure that < ➡0< > symbol is indicated.

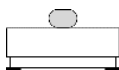
If not, perform zero setting by referring "2-3 Zero setting".

Zero setting ➡

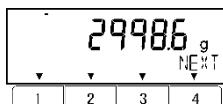


(Within the zero-point deviation limit)

- 3 Load an object on the weighing pan.



- 4 Read the measurement value.



(Unstable) ➡

- Read the indication when the scale indication reaches stable equilibrium and < ● > symbol is indicated.



(Stable) ➡

Read the indication.



For verified scale, when the actual scale interval is smaller than the verification scale interval, the digit of the actual scale interval is indicated with a differentiated scale division (surrounded by a rectangle). (cf. 1-7 How to interpret the display)
The digit indicated with a differentiated scale division is for reference only and cannot be used for legal for trade purpose.

Reference

- (1) For measuring the object with tare (container), please refer to "2-4 Tare device".
- (2) In weight mode, "free key" (various functions and shortcuts) can be assigned to the function keys. Please refer to "2-8 Free key setting".

2-3 Zero setting

Zero point may vary from the initial zero point (set by initial zero setting) due to hysteresis, environmental factors such as temperature and pressure changes, and other factors.

Therefore, for accurate measurements, the zero point must be reset beforehand by "zero setting" each time a measurement is initiated.

When the zero setting has taken place, symbol $\rightarrow 0 \leftarrow$ appears, which indicates that the deviation from the zero point (of gross reading) is within 1/4 of the actual scale interval.

There are the following types of zero setting on this product (other than initial zero setting described in "2-1 Turning on/off the power and preparing measurements"), all of which are carried out automatically following a single manual operation.

- (1) Semi-automatic zero setting with [Zero] key
(cf. "2-3-1 Operation of semi-automatic zero setting")
- (2) Semi-automatic zero setting by external execution command input
(cf. "2-3-1 Operation of semi-automatic zero setting" and "5-4-2(1) Zero-setting/Tare-weighing command")
- (3) Semi-automatic zero setting by external contact input

When to use external contact input for semi-automatic zero setting, set <421 ACTIVATE> to "ON" and set <422 OPERATION> to "ZERO".

(cf. "2-3-1 Operation of semi-automatic zero setting" and "5-1-2(1) External contact input")

- (4) Combined semi-automatic zero-setting and tare-subtraction operated by the same external contact input

When to use external contact input for combined semi-automatic zero-setting and tare-subtraction, set <421 ACTIVATE> to "ON" and set <422 OPERATION> to "Z/T".

(cf. "3-10 Combined semi-automatic zero-setting and tare-subtraction" and "5-1-2(1) External contact input")



For verified scale, the setting value "Z/T" of <422 OPERATION> is not available and combined semi-automatic zero-setting and tare-subtraction cannot be assigned to the external contact input.

Reference

Once zero point is set, zero indication can be maintained by zero tracking function.
(cf. "4-3 Zero tracking")

2-3-1 Operation of semi-automatic zero setting

- 1 Check that nothing is loaded on the weighing pan.

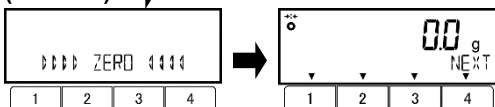


- 2 Perform "Zero setting".



or Command input or External contact input

("ZERO") $\Rightarrow$



- Press [Zero] key or input "Zero setting" command (cf. "5-4-2(1)

Zero-setting/Tare-weighing

command") or carry out external

contact input (cf. "5-1-2(1) External

contact input") to perform zero

setting.

Indication becomes zero and

$\rightarrow 0 \leftarrow$ symbol lights.

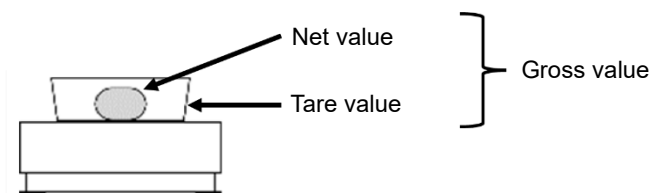
Reference

- (1) Zero setting cannot not be performed when the deviation from the initial zero point is over the "zero-setting range" (cf. "Appendix 1-1 Metrological specifications").
In that case, turn the scale to standby or off and then turn it on again to perform initial zero setting.
- (2) It is possible to set whether or not to wait for stable equilibrium to be reached before zero setting via the menu item <18 WT STABLE>. If this is set to "not wait", the accuracy and precision of the measurement cannot be guaranteed. (cf. "4-4 Stabilisation wait setting")



On verified scale, the setting of <18 WT STABLE> is not changeable and the scale always waits the stable equilibrium to be reached before zero setting execution.

2-4 Tare device



When weighing the object placed on a container (tare), the weight of the container must be subtracted from the total weight (gross) to get the weight of the object to be weighed (net). This is called “tare subtraction” or “tare”.

Tare device on this product reduces the weighing range for net loads (subtractive tare device).

Weighable range = weighing capacity - tare value

When the tare subtraction has taken place, symbol < **Net** > appears, which indicates that tare value has been subtracted and the display is net reading. In addition, when the tare subtraction has taken place and indication becomes zero, symbol < **→0←** > appears, which indicates that the deviation from the net zero point is within 1/4 of the actual scale interval.

There are the following types of tare subtraction on this product (other than initial tare subtraction described in “2-1 Turning on/off the power and preparing measurements”).

(1) Semi-automatic tare weighing

Tare is carried out automatically following a single manual operation. The tare value is temporarily stored and that is capable of displaying or outputting it whether or not the scale is loaded.

This function is further subdivided into the following three types, depending on the manual operation:

(1-1) Semi-automatic tare weighing with [Tare] key

(cf. “2-4-1 Measuring with semi-automatic tare weighing”)

(1-2) Semi-automatic tare weighing with external execution command input

(cf. “2-4-1 Measuring with semi-automatic tare weighing” and “5-4-2(1) Zero-setting/Tare-weighing command”)

(1-3) Semi-automatic tare weighing by external contact input

When to use external contact input for semi-automatic tare weighing, set <421 ACTIVATE> to “ON” and set <422 OPERATION> to “TARE”.

(cf. “2-4-1 Measuring with semi-automatic tare weighing” and “5-1-2(1) External contact input”)

(1-4) Combined semi-automatic zero-setting and tare-subtraction operated by the same external contact input

When to use external contact input for combined semi-automatic zero-setting and tare-subtraction, set <421 ACTIVATE> to “ON” and set <422 OPERATION> to “Z/T”.

(cf. “3-10 Combined semi-automatic zero-setting and tare-subtraction” and “5-1-2(1) External contact input”)



For verified scale, the setting value “Z/T” of <422 OPERATION> is not available and combined semi-automatic zero-setting and tare-weighing cannot be assigned to the external contact input.

(2) Automatic tare subtraction

Tare is carried out automatically without the intervention of an operator.

(cf. “3-5 Automatic tare subtraction”)

Reference

This product also features “preset tare device”, which subtracts preset tare value from gross value and indicates the result of the calculation.

When preset tare is in operation, semi-automatic and automatic tare weighing cannot be carried out.

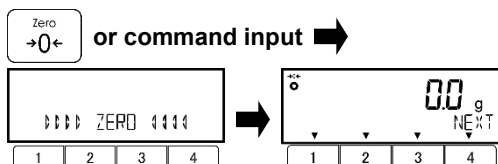
(cf. “3-8 Preset tare device”)

2-4-1 Measuring with semi-automatic tare weighing

- 1 Check that nothing is loaded on the weighing pan.



- 2 Execute "Zero setting".



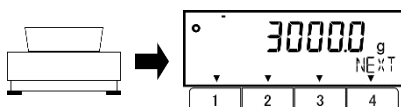
- Press [Zero] key or input "Zero setting" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command").

Indication becomes zero and the < →0← > symbol lights.

Note

This operation is important for accurate tare weighing afterwards.

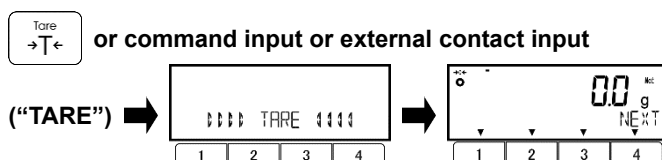
- 3 Place a tare container on the weighing pan.



- Place a tare container on the weighing pan.

The weight value corresponding the tare value is displayed.

- 4 Perform "tare weighing".

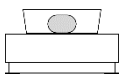


- Press [Tare] key or input "Tare weighing" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command") or carry out external

contact input (cf. "5-1-2(1) External contact input") to perform tare weighing.

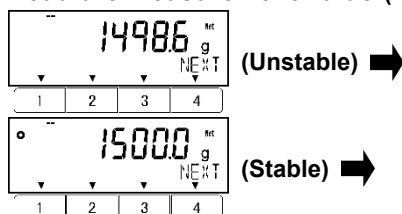
The indication changes to zero, and < →0← > and < Net > symbol lights.

- 5 Load an object on the tare.



- Load the object to be measured, ensuring that < →0← > symbol is lit immediately before loading the object.

- 6 Read the measurement value (net reading).



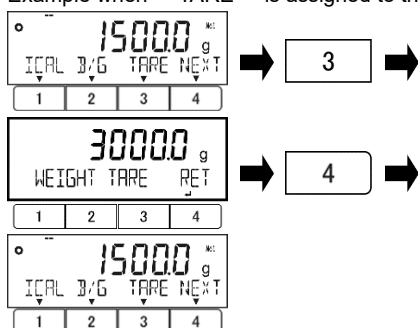
Read the indication.

The net value (measured value of the object only) is displayed.

- Read the indication when the scale indication reaches stable equilibrium and < ● > symbol is indicated.

7 Check the tare value (for weight mode only).

Example when <<TARE>> is assigned to the free key F3.



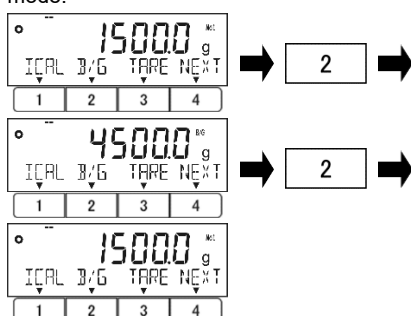
In weight mode, the tare value can be displayed by the free key <<TARE>>. (cf. "2-8 Free key setting")
- Press function key on which <<TARE>> is displayed above.

The tare value is displayed on the display.

- Press [4] key (<<RET >>) to return to the measurement display.

8 Check the gross value (for weight mode and percent mode only).

Example when <<B/G>> is assigned to the free key F2 in weight mode.

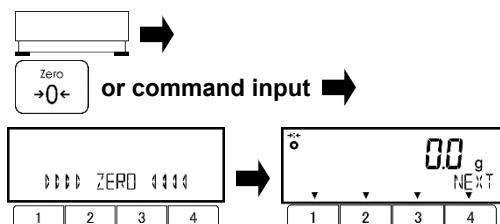


In weight mode and percent mode, the display can be switched between the net reading and gross reading. To use this function in weight mode, the item <<B/G>> needs to be assigned to the free key. (cf. "2-8 Free key setting")

- Press function key on which <<B/G>> is displayed above.

The display switches to gross reading, <Net> symbol disappears and <B/G> symbol appears instead.
- Press the function key (<<B/G>>) again to return to the net reading.

9 Cancel the tare operation.



- Remove both the object and tare from the weighing pan, then press [Zero] key or input "Zero setting" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command").

Tare operation is cancelled, the tare value is cleared, and zero setting is carried out.

The indication then becomes zero, <→0←> symbol appears, and <Net> symbol disappears.

Reference

- (1) It is possible to set whether or not to wait for stable equilibrium to be reached before tare weighing via the menu item <18 WT STABLE>. If this is set to "not wait", the accuracy and precision of the measurement cannot be guaranteed. (cf. "4-4 Stabilisation wait setting")

Legal
Metrology

On verified scale, the setting of <18 WT STABLE> is not changeable and the scale always waits the stable equilibrium to be reached before tare weighing execution.

- (2) Net value can be output, in accordance with the output setting, during net value indication ("Step 6 Read the measurement value (net reading)"). (cf. "5 External input/output functions")
- (3) Tare value can be output by pressing the [Output] key during tare value indication ("Step 7 Check the tare value (for weight mode only)"). The tare value is output once immediately after the [Output] key is pressed, irrespective of the setting of <413 CONDITION>. (cf. "5-2 Communication setting")

Legal
Metrology

On verified scale, the tare value cannot be output alone.

- (4) Gross value can be output, in accordance with the output setting, during gross value indication ("Step 8 Check the gross value (for weight mode only)").
- (5) Combined Gross-Net-Tare output can be enabled by the menu item <41C GNT OUT>. (cf. "5-2 Communication setting")

2-5 Setting menu

Reference

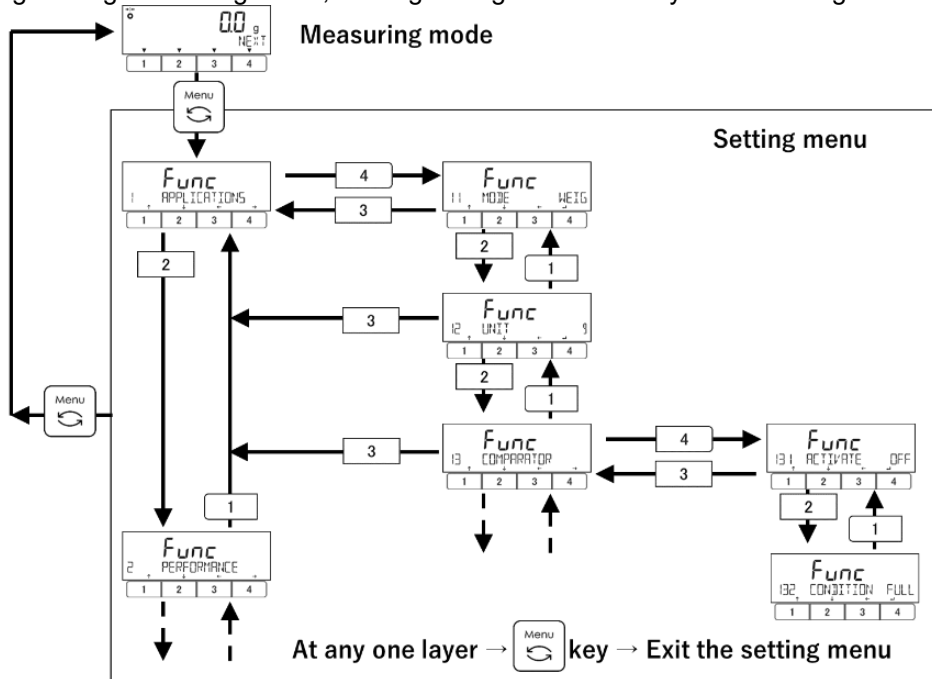
Shortcuts for various functions can be assigned to function keys.

Please refer to "2-8 Free key setting".

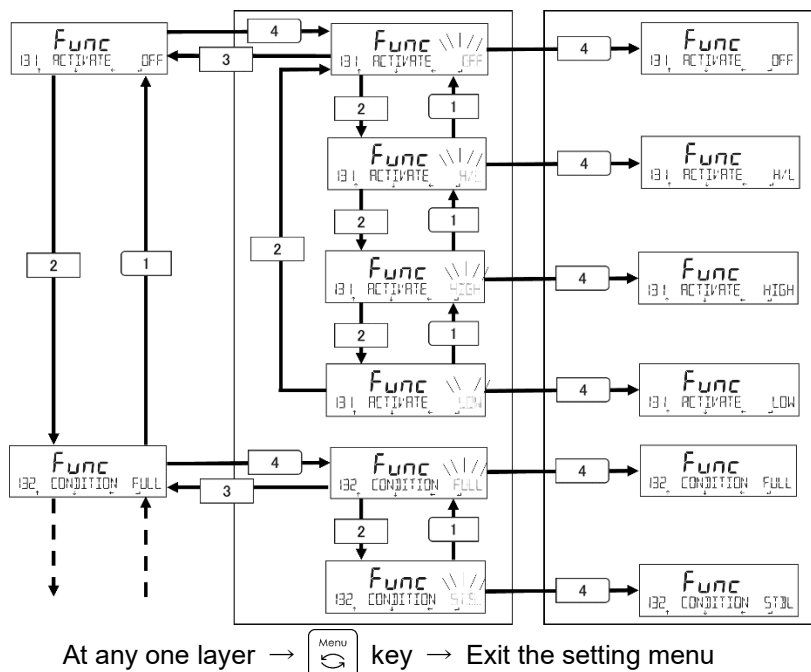
The setting menu provides the various operations such as outputting and calibration, execution of additional functions of the measurement, the selection of operating modes, changing and adjusting function settings, and configuration of various parameters.

■Key operations in the settings menu

(1) Starting/closing the setting menu, moving through the hierarchy and selecting the menu item



(2) Selecting and determining/executing setting values in menu items

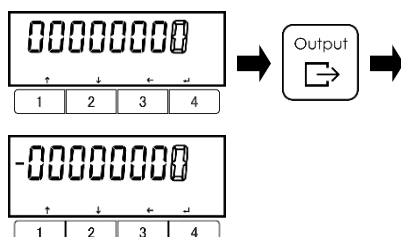


2-6 Keying in of numeric values

Of the numerical inputs in the various modes and functions, unit weight of the counting mode, reference weight of the percentage mode, coefficient of the multiply mode, upper/lower limit and target value of the comparator function, and preset tare value are entered using the following methods.

Example: When inputting “-5.4321”.

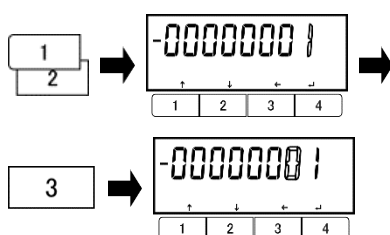
1 Input “-”.



- Press [Output] key to enter the minus sign “-”.

Press the key again to cancel the input (the minus sign disappears).

2 Input “1”.

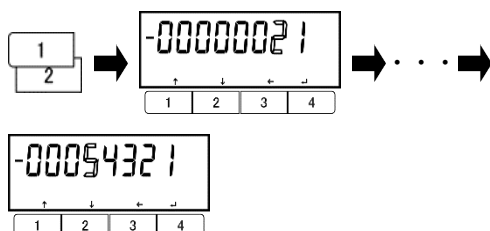


The number entry starts with the rightmost digit, where the cursor —flashing digit— is initially positioned.

- Press [1], [2] key to increment/decrement the digit to “1”.

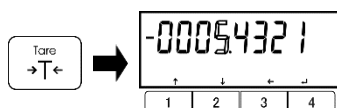
- Press [3] key to move the cursor to the left.

3 Input “2, 3, 4, 5”.



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

4 Input “.”. (For multiply mode only)



- Press [Tare] key to input a decimal point “.” on the immediately right of the cursor.

Pressing [Tare] key at another cursor position moves the decimal point.

Pressing [Tare] key at the same cursor position deletes the decimal point

5 Confirm the input value.



- Press [4] key to confirm the input value.

The coefficient “-5.4321” is registered on the scale.

Reference

- (1) Numeric value inputting is limited to eight digits at a maximum.
- (2) “.” cannot be entered in some setting items, e.g. unit weight setting in counting mode.
- (3) Pressing [Menu] key cancels the keying-in midway through.

2-7 Function keys switching at each measuring mode

By operating the function keys, various functions can be started up and various settings can be made. This chapter shows how the functions allocated to [1]-[3] keys switch by pressing [4] key. Refer to “2-8 Free key setting”, “3-1 Various measuring modes of the scale”, “3-3 Comparator function” and “3-4 Addition function” for details on the operations of the [1]-[3] keys in each measuring mode.



“Multiply mode” is not available for verified scale.

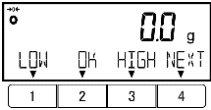
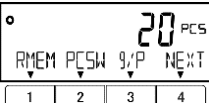
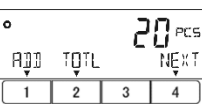
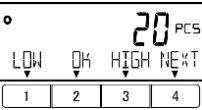
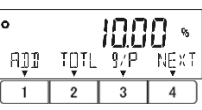
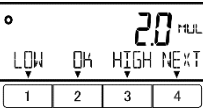
Reference

In weight mode, free keys (various functions and shortcuts) are assigned to function keys as described follow:

Free key F1 and F4: [1] key, Free key F2 and F5: [2] key, Free key F3 and F6: [3] key.

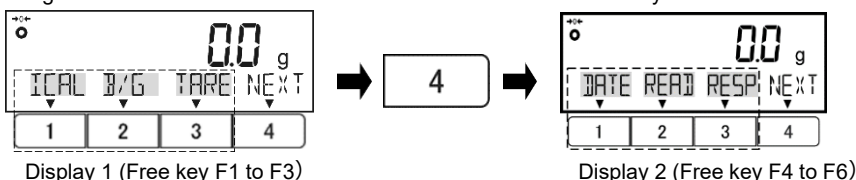
Please take care not to confuse Free key F1-F4 to [1]-[4] keys.

Please also refer to “2-8 Free key setting”.

Weight mode	Counting mode	Percent mode	Multiply mode
Free key F1 to F3  ↓ 4 ↓ Free key F4 to F6  ↓ 4 ↓ Comparator indication  ↓ 4 ↓ Return to the first item	Counting mode menu  ↓ 4 ↓ Addition function operation  ↓ 4 ↓ Comparator indication  ↓ 4 ↓ Return to the first item	Percent mode menu  ↓ 4 ↓ Addition function operation, Percentage/weight indication switching  ↓ 4 ↓ Comparator indication  ↓ 4 ↓ Return to the first item	Multiply mode menu  ↓ 4 ↓ Addition function operation  ↓ 4 ↓ Comparator indication  ↓ 4 ↓ Return to the first item

2-8 Free key setting

Various functions and shortcuts can be assigned to the function keys [1] to [3] for weight mode. This assignment destinations will henceforth be referred to as the "free key".



Note

Despite the indication of the free keys <<CAL>> and <<ICAL>>, what is actually initiated by them is "adjustment". Please take care not to mistake them for "calibration".

Reference

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

Legal Metrology

"CAL", "HOLD", "LB", "OZ", and "TLH" are not available for verified scale.

1 Select each Free key menu item.



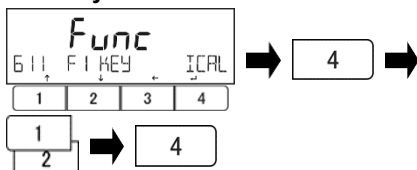
- Go to <611 F1 KEY>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [1]/[2] key to select each free key menu item.

<611 F1 KEY>	: Free key F1
<612 F2 KEY>	: Free key F2
<613 F3 KEY>	: Free key F3
<614 F4 KEY>	: Free key F4
<615 F5 KEY>	: Free key F5
<616 F6 KEY>	: Free key F6

2 Select the function to assign to the Free key.



- Press [4] key to make the setting value changeable.

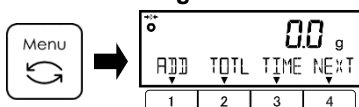
- Press [1]/[2] key to select.

Refer to Set List.

- Press [4] key to confirm.

Set list	
NONE : OFF	B/G : Switch between Gross value and Net value indications
DATE : Display the date	TIME : Display the time
TARE : Tare value or preset tare value indication	HIGH : Upper limit value indication (Comparator function)
LOW : Lower limit value indication (Comparator function)	ID : Display the scale ID
g : Unit set to gram	Kg : Unit set to kilogram
ct : Unit set to carat	LB : Unit set to pound
OZ : Unit set to ounce	TLH : Unit set to tael troy (金衡兩 Hong Kong)
ICAL : Execute semi-automatic span adjustment with internal weight (cf. "6-1-3 Semi-Automatic span adjustment with internal weight")	CAL : Execute span adjustment with external weight (cf. "6-1-1 Span adjustment with external weight")
ADD : Perform addition (Addition function)	TOTL : Total value indication (Addition function)
HOLD : Hold the weight indication	GLPH : GLP header output
GLPF : GLP footer output	READ : Readability setting (cf. "4-5 Actual scale interval (readability) setting")
RESP : Response speed setting (cf. "4-2 Response speed")	

3 Exit the setting menu.



- Press [Menu] key to shift to the weight mode.

2-8-1 Functions specific to Free Keys

Some functions can only be realised by assigning functions to Free keys.

■<<HOLD>>

(Cf. "3-11 Hold the weight indication")

Weight indication can be held.



This function is not available on verified scale.

■<<GLPH>> and <<GLPF>>

(Cf. "3-12 GLP Header/Footer output")

Initiates GLP header output and GLP footer output.

■<<DATE>> and <<TIME>>

Display the date and time.

The date, date format and time can be set via the menu items <637 DATE SETTING>, <636 DATE DISP> and <638 TIME SETTING> respectively.

(Cf. "7-4 Date and time setting")

■<<ID>>

Display the scale ID.

The scale ID can be registered via the menu item <631 SCALE ID>.

(Cf. "7-1 Scale ID setting")

3 Various Modes, functions and settings regarding measurement

3-1 Various measuring modes of the scale

This scale has the following measuring modes:

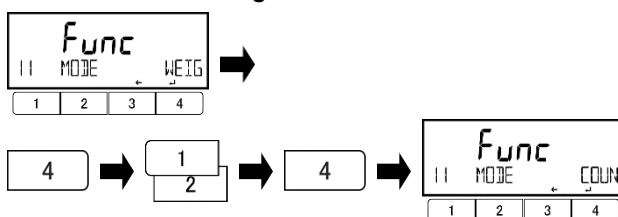
- (1) Weight mode: Measure the mass of the object (cf. "2-2 Weigh the mass of the object (Weight mode)")
- (2) Counting mode: Count the number of items (cf. "3-1-1 Counting mode")
- (3) Percent mode: Indicate the percentage of the weight of the object with respect to the reference (cf. "3-1-2 Percent mode")
- (4) Multiply mode: Indicate the calculated value obtained by multiplying the weight of the object by the pre-set coefficient (cf. "3-1-3 Multiply mode")



Multiply mode is not available on verified scale.

■ Selection of the measuring mode

1 Select the measuring mode.



- Go to <11 MODE>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

WEIG : Weight mode

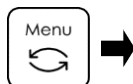
COUN : Counting mode

PCNT : Percent mode

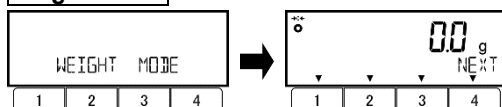
MULT : Multiply mode

- Press [4] key to confirm.

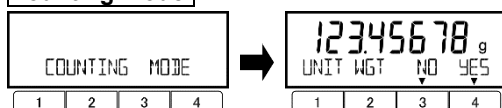
2 Exit the setting menu.



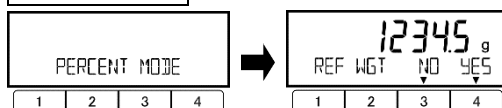
Weight mode:



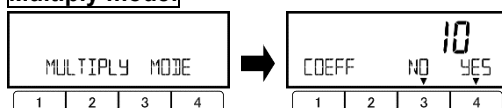
Counting mode:



Percent mode:



Multiply mode:



- Press [Menu] key.

The name of the selected measuring mode is displayed briefly, and then the measuring mode is launched.

3-1-1 Counting mode



This mode is not legal for trade.

Counting mode can count the number of items by placing the items and dividing the total weight of those items by the recorded unit weight.

There are two methods to set the unit weight:

- Actual samples capturing method : Place the specified number of samples of the item on the scale. The weight of the samples is captured and divided by the specified number of samples to calculate the weight per sample, which is registered as the unit weight.
- Numeric value setting method : Input numeric value of the unit weight by keying in.

For the actual sample capturing method, an auxiliary function "SIMPLE SCS" can be used to increase the precision of sampling. When "SIMPLE SCS" is activated, the sample capture and unit-weight registration are divided into several sub-steps, with the unit-weight registration automatically updated while controlling the number of samples that can be added at each sub-step, thereby improving the precision of sampling.

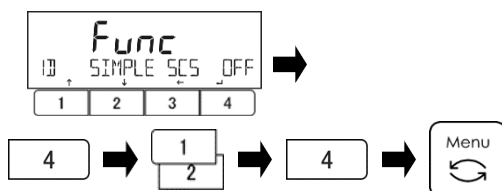
Reference

The lower limit of the unit weight that can be set is the weight equivalent to the default actual scale interval (readability) d in the weight indication in each weighing unit.

For the default actual scale interval (readability) d in each weighing unit, refer to "Appendix 1-1 Metrological specifications".

1

Select the SIMPLE SCS if necessary.



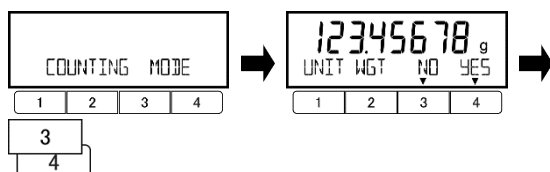
- Go to <1D SIMPLE SCS> from the setting menu.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
OFF: Invalid
ON: Valid
- Press [4] key to confirm.
- Press [Menu] key to return the counting mode.

2

Select whether or not employ the previous recorded unit weight.



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

- Press [3]/[4] key to select whether or not employ the previous data.

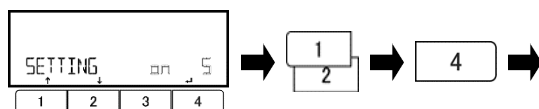
[3](NO): Not employ
(Set a new unit weight)

[4](YES): Employ

When "YES" is selected, go to step 4.

3

Select the number of samples for actual samples capturing method or select the numeric value setting method, and set the unit weight.



