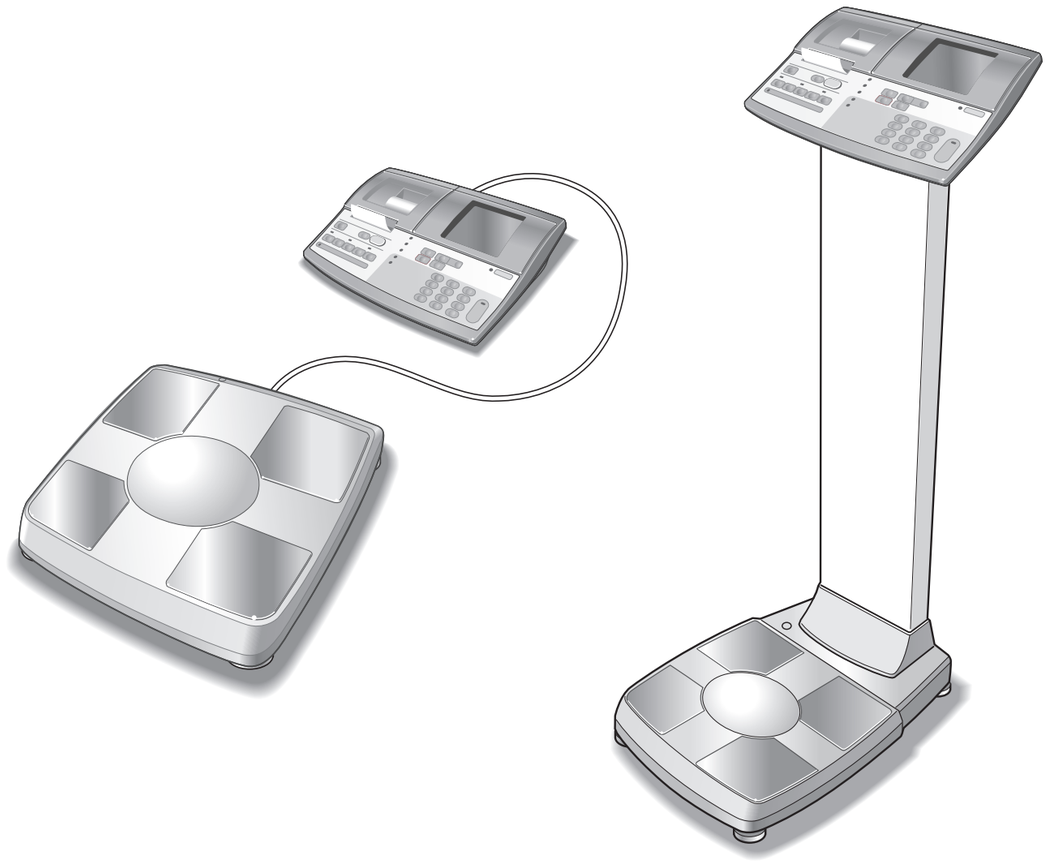
TANITA
Monitoring Your Health

GB

BODY COMPOSITION ANALYZER

BC-420MA III

Instruction manual



REMOTE DISPLAY VERSION

COLUMN MOUNTED VERSION

Please read this Instruction Manual carefully and keep it handy for future reference.

GB

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Applications

- This equipment can be used in the screening of certain adult diseases and conditions related body weight and composition.
- It can be used in the monitoring and prevention of conditions caused by excessive deposits of fat tissue, such as diabetes, hyperlipidemia, cholelithiasis and fatty liver.
- It can be used in the monitoring of changes in individualsÅf body composition, related to differences in the ratio of fat tissue to lean.
- It can be used to assess the effectiveness of individualsÅf nutrition and exercise programmers, both for health and physical fitness.

Benefits

1. This product is simple to use, and requires no specialized facilities or expertise to take measurements.
2. Measurements can be taken quickly and easily, causing minimal inconvenience to the patient during measurement.

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Safety Notes

Caution Symbols

Thank you for purchasing this precision crafted Tanita product. For optimum performance and safety, please familiarize yourself with the **Caution Symbols** below. These symbols are designed to alert the user to potential hazards when using this equipment. Ignoring these **Caution Symbols** may result in serious injury, or damage to the product.
Please be sure to review before proceeding with the INSTRUCTION MANUAL.

⚠WARNING This symbol indicates the possibility of serious injury if the product is mishandled or instructions are ignored.

⚠CAUTION This symbol indicates the possibility of physical injury or equipment damage if instructions are ignored.

⚠ This symbol indicates general precautions that should be taken when using this product.

⚠WARNING

- **Individuals with a Pacemaker or Other Internal Medical Devices**
  This equipment sends a weak electrical current through the body during measurement. Individuals who have internally implanted medical devices, such as Pacemakers, should not use this equipment due to the risk of malfunction to the device that may be caused by the weak electrical current.
- **Inserting and Removing the Power Cord**
  To reduce the risk of electric shock or product damage, never insert or remove the power cord with wet hands.
- **Do not under any circumstances dismantle or alter the device, as this could result in electric shock or injury as well as adversely affect the precision of measurements.**
- **To prevent fire hazard**
  Use only a correctly wired (100-240VAC) outlet, and do not use a multiple outlet extension cable.
- **Measurements for physically disabled persons**
  Physically disabled persons should not attempt to take measurements alone, but instead should have their caretakers assist them in using the device.

⚠CAUTION

- When connecting the BC-420MA to a computer Ensure that the computer conforms to IEC60950.
- Cross Contamination
  The Body Composition Analyzer should be used with bare feet. Please be sure to clean the scale platform with appropriate disinfectant after each use. Never pour any liquid directly on the scale platform, as it may leak and cause internal damage. Use a soft cloth and appropriate ethyl alcohol to wipe off platform. Do not wipe the platform with strong chemicals.
- Interpretation of Results
  The data provided by this machine, as well as any supplementary information such as diet or exercise programs based on this data, should be interpreted by a licensed professional.
- Please make sure you place the Weighing Platform on a level and stable surface. If the equipment is used when the Weighing Platform is unstable because not all feet are on the surface, there may be a risk of stumbling or inaccurate measurement.
  Never jump on the Weighing Platform, there may be a risk of stumbling and malfunction of the equipment.
- When handling printer unit, avoid any sharp edges.
- For the BC-420MA; Ensure you use the original AC adapter (MODEL: SA165A-0950U-3). Using an AC adapter other than the original one may cause malfunction.
  Do not insert or remove the plug by the cable.
- This equipment incorporates a fuse for electrical equipment (2A, 125V.) If an AC adapter other than the original one is used or there is a large surge in electric current, the fuse will blow for safety purposes. If the fuse has blown, the equipment must be inspected again. The fuse is located inside the equipment and users cannot disassemble the equipment easily. Therefore, please contact your nearest Tanita branch office or dealer to change the fuse.

⚠Maintenance

Since this equipment is accurately manufactured and adjusted, please observe the following instructions.

- Users must not disassemble or adjust this equipment. This should be done by trained maintenance agents or certification offices designated under the NAWI directive.
- Never disassemble the equipment as this may cause malfunction. Users must not disassemble or adjust this equipment. Please inspect the equipment in accordance with the regulations in your country.
- Unplug the unit from the wall outlet when it will not be in use for long periods of time.
- In order to reduce the risk of a short circuit, please keep any liquid or metal objects (paper clips, etc.) away from the printer.
- Keep the electrodes clean by wiping them with disinfectant.
- Do not drop the unit, and avoid locations with constant vibration.
- Do not put this equipment in direct sunlight, close to heaters or near direct draughts from air conditioners.
- When transferred to any location where there is a difference of more than 20 degrees centigrade (40 degrees Fahrenheit), wait 2 hours before using.
- When disposing of this unit, please do so in accordance with the prevailing regulations in each country.

⚠General Instructions for Accurate Measurement

This equipment sends out a very weak electric current to measure impedance (electrical resistance) of the body. Therefore, in principle, users need to use this equipment with bare feet. Moreover, since impedance fluctuates in accordance with the distribution of body fluid, please observe the following instructions for accurate measurement.

- To prevent a possible discrepancy in measured values, avoid taking measurements after vigorous exercise until sufficiently rested.
- To prevent inaccurately low body fat percentage measurements and other measurement errors, always hold both arms straight down when taking measurements.
- As changes in body water and body temperature can have a major impact on measurements, measurements should be made every day at the same time under similar conditions (always urinating before taking measurements, etc.) to get a more accurate picture of the measurements over time.
- Ensure that your arms are not touching your side and that the inner thighs are not touching each other during measurements; if necessary, place a dry towel between your arm and side and/or between your thighs.
- Also, make sure the soles of feet are free of excess dirt, as this may also act as a barrier to the mild current.
- False results may be reported after excessive food /fluid intake, or after periods of intense exercise.
  * For further details, see the Technical Notes on page 48.
- This equipment is designed for the majority of the population leading healthy lives with a regular lifestyle. For people suffering from sickness, or whose lifestyle is very different from the norm, it is recommended that the data from this product should not be used as an absolute value, but rather as a reference to observe the rate change.
  * For further details, see the Technical Notes on page 48.
- If there are calluses on the soles of the feet, or an individual is wearing thin nylons, accurate measurement may still be possible. Place 0.5ml of water in the center of each electrode. This will act as a conductant, and may allow the current to pass freely through a thin barrier.
- Measurement is sometimes impossible on a surface that is strongly vibrating. In this case, please move the equipment onto a surface with little vibration.
- Do not take measurements while using transmitters, such as mobile phones, which may affect readings.