- Press [1]/[2] key to select.

on 5: 5 PCS
on 10: 10 PCS
on 30: 30 PCS
on 50: 50 PCS
on 100: 100 PCS
on VAR: Set arbitrary number of samples

Actual samples capturing method.
See 3-1-1(1) or 3-1-1(2)

PCSWG: Numeric value setting method.
See 3-1-1(3)

"3-1-1 (1) Actual samples capturing method"

or

"3-1-1 (2) Actual samples capturing method with "SIMPLE SCS""

or

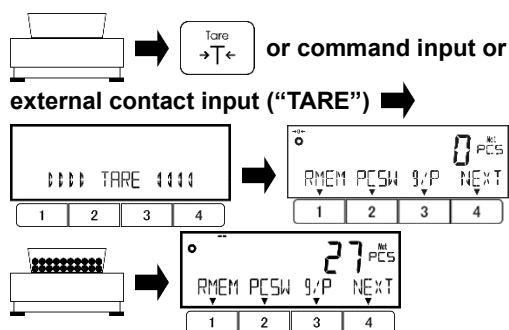
"3-1-1 (3) Numeric value setting method"

- Press [4] key to confirm.

- Set the unit weight by referring 3-1-1(1), 3-1-1(2), or 3-1-1(3).

4

Put items in place to count them.

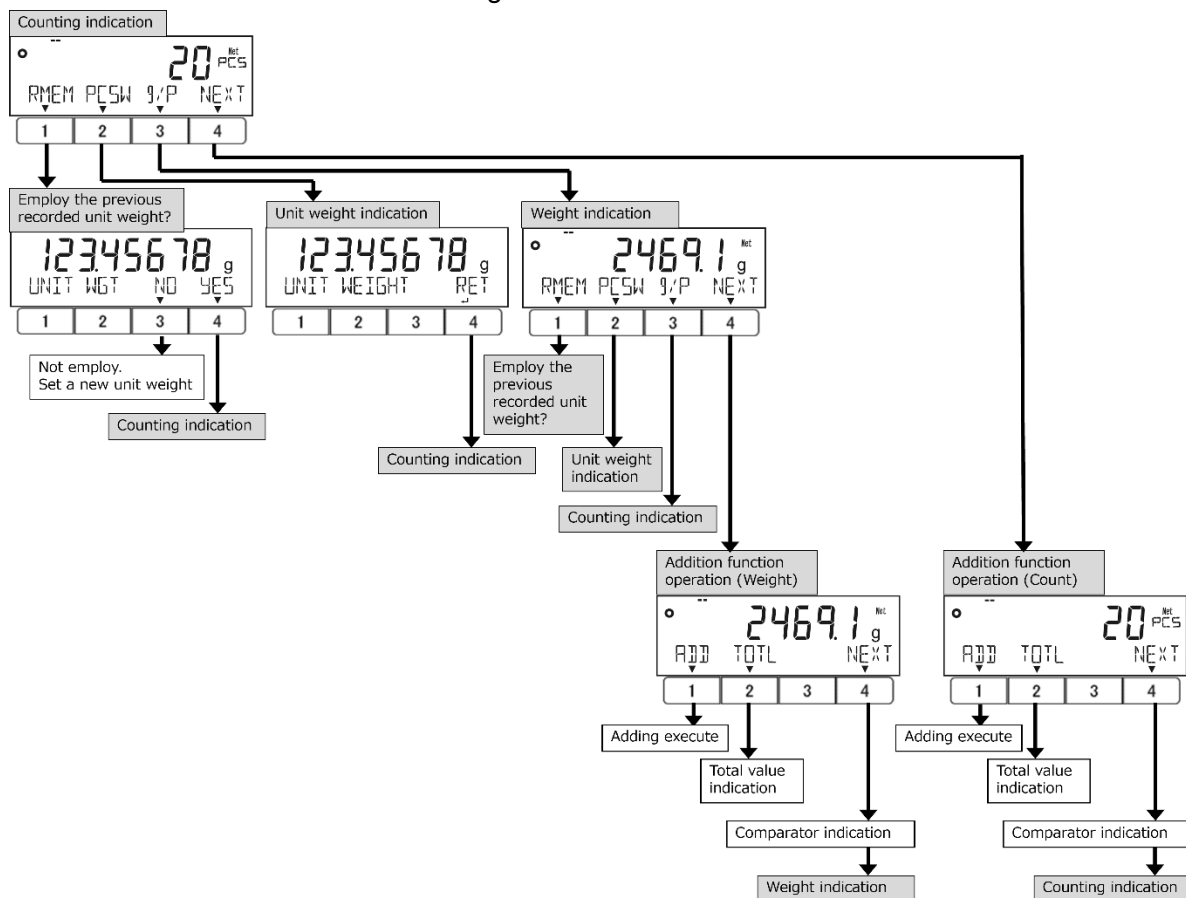


- Place tare container and perform tare weighing.
- Place the items to be counted. Count result is displayed.

Reference

When the actual samples capturing method has been selected for unit weight setting, the subsequent counting operation can be carried out by loading additional items while the samples and tare for the unit weight setting in the previous step remain on the weighing pan.

Overview of the flow from the counting indication screen



Reference

<<ADD>> and <<TOTL>> can be used when the <141 ACTIVATE> is set to "ON" and addition function is activated.

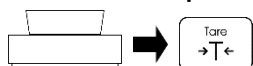
3-1-1 (1) Actual samples capturing method

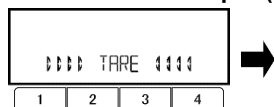
Place the specified number of samples of the item on the scale.

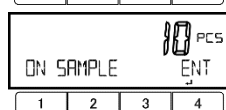
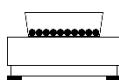
The weight of the samples is captured and divided by the specified number of samples to calculate the weight per sample, which is registered as the unit weight.

1

Place the samples.

 or command input or
external contact input ("TARE") ➡

 ➡

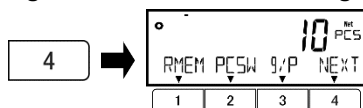
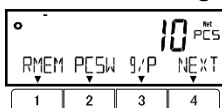
 ➡ 

- Place tare container and perform tare weighing.

- Place the specified number of samples on the tare container.

2

Capture of the samples weight and registration of the unit weight.

 ➡ 

- Press [4] key.

The weight of the samples is captured, after which the unit weight is automatically calculated and registered.

Reference

When "on VAR" is selected in step 3 of 3-1-1, select the specified number of the sample(s) among 1 to 999 by operating [1]/[2] keys before placing the samples.

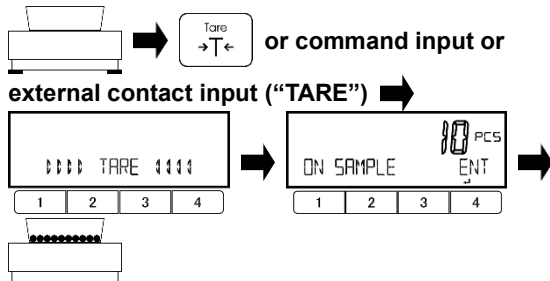
3-1-1 (2) Actual samples capturing method with “SIMPLE SCS”

Place the specified number of samples of the item on the scale.

The weight of the samples is captured and divided by the specified number of samples to calculate the weight per sample, which is registered as the unit weight.

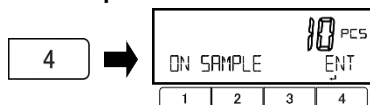
“SIMPLE SCS” divides the sample capture and unit-weight registration into several sub-steps, update the unit-weight registration while controlling the number of samples that can be added at each sub-step, thereby improving the precision of sampling.

1 Place the samples.



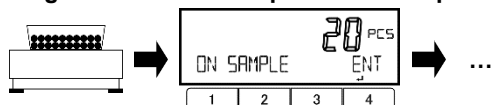
- Place tare container and perform tare weighing.
- Place the set number of samples on the tare container.

2 Capture of the samples weight and registration of the unit weight for the first sub-step.



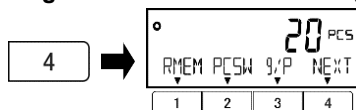
- Press the [4] key.
- The weight of the samples is captured, after which the unit weight is automatically calculated and provisionally registered.

3 Add the samples while checking the display. Capture of the additional samples weight and registration of the updated unit weight for the subsequent sub-steps.



- Add more samples, then the weight of all the samples is re-captured, after which the unit weight is automatically updated. The number of additional samples can be up to two times the total number of the samples of the previous sub-step.
- Repeat this sub-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.

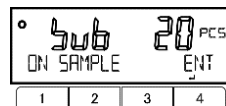
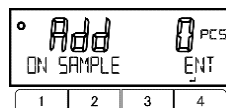
4 Registration of the unit weight.



- Press [4] key to complete the sampling sequence and register the unit weight.

Reference

- (1) When “on VAR” is selected in step 3 of 3-1-1, select the specified number of the first sample(s) among 1 to 999 by operating [1]/[2] keys before placing the first sample(s).
- (2) If the weight of the samples is less than 99 times of the 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 3-1-1 step 3.
- (3) 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.



3-1-1 (3) Numeric value setting method

Input numeric value of the unit weight by keying in.

1

Input and register the unit weight.



➡ **Numeric value input** ➡



4

(cf. "2-6 Keying in of numeric values")

- Input the unit weight by keying in.
- Press [4] key to register.

3-1-2 Percent mode



This mode is not legal for trade.

The percentage of the object weight against the reference weight is displayed.

There are two methods to set the reference weight:

- Actual sample capturing method ("onW"): Place the sample on the scale and register its weight as the reference weight.
- Numeric value setting method ("NUM"): Input numeric value of the reference weight by keying in.

Reference

- (1) The lower limit of the reference weight that can be set is the weight equivalent to 100 times the default actual scale interval (readability) d in the weight indication in each weighing unit. For the default actual scale interval (readability) d in each weighing unit, refer to "Appendix 1-1 Metrological specifications".
- (2) The readability is automatically set according to the recorded reference weight.

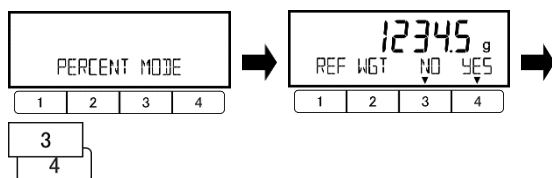
- FMA62K1S(R):

Readability (%)	Range of reference weight	
1	100 g ≤	Reference weight < 1000 g
0.1	1000 g ≤	Reference weight < 10000 g
0.01	10000 g ≤	Reference weight

- Other than FMA62K1S(R):

Readability (%)	Range of reference weight	
1	10 g ≤	Reference weight < 100 g
0.1	100 g ≤	Reference weight < 1000 g
0.01	1000 g ≤	Reference weight

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



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

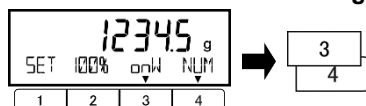
- Press [3]/[4] key to select whether or not employ the previous data.

[3](NO) : Not employ (Set a new reference weight)

[4](YES) : Employ

When "YES" is selected, go to step 4.

2 Select the method of setting the reference weight.



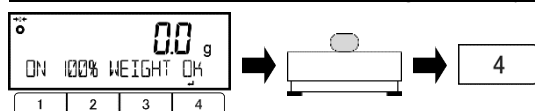
- Press [3]/[4] key to select.

[3](onW) : Actual sample capturing method

[4](NUM) : Numeric value setting method

3 Set the reference weight.

In the case of Actual sample capturing method ("onW")



- Place the sample for the reference weight on the scale.

- Press [4] key to register.

In the case of Numeric value setting method ("NUM")

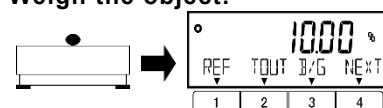


- Input the reference weight by keying in.

- Press [4] key to register.

(cf. "2-6 Keying in of numeric values")

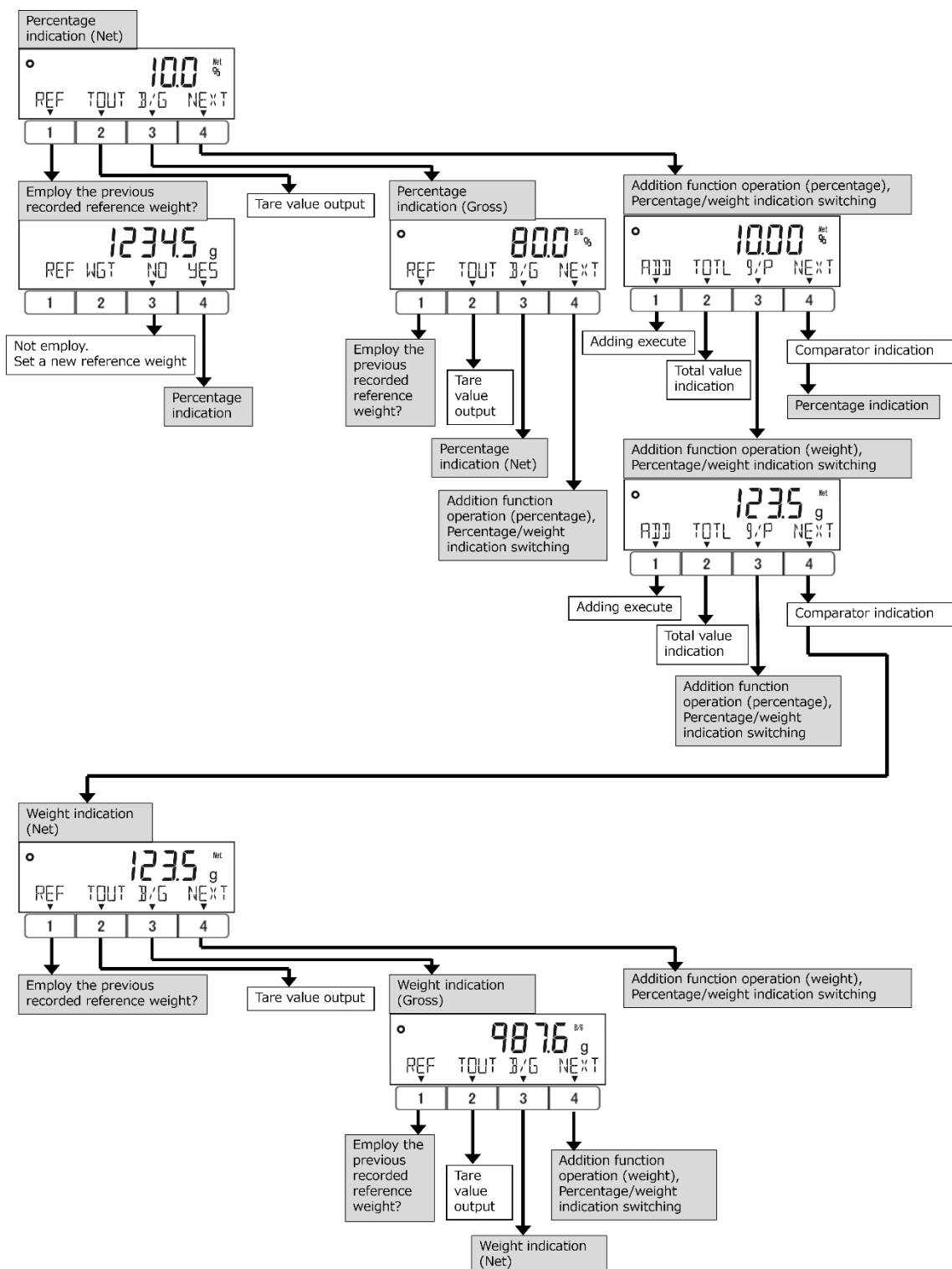
4 Weigh the object.



- Load the object to be measured.

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

■ Overview of the flow from the percentage indication screen



<TOUT> (Tare value output) is not available for verified scale.

Reference

<<ADD>> and <<TOTL>> can be used when the <141 ACTIVATE> is set to "ON" and addition function is activated.

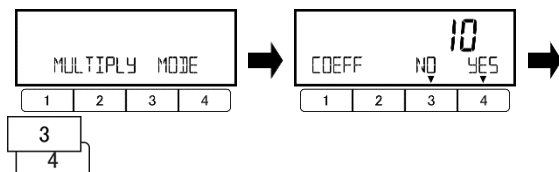
3-1-3 Multiply mode

The calculated value is displayed after multiplying the object weight by a pre-set coefficient.



This mode is not available for verified scale.

1 Select whether or not employ the previous recorded coefficient.



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

- Press [3]/[4] key to select whether or not employ the previous data.

[3](NO): Not employ (Set a new coefficient)

[4](YES): Employ

When "YES" is selected, go to step 3.

2 Set the coefficient.



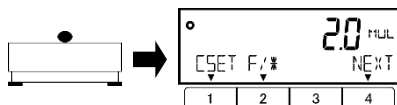
Numeric value input ➡ 4

(cf. "2-6 Keying in of numeric values")

- Input the coefficient by keying in.

- Press [4] key to register.

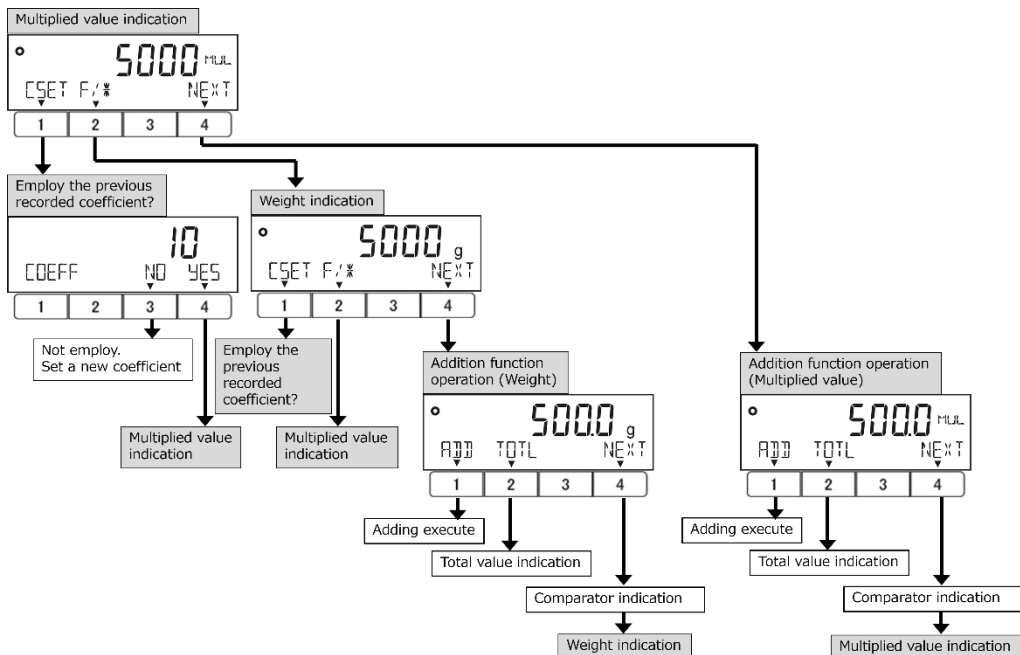
3 Weigh the object.



- Load the object to be measured.

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

■ Overview of the flow from the multiplied value indication screen



Reference

<<ADD>> and <<TOTL>> can be used when the <141 ACTIVATE> is set to "ON" and addition function is activated.

3-2 Unit setting

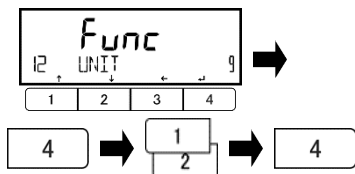
Various units for weight can be selected. Please also refer to "Appendix 1-1 Metrological specifications", "Appendix 1-3 Weighing capacity and readability by non-metric units" and "Appendix 2 Table of display symbols and conversions of weight units".



Only "gram", "kilogram" and "carat" are available for verified scale.

"carat" is a unit of measurement used for trading with precious stones.

1 Select the unit setting.



- Go to <12 UNIT >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

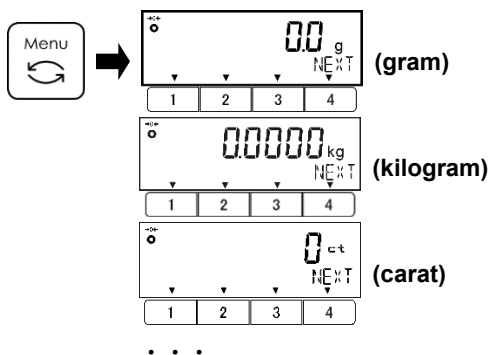
- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select the unit (Refer to Unit Setting List).

- Press [4] key to confirm.

Unit Setting List			
g : gram	Kg : kilogram	ct : carat	LB : pound
OZ : ounce	OZT : ounce troy	DWT : pennyweight	MOM : もんめ momme
TLH : 金衡兩 tael troy (Hong Kong)	TLS : tahl (Singapore/Malaysia)	TLT : 兩 tael (Taiwan)	
TOLA : tola (India)			

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

3-3 Comparator function

The comparator function judges measured values based on pre-registered thresholds.

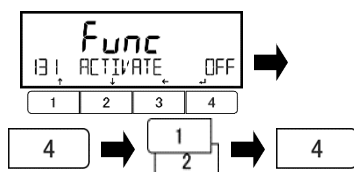
Reference The comparator function can be used in each measuring mode.

3-3-1 Comparator function setting

Reference

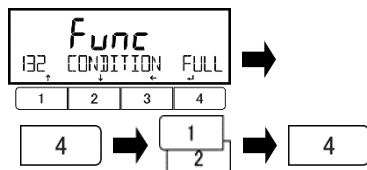
- When to use HIGH/OK/LOW buzzer, be sure to set <1A BUZZER> to "ON". (cf. "8-2 Buzzer".)
- By setting <414 COMPARE> to "ON", the measurement result output can only be produced when the discrimination result of the comparator function is "OK" or absent. (cf. "5-2 Communication setting").

1 Select ON/OFF of the comparator function and type of discrimination.



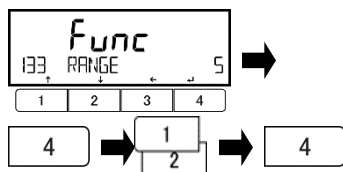
- Go to <131 ACTIVATE>.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
 - OFF: OFF
 - H / L: Upper and lower limits valid
 - HIGH: Upper limit alone valid
 - LOW: Lower limit alone valid
- Press [4] key to confirm.

2 Select the discriminant condition.



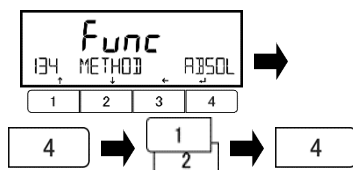
- Go to <132 CONDITION >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
 - FULL: At all times
 - STBL: Only at stable times
- Press [4] key to confirm.

3 Select the discriminant range.



- Go to <133 RANGE >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
 - 5: +5 d or more by weight from net zero
 - FULL: Entire area
- Press [4] key to confirm.

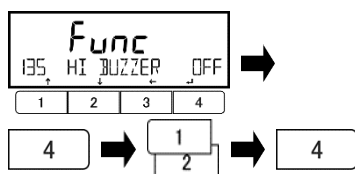
4 Select the threshold setting method.



- Go to <134 METHOD >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
 - ABSOL: Absolute values setting
 - RELAT : Deviation values setting
- Press [4] key to confirm.

5

Set HIGH buzzer.



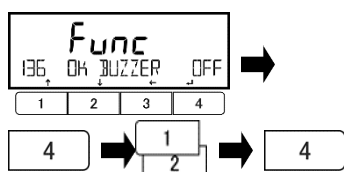
- Go to <135 HI BUZZER >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.

OFF: OFF
ON : Active when the discriminant result is HIGH

- Press [4] key to confirm.

6

Set OK buzzer.



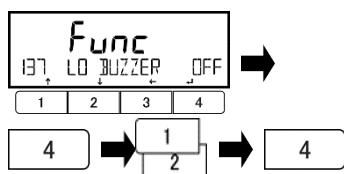
- Go to <136 OK BUZZER >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.

OFF: OFF
ON : Active when the discriminant result is OK

- Press [4] key to confirm.

7

Set LOW buzzer.



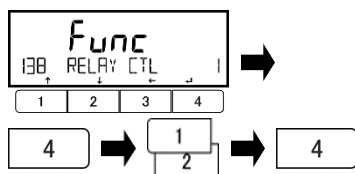
- Go to <137 LO BUZZER >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.

OFF: OFF
ON : Active when the discriminant result is LOW

- Press [4] key to confirm.

8

Selects enable/disable of control by relay contact input for the relay contact output.



- This menu item is for optional relay contact I/O.
- Go to <138 RELAY CTL >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.

1: Disabled
2: Enabled

- Press [4] key to confirm.

3-3-2 Setting of the thresholds

There are two ways to set thresholds:

- Absolute values setting: Specify the threshold values directly.
- Deviation values setting: First, specify the target value, then specify the deviations from the target as threshold values.

(For example) H/L (upper and lower limits valid) setting, to set the target value to 1000,0 g and the "OK" range to 900,0 g to 1200,0 g

Threshold setting method	Target value	Lower limit value	Upper limit value
Absolute values setting		900,0 g	1200,0 g
Deviation values setting	1000,0 g	-100,0 g	200,0 g

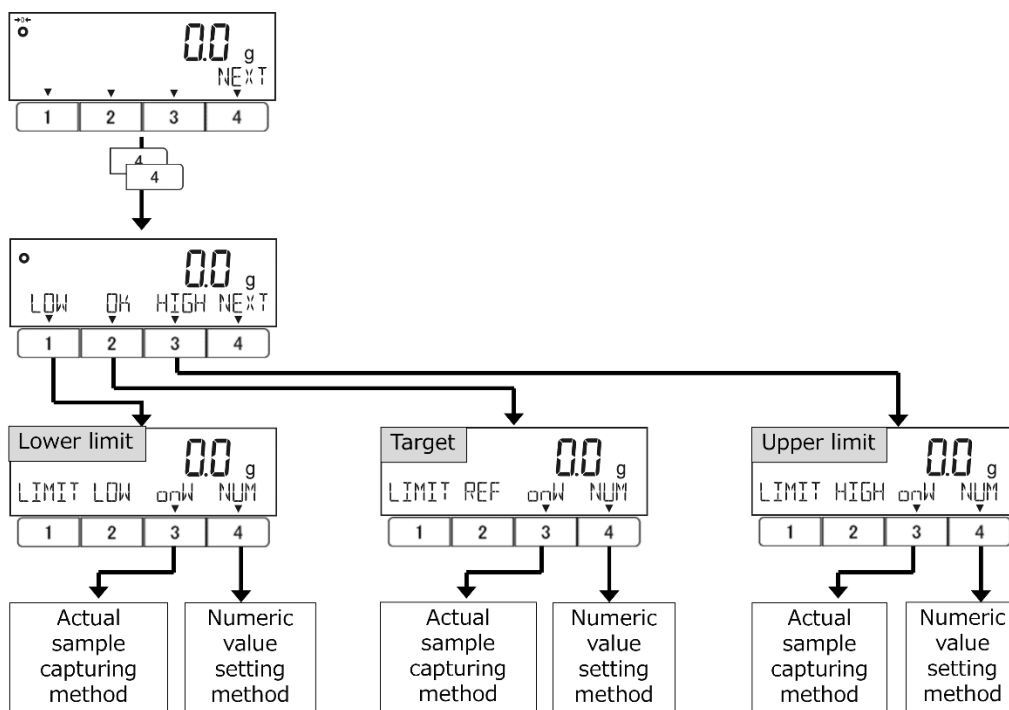
Note

Once thresholds have been entered for one of the methods, switching methods via the menu item <134 METHOD> changes the meaning of the thresholds, while the entered threshold values are maintained.

There are two input methods for each threshold/target value:

- Actual sample capturing method ("onW"): Place the sample on the scale and register its weight as the threshold/target value.
- Numeric value setting method ("NUM"): Input the numeric value of the threshold/target value by keying in.

■ Overview of the flow of setting each threshold/target value.



Reference

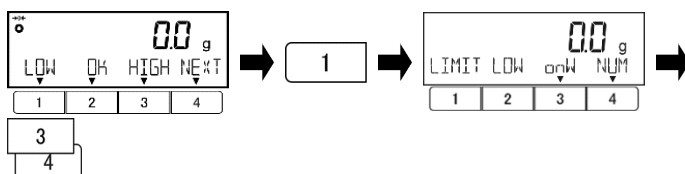
(1) Target value, Lower limit value and Upper limit value can be set also via the following menu items of setting menu.

- For Weight mode: <33 COMPARE WEIGHT>
- For Percent mode: <34 COMPARE PERCENT>
- For Counting mode: <35 COMPARE COUNT>
- For Multiply mode: <36 COMPARE MULT>

(2) In weight mode, the upper limit value and lower limit value of the threshold value can be displayed by the free key <<HIGH>> and <<LOW>> respectively.

3-3-2(1) Absolute values setting method

1 Set a lower limit value. (When <131 ACTIVATE> is set to "H/L" or "LOW")



- Press [1] key to go to the lower limit setting mode.

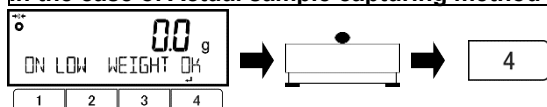
The previously registered lower limit is displayed.

- Press [3]/[4] key to select the input method:

[3] ("onW"): Actual sample capturing method

[4] ("NUM"): Numeric value setting method

In the case of Actual sample capturing method ("onW")

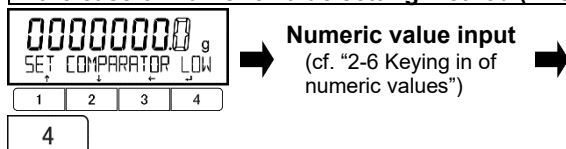


- Place a sample that is equivalent to the lower limit value.

- Press [4] key.

The lower limit value is registered.

In the case of Numeric value setting method ("NUM")

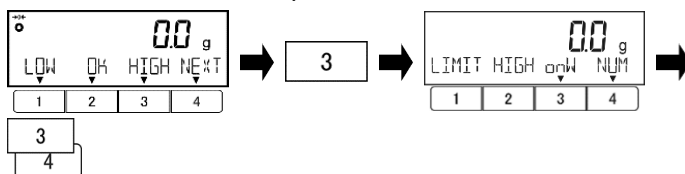


- Input the lower limit value by keying in.

- Press [4] key.

The lower limit value is registered.

2 Set an upper limit value. (When <131 ACTIVATE> is set to "H/L" or "HIGH")



- Press [3] key to go to the upper limit setting mode.

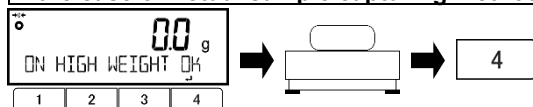
The previously registered upper limit is displayed.

- Press [3]/[4] key to select the input method:

[3] ("onW"): Actual sample capturing method

[4] ("NUM"): Numeric value setting method

In the case of Actual sample capturing method ("onW")

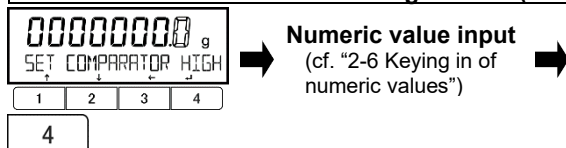


- Place a sample to be weighed that is equivalent to the upper limit value.

- Press [4] key.

The upper limit value is registered.

In the case of Numeric value setting method ("NUM")



- Input the upper limit value by keying in.

- Press [4] key.

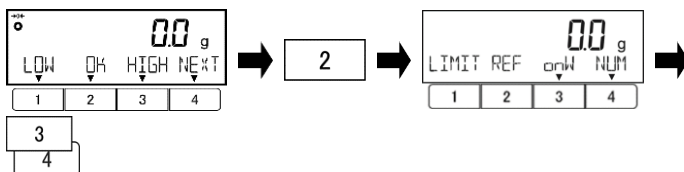
The upper limit value is registered.

Reference

Pressing [Menu] key cancels the setting midway through.

3-3-2(2) Deviation values setting method

1 Set a target value.



- Press [2] key to go to the target value setting mode.

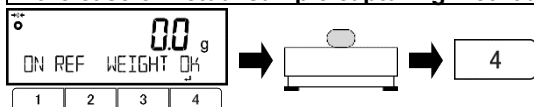
The previously registered target value is displayed.

- Press [3]/[4] key to select the input method:

[3] ("onW"): Actual sample capturing method

[4] ("NUM"): Numeric value setting method

In the case of Actual sample capturing method ("onW")

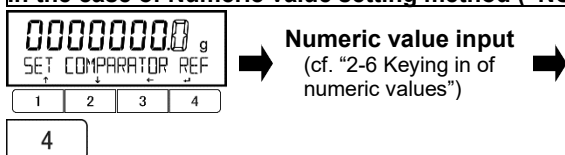


- Place a sample to be weighed that is equivalent to the target value.

- Press [4] key.

The target value is registered.

In the case of Numeric value setting method ("NUM")

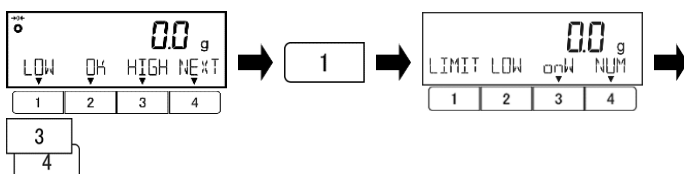


- Input the target value by keying in.

- Press [4] key.

The target value is registered.

2 Set a lower limit value. (When <131 ACTIVATE> is set to "H/L" or "LOW")



- Press [1] key to go to the lower limit setting mode.

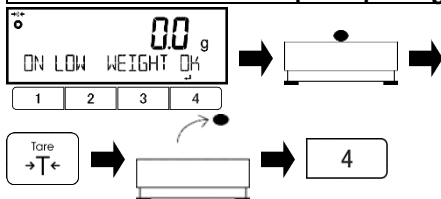
The previously registered lower limit is displayed.

- Press [3]/[4] key to select the input method:

[3] ("onW"): Actual sample capturing method

[4] ("NUM"): Numeric value setting method

In the case of Actual sample capturing method ("onW")

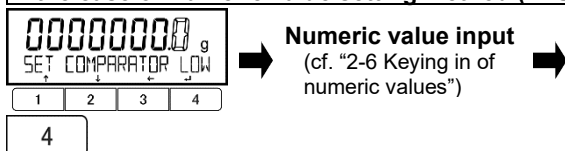


- Place the load and press [Tare] key. Then unload the load by the amount of weight corresponding to the negative lower limit value.

- Press [4] key.

The lower limit value is registered.

In the case of Numeric value setting method ("NUM")



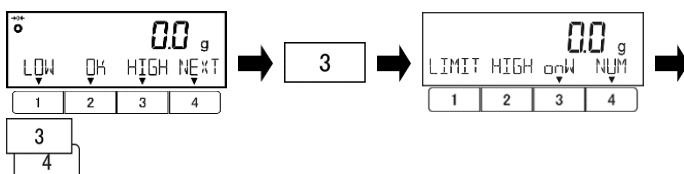
- Input the lower limit value by keying in.

- Press [4] key.

The lower limit value is registered.

3

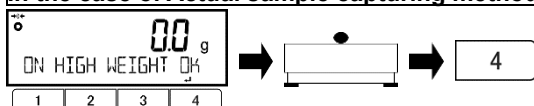
Set an upper limit value. (When <131 ACTIVATE> is set to "H/L" or "HIGH")



- Press [3] key to go to the upper limit setting mode.
The previously registered upper limit is displayed.
- Press [3]/[4] key to select the input method:

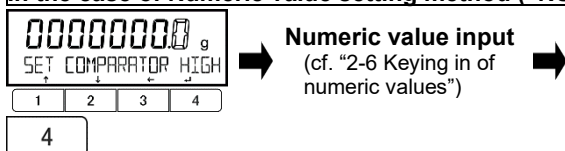
[3] ("onW"): Actual sample capturing method
[4] ("NUM"): Numeric value setting method

In the case of Actual sample capturing method ("onW")



- Place a sample to be weighed that is equivalent to the upper limit value.
- Press [4] key.
The upper limit value is registered.

In the case of Numeric value setting method ("NUM")



Numeric value input
(cf. "2-6 Keying in of numeric values")

- Input the upper limit value by keying in.
- Press [4] key.

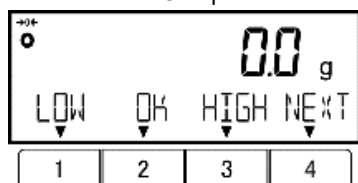
The upper limit value is registered.

Reference

Pressing [Menu] key cancels the setting midway through.

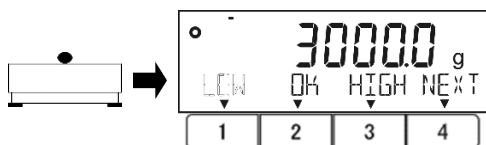
3-3-3 How to perform discrimination

Switch to the “Comparator indication” according to “2-7 Function keys switching at each measuring mode”.



Load an object to be judged.

Depending on the result of the discrimination, <<LOW>>, <<OK>> and <<HIGH>> flashes as shown in the table below. In addition, by setting <135 HI BUZZER>, <136 OK BUZZER> and <137 LO BUZZER>, buzzer can be sounded in response to each discrimination result.



Setting of <131 ACTIVATE> Measured value of the object	H/L (Upper and lower limit valid)	HIGH (Upper limit alone valid)	LOW (Lower limit alone valid)
Over the upper limit	<< HIGH >>Blinking	<< HIGH >>Blinking	NA
Appropriate amount	<< OK >>Blinking	<< OK >>Blinking	<< OK >>Blinking
Below the lower limit	<< LOW >>Blinking	NA	<< LOW >>Blinking

3-4 Addition function

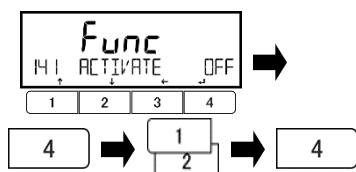
Measure a plurality of objects to be measured in sequence and indicates its total value.

The addition function includes two ways of operating method:

- Replacement method: Method of measuring a series of objects to be added together, replacing each object to be added.
- Net accumulation method: Method of measuring a series of objects to be added together, by loading each additional object without replacing the already added objects.

Reference The addition function can be used in each measuring mode.

1 Select ON/OFF of the addition function.



- Go to <141 ACTIVATE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

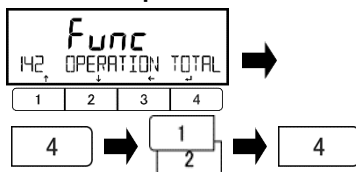
- Press [1]/[2] key to select.

OFF: Invalid

ON: Valid

- Press [4] key to confirm.

2 Select the operation method.



- Go to <142 OPERATION >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

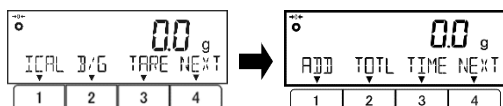
TOTAL: Replacement method

NET: Net accumulation method

- Press [4] key to confirm.

3 For weighing mode:

Set the "Free keys".



- For weighing mode, set the following items to the free keys.

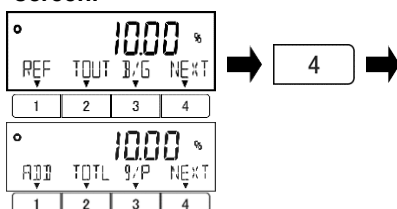
ADD: Adding execute

TOTL: Total indication

(Refer to "2-8 Free key setting" for setting the free keys.)

For other measuring mode:

Switch to the addition function operation screen.



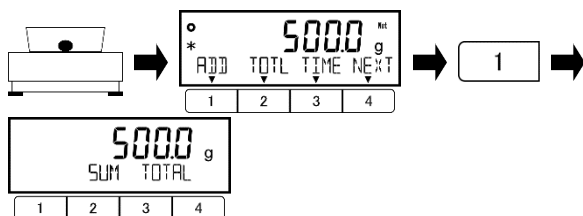
- For other measuring mode, press [4] key to switch to "adding function operation" screen.

(Refer to "2-7 Function keys switching at each measuring mode")

3-4-1 Measuring by means of addition

When <<ADD>> is assigned to [1] key and <<TOTL>> is assigned to [2] key.

1 Place a first object to be measured and capture it.



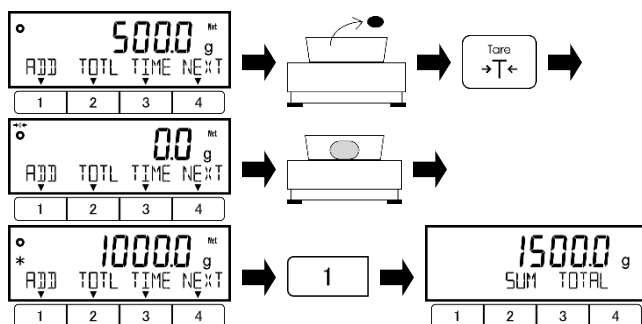
- Place a first object to be measured.
- After < * > appears, press [1](<<ADD>>) key.

The measurement value is stored and displayed with <SUM TOTAL> for a few seconds.

2 In the case of the replacement method

(<142 OPERATION>: "TOTAL")

Replace an object to be measured with a new one and add its measurement.



The scale returns to the measuring indication.

- Remove the previous object and press [Tare] key.

- Then place the next object to be weighed.

- After < * > appears, press [1](<<ADD>>) key.

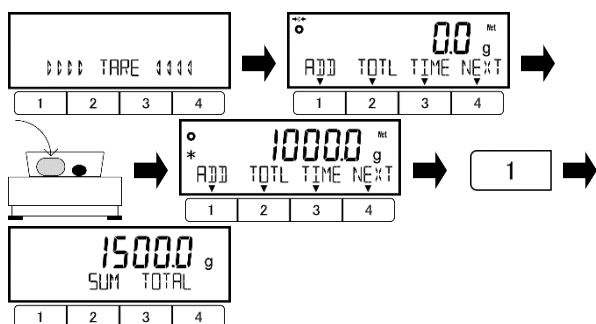
The total value is stored and displayed with <SUM TOTAL> for a few seconds.

- Repeat this operation to perform addition.

In the case of the net accumulation method

(<142 OPERATION>: "NET")

Add an object to be measured and add its measurement.



Tare weighing starts automatically after <SUM TOTAL> indication, then the scale returns to net-zero indication.

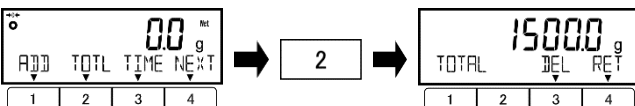
- Add an object to be measured without doing any other operation.

- After < * > appears, press [1](<<ADD>>) key.

The total value is stored and displayed with <SUM TOTAL> for a few seconds.

- Repeat this operation to perform addition.

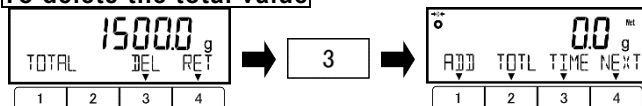
3 Indicate the total value.



- Press [2](<<TOTL>>) key.

Total value is indicated.

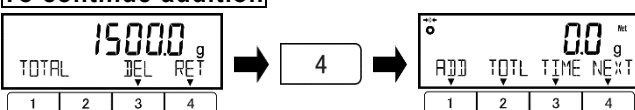
To delete the total value



- Press [3](<>) key.

The total value is deleted, and the screen returns to the measuring mode.

To continue addition



- Press [4](<<RET>>) key.

The screen returns to the measuring mode, with the total value retained.

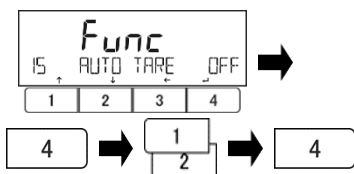
3-5 Automatic tare subtraction

Tare subtraction is carried out automatically without key operation, command input, or external contact input. This function identifies the first load as the tare and automatically perform tare subtraction.

Note When automatic tare subtraction is used, the accuracy of the displayed/output tare value cannot be guaranteed, as the zero point may deviated.

Reference (1) This function can be operated in each measuring mode, except for the unit weight setting in the counting mode, reference weight setting in the percentage mode, and target value and threshold value setting in the comparator function.
(2) When preset tare is in operation, automatic tare weighing is disabled and cannot be carried out.

1 Select ON/OFF of the automatic tare subtraction.



- Go to <15 AUTO TARE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

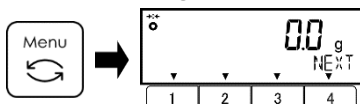
- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

OFF: OFF
ON: Valid

- Press [4] key to confirm.

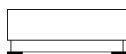
2 Exit the setting menu.



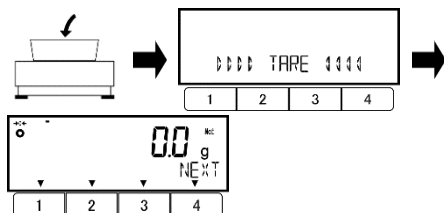
- Press [Menu] key to shift to the measuring mode.

3-5-1 Measuring with automatic tare subtraction

1 Check that nothing is loaded on the weighing pan.



2 Place a container on the weighing pan.



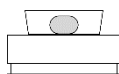
- Place a container on the weighing pan.

Tare subtraction operates automatically, indication changes to zero, and < **Net** > and <=>0<=> symbol lights.

Note

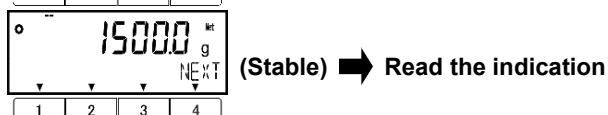
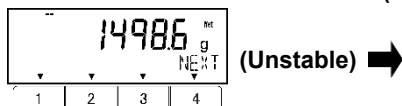
Use a container whose weight is over 0,15% of the maximum capacity (Max).

3 Load an object on the tare.



- Load the object to be measured, ensuring that <=>0<=> symbol is lit immediately before loading the object.

4 Read the measurement value (net reading).

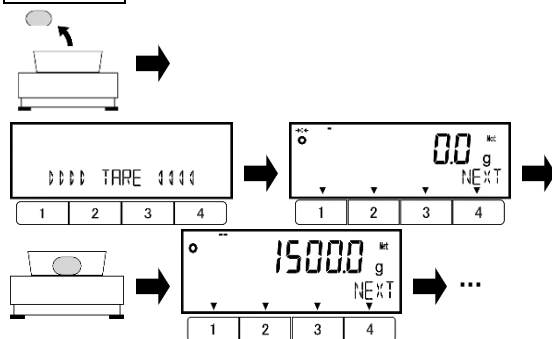


The net value (measured value of the object only) is displayed.

- Read the indication when the scale indication reaches stable equilibrium and < ● > symbol is indicated.

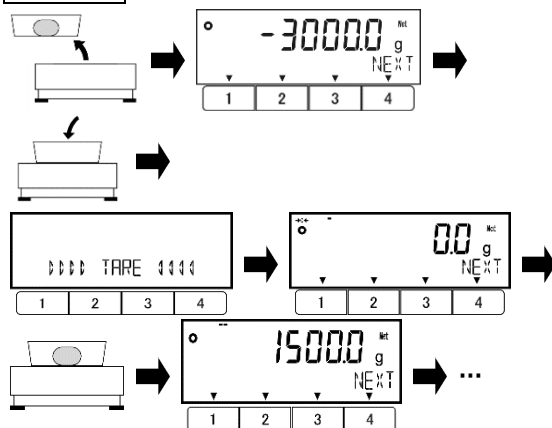
5

To measure another object in the same container



- Remove the object. Automatic tare subtraction is carried out. Indication changes to zero, and < Net > and < →0← > symbol lights.
 - Load another object. The net value of it is displayed.
 - Repeat the above operation for weighing.
- Automatic tare subtraction is carried out when the object is removed and net reading becomes around zero.

To measure another object in another container



- Remove the object and the container.
 - Load another container. Automatic tare subtraction is carried out. Indication changes to zero, and < Net > and < →0← > symbol lights.
 - Load another object. The net value of it is displayed.
 - Repeat the above operation for weighing.
- Automatic tare subtraction is carried out when a container is loaded after nothing is loaded on the weighing pan.

Reference

- (1) It is possible to set whether or not to wait for stable equilibrium to be reached before tare subtraction via the menu item <18 WT STABLE>. If this is set to "not wait", the accuracy and precision of the measurement cannot be guaranteed. (cf. "4-4 Stabilisation wait setting")

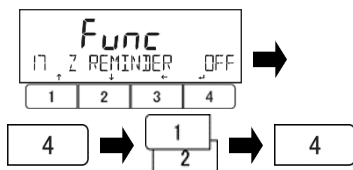
Legal Metrology

 On verified scale, the setting of <18 WT STABLE> is not changeable and the scale always waits the stable equilibrium to be reached before tare subtraction operation.
- (2) Symbol < →0← > during net reading indicates that the deviation from the zero point of net reading is within 1/4 of the actual scale interval.

3-6 Zero reminder

This function displays a reminder to ensure that the zero-setting operation is not forgotten during a series of measuring operation.

1 Select ON/OFF of the zero reminder.



- Go to <17 Z REMINDER >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

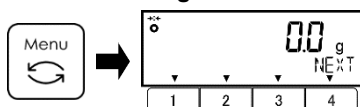
- Press [1]/[2] key to select.

OFF: Invalid

ON: Valid

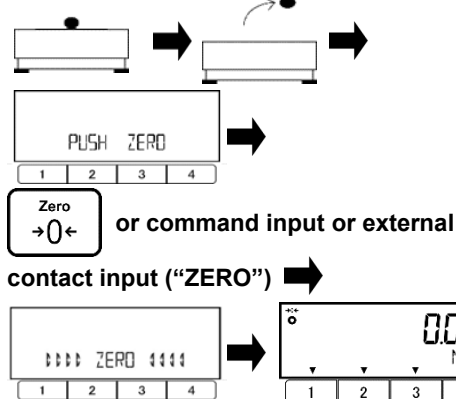
- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

3 Operation of the zero reminder.



- Load an object beyond the zero-setting range (cf. "Appendix 1-1 Metrological specifications") on the weighing pan and remove it.

The display shows <PUSH ZERO>.

- Press [Zero] key or input "Zero setting" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command") or carry out external contact input (cf. "5-1-2(1) External contact input") to perform zero setting. <PUSH ZERO> disappears and zero setting is executed.

Indication becomes zero and < →0← > symbol lights.

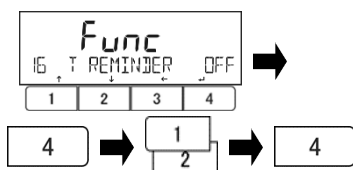
3-7 Tare reminder

This function displays a reminder to ensure that the tare operation is not forgotten during a series of measuring operation.

Note (1) When used simultaneously with the Zero reminder function, the operation of the Zero reminder function has priority.
(2) When used simultaneously with the Automatic tare subtraction function, the operation of the Automatic tare subtraction has priority.

Reference This function has two operation modes:
Mode 1: The display shows <PUSH TARE> when the gross value is over 0,15% of the maximum capacity (Max) for the first time.
Mode 2: The display shows <PUSH TARE> when the gross value is over 0,15% of the maximum capacity (Max) for the first time, or when the net value reaches a negative value.

1 Select the tare reminder setting



- Go to <16 T REMINDER >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

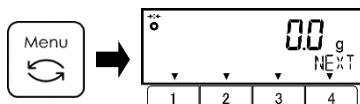
OFF: Invalid

1: Mode 1 Valid

2: Mode 2 Valid

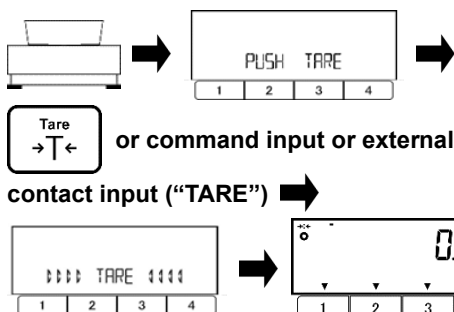
- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

3 Operation of the tare reminder.



- Place a tare on the weighing pan.

The display shows <PUSH TARE>.

- Press [Tare] key or input "Tare weighing" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command")

or carry out external contact input (cf. "5-1-2(1) External contact input") to perform tare weighing.

<PUSH TARE> disappears and tare weighing is executed.

- Indication becomes zero, and <=>0<=> and < Net > symbol lights.

3-8 Preset tare device

Subtracts a preset tare value from a gross value and indicates the result of the calculation.

The preset tare values are once registered in the memory by keying in or weighing the tare, and recalled later when used.

Five preset tare values can be registered for this scale.

Reference

When preset tare is in operation, semi-automatic tare weighing by [Tare] key or command input, automatic tare weighing, and semi-automatic tare weighing by external contact input cannot be carried out.

If tare weighing is already in operation when preset tare is activated, the tare is cancelled.

3-8-1 Registration of preset tare values

There are three methods of setting preset tare values:

- Actual object capturing method ("onW"): Weigh a tare container with this scale to capture the weight as a preset tare value.
- Keying in method ("NUM"): Inputting a preset tare value directly via key operation.
- Command input: Inputting the preset tare value and execution command from external device. (cf. "5-4 Command input" and "5-4-3(2) Preset tare value setting and execution command")

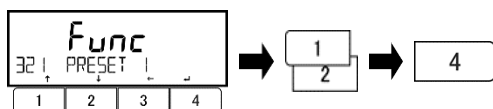
Reference

When the "command input" is used, the input value is registered in <321 PRESET 1> (preset tare value No. 1) and, in addition, the scale operates preset tare subtraction with preset tare value No. 1.

■For Actual object capturing method and Keying in method

1

Select the preset tare value No. to be registered.



- Go to <321 PRESET 1>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [1]/[2] key to select the preset tare value No. to be registered.

<321 PRESET 1>

<322 PRESET 2>

<323 PRESET 3>

<324 PRESET 4>

<325 PRESET 5>

- Press [4] key to confirm.

2

Select the setting method.



"3-8-1 (1) Actual object capturing method"

or

"3-8-1 (2) Keying in method"

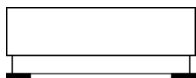
- Press [3]/[4] key to select the setting method.

[3] ("onW"): Actual object capturing method

[4] ("NUM"): Keying in method

3-8-1 (1) Actual object capturing method

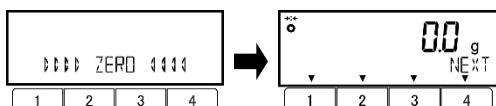
- 1 Check that nothing is loaded on the weighing pan.



- 2 Execute "Zero setting".



or Command input or External contact input ("ZERO") ➡



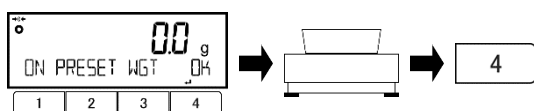
- Press [Zero] key or input "Zero setting" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command") or carry out external contact input (cf. "5-1-2(1) External contact input") to perform zero setting.

Indication becomes zero and the symbol < ➡0< ➡ lights.

Note

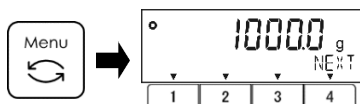
This operation is important for accurate preset tare input afterwards.

- 3 Set a preset tare value.



- Place a tare container and press [4] key. The weight of the tare is captured and stored as a preset tare value.

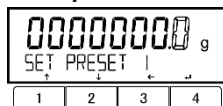
- 4 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

3-8-1 (2) Keying in method

- 1 Set a preset tare value.



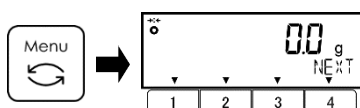
➡ Numeric value input ➡



(cf. "2-6 Keying in of numeric values")

- Input the preset tare value.
- Press [4] key to confirm.
The preset tare value is stored.

- 2 Exit the setting menu.

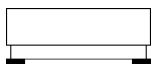


- Press [Menu] key to shift to the measuring mode.

3-8-2 Measuring with preset tare

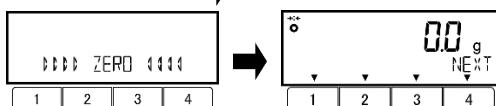
Reference <31 PT MODE> is reset to "OFF" and preset tare is deactivated each time the scale is turned on.

1 Check that nothing is loaded on the weighing pan.



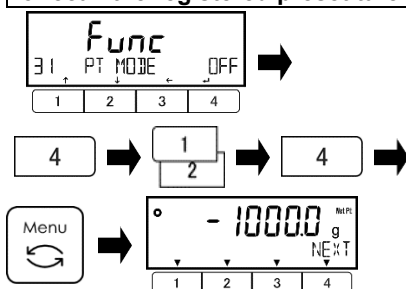
2 Execute "Zero setting".

Zero $\rightarrow 0 \leftarrow$ or Command input or External contact input ("ZERO") $\Rightarrow$



3 Enable the preset tare.

To recall the registered preset tare value



- Press [Zero] key or input "Zero setting" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command") or carry out external contact input (cf. "5-1-2(1) External contact input") to perform zero setting.

Indication becomes zero and the symbol $\leftarrow \rightarrow 0 \leftarrow$ lights.

To recall the registered preset tare value:

- Go to <31 PT MODE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1] / [2] key to select.

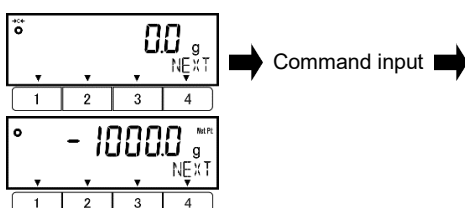
- OFF : Disabled
- 1 : Subtract preset tare value 1
- 2 : Subtract preset tare value 2
- 3 : Subtract preset tare value 3
- 4 : Subtract preset tare value 4
- 5 : Subtract preset tare value 5

- Press [4] key to confirm.

- Press [Menu] key to shift to the measuring mode.

The selected preset tare value is subtracted, and the calculated net value is displayed with < **Net Pt** > indication.

To set the preset tare value by command input



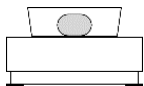
To set the preset value by command input:

- Input the "Preset tare value setting and execution command"

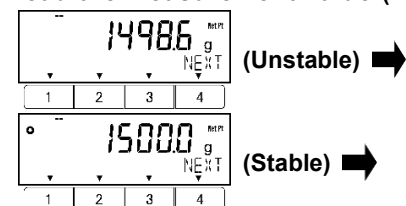
(cf. "5-4 Command input" and "5-4-3 (2) Preset tare value setting and execution command")

The preset tare value No.1 is registered and subtracted, and the calculated net value is displayed with < **Net Pt** > indication.

4 Place the tare container and object.



5 Read the measurement value (net reading).



Read the indication.

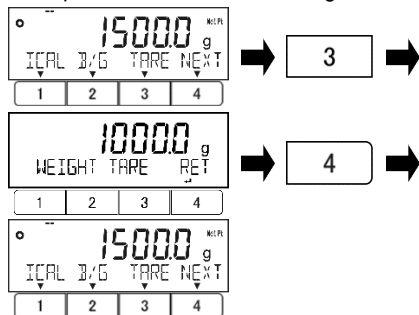
Place an object together with the tare container whose weight has been registered as a preset tare value.

The net value (measured value of the object only) is displayed.

- Read the indication when the scale indication reaches stable equilibrium and < **Net Pt** > symbol is indicated.

6 Check the preset tare value (for weight mode only).

Example when <<TARE>> is assigned to the free key F3.



In weight mode, the preset tare value can be displayed by the free key <<TARE>>. (cf. "2-8 Free key setting")

- Press function key on which <<TARE>> is displayed above.

The preset tare value is displayed on the display.