<Usage Conditions>

Temperature Range for Use : 0°C - 35°C
Relative Humidity : 30% - 80% (without condensation)

<Storage Conditions>

Temperature Range of Environment : -10°C - 50°C
Range of Relative Humidity : 10% - 90% (without condensation)
To avoid malfunctions, avoid storing the equipment where there is direct sunlight, significant temperature changes, the risk of dampness, a large amount of dust, in the vicinity of fires, or where there is the risk of receiving vibrations or shocks.

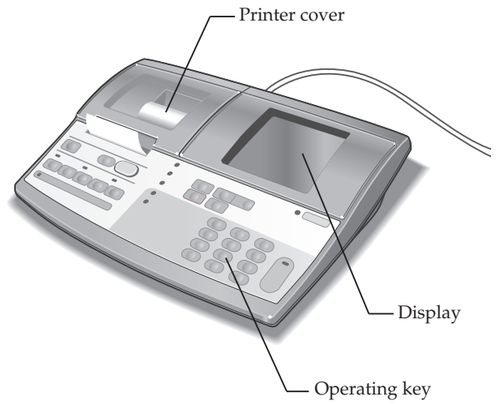
<Power Source>

Model Name	BC-420MA
Frequency Range	50 / 60Hz
Electric Current Range	1.5A

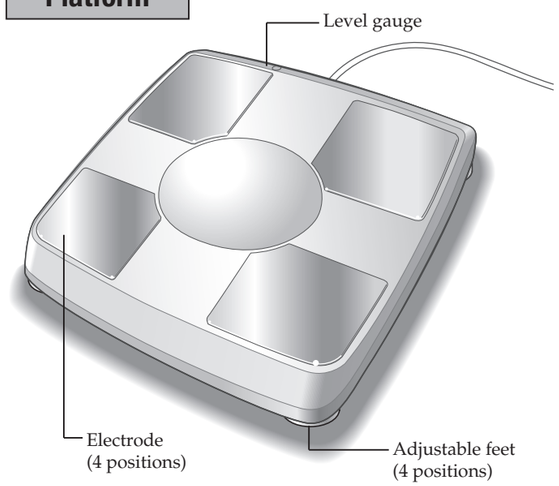
Product Assembly and Components

Remote display version

Control Box

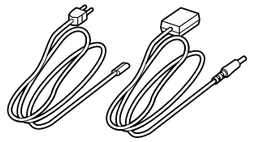


Platform

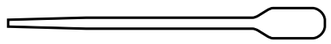


Accessories

- [x] Instruction manual (This manual)
- [ ] Operation guide
- [ ] AC adapter
- [ ] AC cord



- [ ] Syringe (1 item)

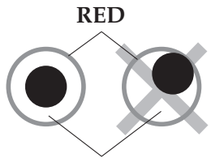


- [ ] Printer paper
  (Ordinary thermal paper, roll diameter: 55mm, roll length: approx. 34m)
  * Please contact the agent from which you have purchased the product for details.



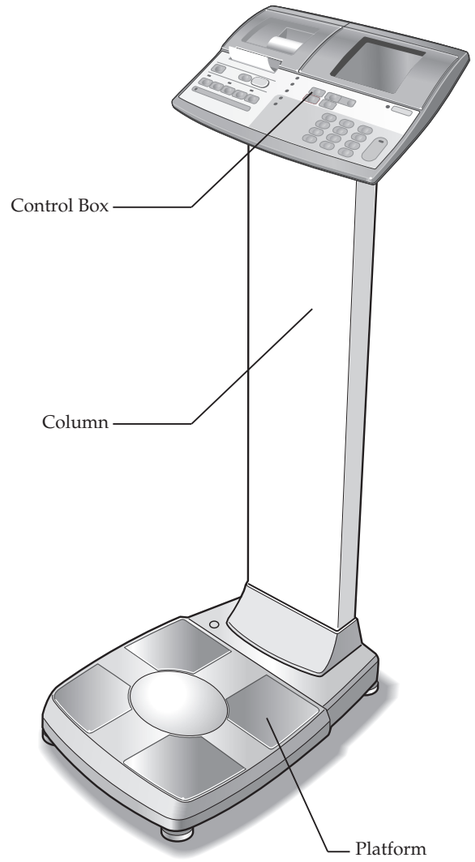
Level gauge check

* For accurate measurement, place the machine as level as possible.
* Rotate the adjustable feet in 4 positions for adjustment so that the bubbles of the level gauge reach the centre.



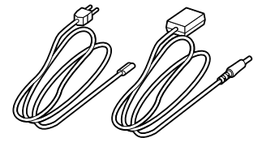
Air bubble
In the state that the level gauge is viewed from the top

Column mounted version

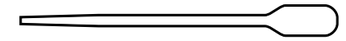


Accessories

- [x] Instruction manual (This manual)
- [ ] Assembling guide
- [ ] AC adapter
- [ ] AC cord



- [ ] Hexagonal wrench (1 item)
- [ ] Hexagon socket head bolts (M5L12) (4 items)
- [ ] Syringe (1 item)

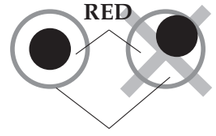


- [ ] Printer paper
  (Ordinary thermal paper, roll diameter: 55mm, roll length: approx. 34m)
  * Please contact the agent from which you have purchased the product for details.



Level gauge check

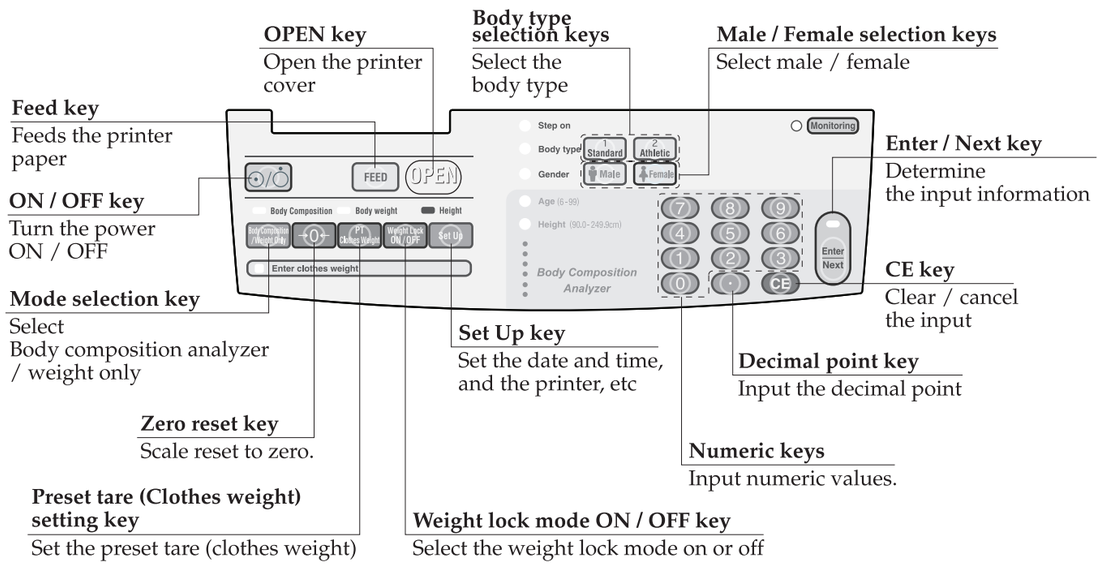
* For accurate measurement, place the machine as level as possible.
* Rotate the adjustable feet in 4 positions for adjustment so that the bubbles of the level gauge reach the centre.



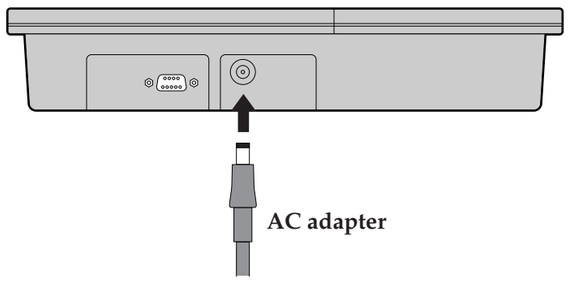
Air bubble
In the state that the level gauge is viewed from the top

⚠Caution Make sure you place the Weighing Platform on a stable, level surface.If the Weighing Platform is not stable because not all the feet are on the surface, for example, there is a risk of stumbling or inaccurate measurement.

Control panel



Connection of Plugs



Warning

- **To avoid electric shock, do not insert or remove the plug with wet hands.**
- **To avoid electric shock, do not use the equipment near water.**

Caution

- To avoid measurement error, do not measure while using equipment that generates radio waves, such as mobile phones.
- Use only the original AC adapter (MODEL: SA165-0950U-3). Using AC adapters other than the original one may cause malfunction, smoke or fire.