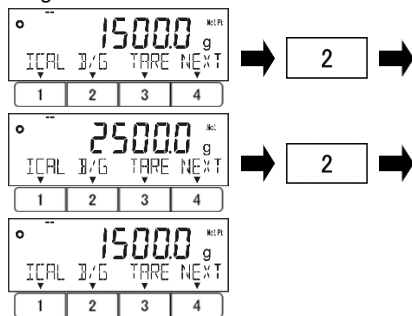
- Press [4] key (<<RET >) to return to the measurement display.

Note

Despite the message <WEIGHT TARE>, what is actually displayed is not the tare value but the preset tare value.

7 Check the gross value (for weight mode and percent mode only).

Example when <<B/G>> is assigned to the free key F2 in weight mode.



In weight mode and percent mode, the display can be switched between the net reading and gross reading.

To use this function in weight mode, the item <<B/G>> needs to be assigned to the free key. (cf. "2-8 Free key setting")

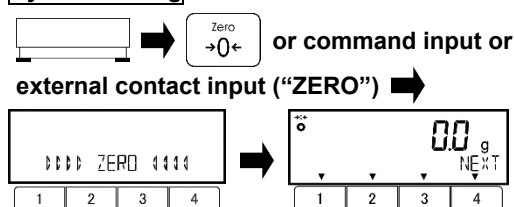
- Press function key on which <<B/G>> is displayed above.

The display switches to gross reading, <Net Pt> symbol disappears and <B/G> symbol appears instead.

- Press the function key (<<B/G>>) again to return to the net reading.

8 Deactivate the preset tare.

By zero setting



There are two ways to deactivate the preset tare:

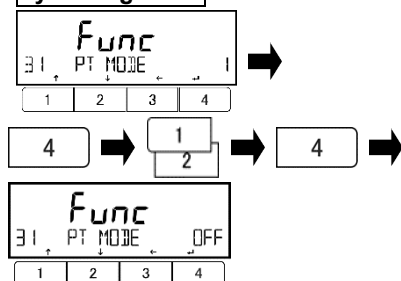
(1) By zero setting

- Remove both the object and tare container on the weighing pan, then press [Zero] key or input "Zero setting" command (cf. "5-4-2(1) Zero-setting/Tare-weighing command") or carry out external contact input (cf. "5-1-2(1) External contact input") to perform zero setting.

Preset tare is deactivated and zero setting is carried out.

The indication then becomes zero, <=>0> symbol appears, and < Net Pt > symbol disappears.

By setting menu



(2) By setting menu

- Go to <31 PT MODE>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1] / [2] key to select "OFF".

- Press [4] key to confirm.

Reference

- (1) Symbol $\rightarrow 0 \leftarrow$ during net reading indicates that the deviation from the zero point of (preset tared) net reading is within 1/4 of the actual scale interval.
- (2) Net value can be output, in accordance with the output setting, during net value indication ("Step 5 Read the measurement value (net reading)").



On verified scale, the preset tare value is always output following the net value output.

When <41C GNT OUT> is set to "GNT" to enable the Combined Gross-Net-Tare output, net value is output together with the corresponding gross value and preset tare value.

(cf. "5-2 Communication setting")

- (3) Preset tare value alone can be output by pressing the [Output] key during preset tare value indication ("Step 6 Check the preset tare value (for weight mode only)").
- The preset tare value is output once immediately after the [Output] key is pressed, irrespective of the setting of <413 CONDITION>. (cf. "5-2 Communication setting")



On verified scale, the preset tare value cannot be output alone.

- (4) Gross value can be output, in accordance with the output setting, during gross value indication ("Step 7 Check the gross value (for weight mode only)").

3-9 Save tare weight function

When this function is activated, the last tare value at the time the scale is powered off is recalled to tare-subtract when turning on the scale, instead of initial zero-setting or initial tare-subtraction.

Use this function when you would like to prevent redoing the weighing operation due to an unexpected power failure in a place where the power supply is unstable.

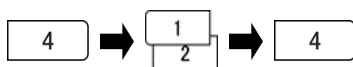


This function is not available on verified scale.

Reference

- (1) Unlike its name "Save Tare Weight Function" or its displayed name <STORE TARE>, it is not a function that save the tare value and keep it ready to be recalled at any time. When you would like to use the scale with such a function, please use "Preset tare" (cf. "3-8 Preset tare device") instead.
- (2) When this function is used together with "Span adjustment at power on" (<63B START CAL>), it is necessary to unload the measurement item and tare from the weighing pan before turning on the scale.

1 Select ON/OFF of the save tare weight function.



- Go to <63D STORE TARE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

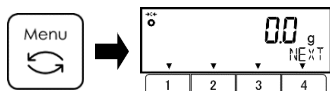
- Press [1]/[2] key to select.

OFF: Disabled

ON: Enabled

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

Note

Leaving the balance loaded for a long period may result in a larger error in weighing.

3-10 Combined semi-automatic zero-setting and tare-subtraction

This function is to make indication to zero by the same external contact input operation without distinguishing between zero-setting and tare-subtraction.

To use this function, set <422 OPERATION> to "Z/T" by referring "5-1-2(1) External contact input".



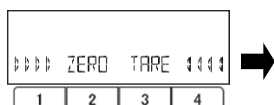
This function is not available on the verified balance.

Note

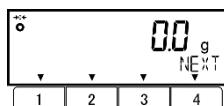
- "Preset tare", "Zero reminder" and "Tare reminder" may not work properly with this function.
- When combined semi-automatic zero-setting and tare-subtraction is used, the accuracy of the displayed/output tare value cannot be guaranteed.

1 Execute combined zero-setting and tare-subtraction.

External contact input ("Z/T") ➡



- When the load is within the zero-setting range:



- When the load is greater than the zero-setting range:

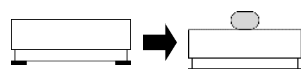


- Carry out external contact input (cf. "5-1-2(1) External contact input") to perform combined zero-setting and tare-subtraction.

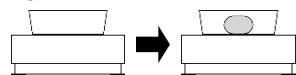
Indication becomes zero and the <➡0<➡> symbol lights.

When the load is greater than the zero-setting range, <Net> symbol also lights.

2 Load an object.

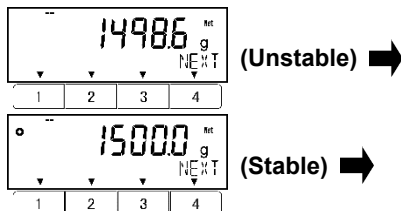


or



- Load the object to be measured, ensuring that <➡0<➡> symbol is lit immediately before loading the object.

3 Read the measurement value.



Read the indication.

The measured value of the object is displayed.

- Read the indication when the scale indication reaches stable equilibrium and <●> symbol is indicated.

Reference

- (1) It is possible to set whether or not to wait for stable equilibrium to be reached before combined zero-setting and tare-subtraction via the menu item <18 WT STABLE>. If this is set to "not wait", the accuracy and precision of the measurement cannot be guaranteed. (cf. "4-4 Stabilisation wait setting")
- (2) Symbol <➡0<➡> during net reading indicates that the deviation from the zero point of gross reading or net reading is within 1/4 of the actual scale interval.

3-11 Hold the weight indication

Weight indication can be held by operating the free key <<HOLD>>.

Reference This function is only available on the weight mode.

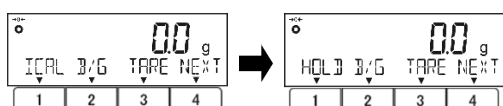
Note

(1) < ● > symbol at the held weight indication indicates the stable state at the time the free key <<HOLD>> is operated, not the current stable state.
(2) Output is still possible when this function is activated, but care must be taken when handling the data, as the content of the output data is not differentiated from when this function is not activated.



This function is not available on verified scale.

1 Set the "Free key".

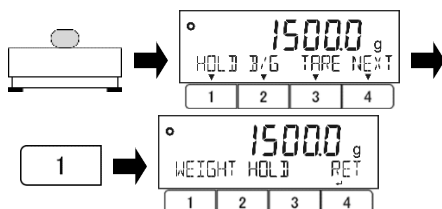


- Set the following item to the free key.

HOLD: Hold the weight indication
(Refer to "2-8 Free key setting" for setting the free keys.)

2 Weigh the object and hold the weight indication.

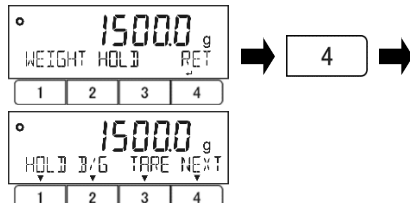
Example when <<HOLD>> is assigned to the free key F1.



- Weigh the object, then press the function key to which the free key <<HOLD>> is assigned.

The weight indication relevant marks are hold.

3 Release the hold.



- Press [4] key (<<RET >) to release the hold.

3-12 GLP Header/Footer output

By outputting a header and footer together with the measurement data, the measurement results can be recorded or printed on a connected external device, with the measurement information such as date, time and scale device identification tied to them.

GLP header contains the scale model name (TYPE:), serial number (S/N:), scale ID (ID:), date and time.

```
SHINKO DENSHI
TYPE:
  FMA62K0.1SR
S/N:  253012345
ID:   0123456789

START
DATE: 01.01.2025
TIME:  23:00
```

GLP footer contains date, time and signature line.

```
END
DATE: 01.01.2025
TIME:  23:59

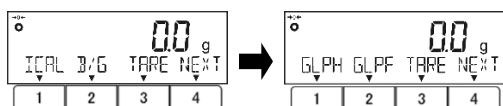
SIGNATURE

*****
```

Note The model identifier is prefaced by the word "TYPE". Be careful not to confuse it with the Type name.

- Reference**
- (1) Refer to "5-2 Communication setting" for enabling output and communication settings.
 - (2) The language can be set to English or Japanese via the menu item <639 PRT LANG>. (Cf. "5-2 Communication setting")
 - (3) The scale ID can be set via the menu item <631 SCALE ID>. (Cf. "7-1 Scale ID setting")
 - (4) Date, date format, and time can be set via the menu items <637 DATE SETTING>, <636 DATE DISP>, and <638 TIME SETTING> respectively. (Cf. "7-4 Date and time setting")

1 Set the "Free key".



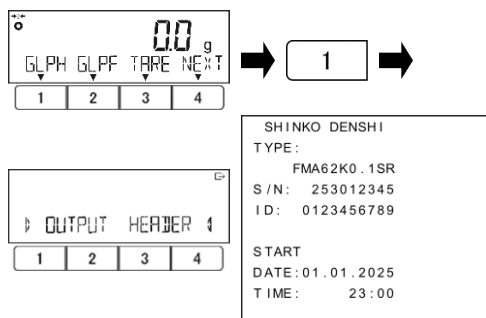
- Set the following items to the free keys.

GLPH: GLP header output

GLPF: GLP footer output

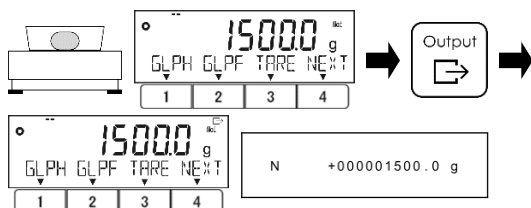
(Refer to "2-8 Free key setting" for setting the free keys.)

2 Output the GLP header.



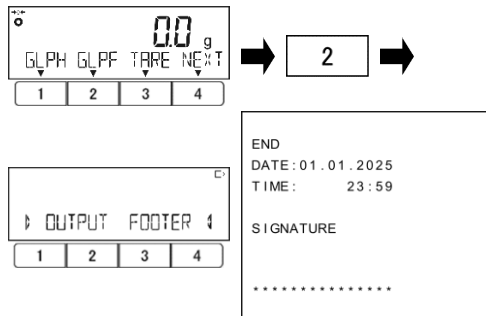
- Press the function key to which the free key <<GLPH>> is assigned to output the GLP header.

3 Perform measurement operations and output the results.



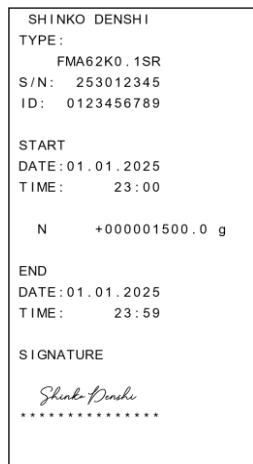
- Press the function key to which the free key <<GLPF>> is assigned to output the GLP footer.

4 Output the GLP footer.



Sign the signature line in the footer.

5 Print out the measurement result and sign it.



4 Measurement performance settings

By adjusting the parameters in accordance with the measurement environment and the measuring object, it is possible to achieve more accurate and precise measurements over time in a stable environment, or conversely, to enable measurement in a more unstable environment or with more unstable measuring objects or enables quick weighing operations.

4-1 Stability discrimination width

“Stability discrimination width” is the threshold value for stability discrimination when switching on the “Stable mark” <  >, zero setting, tare subtraction and output.
When this is set to a smaller value, the stability discrimination becomes stricter, making it more difficult to determine as stable in an unstable environment, while the weighing results become more precise.
When this is set to larger value, the stability discrimination becomes looser, making it easier to determine as stable, while the weighing results become more imprecise.

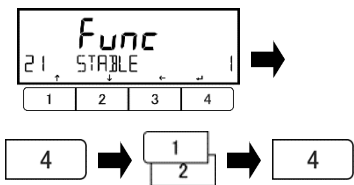
Legal Metrology

For verified scale, setting values “2” and “4” of <21 STABLE> are not available.

Reference

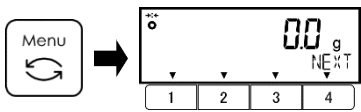
If the value of the actual scale interval "d" is switched by the menu item <63A READABILIT>, the value of the stability discrimination width is also switched in conjunction with it. (cf. “4-5 Actual scale interval (readability) setting”)

1 Select the stability discrimination width.



- Go to <21 STABLE >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
 - 0.5: 0,5 d
 - 1: 1 d
 - 2: 2 d
 - 4: 4 d
- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

4-2 Response speed

“Response speed” is the value that expresses how quickly the measurement indication reacts to changes in load.

When this is set to a smaller value, the response of the measurement indication to load fluctuations becomes faster and more accurate, while the measurement indication is more susceptible to adverse effects of the measurement environment, such as vibrations.

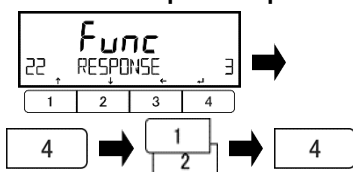
When this is set to a larger value, the response of the measurement indication to load fluctuations becomes slower and deviations are more likely to occur, while the measurement indication is less susceptible to vibrations and other adverse effects of the measurement environment, enabling stable measurements.

In addition, the following two advanced functions can also be selected:

(1) Sensitive mode: The indicated value quickly reacts to slight load fluctuations and follows them. This mode is useful when weighing powders or granules with gradual filling.

(2) Anti-vibration mode: The indicated value is less likely to react and follow slight load fluctuations. This mode is useful for use in environments with vibrations.

1 Select the response speed.



- Go to <22 RESPONSE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

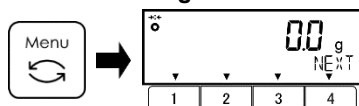
- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

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

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

4-3 Zero tracking

Zero tracking function automatically corrects the zero-point fluctuation caused by the temperature fluctuation, wind, vibration, etc. when "0" is indicated, through which the "0" indication is maintained.

- Overall range: $\pm 1.5\%$ of the maximum capacity (Max)
- Rating: Up to 0,5 d/s
- The maximum zero-point fluctuation that can be corrected: Variable via menu item <23 ZERO TRAC>

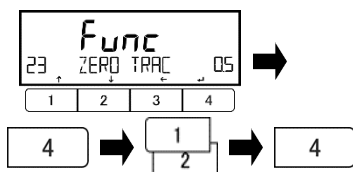


For verified scale, setting values "1", "2" and "4" of <23 ZERO TRAC> are not available.

Reference

- (1) Zero tracking operates only when the indication is at zero (in both gross reading and net reading) or at a negative net value equivalent to gross zero and the equilibrium is stable.
- (2) If the value of the actual scale interval "d" is switched by the menu item <63A READABILIT>, the specification values for zero-tracking are also switched in conjunction with it. (cf. "4-5 Actual scale interval (readability) setting")

1 Select ON/OFF and the maximum zero-point fluctuation that can be corrected for the zero-tracking.



- Go to <23 ZERO TRAC >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

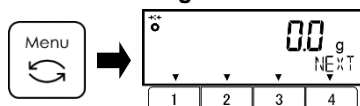
- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

OFF	:	Disabled
0.5	:	0,5 d
1	:	1 d
2	:	2 d
4	:	4 d

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

4-4 Stabilisation wait setting

By default, to ensure measurement accuracy and precision, zero-setting and tare-weighing is only performed when the scale indication reaches stable equilibrium.

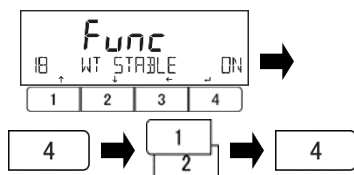
Disabling this function allows forced zero-setting and tare-weighing to be carried out even when stable equilibrium is not reached when using the scale in unstable environments.

Note When this is set to "OFF" (Invalid), the accuracy and precision of the measurement cannot be guaranteed.

Reference The stabilisation wait setting for data output is not implemented in this setting, but separately in the communication setting. (cf. "5-2 Communication setting")

Legal Metrology For verified scale, this setting item is not available, and the scale always waits the stable equilibrium to be reached before execution of zero setting and tare weighing.

1 Select the stabilisation wait setting.



- Go to <18 WT STABLE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

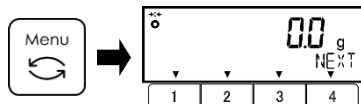
- Press [1]/[2] key to select.

OFF: Invalid

ON: Valid

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

4-5 Actual scale interval (readability) setting

This setting item is to set the actual scale interval (readability) in the weight indication.

The larger the actual scale interval becomes, the less the scale is affected by external influences, and it takes less time for the scale indication to be reached stable equilibrium.

Reference

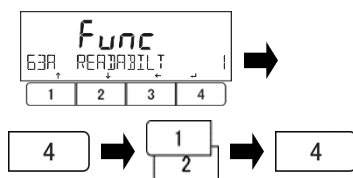
Refer to "Appendix 1-2 Actual scale interval (readability) settings for each weight unit" for the actual scale interval for each unit set by this setting item.

Legal Metrology

- (1) If the actual scale interval "d" is set to a value smaller than the verification scale interval "e", the digit is displayed with a differentiated scale division $\square$.
- (2) The minimum capacity shall be adopted according to the switching of the readability in order to reduce the effect of digital rounding errors. Refer to the label near the display.
- (3) This function is not available on verified FMA62K1S(R).

1

Select the actual scale interval.



- Go to <63A READABILIT>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

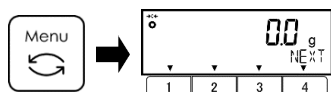
- Press [1]/[2] key to select.

Set value	1:	Fine (default)
	10:	Coarse

- Press [4] key to confirm.

2

Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

5 External input/output functions

As standard equipment, there are two 9-pin D-SUB male connectors, one for RS-232C I/O, and the other for serial output to and external contact input from peripheral devices.

The RS-232C I/O is bidirectional and the serial output for peripherals is for output only. The RS-232C I/O and the serial output for peripherals output the same signal.

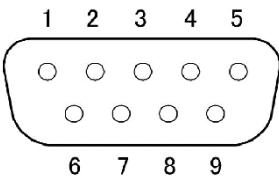
Reference

As factory option, relay output can be added, or RS-422 I/O can be equipped instead of RS-232C I/O. Please refer to the option manual for using each option.

5-1 Connector specifications

5-1-1 9-pin D-SUB connector for RS232C I/O

This connector is for RS232C communication with external devices, both input and output.

9-pin D-SUB male connector Connector fixing screws: No.4-40 UNC 	Pin number	Signal name	Input/Output	Function
	1	—	—	—
	2	RXD	Input	Receive data
	3	TXD	Output	Transmit data
	4	DTR	Output	This signal is fixed to "HIGH" while the scale is powered on.
	5	GND	—	Signal ground
	6	—	—	—
	7	—	—	—
	8	—	—	—
	9	—	—	—

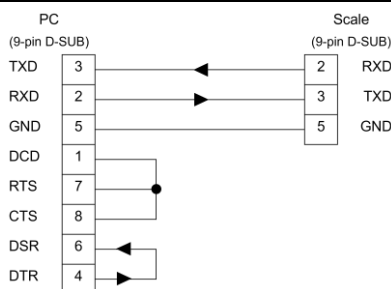
Items		Description
Transmission system		Serial transmission, Start-stop synchronisation, Bidirectional, Equivalent to EIA RS-232C
Signal voltage level		High level (data logic 0): +5 to +15 V Low level (data logic 1): -5 to -15 V
Baud rate		1200/2400/4800/9600/ 19200/38400/57600/115200 bps
Transmission data format	Start bit	1 bit
	Parity bit	None/1 bit (Odd number/Even number)
	Data bit	8 bits
	Stop bit	1 bit/2 bits

Note

- (1) Use shielded crossover serial cable of up to 15 m in length.
- (2) To ensure conformity with IP65 when cable is connected, it is necessary to use a cable with specific water-/dust-proof connector.
Please contact to your local dealer for the specified connector or cable.
- (3) Take care not to short-circuit the pin 4 (DTR) to the ground.

Reference

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

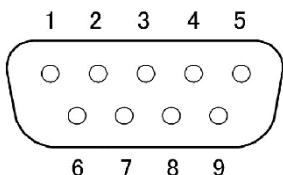


5-1-2 9-pin D-SUB connector for peripheral devices

This connector is for serial unidirectional output (duplication of RS232C output) for peripherals and external contact input for tare-subtraction and/or zero-setting from external switches.

Reference

Note that although this connector is labelled "PRINTER", it can also be used for connection to other peripherals, not just printers.

9-pin D-SUB male connector Connector fixing screws: No.4-40 UNC 	Pin number	Signal name	Input/Output	Description
	1	—	—	—
	2	—	—	—
	3	TXD	Output	Transmit data
	4	DTR	Output	This signal is fixed to "HIGH" while the scale is powered on.
	5	GND	—	Signal ground
	6	—	—	—
	7	—	—	—
	8	—	—	—
	9	External Contact	Input	External contact input for tare-subtraction and/or zero-setting

Items		Description
Transmission system		Serial transmission, Start-stop synchronisation, Unidirectional from the scale to peripherals
Signal voltage level		High level (data logic 0): +5 to +15 V Low level (data logic 1): -5 to -15 V
Baud rate		1200/2400/4800/9600/ 19200/38400/57600/115200 bps
Transmission data format	Start bit Parity bit Data bit Stop bit	1 bit None/1 bit (Odd number/Even number) 8 bits 1 bit/2 bits

Note

- (1) For serial output, use shielded crossover serial cable of up to 15 m in length.
- (2) For external contact input, use 2-core cable of up to 3 m in length.
- (3) To maintain IP65, use water-/dust-proof-type serial cable.
Please contact to your local dealer for the specified cable.
- (4) Take care not to short-circuit the pin 4 (DTR) to the ground.

5-1-2(1) External contact input

Tare-subtraction and/or zero setting can be assigned to the function of the external contact input, which is switched on by ensuring continuity between pin 9 (External Contact) and pin 5 (GND) for at least 400 ms.

Ratings:

- Open circuit voltage: 15 V
- Sink current: 20 mA

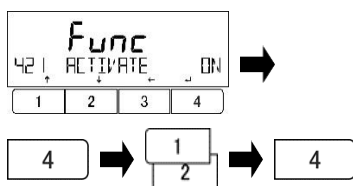


For verified scale, setting value "Z/T" (combined zero-setting and tare-subtraction) of <422 OPERATION> is not available.

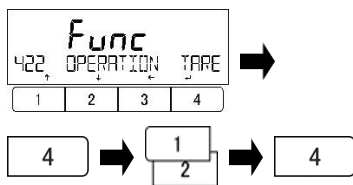
Reference

When <422 OPERATION> is set to "Z/T" (combined zero-setting and tare-subtraction), zero-setting is carried out when the load is within the zero-setting range and tare-weighing is carried out when the load exceeds the zero-setting range.
Refer to "Appendix 1-1 Metrological specifications" for the zero-setting range.

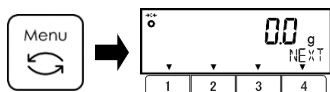
1 Select enable/disable of the external contact input.



2 Select the function to be assigned to the external contact input.



3 Exit the setting menu.



- Go to <421 ACTIVATE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

OFF: Disabled

ON: Enabled

- Press [4] key to confirm.

- Go to <422 OPERATION>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

ZERO: Zero setting

TARE: Tare weighing

Z/T: Combined zero-setting and tare-subtraction

- Press [4] key to confirm.

- Press [Menu] key to shift to the measuring mode.

5-2 Communication setting

Legal
Metrology

For verified scale:

- Menu item <412 FORMAT> is not available. That is fixed to "CBM" (CBM format) and other formats are not available;
- Output data when setting values "1", "3" or "6" of <413 CONDITION> (Output condition) is selected shall not be used for printing or storing for legal for trade purposes, as they will cause the scale to output weight during continuous or temporary disturbance of the equilibrium;
- When the menu item <41A STATUS> is set to "OFF" and <41C GNT OUT> is set to "SNGL", the net value designation "N" is not appended for net value output, except when preset tare is activated and net value is output together with the preset tare value.
- Menu item <41D ERR DETECT> is not available and fixed to "OFF".

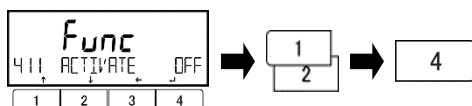
Note

When outputting to a printer, do not set the menu item <41D ERR DETECT> to "ON", otherwise the measurement results cannot be printed correctly.

Reference

- (1) External contact input (cf. "5-1-2(1) External contact input") can be used irrespective of the settings of <411 ACTIVATE>.
- (2) <413 CONDITION> sets the output condition during net or gross display in each measuring mode. Other outputs, such as tare value output and unit weight output initiated by pressing [Output] key, are not subject to this setting and can be used regardless of the setting.
- (3) The format of the date notation in date stamps reflects the setting of <636 DATE DISP >. (cf. "7-4-1 Date indication format")

1 Select whether to enable or disable the RS232C I/O (or optional RS422 I/O) and serial output for peripherals.



- Go to <411 ACTIVATE >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

OFF: Disabled

ON: Input and output enabled

- Press [4] key to confirm.

2 Set each communication setting.

Select the output format.

412 FORMAT

Set list

6 : 6-digit numeric format	7 : 7-digit numeric format	8 : 8-digit numeric format
CSP6 : CSP 6-digit format	CSP7 : CSP 7-digit format	CBM : CBM format

Select the output condition (for net or gross display of each measuring mode).

413 CONDITION

Set list

0 : Output stop	1 : Continuous output at all times	2 : Continuous output during stable equilibrium state (Output stop when unstable)
3 : One-time output immediately after the [Output] key is pressed	4 : One-time output every time when the scale is loaded from the zero or negative display and reaches stable equilibrium state	5 : One-time output every time when the scale reaches stable equilibrium state from unstable state
6 : Continuous output during unstable state, and one-time output every time when the scale reaches stable equilibrium state from unstable state	7 : One-time output after [Output] key is pressed and the scale reaches stable equilibrium state	

Set the linkage of the output control to the comparator function.

414 COMPARE

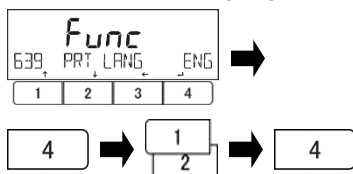
Set list

0 : Disabled	1 : Enabled (Output can only be produced when the discrimination result is "OK" or absent)
--------------	--

Select the baud rate.		
4 15 BAUD RATE		
Set list		
1200 : 1200 bps	2400 : 2400 bps	4800 : 4800 bps
9600 : 9600 bps	19200 : 19200 bps	38400 : 38400 bps
57600 : 57600 bps	115.2K : 115200 bps	
Select the parity bit.		
4 16 PARITY		
Set list		
OFF : None	ODD : Odd number	EVEN : Even number
Select the stop bit.		
4 17 STOP BIT		
Set list		
1BIT : 1 bit	2BIT : 2 bits	
Select process for insufficient digit.		
4 18 BLANK		
Set list		
ZERO : Fill with 0 (0x30) (leading zero padding)	SPACE : Fill with space (SPC=0x20) (leading zero suppress)	
Select the response format for command input.		
4 19 RESPONSE		
Set list		
1 : "A00/Exx" format	2 : "ACK/NAK" format	
Select whether the net value designation symbol to be appended.		
4 1A STATUS		
Set list		
OFF : Not appended	ON : Appended	
Select the date and time stamp setting.		
4 1B TIME STAMP		
Set list		
OFF : Not appended	TIME : Time stamp appended	D/T : Date and time stamp appended
Select the combined Gross/Net/Tare output setting when outputting weight values in each measuring mode.		
4 1C GNT OUT		
Set list		
SNGL : Disabled (Only the indicated weight value is output.)	GNT : Enabled (Gross, net and tare (or preset tare) values are output simultaneously.)	
Select whether to enable or disable the communication function with error detection code. (cf. 5-5 Communication function with error detection code)		
4 1D ERR DETECT		
Set list		
OFF : Disabled	ON : Enabled	

3

Select the output language.



- Go to <639 PRT LANG >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.

ENG: English

JPN: Japanese

- Press [4] key to confirm.

Reference

The output language setting is reflected in the GLP header output, GLP footer output, date and time stamp, date and time output, and span adjustment/test result output.

5-3 Output format

5-3-1 6/7/8-digit numeric format and CSP 6/7-digit format



These formats are not available for verified scale.

1. Data composition

- Measurement result:

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

Consists of 14 characters, including terminators (CR=0x0D, LF=0x0A).