Symbols and their Meanings

⊙	Display Unit On.	○	Display Unit Off.	⎓	Direct current	⇨	Input, Output	⧈	Class II Equipment
FEED	Advances the paper		Type BF applied part	⚠	Caution Refer to the attached notes.	CE 0123	Conformity with Medical Device Directive 93/42/EEC	P T	Clothes Weight Setting
Male	Male	Female	Female						

Preparation

Setting of the printer paper roll

Caution

- Please change the paper roll when red lines appear along the sides of the paper.
- Please pay careful attention to avoid injury from the sharp edge.
- Please turn off the machine before clearing Paper jams.

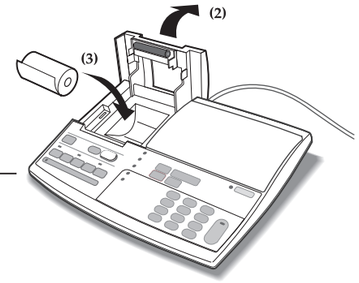
Setting of the printer paper roll

1 Press ⊙/○ to turn on the power.

- After all lamps light up, the model number is displayed as 420, and 0.0 kg is displayed.



2 (1) Press OPEN.
(2) Remove the printer cover.



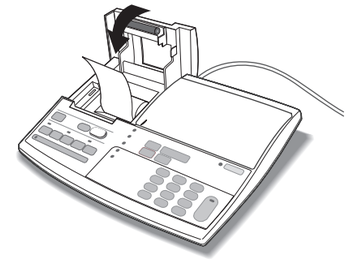
3 (3) Set up the print roll paper

- Remove the adhesive of the printer paper and draw it out approx. 10 cm.

4 Return the printer cover.

⚠

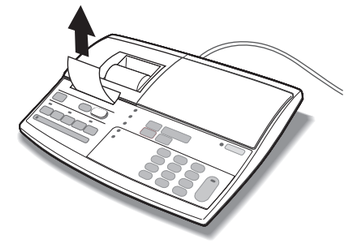
- In the case that COPEn is displayed,
  ⇨The printer cover is open, so please close it again properly (☞page 43).



5 Press the FEED, and cut off the excessive paper.

⚠

- In the case that the automatic cutting is set to "OFF," the automatic cutting does not function (☞page 14).



6 Setting completed.

Various settings

Setting methods

Call up the setting item selection screen.

1 Press ⊙/○ to turn on the power.

- After all lamps light up, the model number is displayed, and 0.0kg is displayed.



2 Press Set Up

- The setting item input screen is displayed.



Note

- 39 – 67 are the setting items related to print out items (☞ page 20).
- When the various settings are all completed,
  ⇨Press Set Up on the "Setting item selection" screen (**it returns to the tare input screen**).

Setting items

1	Date and time(☞ page 12)
2	Number of sheets to print Body composition mode (☞ page 13)
3	Number of sheets to print Weight only mode (☞ page 13)
4	Auto Cutting the printer paper (☞ page 14)
5	Beep sound (☞ page 14)
6	Display Fat % Healthy range (☞ page 15)
7	ID No. (☞ page 15)
8	Measurement flow (☞ page 16)
9	Athletic mode (☞ page 16)
10	Input unit of height (☞ page 17)
11	Automatic determination time (☞ page 17)
18	Target body fat ratio (☞ page 18)
19	Select language (☞ page 18)
20	Print item preset (☞ page 18)

Print item setting ON / OFF

39	TANITA Logo (☞ page 22)
40	Category name (☞ page 22)
41	Date (☞ page 22)
42	Serial number (☞ page 22)
43	Memo space (☞ page 22)
44	ID No (☞ page 22)
45	Fat mass (☞ page 22)
46	Fat free mass (☞ page 22)
47	Muscle mass (☞ page 22)
48	Total body water (☞ page 22)
49	Total body water % (☞ page 22)
50	Bone mass (☞ page 22)
51	BMR (☞ page 22)
52	Metabolic age (☞ page 22)
53	Visceral fat rating (☞ page 22)
54	BMI (☞ page 22)
55	The Rohrer's index (☞ page 22)
56	Ideal body weight (☞ page 22)
57	Degree of obesity (☞ page 22)
58	Desirable range Body fat (☞ page 22)
59	Graph Fat % (☞ page 22)
60	Graph BMI (☞ page 22)
61	Graph Visceral fat rating (☞ page 22)
62	Graph Muscle mass (☞ page 22)
64	Graph BMR (☞ page 22)
65	Physique rating (☞ page 22)

Note

* When various settings are continuously carried out,
  ⇨press each number to set.
* The set contents are memorized until they are changed next time.

* When various settings are all completed,
  ⇨press Set Up on the "setting item selection screen" (**it returns to the tare input screen**).

Various settings (Setting methods (continued))

Register the date and time (Continued from page).

3 Press 1 and then press Enter / Next.

- The "date and time" setting screen is displayed.



4 Input the date and time

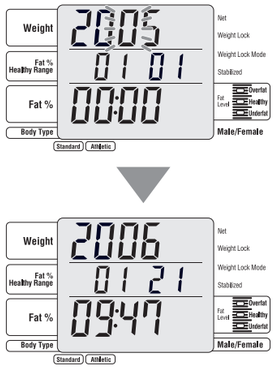
- Input the year, month, day, hour and minute in order with 2 digits.

Example: In the case to input: 9:47 am January 21st, 2006

0 6 | 0 1 | 2 1 | 0 9 | 4 7

Year 2006 January 21st

In the case of 6:00 pm, press 1 8

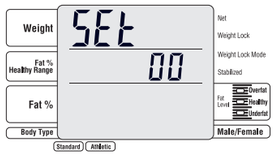


Note

- To input a number with 1 digit (0 – 9), first press 0.
- To correct the input value, or cancel the input, ⇨press CE (the input is deleted).
- To end inputting in midstream, ⇨press Enter / Next.

5 After inputting all the items, press Enter / Next.

- It returns to the "setting item selection" screen.



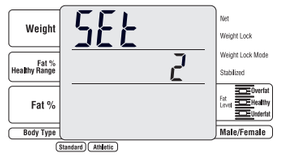
Note

* When various settings are continuously carried out, ⇨press each number to set.
* The set contents are memorized until they are changed next time.

Set the number of sheets to print for the body composition monitor (Continued from page).

3 Press 2 and then press Enter / Next.

- The "number of sheets to print for the body composition monitor" setting screen is displayed.



4 Input the number of sheets to print.

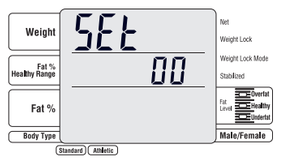
Note

- The default is "1" (input range: 0 – 3).
- In the case that the number of sheets to print is set to "0" for both the body composition monitor and the scale, FEED key does not function.
- To correct the input value, or cancel the input, ⇨press CE (the input is deleted).



5 After inputting the numeric value, press Enter / Next.

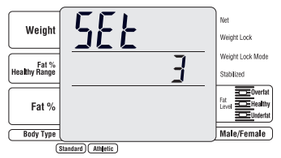
- It returns to the "setting item selection" screen.



Set the number of sheets to print for the scale (Continued from page).

3 Press 3 and then press Enter / Next.

- The "number of sheets to print for the scale" setting screen is displayed.



4 Input the number of sheets to print.

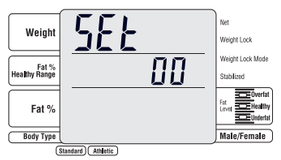
Note

- The default is "1" (input range: 0 – 3).
- In the case that the number of sheets to print is set to "0" for both the body composition monitor and the scale, FEED key does not function.
- To correct the input value, or cancel the input, ⇨press CE (the input is deleted).



5 After inputting the numeric value, press Enter / Next.

- It returns to the "setting item selection" screen.

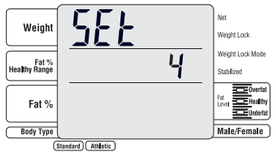


* When various settings are all completed, ⇨press Set Up on the "setting item selection screen" (**it returns to the tare input screen**).

Set ON / OFF of the automatic cutting of the printer paper (Continued from page).

3 Press **4** and then press **Enter / Next**.

- The "ON or OFF of automatic cutting" selection screen is displayed.



4 Set ON or OFF of the automatic cutting.

Note

- The default is "0.off." ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input, ⇨press **CE** (the input is deleted).



5 After inputting the numeric value, press **Enter / Next**.

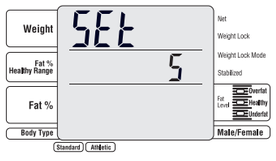
- It returns to the "setting item selection" screen.



Set ON / OFF of the beep sound (Continued from page).

3 Press **5** and then press **Enter / Next**.

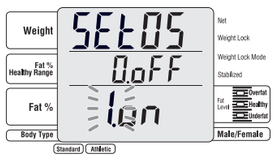
- The "ON or OFF of the beep sound" selection screen is displayed.