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

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

Consists of 15 characters, including terminators (CR=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 etc.):

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

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

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

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

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

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

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

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

2. Meaning of the data

SPC=0x20: space

Symbol		Code		Description
“P1” (one character): Represents the polarity of data.				
+		0x2B		Zero or positive data
-		0x2D		Negative data
“D1” to “D7/D8/D9” (seven to nine characters): Numeric value data.				
0 – 9		0x30 – 0x39		- Digits 0 to 9 - 0 is also used to fill the leading portion of value (leading zero padding) (When <418 BLANK> is set to "ZERO".).
.		0x2E		Decimal point
SPC		0x20		- Used to fill the leading portion of value (leading zero suppress) (When <418 BLANK> is set to "SPACE".). - Placed on the least significant digit in the absence of a decimal point.
“U1”, “U2” (two characters): Represents the unit of numeric value data.				
SPC	G	0x20	0x47	gram
K	G	0x4B	0x47	kilogram
C	T	0x43	0x54	carat
M	O	0x4D	0x4F	もんめ momme
O	Z	0x4F	0x5A	ounce
L	B	0x4C	0x42	pound
O	T	0x4F	0x54	ounce troy
D	W	0x44	0x57	pennyweight
T	L	0x54	0x4C	金衡兩 tael troy (Hong Kong)
T	L	0x54	0x4C	tahil (Singapore/Malaysia)
T	L	0x54	0x4C	兩 tael (Taiwan)
t	o	0x74	0x6F	tola (India)
P	C	0x50	0x43	piece(s) (Counting mode)
SPC	%	0x20	0x25	percentage (Percent mode)
SPC	#	0x20	0x23	Calculation result of the multiply mode
“S1” (one character): Represents the designation of the data, or the discrimination result when the comparator function is activated.				
L		0x4C		Below the lower limit (LOW)
G		0x47		Appropriate amount (OK)
H		0x48		Over the upper limit (HIGH)
SPC		0x20		- Comparator function is activated but no judgment result is made - No data type specified - Gross value when comparator function is inactivated, tare weighing and preset tare are not in operation, <41C GNT OUT> is set to “SNGL”, and <B/G> is not displayed. - Net value when comparator function is inactivated, <41A STATUS> is set to “OFF” and <41C GNT OUT> is set to “SNGL”.
d		0x64		- Gross value when tare weighing or preset tare is in operation and <B/G> is displayed. - Gross value when <41C GNT OUT> is set to “GNT”.

e	0x65	- Net value when comparator function is inactivated and <41A STATUS> is set to "ON". - Net value when <41C GNT OUT> is set to "GNT". - Net value when the net value is output in combination with the corresponding preset tare value.
f	0x66	- Used to output preset tare value in conjunction with the designation "PT" on the line above the relevant data line when <412 FORMAT> is set to "CSP6" or "CSP7". - Otherwise, this character is used to designate tare value.
P	0x50	Preset tare value when <412 FORMAT> is set to "6", "7" or "8".
T	0x54	Total value (Addition function)
U	0x55	Unit weight (Counting mode)
"S2" (one character): Represents the stable equilibrium status or error status.		
S	0x53	Data stable
U	0x55	Date unstable
E	0x45	Data error (indicates that any value other than this value is invalid and must be ignored in the data line in which this value appears)
SPC	0x20	No status specified

5-3-2 CBM format

1. Data composition

- Measurement result:

Composed of 26 characters including terminators (CR=0x0D, LF=0x0A)

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

- Error message:

Composed of 26 characters including terminators (CR=0x0D, LF=0x0A)

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

- Others (Date, Time 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

SPC=0x20: space

Symbol						Code						Description	
“S1” (1 character): Represents the stable equilibrium status.													
SPC				0x20				Data stable					
*				0x2A				Data unstable					
“C1” (1 character): Represents the discrimination result of comparator function.													
SPC				0x20				Appropriate amount (OK) or no result					
H				0x48				Over the upper limit (HIGH)					
L				0x4C				Below the lower limit (LOW)					
“T1” to “T6” (6 characters): Represents the designation of the data.													
SPC	SPC	SPC	SPC	SPC	SPC	0x20	0x20	0x20	0x20	0x20	0x20	- Gross value when tare weighing and preset tare and not in operation, <41C GNT OUT> is set to “SNGL”, and <B/G> is not displayed. - Net value when <41A STATUS> is set to “OFF”, <41C GNT OUT> is set to “SNGL”, and when net value alone is output.	
G	SPC	SPC	SPC	SPC	SPC	0x47	0x20	0x20	0x20	0x20	0x20	- Gross value when tare weighing or preset tare is in operation and <B/G> is displayed. - Gross value when <41C GNT OUT> is set to “GNT”.	
N	SPC	SPC	SPC	SPC	SPC	0x4E	0x20	0x20	0x20	0x20	0x20	- Net value when <41A STATUS> is set to “ON”. - Net value when <41C GNT OUT> is set to “GNT”. - Net value when the net value is output in combination with the corresponding preset tare value.	
T	SPC	SPC	SPC	SPC	SPC	0x54	0x20	0x20	0x20	0x20	0x20	Tare value	
P	T	SPC	SPC	SPC	SPC	0x50	0x54	0x20	0x20	0x20	0x20	Preset tare value	
												Legal Metrology In verified scale, preset tare value is always output in combination with the net value.	
T	O	T	A	L	SPC	0x54	0x4F	0x54	0x41	0x4C	0x20	Total value (Addition function)	
U	N	I	T	SPC	SPC	0x55	0x4E	0x49	0x54	0x20	0x20	Unit weight (Counting mode)	
“D1” to “D12” (12 characters): Numeric value data.													
+				0x2B				Zero or positive data					
-				0x2D				Negative data					
0 – 9				0x30 – 0x39				- 0 to 9 (numeric) - 0 is also used to fill the leading portion of value (leading zero padding) (When <418 BLANK> is set to “ZERO”).					
.				0x2E				Decimal point					
[				0x5B				Legal Metrology					
]				0x5D				Differentiated scale division (When the actual scale interval is smaller than the verification scale interval, it is enclosed in brackets '[' and ']'.)					
SPC				0x20				- Used to fill the leading portion of value (leading zero suppress) (When <418 BLANK> is set to "SPACE"). - Placed on the least significant digit in the absence of a decimal point.					
“U1”, “U2” (2 characters): Represents the unit of numeric value data.													
SPC	g			0x20				0x67		gram			
k	g			0x6B				0x67		kilogram			
c	t			0x63				0x74		carat			
m	o			0x6D				0x6F		もんめ momme			
o	z			0x6F				0x7A		ounce			
l	b			0x6C				0x62		pound			
O	T			0x4F				0x54		ounce troy			
d	w			0x64				0x77		pennyweight			
t	l			0x74				0x6C		金衡兩 tael troy (Hong Kong)			
t	l			0x74				0x6C		tahlil (Singapore/Malaysia)			
t	l			0x74				0x6C		兩 tael (Taiwan)			
t	o			0x74				0x6F		tola (India)			
P	C			0x50				0x43		piece(s) (Counting mode)			
SPC	%			0x20				0x25		percentage (Percent mode)			
SPC	#			0x20				0x23		Calculation result of the multiply mode			

5-4 Command input

Reference

Command input is available only through RS232C I/O (or optional RS422 I/O).

5-4-1 Transmission procedure

- 1** Set the screen to the measuring indication in each measuring mode.
- 2** Send a command from an external device to the scale.
- 3** Upon successful completion of an input command, the scale will output either a normal completion response or the data requested by the command.

Note

- (1) Do not send another command to the scale until the external device receives a response from the scale.
- (2) Commands input while the scale is in setting menu or in busy status (e.g. during the process of waiting to reach stable equilibrium state in zero setting or tare weighing, during span adjustment/test operation, etc.) are either ignored or result in an error response.

Reference

- (1) For the tare-weighing command and the zero-setting command, a response is sent after the commands are completely processed. In addition, when <18 WT STABLE> is set to "ON", the scale waits the stable equilibrium to be reached after receiving tare-weighing command or zero-setting command, so the scale may need additional response time.

For other commands, on the other hand, the response is output within one second.



For verified scale, <18 WT STABLE> is fixed to "ON" and the scale always waits the stable equilibrium to be reached after receiving such a command.

- (2) If the operation has not resulted in successful completion or if the command is invalid, the scale will transmit an error response.

5-4-2 Input command composition 1

Composed of four characters including terminators (CR=0x0D, LF=0x0A).

1	2	3	4
C1	C2	CR	LF

5-4-2 (1) Zero-setting/Tare-weighing command

C1	C2	Code (C1)	Code (C2)	Description	Response	
					A00/Exx format	ACK/NAK format
T	SPC (Space)	0x54	0x20	Tare weighing execution	A00: Normal Response E01: Abnormal response	ACK: Normal response NAK: Abnormal response
Z	SPC (Space)	0x5A	0x20	Zero setting execution		

Reference

In the case that <18 WT STABLE> is "ON", the scale waits the stable equilibrium to be reached after receiving tare-weighing command or zero-setting command, so the scale may need additional response time.



For verified scale, <18 WT STABLE> is fixed to "ON" and the scale always waits the stable equilibrium to be reached after receiving such a command.



The "Zero setting execution" command shall be input manually with the intervention of an operator.

5-4-2 (2) Output control setting command

Note

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



Unstable weight data obtained by the commands "O1", "O3", "O6", "O8" and "OA" shall not be used for legal for trade purpose.

C1	C2	Code (C1)	Code (C2)	Description	Response	
					A00/Exx format	ACK/NAK format
O	0	0x4F	0x30	Output stop	A00: Normal Response E01: Abnormal response	ACK: Normal response NAK: Abnormal response
O	1	0x4F	0x31	Continuous output at all times		
O	2	0x4F	0x32	Continuous output during stable equilibrium state (Output stop when unstable)		
O	3	0x4F	0x33	One-time output immediately after the [Output] key is pressed		
O	4	0x4F	0x34	One-time output every time when the scale is loaded from the zero or negative display and reaches stable equilibrium state		
O	5	0x4F	0x35	One-time output every time when the scale reaches stable equilibrium state from unstable state		
O	6	0x4F	0x36	Continuous output during unstable state, and one-time output every time when the scale reaches stable equilibrium state from unstable state		
O	7	0x4F	0x37	One-time output after [Output] key is pressed and the scale reaches stable equilibrium state		
O	8	0x4F	0x38	One-time instant output		
O	9	0x4F	0x39	One-time output after the scale reaches stable equilibrium state		
O	A	0x4F	0x41	Interval output function (Output once for each elapsed time.)		
O	B	0x4F	0x42	Interval output function (Output once for each elapsed time while the equilibrium is stable.)		

Reference

- Commands "O8" and "O9" are used as direct triggers to obtain data output from the scale. Once the output performed by these commands is complete, the output stops.
- Once any one of the commands "O0" to "O7" is executed, the output control setting is maintained until the setting menu is activated or the scale is turned off. When [Menu] key is pressed or the scale is turned on again, the output control setting is reset to the < 413 CONDITION > setting.
- When the command "OA" or "OB" is input, the interval output starts, and when input again, the interval output stops. To use these functions, the interval time must be set in advance by entering the command. (cf. "5-4-3(3) Interval output time setting command")

5-4-2 (3) Date output request and time output request

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

5-4-2 (4) Span adjustment/test command



The command "C3" is not accepted on verified scale.

C1	C2	Code (C1)	Code (C2)	Description	Response	
					A00/Exx format	ACK/NAK format
C	1	0x43	0x31	Execute semi-automatic span adjustment with internal weight	A00: Normal response E01: Abnormal response	ACK: Normal response NAK: Abnormal response
C	2	0x43	0x32	Execute span test with internal weight		
C	3	0x43	0x33	Execute span adjustment with external weight		
C	4	0x43	0x34	Execute span test with external weight		

5-4-3 Input command composition 2

Composed of 6 to 15 variable length characters including a comma and terminators (CR=0x0D/LF=0x0A)

C1	C2	,	C3(variable length)	CR	LF
----	----	---	---------------------	----	----

Note Do not enter a space between the comma and "C3".

Reference (1) "C3" is variable length and can contain up to 10 characters.
(2) If the input value is invalid, the scale output an abnormal response.

5-4-3 (1) Threshold setting command for comparator function

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

Note (1) In "C3", enter a negative sign (only for negative values), digits, and a decimal point.
- Make sure not input the measuring unit (kg, g, ct, etc.).
- Input the weight value in grams.
- Use "." (point) for decimal separator.
(2) Enter the threshold values according to the threshold setting method selected in the menu item <134 METHOD>. When <134 METHOD> is set to "ABSOL", the target value setting command is invalid.

Command example) Upper limit input 12000,0 g: LA,12000.0

5-4-3 (2) Preset tare value setting and execution command

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

Note In "C3", enter a negative sign (only for negative values), digits, and a decimal point.
- Make sure not input the measuring unit (kg, g, ct, etc.).
- Input the weight value in grams.
- Use "." (point) for decimal separator.
- Input of negative values to the preset tare is invalid.

Reference (1) When the normal response, the preset tare value is registered in <321 PRESET 1> and the scale operates preset tare subtraction.
(2) If the input value is "0", the preset tare operation is deactivated.

Command example) Preset tare value input 10000,0 g: PT,10000.0

5-4-3 (3) Interval output time setting command

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

Note

In "C3", enter time in hh,mm,ss format.

Enter the hours, minutes and seconds in two digits each, without omissions, and separate them with commas, and without spaces.

Command example) Interval time input 01:23:45: IA,01,23,45

5-4-4 Response

5-4-4(1) A00/Exx format

Consists of five characters including terminators.

1	2	3	4	5
A1	A2	A3	CR	LF

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

5-4-4(2) ACK/NAK format

Consists of one character without a terminator.

1
A1

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

5-5 Communication function with error detection code



This function is not available on verified scale.

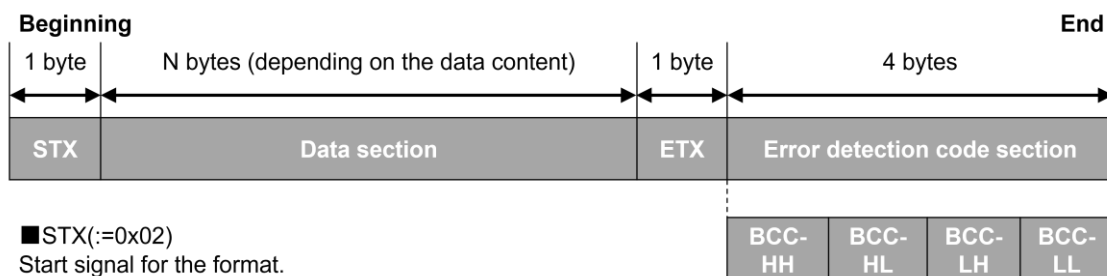


Do not activate this function when outputting to a printer. The printer does not support the format of the output when this function is activated, so the measurement results cannot be printed correctly.

This scale can output data in a communication format with “error detection code”.

This feature allows for efficient removal of data corrupted by disturbances.

Communication format



■ STX(=0x02)

Start signal for the format.

- STX(=0x02)
Start signal for the format.
- Data section:
The following data listed in “5 External input/output functions” are covered:
 - Measurement results / Others (Date, Time etc.) / Input commands / Response commands
- ETX(=0x03)
- Termination signal for the format.
- Error detection code
The error detection code for the communication data section is assigned as a 4-byte fixed-length field. It corresponds to BCC-HH, ..., BCC-LL in order from the upper 4 bits of the error detection code and is encoded in ASCII code.

Scope of coverage

Applies to all communications transferred by RS232C.

The communication data transferred when this function is set to disabled is encapsulated in the data section of the communication format.

In transmission from the scale to an external system, data error detection can be carried out by the external system.

In communication commands from external systems to the scale, the scale verifies data corruption using the error detection codes and if data corruption is detected, the communication command is not executed.

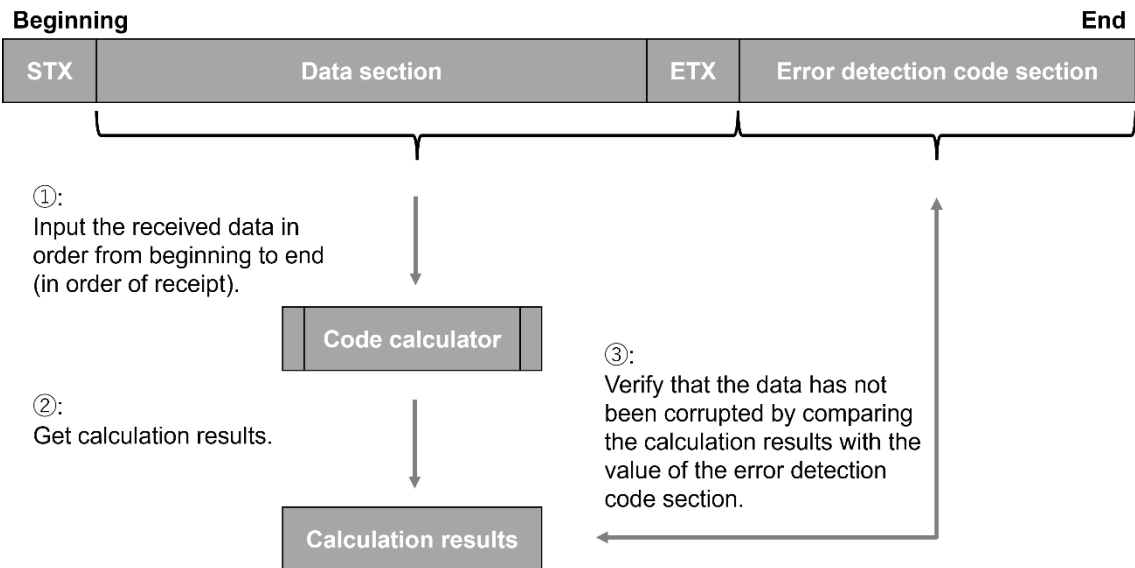
Method of error detection

Error detection can be carried out by a simple comparison of the value calculated from the communication data and the error detection code received.

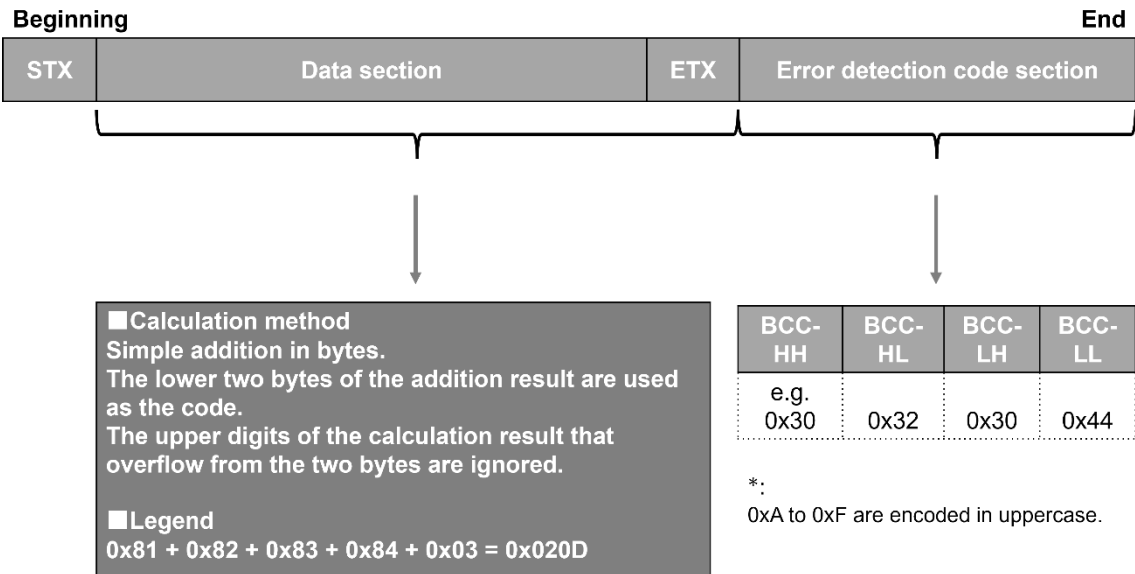
For calculations from communication data, the part of the communication format up to data section ~ETX is used.

Error detection codes are calculated and compared in the following steps.

The communication data section length is fixed according to the format of the measurement results and command type set in the FMA.



In this function, the calculation of the error detection code is a checksum by simple addition. The error detection code section is calibrated with 4-byte ASCII uppercase alphabetic characters plus digits.



6 Calibration and adjustment of the scale

6-1 Span test and span adjustment

For accurate and precise measurement, the "span test (calibration)" or "span adjustment" should be made periodically and as necessary (e.g. in response to relocation or to changes in the measurement environment, such as temperature, air pressure or humidity).

Span test and span adjustment are functions that calibrate/adjust the difference (span) between the capacity point and zero point.

- Span test: Determining the difference between an indicated value and the true value (= calibration) of the span.

- Span adjustment: Determining the difference between an indicated value and the true value of the span, then rewriting the internal correction coefficient of the scale.

Note

(1) The span test and span adjustment significantly affects the weighing accuracy. Please read the instructions in this chapter carefully before performing the span test/adjustment.

(2) Despite the indication of the menu items <621 EX CAL>, <623 INT CAL> and <626 REF CAL>, and the indication of the free keys <<CAL>> and <<ICAL>>, what is actually initiated by them is "adjustment". Please take care not to mistake them for "calibration".

(3) For accurate adjustment and calibration, the scale must be allowed to acclimatise to the ambient temperature for at least 2 hours beforehand, in the actual place of use and at a constant room temperature.

6-1-1 Span adjustment with external weight

Legal Metrology

This function is not available for verified scale.

Note

(1) External weights used for the span adjustment shall be the one equivalent to:

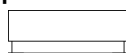
- OIML class F1 or higher for models with capacity of 33 kg and 62 kg;
- OIML class F2 or higher for models with capacity of 22 kg.

(2) If any object is on the weighing pan at the start of this function, an error will occur and the function cannot be performed.

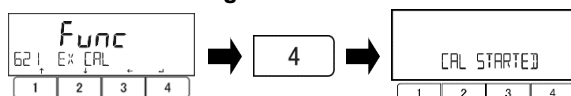
Reference

Shortcut (free key) for this function <<CAL>> is assigned to the free key F1 by default on the models without internal calibration mechanism).

1 Check that nothing is loaded on the weighing pan.



2 Launch the sequence of span adjustment with external weight.

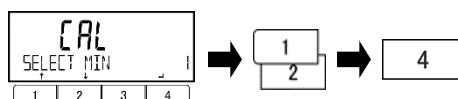


- Go to <621 EX CAL>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to launch the span adjustment sequence.

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



- Press [1]/[2] key to select.

	Other than FMA 62K1S(R)	FMA62K1S(R)
1:	0,1 g	1 g
10:	1 g	10 g

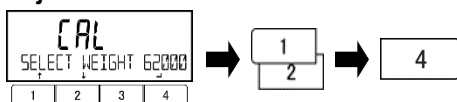
- Press [4] key to confirm.

Note

This setting should be set to the smallest value to ensure accurate and precise adjustment.

Only set this to a larger value if it is unavoidable because the influence of disturbances cannot be removed and span adjustment is not possible.

4 Select a weight used for the span adjustment.

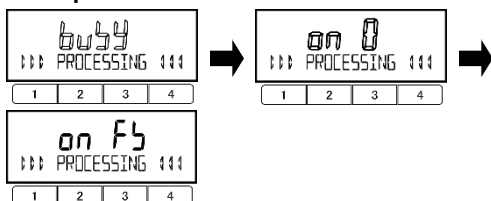


List of weights used for the span adjustment by model

Model	FMA22K0.1S(R)	FMA33K0.1S(R)	FMA62K0.1S(R) FMA62K1S(R)
Selectable weight on the menu	22000 g	33000 g	62000 g
VAR set	1 g to 22000 g	1 g to 33000 g	1 g to 62000 g

- Press [1]/[2] key to select a weight used for the span adjustment.
(Refer to List of "weights used for the span adjustment by model")
- Press [4] key to confirm.

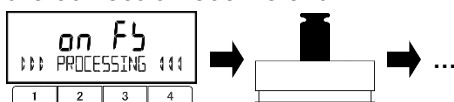
5 Zero-point calibration.



Display changes to the order of "blinking of <buSY>" → "blinking of <on 0>".

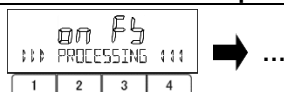
On completion of the zero-point calibration, the display automatically changes to <on FS>.

6 Capacity-point calibration and rewriting of the correction coefficient.



- Place the weight in the centre of the weighing pan.

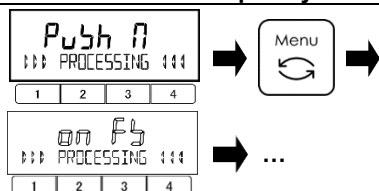
For models with capacity of 22 kg:



- For models with capacity of 22 kg:

Display changes to the order of <on FS> → "blinking of <on FS>". Then capacity-point calibration starts.

For models with capacity of 33 kg and 62 kg:



- For models with capacity of 33 kg and 62 kg:

Display changes to the order of <on FS> → <PuSh M>.
- Press [Menu] key.
Display changes to "blinking of <on FS>", then capacity-point calibration starts.

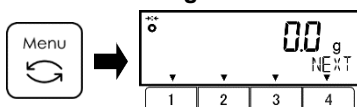
(Span adjustment complete) ➡



On completion of the calibration, the correction coefficient of the span is rewritten, and the display automatically changes to <621 EX CAL>.

- Unload the weight from the weighing pan.

7 Exit the setting menu.



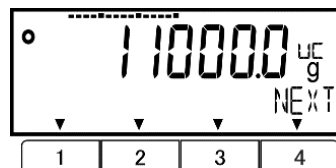
- Press [Menu] key to shift to the measuring mode.

Note

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;

- When an object that is more than two times heavier than the weight that was used for the span adjustment is loaded; or
- When the actual scale interval (readability, setting of <63A READABILTY>) is finer than the minimum interval for rounding setting <SELECT MIN> selected in the span adjustment.



6-1-2 Span test with external weight

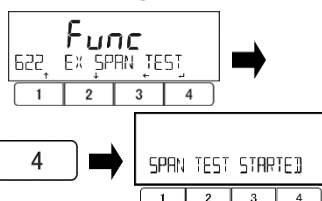
Note

- (1) An external weight used for the span test shall be the one equivalent to:
 - OIML class F1 or higher for models with capacity of 33 kg and 62 kg;
 - OIML class F2 or higher for models with capacity of 22 kg.
- (2) Make sure to use the external weight which is equal to the weighing capacity of each model.
- (3) If any object is on the weighing pan at the start of this function, an error will occur and the function cannot be performed.

1 Check that nothing is loaded on the weighing pan.

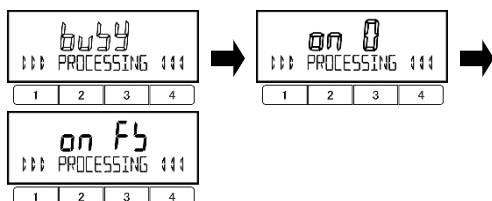


2 Launch the sequence of span test with external weight.



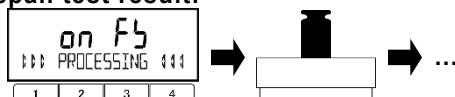
- Go to <622 EX SPAN TEST>.
- (For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to launch the span test sequence.

3 Zero-point calibration.



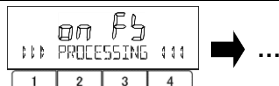
- Display changes to the order of "blinking of <buSY>" → "blinking of <on 0>".
- On completion of the zero-point calibration, the display automatically changes to <on FS>.

4 Capacity-point calibration and display of the span test result.



- Place the weight in the centre of the weighing pan.

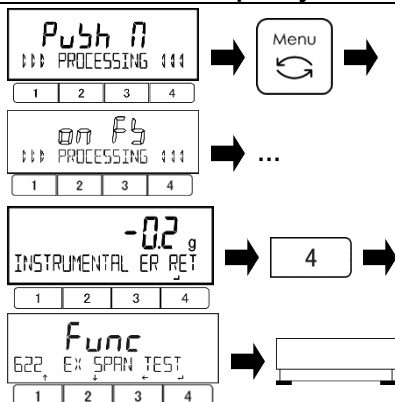
For models with capacity of 22 kg:



• For models with capacity of 22 kg:

- Display changes to the order of <on FS> → "blinking of <on FS>".
- Then capacity-point calibration starts.

For models with capacity of 33 kg and 62 kg:



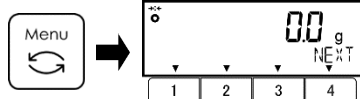
• For models with capacity of 33 kg and 62 kg:

- Display changes to the order of <on FS> → <PuSh M>.
- Press [Menu] key.
- Display changes to "blinking of <on FS>", then capacity-point calibration starts.

- On completion of the capacity-point calibration, the display automatically changes to <INSTRUMENTAL ER> and the instrumental error of the scale is displayed.
- Press [4] key (<<RET <=>>) to go back to <622 EX SPAN TEST> display.
 - Unload the weight from the weighing pan.

5

Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

6-1-3 Semi-Automatic span adjustment with internal weight

Note

- (1) Do not power-off the scale while this function is operating.
- (2) If any object is on the weighing pan at the start of this function, an error will occur and the function

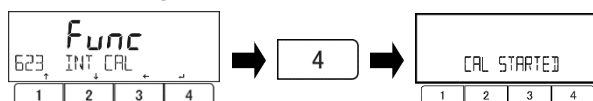
Reference

- (1) This function is available only on models with internal calibration mechanism.
- (2) Shortcut (free key) for this function <<ICAL>> is assigned to free key F1 by default on the models with internal calibration mechanism.