4 Set ON or OFF of the beep sound.

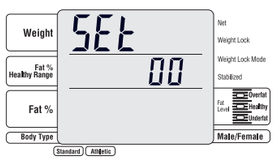
Note

- The default is "1.on." ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input, ⇨press **CE** (the input is deleted).



5 After inputting the numeric value, press **Enter / Next**.

- It returns to the "setting item selection" screen.



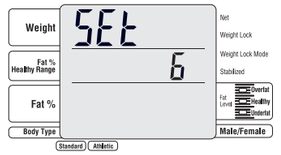
Note

* When various settings are continuously carried out, ⇨press each number to set.
* The set contents are memorized until they are changed next time.

Set ON / OFF of the Fat % Healthy range display (Continued from page).

3 Press **6** and then press **Enter / Next**.

- The "ON or OFF of the BMI display" selection screen is displayed.



4 Set ON or OFF of the Fat % Healthy range display when using the body composition

Note

- The default is "1.on." ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input, ⇨press **CE** (the input is deleted).



5 After inputting the numeric value, press **Enter / Next**.

- It returns to the "setting item selection" screen.



Set with or without an ID (Continued from page).

3 Press **7** and then press **Enter / Next**.

- The "with or without an ID" setting screen is displayed.



4 Set with or without an ID.

Note

- The default is "0.off." ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input, ⇨press **CE** (the input is deleted).



5 After inputting the numeric value, press **Enter / Next**.

- It returns to the "setting item selection" screen.



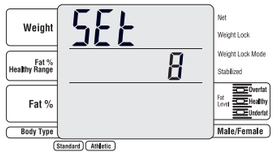
* When various settings are all completed, ⇨press **Set Up** on the "setting item selection screen" (**it returns to the tare input screen**).

Various settings (Setting methods (continued))

Select the measurement flow (Continued from page).

3 **Press 8 and then press Enter / Next.**

- The "ON or OFF of the one step mode" selection screen is displayed.



Note
- The one step mode is
  ⇨a mode to measure body weight after inputting personal information.

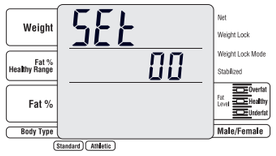
4 **Set ON or OFF of the one step mode when using the body composition analyzer.**



Note
- The default is "0. off." ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input,
  ⇨press CE (the input is deleted).

5 **After inputting the numeric value, press Enter / Next.**

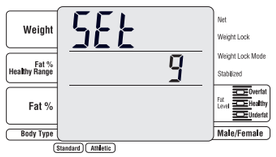
- It returns to the "setting item selection" screen.



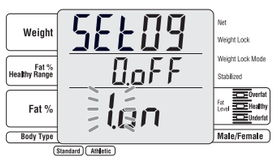
Set ON or OFF of the athlete selection (Continued from page).

3 **Press 9 and then press Enter / Next.**

- The "Set ON / OFF of the athletic mode selection" setting screen is displayed.



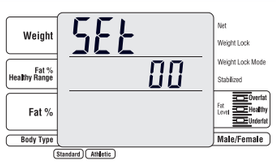
4 **Set ON or OFF of the athletic mode selection when using the body composition analyzer.**



Note
- The default is "0. off." ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input,
  ⇨press CE (the input is deleted).

5 **After inputting the numeric value, press Enter / Next.**

- It returns to the "setting item selection" screen.



Note
- When various settings are continuously carried out,
  ⇨press each number to set.
- The set contents are memorized until they are changed next time.

Set the input unit of height (Continued from page).

3 **Press 1 0 and then press Enter / Next.**

- The "input unit of height" selection screen is displayed.



4 **Selects the input unit of height.**



Note
- The default is "1. on."
  0. off: sets 0.1 cm unit input
  1. on: sets 1 cm unit input
- To correct the input value, or cancel the input,
  ⇨press CE (the input is deleted).

5 **After inputting the numeric value, press Enter / Next.**

- It returns to the "setting item selection" screen.



Set the automatic determination time when inputting (Continued from page).

3 **Press 1 1 and then press Enter / Next.**

- The "automatic determination time when inputting" setting screen is displayed.



Note
- Automatic determination when inputting is,
  ⇨a function to determine the input value automatically even without pressing Enter / Next, after inputting the numeric value.

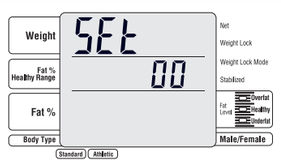
4 **Set the automatic determination time when inputting.**



Note
- The default is 5 seconds ("5"). (input range: 0 – 9).
  *If "0" is set, it is not automatically determined.
- To correct the input value, or cancel the input,
  ⇨press CE (the input is deleted).

5 **After inputting the numeric value, press Enter / Next.**

- It returns to the "setting item selection" screen.



*When various settings are all completed,
⇨press Set Up on the "setting item selection screen" (**it returns to the tare input screen**).

Set ON / OFF of the target body fat ratio (Continued from page).

3 Press **1** **8** and then press **Enter / Next**.



4 Set ON or OFF of the target body fat ratio.

Note
- The default is "0. off" ("1. on" for valid, "0. off" for invalid.)
- To correct the input value, or cancel the input, ⇨press **CE** (the input is deleted).



5 After inputting the numeric value, press **Enter / Next**.

- It returns to the "setting item selection" screen.



Set print language (Continued from page).

3 Press **1** **9** and then press **Enter / Next**.



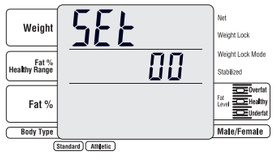
4 Set the print language.

Note
- 1: English / 2: French / 3: German 4: Italian / 5: Spanish
- To correct the input value, or cancel the input, ⇨press **CE** (the input is deleted).



5 After inputting the numeric value, press **Enter / Next**.

- It returns to the "setting item selection" screen.



Note
- *When various settings are continuously carried out, ⇨press each number to set.
- *The set contents are memorized until they are changed next time.

Set the print item preset (Continued from page).

3 Press **2** **0** and then press **Enter / Next**.

- The "print out preset" setting screen is displayed.



4 Set the print item preset.

- Set with **1** – **3**.

Note
- The print items preset are ⇨a function to set the print items of the pattern 1 – 3 to ON automatically at once (☞page 19). The default is "1" (pattern 1).
- When ON or OFF of print items are changed with the "setting of the print out item" after the print out preset (☞page 22), the state set for the last time is valid.



5 After inputting the numeric value, press **Enter / Next**.

- It returns to the "setting item selection" screen.



[Lists of contents of the print item preset]

Print item	Body composition monitor									Scale
	1 Pattern 1			2 Pattern 2			3 Pattern 3			
Body type	Standard	Athletic	Child	Standard	Athletic	Child	Standard	Athletic	Child	
TANITA Logo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Category name	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Date	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Serial number	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Memo Space	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ID No	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fat mass	✓	✓	✓	✓	✓	✓				
Fat free mass	✓	✓	✓	✓	✓	✓				
Muscle mass	✓	✓	✓	✓	✓	✓				
Total body water	✓	✓	✓	✓	✓	✓				
Total body water %	✓	✓	✓	✓	✓	✓				
Bone mass	✓	✓	✓	✓	✓	✓				
BMR	✓	✓		✓	✓					
Metabolic age	✓	✓		✓	✓					
Visceral fat rating	✓	✓		✓	✓					
BMI	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Rohrer's index			✓			✓			✓	
Ideal body weight	✓			✓						
Degree of obesity	✓			✓						
Desirable range	✓	✓	✓							
Graph Fat %	✓	✓	✓	✓	✓	✓				
Graph BMI	✓	✓		✓	✓					
Graph Visceral fat rating	✓	✓								
Graph Muscle mass	✓	✓								
Graph BMR	✓	✓								
Physique rating	✓	✓								

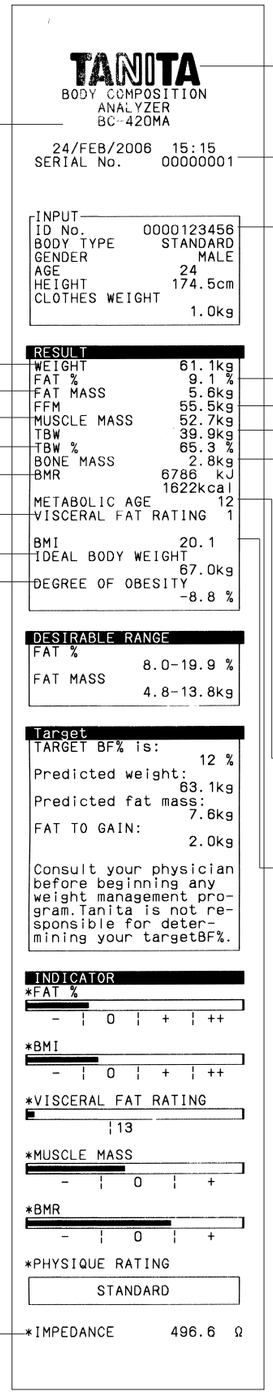
- The items marked with "✓" are printed.
- The items marked with "✓" can be selected to print (☞page 22)

* See page 20 for an example of preset print.

*When various settings are all completed, ⇨press **Set Up** on the "setting item selection screen" (**it returns to the tare input screen**).

Various settings (Setting methods (continued))

[In the case to select the print item preset “1”]



Category name

Weight
- Measured weight.

Fat mass
- -Total weight of fat mass in the body.

Muscle mass
- - Bone-free lean tissue mass (LTM)

TBW %

BMR
- Basal Metabolic Rate represents the total energy expended by the body to maintain normal functions at rest such as respiration and circulation.

Visceral fat rating
- - Visceral fat rating feature indicates the rating of visceral fat.

Ideal body weight
- Ideal body weight is a value for which the BMI is 22.

Degree of obesity
- Calculated as (weight) – (standard weight) / (standard weight) × 100.

Impedance
- Impedance (This does not affect judgment of the measurement results.)

LOGO

Serial No.
- The default is 00000001. Adds 1 each time it measures.

ID
- When it is set with an ID, it is printed out. (The default is without an ID.)

Fat %
- Fat % is amount of body fat as a proportion of body weight.

FFM
- Fat Free Mass is comprised of muscle, bone, tissue, water, and all other fat free mass in the body.

TBW
- Total Body Water is the amount of water retained in the body. TBW is said to comprise between 50% - 70% of total body weight. Generally, men tend to have higher water weight than women due to a greater amount of muscle.

Bone mass
- Bone mineral amount included in the entire bone.

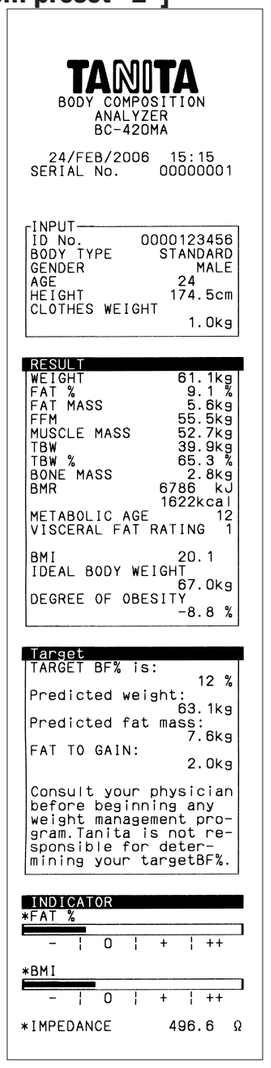
Metabolic age
- Metabolic age is evaluated young when a muscular amount is larger, and BMR is higher.

BMI
- Calculated with “weight (kg) / height (m)²”
- Desirable Range 18.5 - 24.9

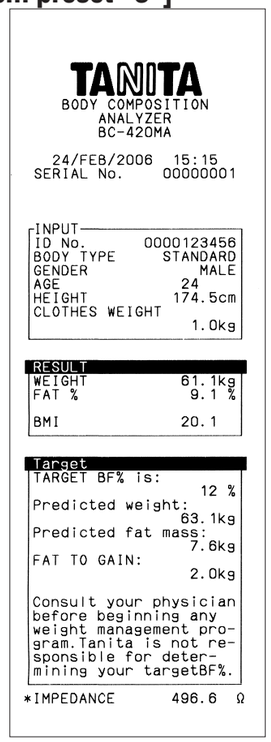
* The standard value is for the Standard mode. In the case of the Athletic mode, the standard value is just a reference. And for those who are 17 years old or younger, only the body fat % is displayed as the standard value. The muscle mass, total body water and the estimated bone mass for those who are 17 years old or younger are for reference.

Please consult your doctor before you start a body weight management program. Tanita is not responsible for the target body fat ratio.

[In the case to select the print item preset “2”]



[In the case to select the print item preset “3”]



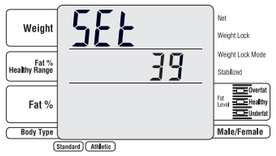
Please consult your doctor before you start a body weight management program. Tanita is not responsible for the target body fat ratio.

Set the items to print out (Continued from page).

3 Select the number to set with the numeric keys (3 9 – 6 4) and press Enter / Next.

• The setting screen is displayed.

<In the case of selecting 39>



Note

• See the next page for the setting number of each item.
• When the print item preset is set, after setting the items to print out (☞page 18), the items to print may be changed automatically. Please confirm, "Print items preset list" (☞page 19).

4 Selects ON or OFF of the item to print out.

‹ In the case of selecting the logo setting on. ›

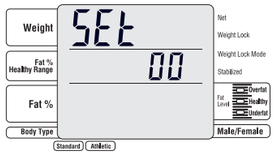


Note

• "0. off" is not to print out and "1. on" is to print out.
• To correct the input value, or cancel the input,
⇨press CE (the input is deleted).

5 After inputting the numeric value, press Enter / Next.

• It returns to the "setting item selection" screen.



Print item setting ON / OFF

39	TANITA Logo
40	Category name
41	Date
42	Serial number
43	Memo space
44	ID No
45	Fat mass
46	Fat free mass
47	Muscle mass
48	Total body water
49	Total body water %
50	Bone mass
51	Basal metabolic rate (BMR)

52	Metabolic age
53	Visceral fat rating
54	BMI
55	Rohrer's index
56	Ideal body weight
57	Degree of obesity
58	Desirable range Body fat %
59	Graph Fat %
60	Graph BMI
61	Graph Visceral fat rating
62	Graph Muscle mass
63	Graph BMR
64	Physique rating

Note

* When various settings are continuously carried out,
⇨press each number to set.
* The set contents are memorized until they are changed next time.

* When various settings are all completed,
⇨press Set Up on the "setting item selection screen" (**it returns to the tare input screen**).

⚠ This explains the procedure when the printer is turned on. Please be aware that the display may be different if the number of print outs is set to 0.

⚠
- Do not wipe the equipment with corrosive chemicals (gasoline, cleaner, etc.). Please use a neutral detergent to clean the equipment.
- When the equipment has been transferred to any location where there is a temperature difference of 20˚C or more, wait for at least two hours before using it.
- In taking measurements, please keep the person away from the unit, who uses transmitters such as a mobile phone avoid causing margin errors.

About Athletic Mode

- **It is recommended for those who are 18 years old or older and meet the following conditions to select "Athletic Mode" and measure as reference values.**
  - Those who exercise for 12 hours or more per a week.
  - Those who belong to a sport team or a sport organization with the aim of participation in competition, etc.
  - Those who exercise to build up like a bodybuilder.
  - Those who are professional athletes.

Attention

- **The posture when measuring**
  - Stand with both feet parallel on the electrodes.
  - Stand fullface without bending knees.
- **The age input range is 5 – 99 years old.**
  Input age 99 for those who are 100 years old or older.

Note

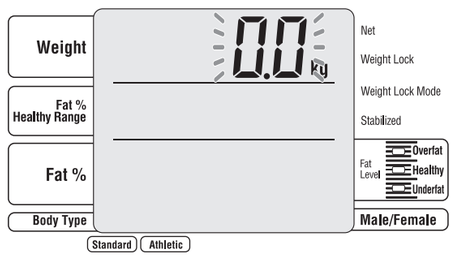
- False results may be reported after excessive food/fluid intake, or after periods of intense exercise.
- When the user is 18 years or older, Athletic mode can be used.
- When Clothes weight is input, Clothes weight is subtracted from measurements and it displays it as Weight.

In the case of the standard flow (not the one step mode)

In the standard flow, after measuring weight, personal data is input and then body composition is measured.

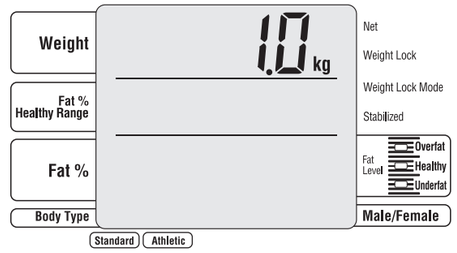
Weight measurement ▶ **Personal data input** ▶ **Body composition measurement**

1 Press ⊙/○ to turn on the power.



2 Check that the body composition monitor is selected and input the clothes weight.

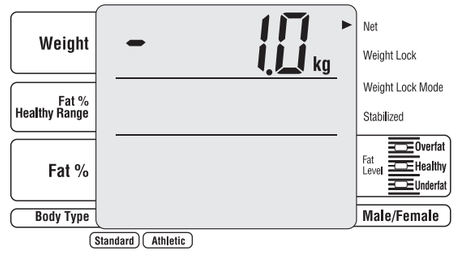
Input it by pressing 0 – 9 and ·.

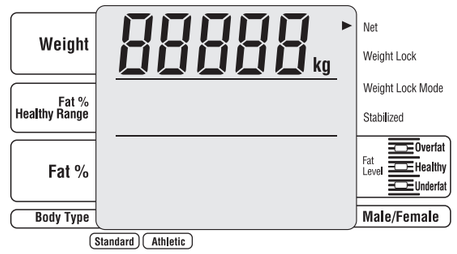


Note

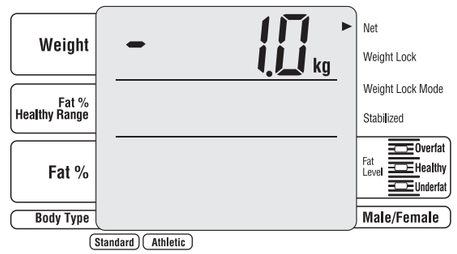
- The clothes weight (preset tare) can be input in the range of 0.0 – 10.0 kg.
- To correct the input value,
  ⇨press CE (the input is deleted).