1 Check that nothing is loaded on the weighing pan.



2 Launch the sequence of span adjustment with internal weight.

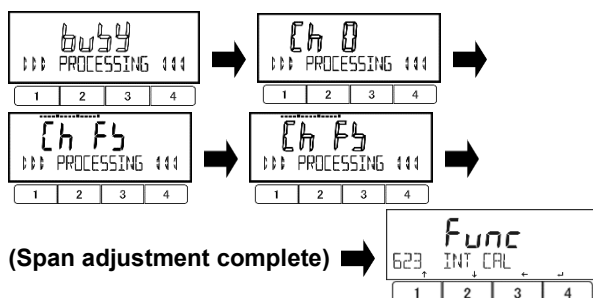


- Go to <623 INT CAL>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to launch the span adjustment sequence.

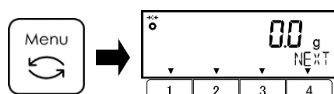
3 The span adjustment is executed.



Display changes to the order of "blinking of <buSY>" → "blinking of <Ch 0>" → <Ch FS> → "blinking of <Ch FS>"

On completion of the span adjustment, the display automatically changes to <623 INT CAL>.

4 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

6-1-4 Span test with internal weight

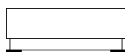
Note

- (1) Do not power-off the scale while this function is operating.
- (2) If any object is on the weighing pan at the start of this function, an error will occur and the function cannot be performed.

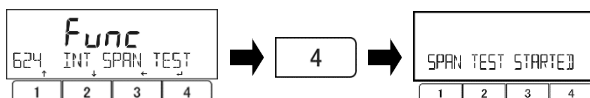
Reference

This function is available only on models with internal calibration mechanism.

1 Check that nothing is loaded on the weighing pan.

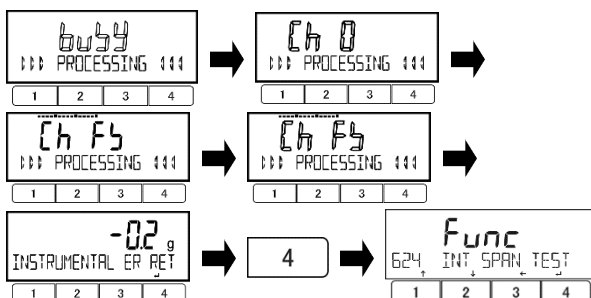


2 Launch the sequence of span test with internal weight.



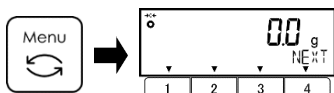
- Go to <624 INT SPAN TEST>.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to launch the span test sequence.

3 The span test and display of the result.



- Display changes to the order of "blinking of <buSY>" → "blinking of <Ch 0>" → <Ch FS> → "blinking of <Ch FS>" → <INSTRUMENTAL ER> and the instrumental error of the scale is displayed.
- Press [4] key (<<RET [4]>>) to go back to <624 INT SPAN TEST> display.

4 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

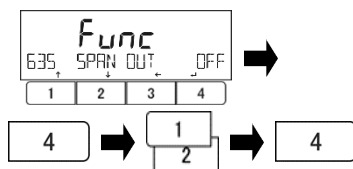
6-1-5 Outputting of the span test / adjustment result

By setting the menu item <635 SPAN OUT> to "ON", the result of span test/adjustment is automatically output.

Reference

To use this function, the communication setting must have been made in addition to the settings below. (cf. "5-2 Communication setting")

1 Select ON/OFF of the outputting.



- Go to <635 SPAN OUT >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

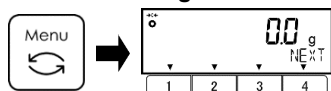
- Press [1]/[2] key to select.

OFF: Disable

ON: Enable

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

Examples of the output:

Span adjustment with external weight	Span test with external weight	Semi-automatic span adjustment with internal weight	Span test with internal weight
<pre> **CALIBRATION** DATE:01.01.2025 TIME: 23:00 SHINKO DENSHI TYPE: FMA62K0.1SR S/N: 253012345 ID: 0123456789 CAL. EXTERNAL REF: 62000.0 g COMPLETE DATE:01.01.2025 TIME: 23:05 SIGNATURE ***** </pre>	<pre> **SPAN TEST** DATE:01.01.2025 TIME: 23:00 SHINKO DENSHI TYPE: FMA62K0.1SR S/N: 253012345 ID: 0123456789 CAL. EXT. TEST REF: 62000.0 g ERROR: 0.1 g COMPLETE DATE:01.01.2025 TIME: 23:05 SIGNATURE ***** </pre>	<pre> **CALIBRATION** DATE:01.01.2025 TIME: 23:00 SHINKO DENSHI TYPE: FMA62K0.1SR S/N: 253012345 ID: 0123456789 CAL. INTERNAL REF: 62000.0 g COMPLETE DATE:01.01.2025 TIME: 23:01 SIGNATURE ***** </pre>	<pre> **SPAN TEST** DATE:01.01.2025 TIME: 23:00 SHINKO DENSHI TYPE: FMA62K0.1SR S/N: 253012345 ID: 0123456789 CAL. INT. TEST REF: 62000.0 g ERROR: 0.1 g COMPLETE DATE:01.01.2025 TIME: 23:01 SIGNATURE ***** </pre>

Note

- (1) Span adjustment results are titled "CALIBRATION". Please take care not to mistake them for the "calibration" result.
- (2) The model identifier is prefaced by the word "TYPE". Be careful not to confuse it with the Type name.

Reference

- (1) The language can be set to English or Japanese via the menu item <639 PRT LANG>. (cf. "5-2 Communication setting")
- (2) The scale ID can be set via the menu item <631 SCALE ID>. (cf. "7-1 Scale ID setting")
- (3) Date, date format, and time can be set via the menu items <637 DATE SETTING>, <636 DATE DISP>, and <638 TIME SETTING> respectively. (cf. "7-4 Date and time setting")

6-2 Adjustment of the internal calibration mechanism

Use this function to adjust the compensation value of the internal calibration mechanism by external weight.



This function is not available for verified scale.

Note

- (1) To adjust accurately and precisely, use a weight that is equivalent to the weighing capacity (Max).
- (2) An external weight used for this function shall be the one equivalent to OIML class F1 or higher.
- (3) This function significantly affects the weighing accuracy. Please read this procedure carefully before performing the adjustment.
- (4) Do not power-off the scale while this function is operating.
- (5) If any object is on the weighing pan at the start of this function, an error will occur and the function cannot be performed.
- (6) If an incorrect adjustment of the internal calibration mechanism has been performed, e.g. by using incorrect calibration weights, perform <627 REF CAL RESTORE> to restore the compensation value to default, then redo this function. (cf. "6-3 Restore the compensation value of the internal calibration mechanism to default")
- (7) For accurate adjustment, the scale shall be allowed to acclimatise to the ambient temperature for at least 2 hours beforehand, in the place where the adjustment is to be made and at a constant room temperature.

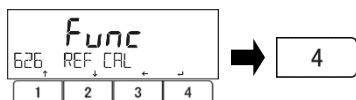
Reference

This function is available only on models with internal calibration mechanism.

1 Check that nothing is loaded on the weighing pan.



2 Launch the sequence of calibration of the internal calibration mechanism.

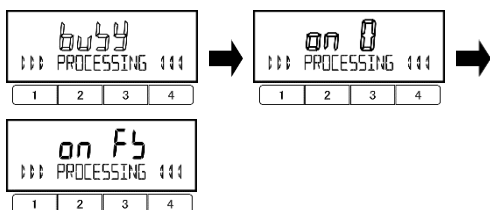


- Go to <626 REF CAL>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to execute.

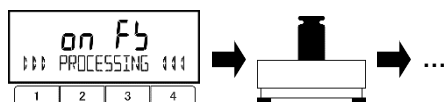
3 Zero-point calibration.



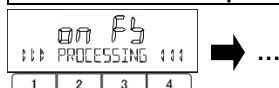
Display changes to the order of "blinking of <buSY>" → "blinking of <on 0>".

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

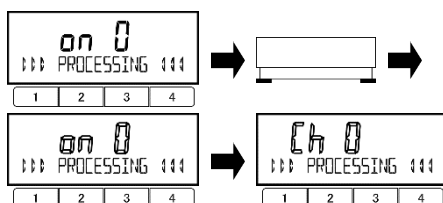
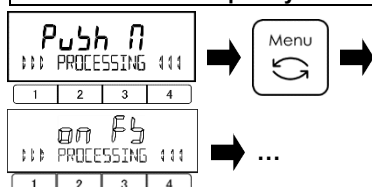
4 Capacity-point calibration and second zero-point calibration.



For models with capacity of 22 kg:



For models with capacity of 33 kg and 62 kg:



- Place the weight in the centre of the weighing pan.

• For models with capacity of 22 kg:

Display changes to the order of
<on FS> → "blinking of <on FS>".
Then capacity-point calibration starts.

• For models with capacity of 33 kg and 62 kg:

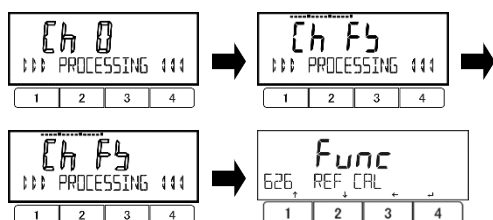
Display changes to the order of
<on FS> → <PuSh M>.
- Press [Menu] key.
Display changes to "blinking of <on FS>", then
capacity-point calibration starts.

On completion of the capacity-point calibration,
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 calibration starts.

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

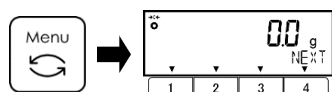
5 The calibration of the internal calibration mechanism and rewriting of the compensation value.



Display changes to the order of
"blinking of <Ch 0>" → <Ch FS> →
"blinking of <Ch FS>".

On completion of the calibration and rewriting of
the compensation value, the display
automatically changes to <626 REF CAL>.

6 Exit the setting menu.



- Press [Menu] key to shift to the measuring
mode.

6-3 Restore the compensation value of the internal calibration mechanism to default

This function is used to recover when adjustment of the internal calibration mechanism fails.

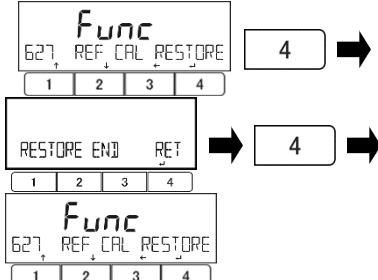
Legal
Metrology

This function is not available for verified scale.

Reference

This function is available only on models with internal calibration mechanism.

1 Execute the restore.



- Go to <627 REF CAL RESTORE >.

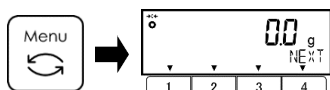
(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to execute.

The compensation value of the internal calibration mechanism is restored to default (factory setting).

- Press [4] key (<<RET <=>>) to go back to <627 REF CAL RESTORE> display.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

Note

For accurate span test/adjustment, please carry out adjustment of internal calibration mechanism by referring "6-2 Adjustment of the internal calibration mechanism" again after performing this function.

6-4 Initial span adjustment at power-on

This function is to perform span adjustment with internal weight at power-on.

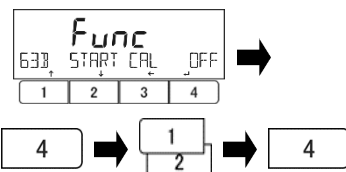
Note

- (1) Despite the indication of the menu item <63B START CAL>, what is actually initiated by this function is "adjustment". Please take care not to mistake it for "calibration".
- (2) For accurate adjustment, the scale must be allowed to acclimatise to the ambient temperature for at least 2 hours beforehand, in the actual place of use and at a constant room temperature.

Reference

- (1) This function is available only on models with internal calibration mechanism.
- (2) This function operates at every first power-on from the power-off status.

1 Select the setting of the initial span adjustment at power on.



- Go to <63B START CAL >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

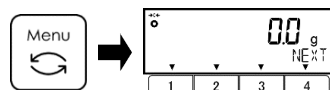
OFF: Disable

FORCE: Enable

SELEC: A selection screen is displayed

- Press [4] key to confirm.

2 Exit the setting menu.



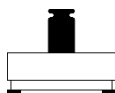
- Press [Menu] key to shift to the measuring mode.

■ Power on sequence with the span adjustment at power on

Note

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

1 (Recommended) Preload the scale.



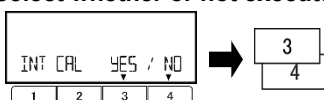
For accurate and precise calibration, perform several preloads with the load near the maximum capacity.

2 Ensure that there is no object on the weighing pan.



**3 Turn on the power for the scale (from power off status).
(Refer to steps 2 to 4 of "2-1 Turning on/off the power and preparing measurements")**

**4 ■ When <63B START CAL> is set to "SELEC":
Select whether or not execute span adjustment.**



When <63B START CAL> is set to "FORCE", this step is skipped.

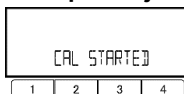
When <63B START CAL> is set to "SELEC", the selection screen for executing or not executing the span adjustment is displayed.

- Press [3] or [4] key to select whether to execute span adjustment.

[3](YES) : Execute

[4](NO) : Not execute

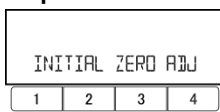
5 The span adjustment is executed.



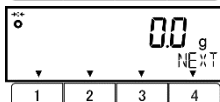
When "NO" is selected, go to step 6.

Display changes to "blinking of <CAL STARTED>" and span adjustment starts.

6 Initial zero-setting and completion of start-up sequence.



(Initial zero setting) ➡



After completion of span adjustment, initial zero setting is carried out.

7 Scale management settings and functions

7-1 Scale ID setting

A scale ID consisting of 10 digits can be set to identify the scale device at hand from other scale devices. The scale ID is included in the content of the GLP header output and span test/adjustment result output. The scale ID can be displayed by free key <<ID>> in weight mode.

1 Launch the scale ID setting.

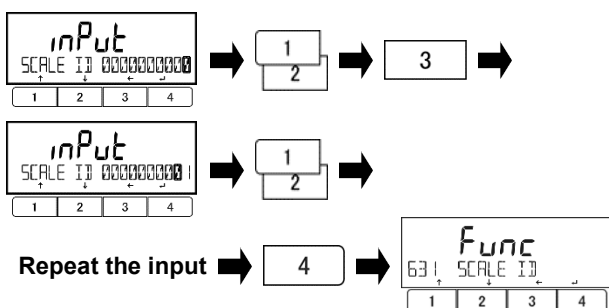


- Go to <631 SCALE ID>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to proceed to the scale ID registration.

2 Set the scale ID.

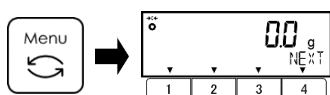


The number entry starts with the rightmost digit, where the cursor —flashing digit— is initially positioned.

- Enter the 10-digit ID by pressing [1]/[2] key to increment/decrement the digit and [3] key to move the cursor to the left.

- Press [4] key to register the scale ID and shift to <631 SCALE ID>.

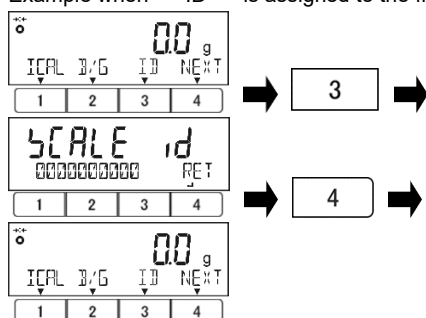
3 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

4 Indication of the scale ID (for weight mode only).

Example when << ID >> is assigned to the free key F3.



In weight mode, the scale ID can be displayed by the free key <<ID>>. (cf. "2-8 Free key setting")

- Press function key on which <<ID>> is displayed above.

The scale ID is displayed.

- Press [4] key (<<RET <=>>) to return to the measurement display.

7-2 Lock functions

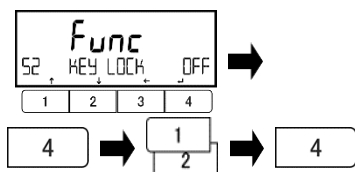
7-2-1 Operation-key lock function

Operation keys can be locked.

Note

When this function is activated, the scale cannot be powered off by [On/Off] key operation. To power off the scale, deactivate this function or activate the auto power-off function (cf. "7-5-1 Auto power-off").

1 Select setting of the operation-key lock function.



- Go to <52 KEY LOCK >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

OFF: Unlock

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

2: Measuring indication:

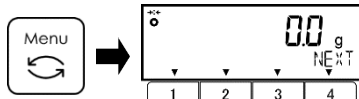
All keys excluding [Menu] key invalid

Setting menu:

[On/Off] key invalid

- Press [4] key to confirm.

2 Exit the setting menu.

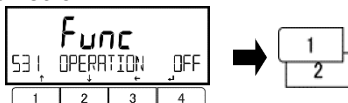


- Press [Menu] key to shift to the measuring mode.

7-2-2 Menu lock function

Various setting menu items can be locked.

1 Select the menu item of menu lock function.



- Go to <531 OPERATION >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [1]/[2] key to select each "menu lock" menu items.

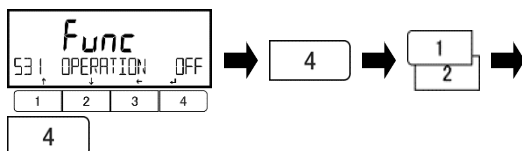
Refer to "Menu lock" menu items.

Refer to "Appendix 5 Hierarchy of the setting menu" for each menu item and the hierarchy below it.

"Menu lock" menu items

<531 OPERATION>	: Lock the menu item <1 APPLICATIONS>
<532 PERFORM>	: Lock the menu item <2 PERFORMANCE>
<533 USER>	: Lock the menu item <3 USER INFO>
<534 I/O>	: Lock the menu item <4 EXTERNAL I/O>

2 Select lock/unlock at each menu items.



- Press [4] key to make the setting value changeable.

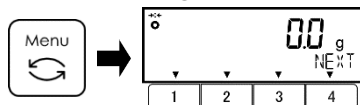
- Press [1]/[2] key to select.

OFF: Unlock

ON: The menu item is hidden

- Press [4] key to confirm.

3 Exit the setting menu.

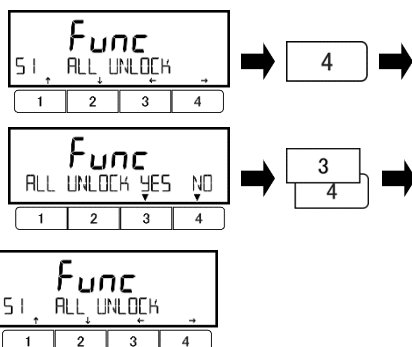


- Press [Menu] key to shift to the measuring mode.

7-2-3 Release all locks

All locks that have been set can be released.

1 Select all locks release.



- Go to <51 ALL UNLOCK>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key.

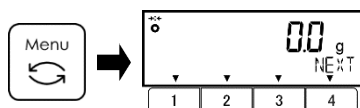
- Press [3]/[4] key to select.

[3](YES): Execute

[4](NO): No execute

After the operation, the display returns to <51 ALL UNLOCK>.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

7-3 Account control

Three user accounts are generated to a single device and one can be assigned to each operator, and the administrator can configure the authorisations and device settings for each account. Two of these accounts are each assigned a password (four-digit passcode) to be used for login, while the remaining one is a guest user account and is not assigned a passcode for login.

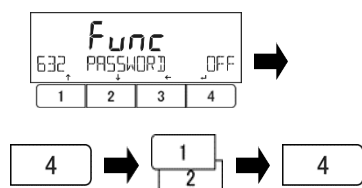
Note

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

Reference

When this function is enabled, the menu items <5 LOCK> and <6 ADMIN/ADJUST> can only be accessed by the administrator, while some of the menu items under <6 ADMIN/ADJUST> umbrella, the restrictions can be bypassed by setting up the “free keys” that provide shortcuts to those menu items. For more information on the “free key”, see “2-8 Free key setting”.

1 Enable/disable the account control.



- Go to <632 PASSWORD >.

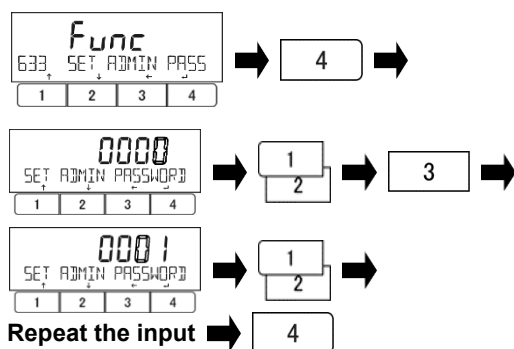
(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] keys to select;
OFF : Disable
ON : Enable

- Press [4] key to confirm.

2 Administrator password registration



Register a password (four-digit passcode) to enter administrator mode.

- Go to <633 SET ADMIN PASS >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to proceed to password registration.

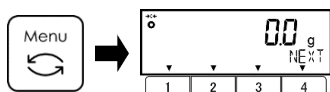
The number entry starts with the rightmost digit, where the cursor —flashing digit— is initially positioned.

- Enter 4 digits by pressing [1]/[2] key to increment/decrement the digit and [3] key to move the cursor to the left.

- Press [4] key to confirm.

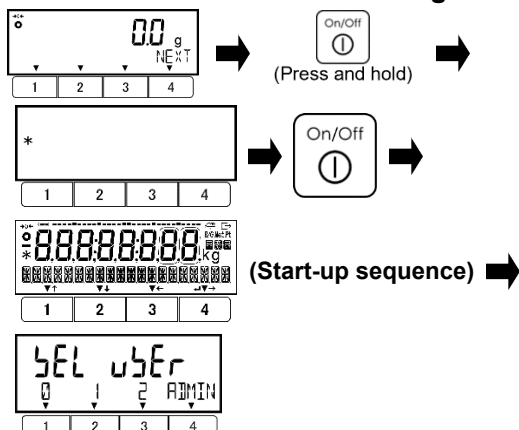
- Press [Menu] key to shift to the measuring mode.

3 Exit the setting menu.



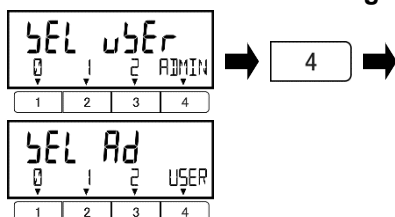
7-3-1 Configuration of user's authority and device setting in administrator mode

1 Switch the scale off and on again.



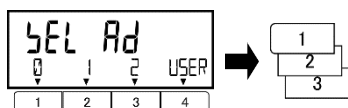
- Enable the <632 PASSWORD> and register the administrator password in <633 SET ADMIN PASS>, then power-off the scale.
- Press [On/Off] key, then the scale shifts to User login screen during the start-up sequence.

2 Go to the Administrator login screen.



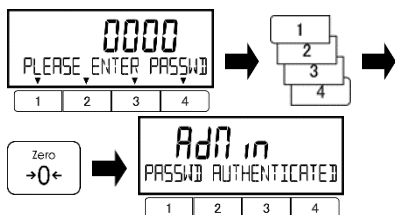
- Press [4] key to go to "Administrator login screen".
- <SEL Ad> is indicated on the 7-segment display.

3 Select the user account for which the authorisation and device settings are to be made.



- Press [1]/[2]/[3] key to select the user account. Pressing [4] key returns the display to the User login screen.
- [1]("0") : Guest user
- [2]("1") : User 1
- [3]("2") : User 2
- [4]("USER") : Shift to the User login screen

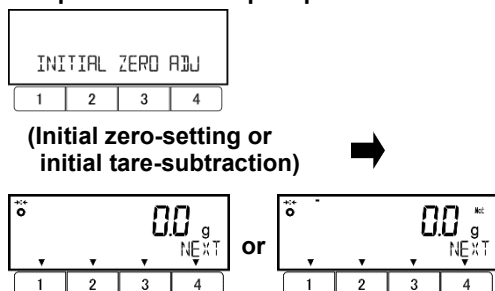
4 Input the administrator password.



- Input the administrator password by pressing [1]-[4] keys.
- Each digit increments as "0, 1, ..., 8, 9, 0" by pressing each function key.
- First digit from the left : [1] key
- Second digit from the left : [2] key
- Third digit from the left : [3] key
- Fourth digit from the left : [4] key
- Press [Zero] key to confirm.
- When the password is authenticated, the message appears, and the scale shifts to the next step.

5

Initial zero-setting/tare-subtraction and completion of start-up sequence.



Either initial zero setting or initial tare subtraction is carried out, depending on the load on the weighing pan.

Indication becomes zero, and < →0← > symbol lights.

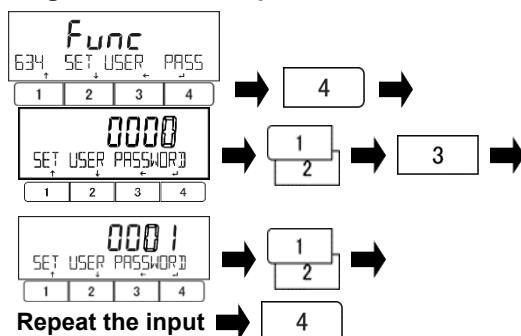
When initial tare subtraction has carried out, < **Net** > symbol also appears.

Legal Metrology
For verified scale, initial tare-subtraction function is not available.

(Cf. "2-1 Turning on/off the power and preparing measurements")

6

Register the user password.



- Go to <634 SET USER PASS >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to proceed to password registration.

The number entry starts with the rightmost digit, where the cursor —flashing digit— is initially positioned.

- Enter 4 digits by pressing [1]/[2] key to increment/decrement the digit and [3] key to move the cursor to the left.

- Press [4] key to confirm.

Reference

When "0" (Guest user) is selected at step 3, this step is skipped.

7

Set the functions and setting values.

Refer to "Appendix 5 Hierarchy of the setting menu" for menu items and setting values.

Reference

- (1) Menu items <5 LOCK> and <6 ADMIN/ADJUST> are displayed only for the administrator.
When to authorise each user to operate "Span adjustment with internal/external weight", "Addition function", etc., please assign the functions to the free keys. (Refer to "2-8 Free key settings".)
- (2) For the following menu items, if a setting or execution is made for one of the user accounts, the same setting values or execution results are reflected not only for the relevant user account but also for all user accounts.
 - <621 EX CAL> (cf. "6-1-1 Span adjustment with external weight")
 - <623 INT CAL> (cf. "6-1-3 Semi-automatic span adjustment with internal weight")
 - <626 REF CAL> (cf. "6-2 Adjustment of the internal calibration mechanism")
 - <627 REF CAL RESTORE> (cf. "6-3 Restore the compensation value of the internal calibration mechanism to default")
 - <631 SCALE ID> (cf. "7-1 Scale ID setting")
 - <632 PASSWORD> (cf. "7-3 Account control")
 - <633 SET ADMIN PASS> (cf. "7-3 Account control")
 - <637 DATE SETTING> (cf. "7-4-2 Date setting")
 - <638 TIME SETTING> (cf. "7-4-3 Time setting")
 - <63C DIRECT ST> (cf. "7-5-2 Direct start function")
 - <63E INITIALIZE> (cf. "7-6 Initialise")
- (3) If the menu item <63E INITIALIZE> is performed, all the settings for all the user accounts (including passwords) are initialised, the administrator password is also reset, and account control function is deactivated.
- (4) If the menu item <632 PASSWORD> is set to "OFF", the account control is deactivated for all the account, and the settings of the scale take over the settings of the "Guest user" account.

8

Set the user's permissions (Lock setting).

Refer to "7-2 Lock functions" to set user's permissions for key operation and/or accessing to setting menus.

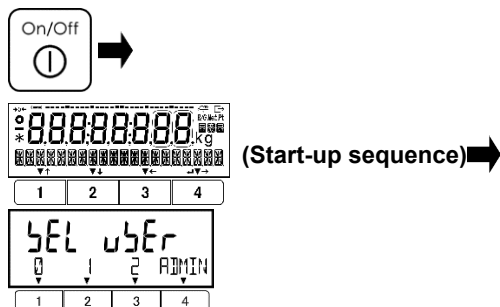
Note

Do not activate the operation-key lock function by setting <52 KEY LOCK > to "1" or "2", otherwise the operator will not be able to power off the scale by pressing [On/Off] key. Especially for the scale with the optional built-in battery, there will be no way to switch off the power.

7-3-2 User login

1

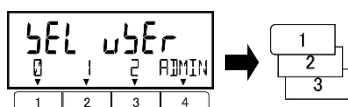
Power on the scale.



- Press [On/Off] key, then the scale shifts to User login screen during the start-up sequence.
< 5EL 5Er > is indicated on the 7-segment display.

2

Select the user account.



- Press [1]/[2]/[3] key to select the user account. Pressing [4] key shifts the display to the Administrator login screen.

[1]("0") : Guest user

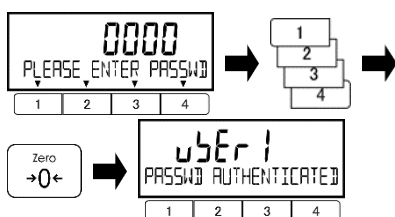
[2]("1") : User 1

[3]("2") : User 2

[4]("ADMIN") : Shift to the Administrator login screen

3

Input the user password.



- Input the user password by pressing [1]-[4] keys.

Each digit increments as "0, 1, ..., 8, 9, 0" by pressing each function key.

First digit from the left : [1] key

Second digit from the left : [2] key

Third digit from the left : [3] key

Fourth digit from the left : [4] key

- Press [Zero] key to confirm.

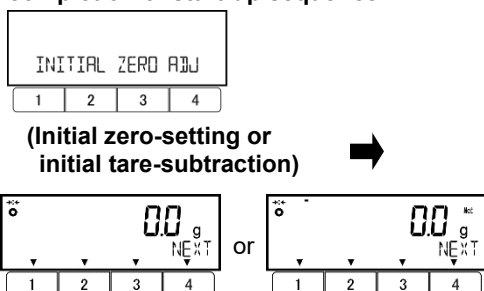
When the password is authenticated, the message appears, and the scale shifts to the next step.

Reference

When "0" (Guest user) is selected at step 2, this step is skipped.