3 Press Enter / Next.





The "step on" lamp flashes.



Note

- When CE is pressed, it returns to the previous screen.

4 Step on the electrodes with bare feet.

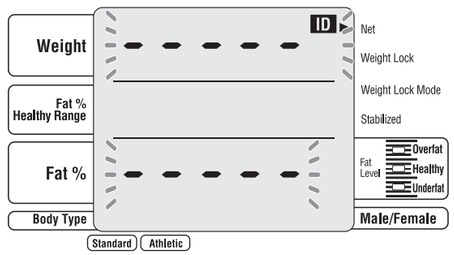
Take off your socks and stockings before stepping on.



When the weight becomes stable, it changes to the screen at the right.

Note

- Do not step off the platform.
- **This screen is not displayed if OFF is set in the "setting with or without an ID" (☞ page 15). (The "body type selection" screen is displayed.)**

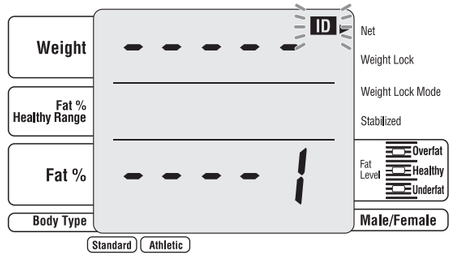


5 Input the ID number.

Input it by pressing 0 – 9.

Note

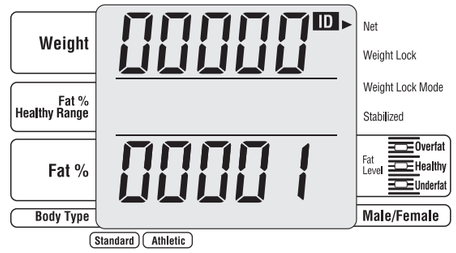
- **This screen is not displayed if OFF is set in the "setting with or without an ID" (☞ page 15).**
- The ID number can be input from 0 – 9999999999. If Enter / Next is pressed, the non-inputted digits are filled with 0s.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that an ID number is not input, it returns to the "measurement start" screen.



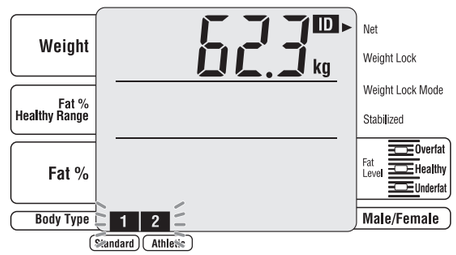
6 Press Enter / Next.

Note

- **This screen is not displayed if OFF is set in the "setting with or without an ID" (☞ page 15).**



The lamp flashes on the "Body type"

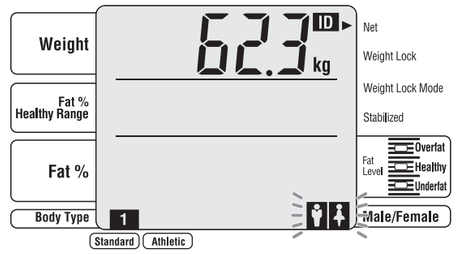


7 Select the body type.

Press the body type selection keys to input.
When the body type is selected, the lamp flashes on the "Gender".

Note

- **This screen is not displayed if OFF is set in the "setting ON or OFF of the athletic mode selection" (☞ page 16).**
- The body type can also be selected with the numeric keys (1 2).
- If it is mistakenly input,
  ⇨press CE (the input is deleted, and it returns to the "body type selection" screen).
- If CE is pressed in the state that the body type is not input, it returns to the "ID number input" screen (or "measurement start" screen).

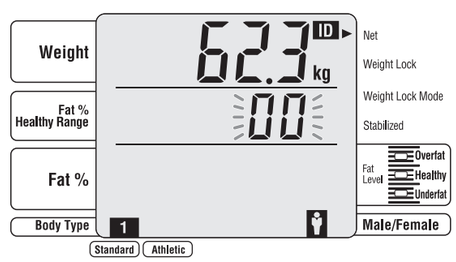


8 Select gender.

Press the male / female selection keys to input.
When male or female is selected, the lamp flashes on the "Age".

Note

- If it is mistakenly input,
  ⇨press CE (the input is deleted, and it returns to the "gender selection" screen).
- If CE is pressed in the state that the male or female is not selected, it returns to the "body type selection" screen.

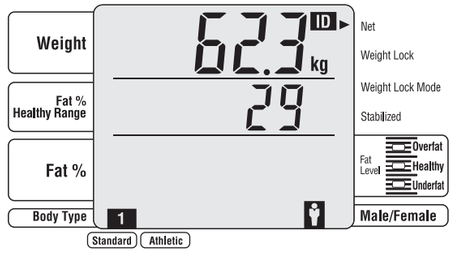


9 Input the age.

Input it by pressing 0 – 9.

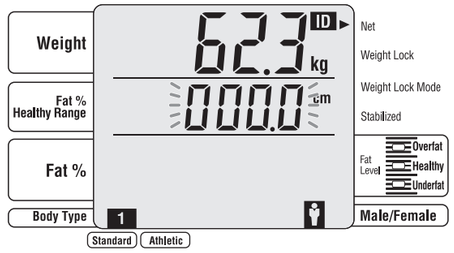
Note

- The age can be input from 5 – 99.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that the age is not input, it returns to the "gender selection" screen.



10 Press Enter / Next.

When the age is input, the lamp flashes on the "Height".

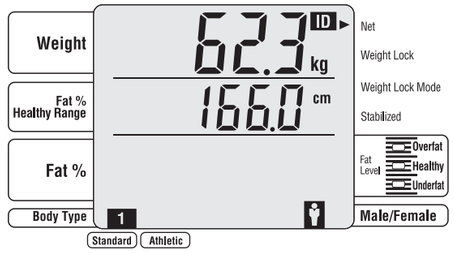


11 Input the height.

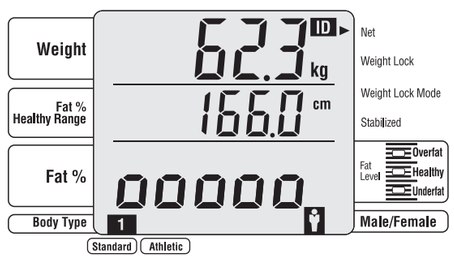
Input it by pressing 0 – 9.

Note

- The height can be input from 90.0 – 249.9 (90 – 249).
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that the height is not input, it returns to the "age selection" screen.

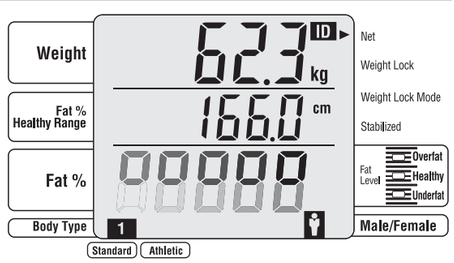


12 Press Enter / Next.



13 Under measurement of the body composition.

88888 display goes off sequentially.



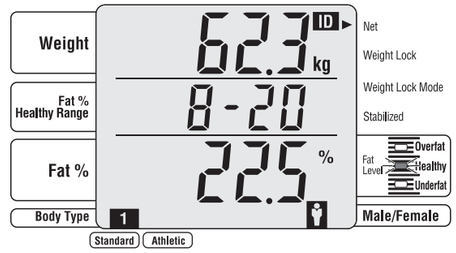
14 Measurement completion

The measurement result and the body fat percentage evaluation are displayed.
It is automatically printed out. (In the case that other than 0 is set in the "Setting the number of sheets to print" (☞page 13).

Note

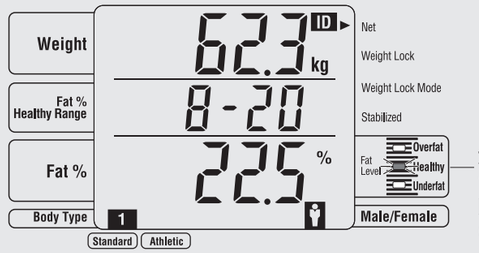
- **Fat % Healthy range is not displayed if OFF is set in the "setting ON or OFF of the Fat % Healthy range display" (☞page 15).**

Step off the platform.
It returns to the "measurement start" screen.





How to read the display



Judgment result based on the body fat percentage. (☞page 37.)

In the case of the one step mode

In the one step mode, after inputting the personal data, the weight and body composition are measured.