4

Initial zero-setting/tare-subtraction and completion of start-up sequence.



Either initial zero setting or initial tare subtraction is carried out, depending on the load on the weighing pan.

Indication becomes zero, and < →0← > symbol lights.

When initial tare subtraction has carried out, < Net > symbol also appears.

Legal Metrology

For verified scale, initial tare-subtraction function is not available.

(Cf. "2-1 Turning on/off the power and preparing measurements")

5

Use the scale within the user's authority.

Scale settings configured by the administrator is reflected.

7-4 Date and time setting

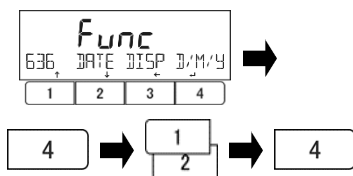
The date and time can be set to help manage measurements, calibration and adjustment.

The date and time is included in the content of the GLP header/footer output and span test/adjustment result output, and also can be included to each measurement result output as a date/time stamp. The date and time can be displayed by free key <<DATE>> and <<TIME>> in weight mode.

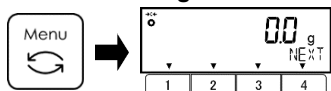
7-4-1 Date indication format

Date indication format can be selected.

1 Select the Date indication format.



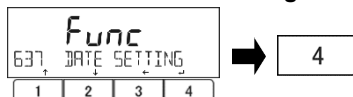
2 Exit the setting menu.



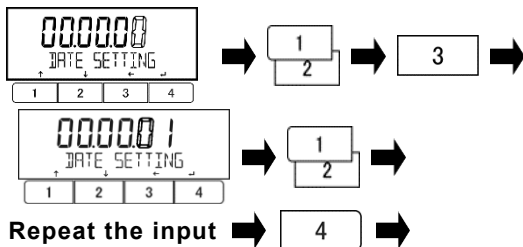
- Go to <636 DATE DISP >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to make the setting value changeable.
- Press [1]/[2] key to select.
Y/M/D: Year, Month, Day
D/M/Y: Day, Month, Year
M/D/Y: Month, Day, Year
- Press [4] key to confirm.
- Press [Menu] key to shift to the measuring mode.

7-4-2 Date setting

1 Launch the date setting.



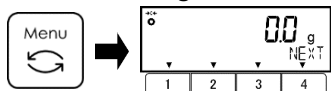
2 Set the date.



Repeat the input → 4 →

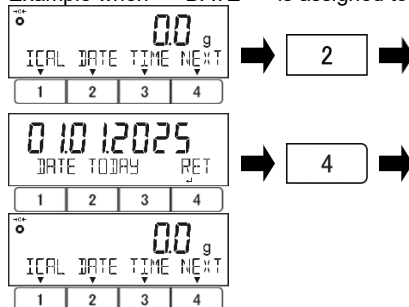


3 Exit the setting menu.



4 Indication of the date (for weight mode only).

Example when << DATE >> is assigned to the free key F2.



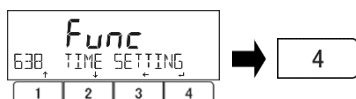
- Go to <637 DATE SETTING >.
(For key operations in the setting menu, refer to "2-5 Setting menu".)
- Press [4] key to start entering the date.
- The number entry starts with the rightmost digit, where the cursor —flashing digit— is initially positioned.
- Enter the date in the format set in <636 DATE DISP> by pressing [1]/[2] key to increment/decrement the digit and [3] key to move the cursor to the left.
- Press [4] key to confirm the date setting and shift to <637 DATE SETTING >.

- Press [Menu] key to shift to the measuring mode.

- In weight mode, the date can be displayed by the free key <<DATE>>. (cf. "2-8 Free key setting")
- Press function key on which <<DATE>> is displayed above.
- The date is displayed.
- Press [4] key (<<RET ←>>) to return to the measurement display.

7-4-3 Time setting

1 Launch the time setting.

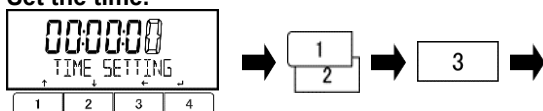


- Go to <638 TIME SETTING >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to start entering the time.

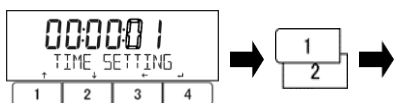
2 Set the time.



The number entry starts with the rightmost digit, where the cursor —flashing digit— is initially positioned.

- Enter the time in 24 hour format by pressing [1]/[2] key to increment/decrement the digit and [3] key to move the cursor to the left.

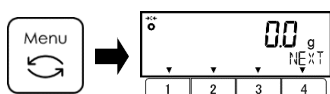
- Press [4] key to confirm the time setting and shift to <638 TIME SETTING>.



Repeat the input → 4 →



3 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

4 Indication of the time (for weight mode only).

Example when << TIME >> is assigned to the free key F3.

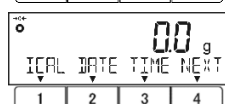
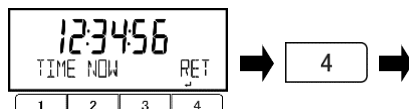


In weight mode, the date can be displayed by the free key <<TIME>>. (cf. "2-8 Free key setting")

- Press function key on which <<TIME>> is displayed above.

The time is displayed.

- Press [4] key (<<RET >>) to return to the measurement display.

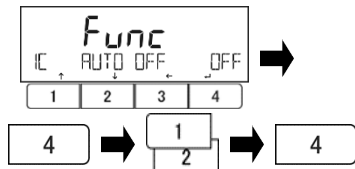


7-5 Power management settings

7-5-1 Auto power-off

This function is to automatically put the scale into standby (when AC adapter operated) or off (when battery operated).

1 Select the auto power-off setting.



- Go to <1C AUTO OFF >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

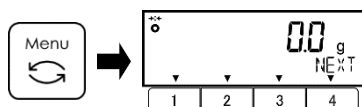
- Press [1]/[2] key to select.

Refer to the "Set List".

- Press [4] key to confirm.

Set List		
OFF : Invalid	3MIN : Power-off after 3 minutes	5MIN : Power-off after 5 minutes
10MIN : Power-off after 10 minutes	30MIN : Power-off after 30 minutes	

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

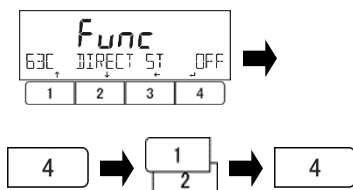
Reference

This function works when the scale is in one of the measuring modes, no key operations are being made, there is no load on the weighing pan and the indication is near zero and stable.

7-5-2 Direct start function

This is a function to turn on the scale automatically without pressing [On/Off] key when it is connected to external power supply.

1 Select Enable/Disable of the direct start function.



- Go to <63C DIRECT ST >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

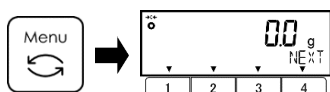
- Press [1]/[2] key to select.

OFF: Disabled

ON: Enabled

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

Reference

When direct-start function is enabled, the turn-on sequence described in step 2 of “2-1 Turning on/off the power and preparing measurements” is replaced by the following:

2

■ When <63C DIRECT ST> (Direct start) is set to “ON”:



(Power off status) ➡



Connect to the external power supply ➡



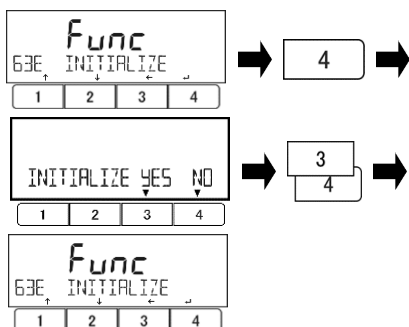
(Start-up sequence)



7-6 Initialise

This function is to initialise the scale to the factory settings except for the date and time settings and the internal correction coefficient determined by span adjustment.

1 Execute initialise.



- Go to <63E INITIALIZE>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key.

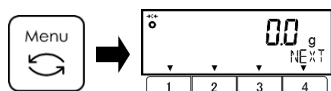
- Press [3]/[4] key to select.

[3](NO): Cancel

[4](YES): Execute

After the operation, the display returns to <63E INITIALIZE>.

2 Exit the setting menu.

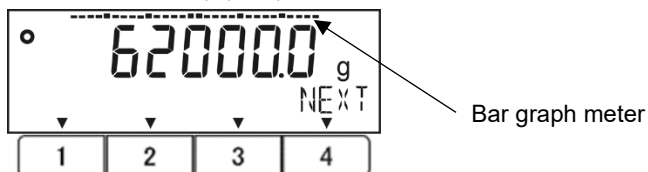


- Press [Menu] key to shift to the measuring mode.

8 Miscellaneous settings

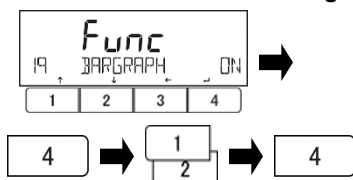
8-1 Bar graph meter

Bar graph meter is an approximate displaying device that shows the rate of gross value of the load to the maximum capacity (Max).



■ Set the bar graph meter to be shown or hidden.

1 Select ON/OFF of the bar graph meter.



- Go to <19 BARGRAPH>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

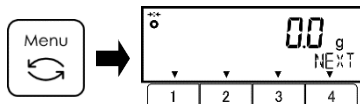
OFF: Hide

ON: Show

- Press [4] key to confirm.

- Press [Menu] key to shift to the measuring mode.

2 Exit the setting menu.



8-2 Buzzer

If buzzer is enabled, buzzer beeps when:

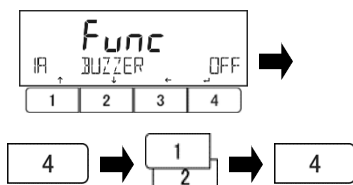
- Unit weight is updated automatically with Simple SCS function in the counting mode;
- Weight to be added is imported in the addition function;
- Error is occurred;
- Battery goes flat when the scale is battery operated;
- According to the result of each discrimination in the comparator function.

Reference

To use the buzzer with the comparator function, some additional settings are required. Please refer to "3-3-1 Comparator function setting".

■ Setting the buzzer control

1 Select Enable/Disable of the buzzer.



- Go to <1A BUZZER>.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

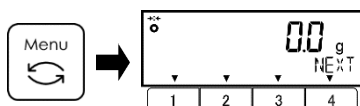
OFF: Disabled

MODE1: Enabled

- Press [4] key to confirm.

- Press [Menu] key to shift to the measuring mode.

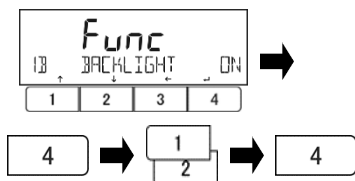
2 Exit the setting menu.



8-3 Backlight setting

Setting the backlight control.

1 Select the backlight setting.



- Go to <1B BACKLIGHT >.

(For key operations in the setting menu, refer to "2-5 Setting menu".)

- Press [4] key to make the setting value changeable.

- Press [1]/[2] key to select.

OFF : OFF

3MIN : Lights off after 3 minutes

5MIN : Lights off after 5 minutes

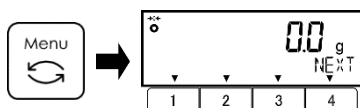
10MIN : Lights off after 10 minutes

30MIN : Lights off after 30 minutes

ON : Always ON

- Press [4] key to confirm.

2 Exit the setting menu.



- Press [Menu] key to shift to the measuring mode.

Reference

- (1) When the scale is battery powered, it is recommended to set backlight settings to continuously "OFF" to save the power.
- (2) The settings, which switch off the backlight after a certain period of time ("3MIN" to "30MIN"), work when the scale is in one of the measuring modes, no key operations are being made, there is no load on the weighing pan and the indication is near zero and stable.

9 Troubleshooting

Reference

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

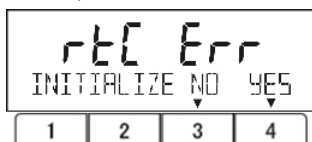
9-1 Error message and error code

Error Message/ Error Code	Description of the error	Coping method
OVER ERROR	- The weight of the object to be weighed is in excess of the maximum capacity. - The addition result has exceeded the maximum number of displayable digits.	- Split the object 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 foreign object. Use the dedicated weighing pan and pan base only.
DISPLAY ERROR	The addition 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/Percent mode is below the lower limit.	Choose the item/reference of which unit weight/reference weight is larger than the lower limit.
rtc Err	- The internal date and time data has been lost because the built-in rechargeable coin cell battery for backup of the clock function has run out.	cf. "9-2 How to restore the internal clock function"
ERR001 to ERR099	System error	Record the error code and notify the store where you purchased the product.
ERR703	- The operation key was pressed at the time of starting from the standby status. If the error message is displayed nevertheless the operation key wasn't pressed, there is something wrong with the hardware.	Do not press the operation keys while the scale 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 foreign 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 scale.
ERR709 ERR710 ERR711	- The load is unstable at the zero-setting/tare-weighing. - Span adjustment time-out error.	- Improper setting of the weighing pan or pan base is suspected. - Check for contact with foreign object. - Check for any wind or vibration.
ERR717	The mass of the external calibration weight is more than 1% differ from: - the designated mass at the span adjustment; or - the maximum capacity (Max) at the span test.	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 "adjustment of the internal calibration mechanism" by external calibration weight.	Use the calibration weight of which weight is equal to the maximum capacity.
ERR719	The adjust value by "span adjustment" is over 1% of the maximum capacity.	- Execute <627 REF CAL RESTORE>, then execute <626 REF CAL>. - Check the mass of the weight used for the span adjustment by external weight.
ERR722	Semi-automatic tare weighing is attempted during the preset tare operation.	Do not attempt semi-automatic tare weighing (by pressing the [Tare] key, command input or external contact input) during the preset tare operation.

Error Message/ Error Code	Description of the error	Coping method
ERR723	Out of zero-setting range (1.5% of the maximum capacity)	Make sure nothing on the weighing pan while executing zero setting.
ERR724	Out of tare-weighing range (0 g to the maximum capacity)	Choose the tare of which weight is within the tare weighing range.
ERR734	Weight of the sample is out of the importing range at actual sample capturing method at percent 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 sample capturing method at percent mode.	- Improper setting of the weighing pan or pan base is suspected. - Check for contact with foreign object. - Check for any wind or vibration.
ERR736	The setting value is out of the setting range at numeric value setting method at percent mode (lower limit to maximum capacity).	Set the value within the range.
ERR739	Time-out error of importing the sample weight in the actual sample capturing 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 preset tare value input is out of the settable range (0 g to maximum capacity).	Set the preset tare value of which weight is within the tare range.
ERR741	<621 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 <623 INT CAL> or <624 INT SPAN TEST> or <626 REF CAL> (Internal rechargeable battery option).	- Recharge the battery. - Connect to the AC adapter.
ERR746	Invalid date or time was input at <637 DATE SETTING> or <638 TIME SETTING>.	Set the date and time correctly.
ERR747	Time-out error of importing the sample weight in the actual sample capturing method at Comparator function.	- Improper setting of the weighing pan or pan base is suspected. - Check for contact with foreign object. - Check for any wind or vibration.
ERR748	The setting value is out of the setting range at numeric value setting method or actual sample capturing method at Comparator function ("0 – maximum capacity" to "maximum capacity").	Set the value within the range.
ERR749	Time-out error of importing the sample weight at Addition function.	- Improper setting of the weighing pan or pan base is suspected. - Check for contact with foreign object. - Check for any wind or vibration.
ERR750	- Addition operation was performed when not in addition-feasible status (when the <*> symbol is not displayed). - Weight of the object to add is out of the importing range (Up to "maximum capacity") at Addition function. - The total value has exceeded the maximum display digit at Addition function.	- Confirm that <*> symbol is displayed before performing addition operation. - Choose the object 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 scale at Counting mode.	Choose the samples of which unit weight is larger than the minimum interval of the scale.
ERR752	The unit weight of the samples is 0 g and under at Counting mode.	- Choose the samples of which unit weight is larger than the minimum interval of the scale. - 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 foreign object. - Check for any wind or vibration.
ERR760	Adding operation is executed while the addition function is disabled.	Set <141 ACTIVATE> "ON" then execute the adding operation.
ERR761	An error occurred at <626 REF CAL>.	Re-execute <626 REF CAL>.
ERR764	External weight used for <621 EX CAL> is different from the selected weight range at <SELECT WEIGHT>.	Use the external weight of which weight is within the selected range.

9-2 How to restore the internal clock function

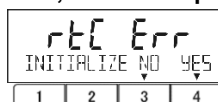
This product has a built-in rechargeable coin cell battery for backup of the clock function. If the battery runs out, the internal date and time data will be lost and the following error display will appear.



In this case, the following procedure must be followed to recover from the error.

1

Select whether to initialise the date and time data, and start-up the scale.



or 10 seconds have elapsed ➡

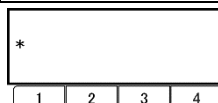
- When <rtc Err> message appears, press [3]/[4] key to select whether to initialise the date and time data.

[3](NO) : Not initialise

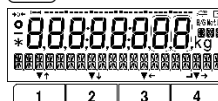
[4](YES) : Initialise

If approximately 10 seconds elapse without any key operation, it proceeds to the next sub-step without initialisation.

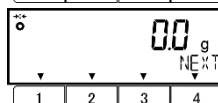
■When AC adapter operated and direct start function is disabled:



(Standby status) ➡



(Start-up sequence) ➡

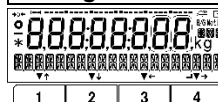


■When AC adapter operated and direct start function is disabled:

The scale shifts to standby status.

- Press [On/Off] key to starts up the scale.

■When AC adapter operated and direct start function is enabled, or optional internal rechargeable battery operated:



(Start-up sequence) ➡



■When AC adapter operated and direct start function is enabled, or optional internal rechargeable battery operated:

The scale starts up.

2

Set the date and time through the menu items <637 DATE SETTING> and <638 TIME SETTING> respectively.

Func			
637 DATE SETTING			
1	2	3	4

Func			
638 TIME SETTING			
1	2	3	4

➡ cf. "7-4-2 Date setting"

➡ cf. "7-4-3 Time setting"

3

Leave the scale to be connected to the power supply for a while to allow the built-in back-up battery to recharge.

Note

When the date and time data were not initialised in the previous step, the date and time data will contain illegal values. In this situation, and if date and time settings are not performed in this step, the same error display will appear again when the power is switched off and then reconnect to the power.

Note

To prevent the error, it is recommended to recharge the battery once every 3 months or less if it is not to be used for an extended period of time.

It takes approximately 20 hours for the battery to be fully charged from a fully discharged state, but please note that this charging time may vary depending on usage conditions and environmental temperature.

10 How to clean the scale



DANGER

Take care not to wet the AC adapter.

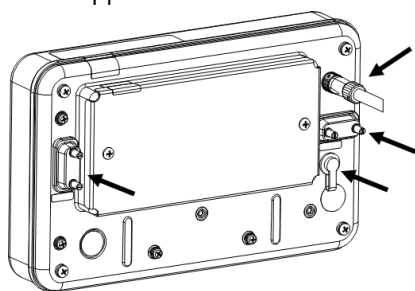
Note

- (1) To prevent water and dust from entering the interior of the scale during cleaning, the following procedures must be followed.
- (2) Do not use items such as chemical agents or solvents for the switch panel or other resin components.
- (3) Do not dismount the pan base.
- (4) Take care not to apply excess force or impact to the scale.

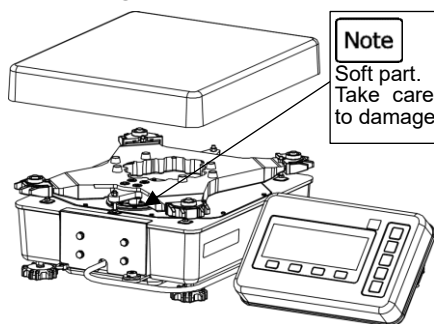
Turn the power off and disconnect the AC adapter.

Detach the indicator stander if necessary.

To prevent ingress of water and dust, close the AC adapter jack with the rubber cap, connect the scale cable, close the cover of hanging measurement hole, and connect the specified water-/dust-proof-type serial cables or close the 9-pin D-SUB connectors with supplied covers.

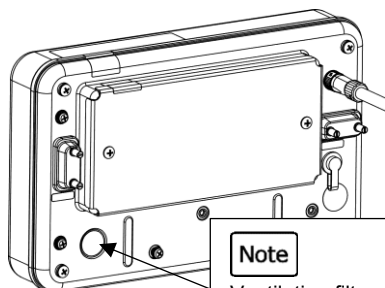


■ Cleaning method



Note

Soft part.
Take care not
to damage it.



Note

Ventilation filter. Be careful
not to get neutral detergent
on this part.

- Wipe the surface with a dry soft cloth or sponge.
- For dirt in grooves or small areas, sweep it out with a soft brush.
- If the scale is heavily soiled use a neutral detergent and rinse it with water. However, take care not to get the neutral detergent on the ventilation filter on the indicator unit.
- When cleaning with water, water jets from ordinary taps or hoses can be used, but avoid the use of high pressure washers or other strong water pressures.
- If the scale gets wet, wipe the surface of the weighing pan, the weighing unit including pan base, and the indicator unit with a dry cloth and dry thoroughly.

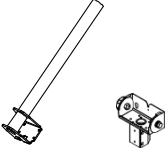
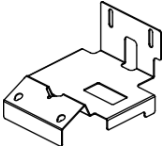
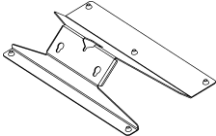
Note

Insufficient wiping of moisture from the weighing pan or pan base after rinsing will adversely affect the accuracy and precision of the measurement.

Appendix

Appendix 1 Specifications

Item	Description	
Product name	Precision Tuning Fork Platform Scale	
Type	FMA series	
Model name and Metrological specifications	Refer to "Appendix 1-1 Metrological specifications".	
Manufacturer	SHINKO DENSHI CO., LTD. Address: 1-52-1 Itabashi, Itabashi-ku, Tokyo 173-0004 JAPAN	
Power	Dedicated AC adapter (100-240 V $\sim$ $\pm$ 10% / 50-60 Hz / 0,6 A) Internal rechargeable battery (Optional)	
Ratings	AC adapter drive: 12 V $\overline{\text{---}}$ / 3,5 W Internal rechargeable battery drive (Optional): 6,0 V $\overline{\text{---}}$ / 1,1 W	
Operating condition	Temperature: 5 °C to 35 °C	
	Humidity: 80% RH or lower (no condensation)	
	Pollution degree: 2	
	Altitude: 2000 m or less above sea level	
	Location of use: Indoor use only	
Electromagnetic Compatibility	■ Immunity: Intended to be used in "Industrial electromagnetic environment". - Performance Level: The difference between the weight indication due to the disturbance and the indication without the disturbance shall not exceed a value corresponding to 1 e (= 1 g, maximum permissible error). - Permissible Loss of Performance: Not specified. - Possible LOSS OF FUNCTION, its causes and recovery procedure: This product may be turned off due to due to voltage dips and/or short interruptions of AC mains. If this is the case, turned on the scale again in accordance with "2-1 Turning on/off the power and preparing measurements". ■ Emission: Class B Group 1 equipment	
Ingress Protection	IP65 (When AC adapter jack cover is mounted, the scale cable is connected, cover of hanging measurement hole is closed, and connector cover is mounted or specified water-/dust-proof output cable is adequately connected. Please contact to your local dealer for the specified cable.)	
External I/O	RS-232C I/O (9-pin D-SUB male connector) Serial output for peripherals and external contact input for tare-subtraction and/or zero-setting from external switches (9-pin D-SUB male connector)	
Weight of the scale (NET)	FMA**K**S Model (Without internal calibration mechanism):	Approximately 18 kg
	FMA**K**SR Model (With internal calibration mechanism):	Approximately 19 kg
Options and	■ Factory options:	

Accessories	- Relay contact I/O *1, *2 - RS422 I/O *2, *3 - Internal rechargeable battery *1 *1 Relay contact I/O and Internal rechargeable battery cannot be installed together. *2 Relay contact I/O and RS422 I/O cannot be installed together. *3 When RS422 I/O is installed, the standard RS232C I/O is not available.		
	■ Retrofit options/accessories:		
	Extended scale cable 5 m / 10 m 	Hanger fitting for hanging measurement *3, *4 	Pole kit 
	Indicator mounting bracket 	Table-top indicator stand 	
*4 When hanger fitting is mounted, the weighing unit cannot meet IP65. *5  Hanging measurement cannot be used for legal for trade purpose.			
Peripherals	- Printer Model: CBM 910II *6, *7 - Foot switch for zero-setting and/or tare-subtraction Model: SFS-1 *6, *8 *6 These peripherals do not meet IP65. *7 Printer CBM 910II may not be available in some countries/regions. Please contact your local dealer on compatible printers. *8 When the foot switch model SFS-1 is connected, the indicator unit cannot meet IP65.		

Appendix 1-1 Metrological specifications

■ Individual models specifications

For non



Model name	Internal calibration mechanism	Max	d (default) *1
FMA22K0.1S	-	22000 g 22 kg	0,1 g 0,0001 kg
FMA22K0.1SR	x	110000 ct	0,5 ct
FMA33K0.1S	-	33000 g 33 kg	0,1 g 0,0001 kg
FMA33K0.1SR	x	160000 ct	0,5 ct
FMA62K1S	-	62000 g 62 kg	1 g 0,001 kg
FMA62K1SR	x	310000 ct	5 ct
FMA62K0.1S	-	62000 g 62 kg	0,1 g 0,0001 kg
FMA62K0.1SR	x	310000 ct	1 ct

Model	Internal calibration mechanism	Max	Min (default) *2	e	d (default) *1	Accuracy Class
FMA22K0.1S	-	22000 g	5 g	1 g	0,1 g	II
FMA22K0.1SR	x	22 kg 110000 ct	0,005 kg 250 ct	0,001 kg 5 ct	0,0001 kg 5 ct	
FMA33K0.1S	-	33000 g	5 g	1 g	0.1 g	II
FMA33K0.1SR	x	33 kg 160000 ct	0,005 kg 250 ct	0,001 kg 5 ct	0,0001 kg 5 ct	
FMA62K1S	-	62000 g	50 g	1 g	1 g	II
FMA62K1SR	x	62 kg 310000 ct	0,05 kg 250 ct	0,001 kg 5 ct	0,001 kg 5 ct	
FMA62K0.1S	-	62000 g	5 g	1 g	0,1 g	II
FMA62K0.1SR	x	62 kg 310000 ct	0,005 kg 250 ct	0,001 kg 5 ct	0,0001 kg 5 ct	

Reference

*1 “d” (actual scale interval, readability) can be changed via the menu item <63A READABILIT> (cf. “4-5 Actual scale interval (readability) setting”) except for FMA62K1S and FMA62K1SR. Please refer to “Appendix 1-2 Actual scale interval (readability) settings for each weight unit” for the value of “d” for each weighing unit, which is switched by the menu item <63A READABILIT>.

*2 “Min” shall be adopted according to the switching of the “d” in order to reduce the effect of digital rounding errors. Refer to the label near the display.

■ Common specifications

Item	Description
Weighing system	Tuning-fork vibration method
Weighing pan size	400 mm x 350 mm
Guaranteed temperature range for metrological performance	5 °C to 35 °C
Zero	■ Initial zero setting Range: -5% to +13% (Total 18%) of the maximum capacity (Max) ■ Semi-automatic zero setting with [Zero] key, external command, or external contact input Range: -1,5% to +1,5% (Total 3%) of the maximum capacity (Max) ■ Combined semi-automatic zero-setting and tare-subtraction by the same external contact input Zero range: -1,5% to +1,5% (Total 3%) of the maximum capacity (Max) ■ Zero tracking On/off switchable Rate: Up to 0,5d /second Range: -1,5% to +1,5% (Total 3%) of the maximum capacity (Max) The maximum zero-point fluctuation that can be corrected: For  : 0,5 d For non  : 0,5 d; 1 d; 2 d; 4 d (switchable)
Tare device	■ Semi-automatic tare weighing with [Tare] key, external command input, or external contact input - Type: Subtractive tare (Tare reduces the weighing range for net loads) - Range: Over 0 g and up to 100% of the maximum capacity (Max) ■ Combined semi-automatic zero-setting and tare-subtraction by the same external contact input - Type: Subtractive tare (Tare reduces the weighing range for net loads) - Tare range: +1,5% to 100 % of the maximum capacity (Max) ■ Automatic tare - Type: Subtractive tare (Tare reduces the weighing range for net loads) - Range: Over 0% and up to 100% of the maximum capacity (Max) (Activated when the load is over 0,15% of Max) - Can be enabled/disabled via the setting menu.
Preset tare device	- 5 data can be registered - Input: Actual object capturing or keying in or command input - Range: Over 0 g and up to the maximum capacity of the scale (Max)
Limits of Indication	■ For  : <OVER ERROR> is displayed when the maximum capacity (Max) is exceeded by 9 e. <UNDER ERROR> is displayed when tare device is not in operation and negative gross value is less than -20 d. ■ For non  : <OVER ERROR> is displayed when the maximum capacity (Max) is exceeded by a certain value. The upper limit of indication depends on the weight unit of measurement.