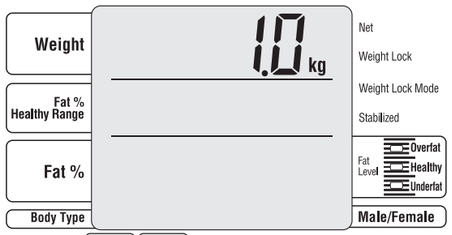
Personal data input ▶ **Weight measurement** ▶ **Body composition measurement**

1 Press ⊙/○ to turn on the power.



2 Check that the body composition monitor is selected, input the clothes weight.

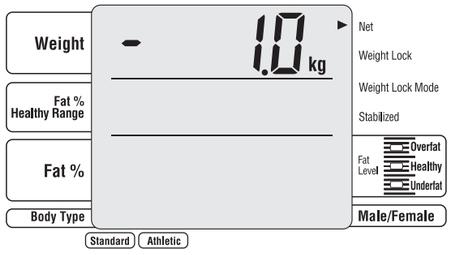
Input it by pressing 0 – 9.

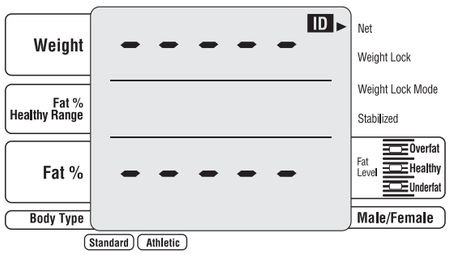


Note

- The clothes weight (preset tare) can be input in the range of 0.0 – 10.0 kg.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).

3 Press Enter / Next.



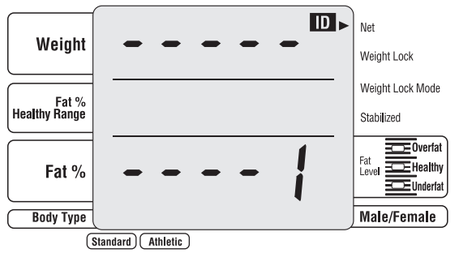


Note

- **This screen is not displayed if OFF is set in the "setting with or without an ID" (☞page 15). (The "body type selection" screen is displayed.)**

4 Input the ID number.

Input it by pressing 0 - 9.

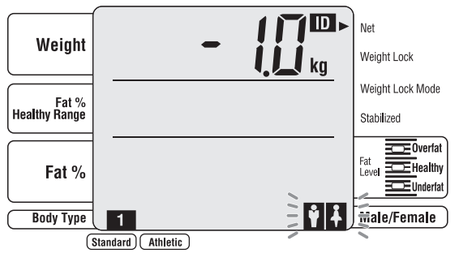


Note

- **This screen is not displayed if OFF is set in the "setting with or without an ID" (☞page 15).**
- The ID number can be input from 0 – 9999999999. If Enter / Next is pressed, the non-inputted digits are filled with 0s.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that an ID number is not input, it returns to the "measurement start" screen.

5 Select the body type.

Press the body type selection keys to input.
When the body type is selected, the lamp flashes on the "Gender".

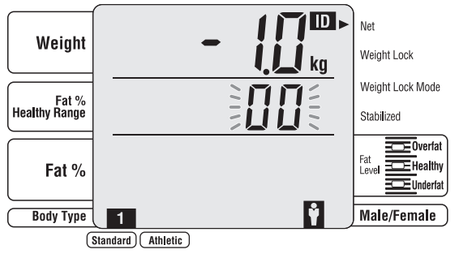


Note

- **This screen is not displayed if OFF is set in the "setting ON or OFF of the athletic mode selection" (☞page 16).**
- The body type can also be selected with the numeric keys (1 2).
- If it is mistakenly input,
  ⇨press CE (the input is deleted, and it returns to the "body type selection" screen).
- If CE is pressed in the state that the body type is not input, it returns to the "ID number input" screen (or "measurement start" screen).

6 Select gender.

Press the male / female selection keys to input.
When male or female is selected, the lamp flashes on the "Age".



Note

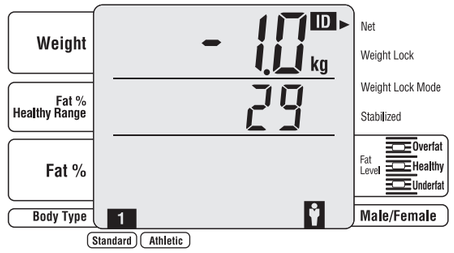
- If it is mistakenly input,
  ⇨press CE (the input is deleted, and it returns to the "gender selection" screen).
- If CE is pressed in the state that the male or female is not selected, it returns to the "body type selection" screen.

7 Input the age.

Input it by pressing 0 – 9.

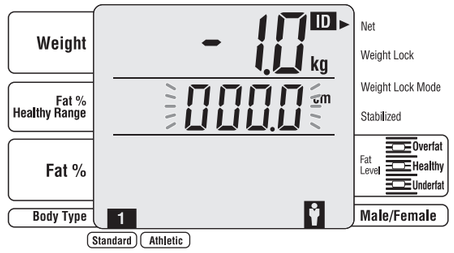
Note

- The age can be input from 5 – 99.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that the age is not input, it returns to the "gender selection" screen.



8 Press Enter / Next.

When the age is input, the lamp flashes on the "Height".

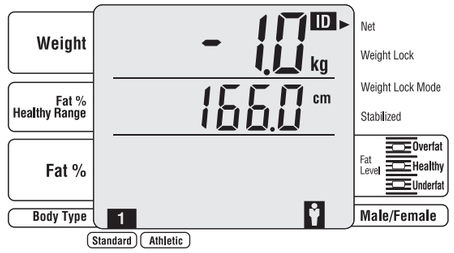


9 Input the height.

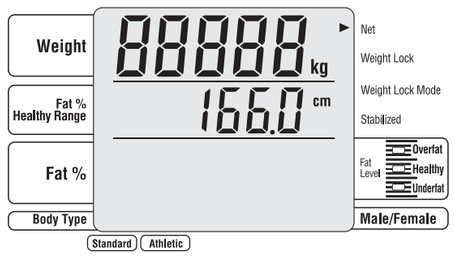
Input it by pressing 0 – 9.

Note

- The height can be input from 90.0 – 249.9 (90 – 249).
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that the height is not input, it returns to the "age selection" screen.



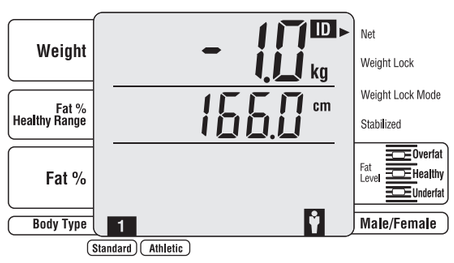
10 Press Enter / Next.



The "step on" lamp flashes.

Note

- When CE is pressed, it returns to the previous screen.



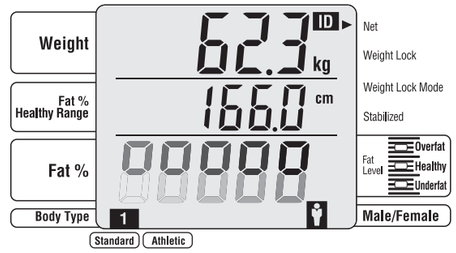
11 Step on the electrodes with bare feet.

Take off your socks and stockings before stepping on.



12 Under measurement of the body composition.

88888 display goes off sequentially.



13 Measurement completion

The measurement result and the body fat percentage evaluation are displayed.
It is automatically printed out. (In the case that other than 0 is set in the "Setting the number of sheets to print" (☞page 13).

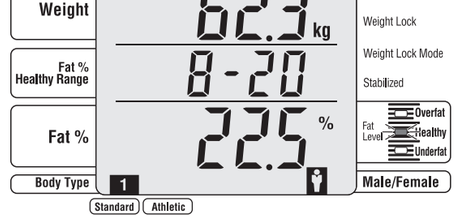
Note

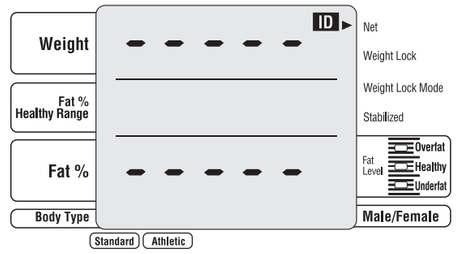
- **Fat % Healthy range is not displayed if OFF is set in the "setting ON or OFF of the Fat % Healthy range display" (☞page 15).**

Step off the platform.
It returns to the "ID input" screen.

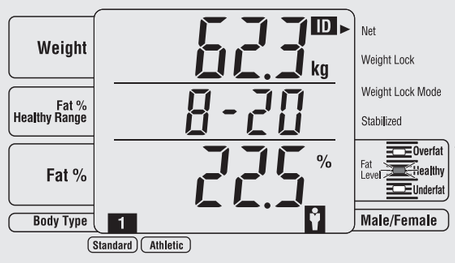
Note

- **The "body type selection" screen is displayed in the case that OFF is set in the "setting with or without an ID" (☞page 15).**





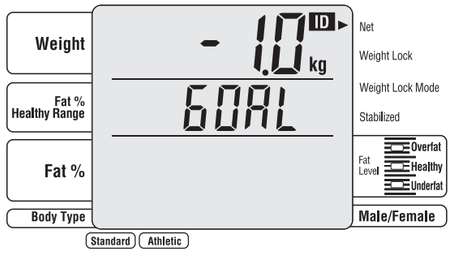
How to read the display



Judgment result based on the body fat percentage. (☞page 37.)