Appendix 1-2 Actual scale interval (readability) settings for each weight unit

For non 

Unit	Setting of <63A READABILIT>	d (readability)			
		FMA22K0.1S(R)	FMA33K0.1S(R)	FMA62K1S(R)	FMA62K0.1S(R)
gram	1	0,1	0,1	1	0,1
	10	1	1	10	1
kilogram	1	0,0001	0,0001	0,001	0,0001
	10	0,001	0,001	0,01	0,001
carat	1	0,5	0,5	5	0,5
	10	5	5	50	5
ounce	1	0,005	0,005	0,05	0,005
	10	0,05	0,05	0,5	0,05
pound	1	0,0005	0,0005	0,005	0,0005
	10	0,005	0,005	0,05	0,005
ounce troy	1	0,005	0,005	0,05	0,005
	10	0,05	0,05	0,5	0,05
pennyweight	1	0,1	0,1	1	0,1
	10	1	1	10	1
もんめ momme	1	0,05	0,05	0,5	0,05
	10	0,5	0,5	5	0,5
金衡兩 tael troy (Hong Kong)	1	0,005	0,005	0,05	0,005
	10	0,05	0,05	0,5	0,05
tahil (Singapore/ Malaysia)	1	0,005	0,005	0,05	0,005
	10	0,05	0,05	0,5	0,05
兩 tael (Taiwan)	1	0,005	0,005	0,05	0,005
	10	0,05	0,05	0,5	0,05
tola (India)	1	0,01	0,01	0,1	0,01
	10	0,1	0,1	1	0,1

For 

Unit	Setting of <63A READABILIT>	d (actual scale interval)			
		FMA22K0.1S(R)	FMA33K0.1S(R)	FMA62K1S(R)	FMA62K0.1S(R)
gram	1	0,1 g	0,1 g	1 g	0,1 g
	10	1 g	1 g		1 g
kilogram	1	0,0001 kg	0,0001 kg	0,001 kg	0,0001 kg
	10	0,001 kg	0,001 kg		0,001 kg
carat	1	5 ct	5 ct	5 ct	5 ct
	10	5 ct	5 ct		5 ct



For verified FMA62K1S(R), <63A READABILIT> is not indicated and the actual scale interval cannot be changed.

Appendix 1-3 Weighing capacity and readability by non-metric units



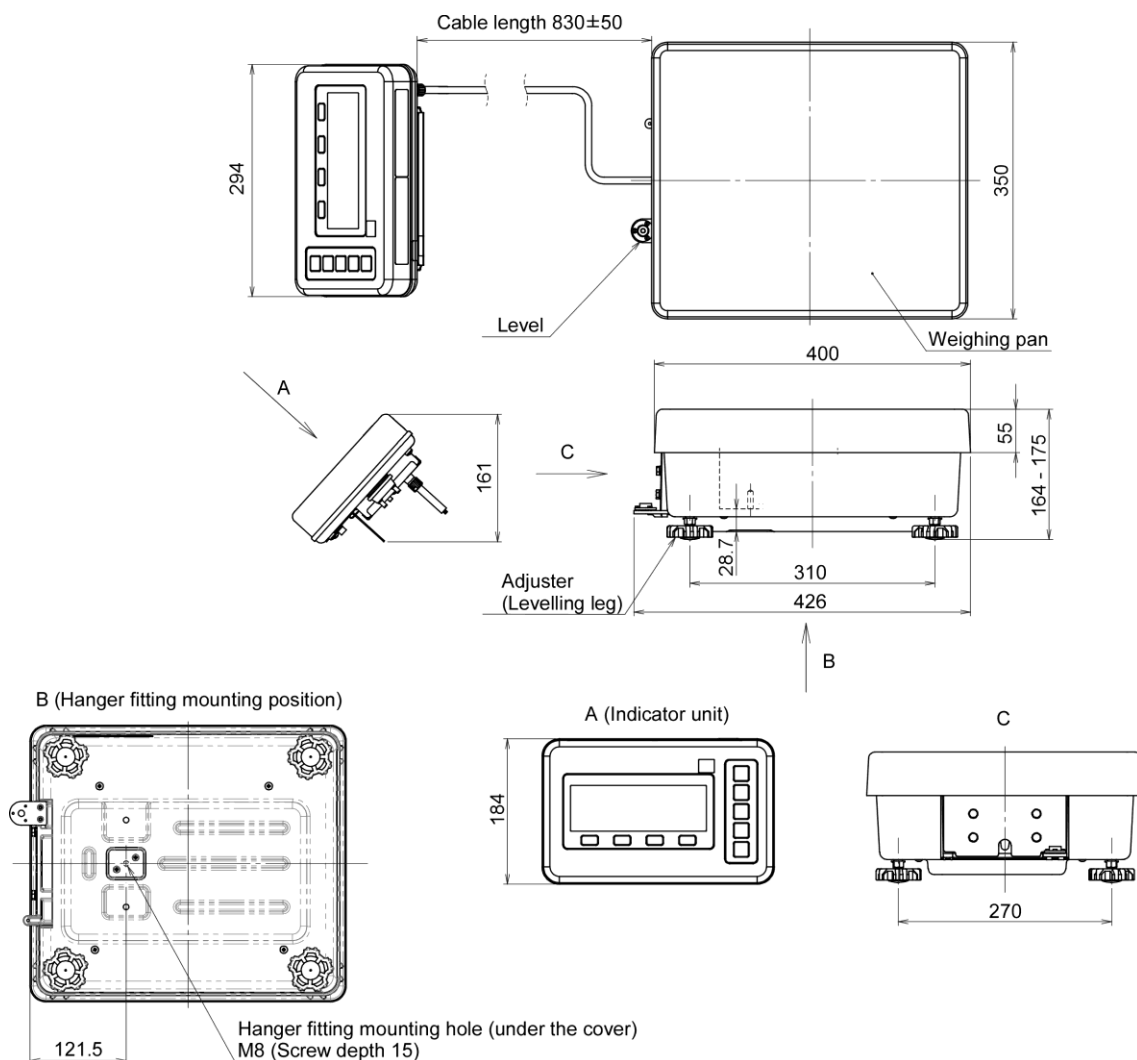
These units are not available for verified scale.

Unit		Model			
		FMA22K0.1S(R)	FMA33K0.1S(R)	FMA62K1S(R)	FMA62K0.1S(R)
pound	Max	48	72	130	130
	d	0,0005	0,0005	0,005	0,0005
ounce	Max	770	1100	2100	2100
	d	0,005	0,005	0,05	0,005
ounce troy	Max	700	1000	1900	1900
	d	0,005	0,005	0,05	0,005
pennyweight	Max	14000	21000	39000	39000
	d	0,1	0,1	1	0,1
もんめ momme	Max	5800	8800	16000	16000
	d	0,05	0,05	0,5	0,05
金衡兩 tael troy (Hong Kong)	Max	580	880	1600	1600
	d	0,005	0,005	0,05	0,005
tahil (Singapore/ Malaysia)	Max	580	870	1600	1600
	d	0,005	0,005	0,05	0,005
兩 tael (Taiwan)	Max	580	880	1600	1600
	d	0,005	0,005	0,05	0,005
tola (India)	Max	1800	2800	5300	5300
	d	0,01	0,01	0,1	0,01

Appendix 2 Table of display symbols and conversions of weight units

Weight unit	Display symbol	Conversion coefficient
gram	g	1,00000000E+00
kilogram	kg	1,00000000E-03
carat	ct	5,00000000E+00
pound	lb	2,2046226E-03
ounce	oz	3,5273961E-02
ounce troy	ozt	3,2150746E-02
pennyweight	dwt	6,4301493E-01
もんめ, momme	mom	2,6666667E-01
金衡兩, tael troy (Hong Kong)	t : H	2,6717251E-02
tahil (Singapore/Malaysia)	t : S	2,6455471E-02
兩, tael (Taiwan)	t : T	2,6666667E-02
tola (India)	to	8,5735324E-02

Appendix 3 Dimensional outline drawing



Appendix 4 Internal rechargeable battery

This appendix describes the optional internal rechargeable battery and applies to the device with it.



WARNING

- (1) Be sure to use the AC adapter supplied with the scale. A different AC adapter may cause the batteries to generate heat or explode.
- (2) The removal or replacement of the battery by the user is not permitted.
Please contact your local dealer for removal, replacement or disposal of the battery.

■ Specifications of the battery

Installation:	Factory option, built-in type
Type:	Nickel-Metal Hydride (NiMH)
Ratings:	6,0 V  / 2100 mAh
Charge time:	About 12 hours
Operation time:	About 10 hours of continuous operation (backlit off)
Can be recharged:	More than 300 times

■ Scale operation with the battery

When the scale is not connected to an AC adapter and is powered by the battery, a battery indicator  is displayed. As the battery get weaker, the battery indicator changes from  to . If the battery is further depleted, the battery indicator  flashes and then the scale switches off.

When the scale equipped with the battery is not connected to the AC adapter, it does not enter standby status but power-off status when the [On/Off] key is pressed to turn off.

(Cf. "2-1 Turning on/off the power and preparing measurements")

Reference

- (1) When the scale is purchased and used for the first time, the capacity of the built-in battery is reduced due to natural discharge.
- (2) When the battery is already run out, pressing the [On/Off] key will result in either no response or, if the scale starts up, it will immediately switch off after beep (PiPiPiPiPiPi) sound.
- (3) When the battery indicator changes to , "Span adjustment with internal weight", "Span test with internal weight", "Adjustment of the internal calibration mechanism", and "Initial span adjustment at power-on" cannot be performed.

■ Recharging the battery

When the battery indicator changes to  (flashing) or scale does not start up, follow the steps below to charge the battery.

- (1) Turn the scale off.
- (2) Clean the AC adapter jack and surrounding area of the indicator and wipe off any moisture.
- (3) Open the AC adapter jack cover and connect the AC adapter supplied with the scale.
- (4) Wait about 12 hours until the battery is fully recharged.
- (5) When charging is finished, unplug the AC adapter from the indicator and close the AC adapter jack cover.



DANGER

Do not charge the battery in wet location.

Note

- (1) To avoid overcharging, use the scale without the AC adapter when the battery is fully charged. It is recommended to disable the direct start function <63C DIRECT ST> when the battery is used. (cf. "7-5-2 Direct start function")
- (2) Leaving the scale unused for long periods of time may cause the battery to become inert or over-discharged due to natural discharge, rendering the battery unusable. In order to maintain satisfactory battery performance, cycling (charging and discharging) of the battery within 6 months period is highly recommended. At least one times cycling should be conducted within 12 months.
- (3) Battery charging must be carried out in an environment that meets the "Operating condition" listed in "Appendix 1 Specifications".

Appendix 5 Hierarchy of the setting menu

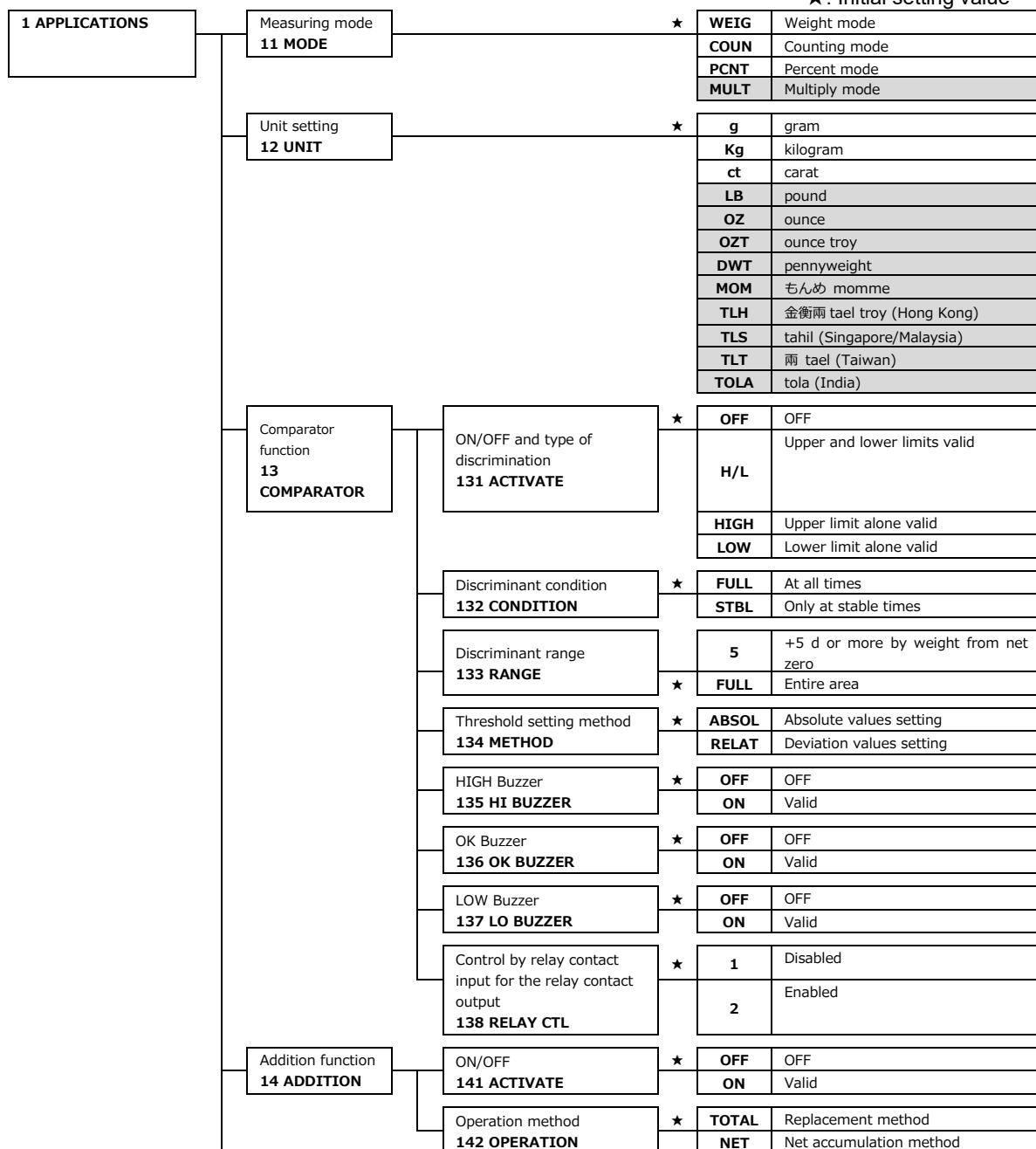
Appendix 5-1 Menu items under <1 APPLICATIONS>



For verified scale:

- Grey-shaded items () are not indicated;
- <18 WT STABLE> is not indicated and fixed to "ON";
- <11 MODE> setting is reset to "WEIG" each time the scale is turned on.

★: Initial setting value



Automatic tare subtraction 15 AUTO TARE	★	OFF	OFF
		ON	Valid
Tare reminder 16 T REMINDER	★	OFF	OFF
		1	Mode 1 Valid
		2	Mode 2 Valid
Zero reminder 17 Z REMINDER	★	OFF	OFF
		ON	Valid
Stability waiting 18 WT STABLE	★	OFF	OFF
		ON	Valid
Bar graph indication 19 BARGRAPH	★	OFF	OFF
		ON	Valid
Buzzer setting 1A BUZZER	★	OFF	OFF
		MODE1	Valid
Back light setting 1B BACKLIGHT	★	OFF	OFF
		3MIN	Light-off after 3 minutes
		5MIN	Light-off after 5 minutes
		10MIN	Light-off after 10 minutes
		30MIN	Light-off after 30 minutes
		ON	Always ON
Auto power-off 1C AUTO OFF	★	OFF	Invalid
		3MIN	Power-off after 3 minutes
		5MIN	Power-off after 5 minutes
		10MIN	Power-off after 10 minutes
		30MIN	Power-off after 30 minutes
SIMPLE SCS 1D SIMPLE SCS	★	OFF	OFF
		ON	Valid

Appendix 5-2 Menu items under <2 PERFORMANCE>



For verified scale, grey-shaded items () are not available.

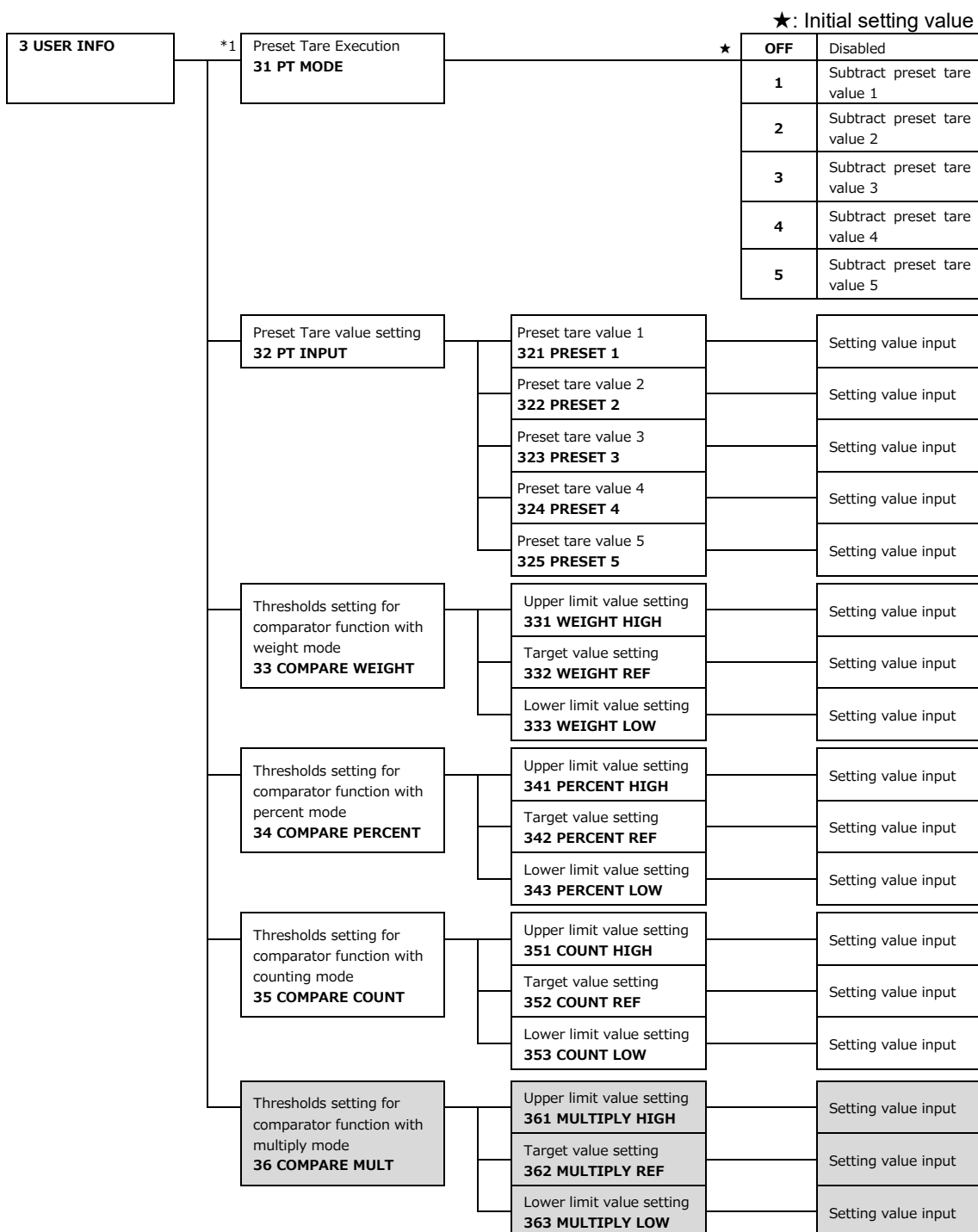
2 PERFORMANCE		★: Initial setting value	
	Stability discrimination width 21 STABLE	★	0.5 0,5 d
			1 1 d
			2 2 d
			4 4 d
	Response speed 22 RESPONSE	★	1 Sensitive mode
			2 Fast
			3 Normal
			4 Slow
			5 Anti-vibration mode
	Zero tracking ON/OFF and the maximum zero-point fluctuation that can be corrected 23 ZERO TRAC	★	OFF OFF
			0.5 0,5 d
			1 1 d
			2 2 d
			4 4 d

Appendix 5-3 Menu items under <3 USER INFO>



For verified scale, grey-shaded items () are not indicated.

Reference *1 <31 PT MODE> setting is reset to "OFF" each time the scale is turned on.



Appendix 5-4 Menu items under <4 EXTERNAL I/O>

Legal
Metrology

For verified scale:

- Grey-shaded items () are not indicated;

*1 <412 FORMAT> is not indicated and fixed to "CBM";

*2 The initial setting value of <41A STATUS> is "ON".

*3 Output data when setting values "1", "3" or "6" of <413 CONDITION> (Output condition) is selected shall not be used for printing or storing for legal for trade purposes, as they will cause the scale to output weight during continuous or temporary disturbance of the equilibrium;

Reference

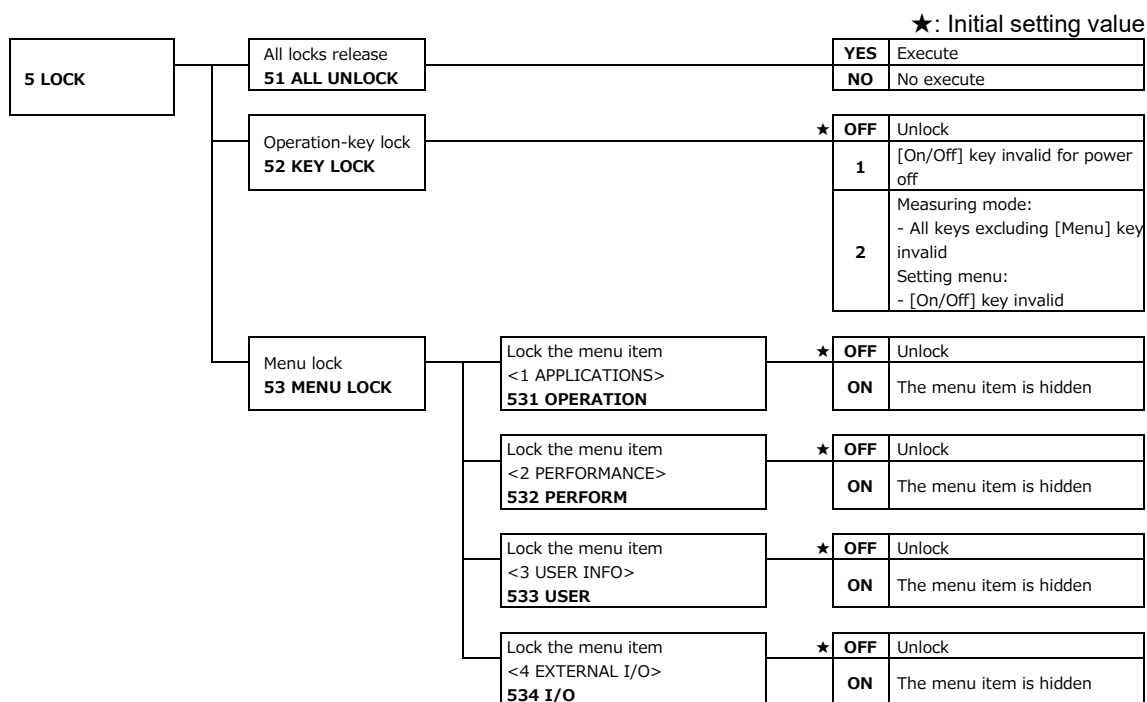
*4 The initial setting value of <41A STATUS> is "OFF" on non-verified scale.

★: Initial setting value

4 EXTERNAL I/O		RS232C I/O / Serial output/ Optional RS422 I/O settings		41 RS232C	
				ON/OFF	★ OFF OFF
				411 ACTIVATE	★ ON ON
				*1 Communication format	6 6-digit numeric format
					7 7-digit numeric format
					8 8-digit numeric format
					CSP6 CSP 6-digit format
					CSP7 CSP 7-digit format
					*1 ★ CBM CBM format
				Output condition	OFF Output stop
					*3 1 Continuous output at all times
					2 Continuous output during stable equilibrium (Output stop when unstable)
					*3 3 One-time output immediately after the [Output] key is pressed
					4 Auto output (One-time output when the scale is loaded and reaches stable equilibrium. The next output for another object loading is executed once the indication becomes stabilised at less than or equal to zero by unloading, zero setting or tare weighing.)
					5 One-time output every time when the scale reaches stable equilibrium (Output stop at unstable times)
					*3 6 Continuous output during unstable state and one-time output every time when the scale reaches stable equilibrium
					★ 7 One-time output after [Output] key is pressed and the scale reaches stable equilibrium
				Linkage of the output control and the comparator function	★ 0 Disabled
					1 Enabled (Output when discrimination result is OK or absent)
				Baud rate	★ 1200 1200 bps
					2400 2400 bps
					4800 4800 bps
					9600 9600 bps
					19200 19200 bps
					38400 38400 bps
					57600 57600 bps
					115.2K 115200 bps
				Parity	★ OFF None
					ODD Odd number
					EVEN Even number
				Stop bit	1BIT 1 bit
					★ 2BIT 2 bit
				Unused high order digit	ZERO Zero padding (0x30)
					★ SPACE Fill with spaces (SPC=0x20)

	Response command 419 RESPONSE	★	1	A00/Exx format
			2	ACK/NAK format
	Net value designation symbol 41A STATUS	*4 ★	OFF	Not appended
		*2 ★	ON	Appended
	Date and time stamp 41B TIME STAMP	★	OFF	Not appended
			TIME	Time stamp appended
			D/T	Date and time stamp appended
	Combined Gross/Net/Tare output 41C GNT OUT	★	SNGL	Disabled (Only the indicated weight is output)
			GNT	Enabled (Gross, net and tare (or preset tare) values are output simultaneously.)
	Communication function with error detection code 41D ERR DETECT	★	OFF	Disabled
			ON	Enabled
External contact input 42 CONTACT INPUT	ON/OFF 421 ACTIVATE	★	OFF	Disabled
			ON	Enabled
	Function assigned to the external contact input 422 OPERATION	★	ZERO	Zero setting
			TARE	Tare weighing
			Z/T	Combined zero-setting and tare-subtraction

Appendix 5-5 Menu items under <5 LOCK>



Appendix 5-6 Menu items under <6 ADMIN/ADJUST>

Reference

- *1 For non-verified scale, the initial setting value of <611 F1 KEY> is:
- "CAL" for model without internal calibration mechanism;
 - "ICAL" for model with internal calibration mechanism.
- *2 Setting value "ICAL" of the free key menu item <61* F* KEY>, and menu items <623 INT CAL>, <624 INT SPAN TEST>, <625 ARM>, <626 REF CAL>, <627 REF CAL RESTORE>, and <63B START CAL> are available only on the models with internal calibration mechanism.
- *3 <634 SET USER PASS> appears only when you log in in administrator mode with <632 PASSWORD> set to "ON".

Note

Despite the indication of the menu items <621 EX CAL>, <623 INT CAL>, <626 REF CAL> and <63B START CAL>, and the indication of the free keys <<CAL>> and <<ICAL>>, what is actually initiated by them is "adjustment". Please take care not to mistake them for "calibration".



- For verified scale, grey-shaded items () are not indicated.
- *4 Initial setting value of <611 F1 KEY> is:
- "NONE" for model without internal calibration mechanism;
 - "ICAL" for model with internal calibration mechanism.
- *5 The setting of <63A READABILIT> is not valid and fixed to "1" when weighing unit "carat" is selected.
- *6 Setting value "READ" of <61* F* KEY> and menu item <63A READABILIT> are not available on FMA62K1S(R).

★: Initial setting value

6 ADMIN/ADJUST	Key assignment for free key 61 FREE KEY	Free key F1 611 F1 KEY	★F1	*4	
				NONE	OFF
		Free key F2 612 F2 KEY	★F2	B/G	Switch between Gross value and Net value indications
		Free key F3 613 F3 KEY	★F4	DATE	Display the date
				TIME	Display the time
		Free key F4 614 F4 KEY	★F3	TARE	Tare value or preset tare value indication
				HIGH	Upper limit value indication (Comparator function)
				LOW	Lower limit value indication (Comparator function)
				ID	Display the Scale ID
		Free key F5 615 F5 KEY		g	Set unit to gram
				Kg	Set unit to kilogram
		Free key F6 616 F6 KEY		ct	Set unit to carat
				LB	Set unit to pound
				OZ	Set unit to ounce
				TLH	Set unit to tael troy (金衡兩 Hong Kong)
			*1,2,4 ★F1	ICAL	Execute semi-automatic span adjustment with internal weight
			*1 ★F1	CAL	Execute span adjustment with external weight
				ADD	Perform addition (Addition function)
				TOTL	Total value indication (Addition function)
				HOLD	Hold the weight indication
				GLPH	GLP header output
				GLPF	GLP footer output
			*6 ★F5	READ	Readability setting
			★F6	RESP	Response speed setting

Functions related to calibration and adjustment 62 MAINTENANCE		Span adjustment with external weight 621 EX CAL		Execute
		Span test with external weight 622 EX SPAN TEST		Execute
	*2	Semi-automatic span adjustment with internal weight 623 INT CAL	*2	Execute
	*2	Span test with internal weight 624 INT SPAN TEST	*2	Execute
	*2	Adjustment of the internal calibration mechanism 626 REF CAL	*2	Execute
	*2	Restoring the compensation value of the internal calibration mechanism to default 627 REF CAL RESTORE	*2	Execute
63 SCALE MANAGE		Scale ID setting 631 SCALE ID		Setting value input
		Account control 632 PASSWORD	★	OFF OFF ON Valid
		Admin password registration 633 SET ADMIN PASS		Setting value input
	*3	User password registration 634 SET USER PASS		Setting value input
		Span adjustment result output 635 SPAN OUT	★	OFF OFF ON Valid
		Date format 636 DATE DISP	★	Y/M/D yyyy.mm.dd D/M/Y dd.mm.yyyy M/D/Y mm.dd.yyyy
		Date setting 637 DATE SETTING		Setting value input
		Time setting 638 TIME SETTING		Setting value input
		Output Language 639 PRT LANG	★	ENG English JPN Japanese
	*5,6	Actual scale interval (readability) setting 63A READABILIT	*5 ★	1 Fine (default) 10 Coarse
	*2	Span adjustment at power-on 63B START CAL	*2 ★ *2 *2	OFF Disable FORCE Enable SELEC A selection screen is displayed
		Direct start 63C DIRECT ST	★	OFF Disabled ON Enabled
		Save tare weight function 63D STORE TARE	★	OFF Disabled ON Enabled
		Resetting to the factory settings 63E INITIALIZE		YES Execute NO Cancel