1 Input the target body fat ratio.

Input it by pressing 0 – 9.



Note

- This screen is displayed if ON is set in the "setting ON or OFF of the target body fat ratio".
- The target body fat ratio can be input from 4-55.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).

If the number of sheet to print is set to "0", target body fat ratio setting function will be OFF, automatically.
If the target body fat is set to 0 or nothing, the target body fat ratio will not print.

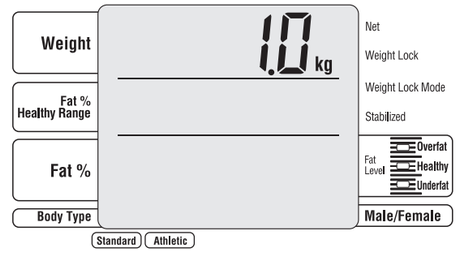
⚠Caution Before you start a body weight management program and set the appropriate personal body fat ratio, please consult your doctor. Tanita is not responsible for setting the appropriate target body fat ratio for specific individuals.

1 Press ⊙/○ to turn on the power.



2 Check that the body composition monitor is selected and input the clothes weight.

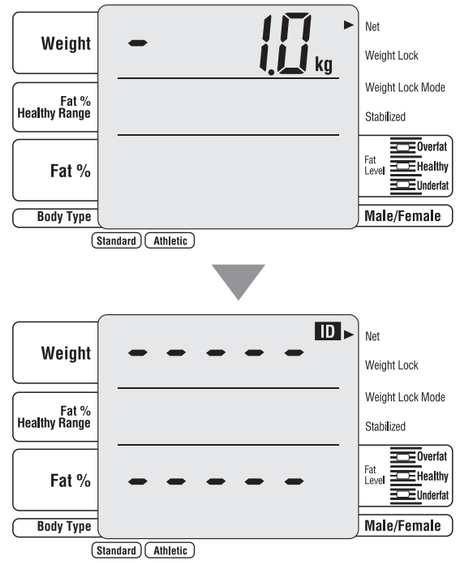
Input it by pressing 0 – 9 and ·.



Note

- The clothing weight (tare) can be input in the range of 0.0 – 10.0 kg.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).

3 Press Enter / Next.



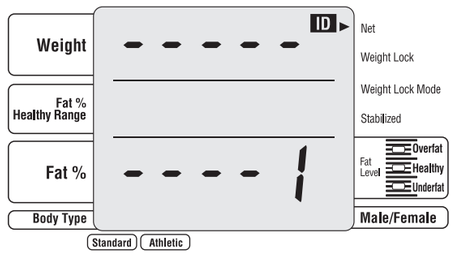
Note

- **This screen is not displayed if OFF is set in the "setting with or without an ID" (☞page 15). (The "body type selection" screen is displayed.)**

Operating Instructions (when using as a scale (continued))

4 Input an ID number.

Input it by pressing 0 – 9.



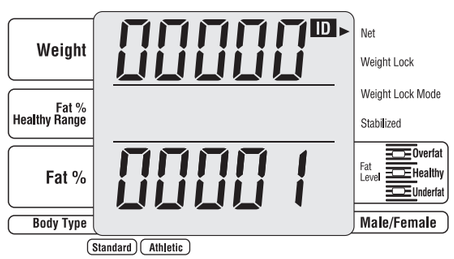
Note

- **This screen is not displayed in the case that OFF is set in the "setting with or without an ID" (☞ page 15).**
- The ID number can be input from 0 – 9999999999.
- If it is mistakenly input,
  ⇨press CE (the input is deleted).
- If CE is pressed in the state that an ID number is not input, it returns to the "measurement start."

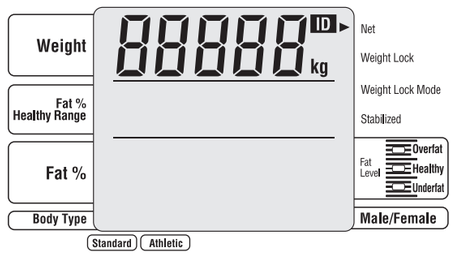
5 Press Enter / Next.

Note

- **This screen is not displayed in the case that OFF is set in the "setting with or without an ID" (☞ page 15).**



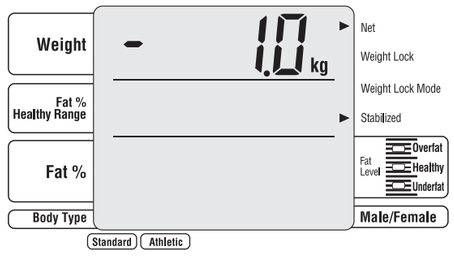
88888 display goes off sequentially.



The lamp flashes for "step on."

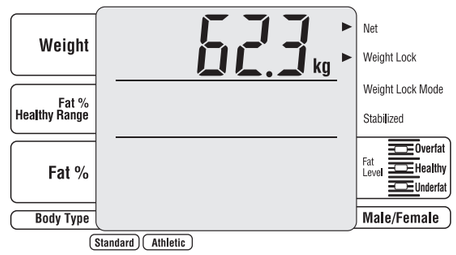
Note

- If CE is pressed, it returns to the previous screen.

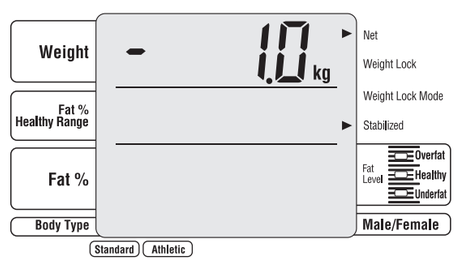


6 Measurement completion

The measurement result and the body fat percentage evaluation are displayed.
It is automatically printed out. (In the case that other than 0 is set in the "Setting the number of sheets to print" (☞ page 13).



Step off the platform.
It returns to the "measurement start" screen.



Various criteria

- Criteria based on body fat percentage

Body fat percentage is the amount of body fat as a proportion of your body weight.
Reducing excess levels of body fat has shown to reduce the risk of certain conditions such as high blood pressure, heart disease,diabetes and cancer. The chart below shows the healthy ranges for body fat.

Body Fat Ranges for Standard Children [1]
Body Fat Ranges for Standard Adults [2]

[1] *Susan Jebb et al. Obesity Reseach[o2] 2004;12:A156-157 "New Body Fat Reference Curves for children"*

[2] *Gallagher D et al. Am J Clin Nutr 2000,72:694-701. "Healthy percentage body fat ranges:an approach for developing guidelines based on body mass index."*

| | | Underfat | | | | | | | | | Healthy | | | | | | | | |

- What is basal metabolic rate (BMR)?

WHAT IS BMR?

Your Basal Metabolic Rate(BMR) is the minimum level of energy your body needs when at rest to function effectively including your respiratory and circulatory organs, neural system, liver, kidneys, and other organs. You burn calories when sleeping.

About 70% of calories consumed every day are used for your basal metabolism. In addition, energy is used when doing any kind of activity however; the more vigorous the activity is the more calories are burned. This is because skeletal muscle (which accounts for approximately 40% of your body weight) acts as your metabolic engine and uses a large amount of energy. Your basal metabolism is greatly affected by the quantity of muscles you have, therefor increasing your muscle mass will help increase your basal metabolism.

By studying healthy individuals, scientists have found that as people age, their metabolic rate changes. Basal metabolism rises as a child matures. After a peak at the age of 16 or 17, it typically starts to decrease gradually.

Having a higher basal metabolism will increase the number of calories used and help to decrease the amount of body fat. A low basal metabolic rate will make it harder to lose body fat and overall weight.

HOW DOES A TANITA BODY COMPOSITION MONITOR CALCULATE BMR?

The basic way of calculating Basal Metabolic Rate BMR is a standard equation using weight and age. Tanita has conducted in-depth research into the relationship of BMR and body composition giving a much more accurate and personalized reading for the user based on the impedance measurement. This method has been medically validated using indirect calorimetry (measuring the breath composition).*

* Reliability on equation for Basal Metabolic Rate: At 2002 Nutrition Week : A Scientific and Clinical Forum and Exposition Title: International Comparison: Resting Energy Expenditure Prediction Models: The American Journal of Clinical Nutrition

- WHAT IS METABOLIC AGE?

This feature calculates your BMR and indicates the average age associated with that type of metabolism. If your BMR Age is higher than your actual age, it is an indication that you need to improve your metabolic rate. Increased exercise will build healthy muscle tissue, which will improve your metabolic age.

You will obtain a reading between 12 and 50. Under 12 will be displayed as “12” and over 50 displayed as “50”.

- WHAT IS MUSCLE MASS?

This feature indicates the weight of muscle in your body. the muscle mass displayed includes the skeletal muscles, smooth muscles (such as cardiac and digestive muscles) and the water contained in these muscles.

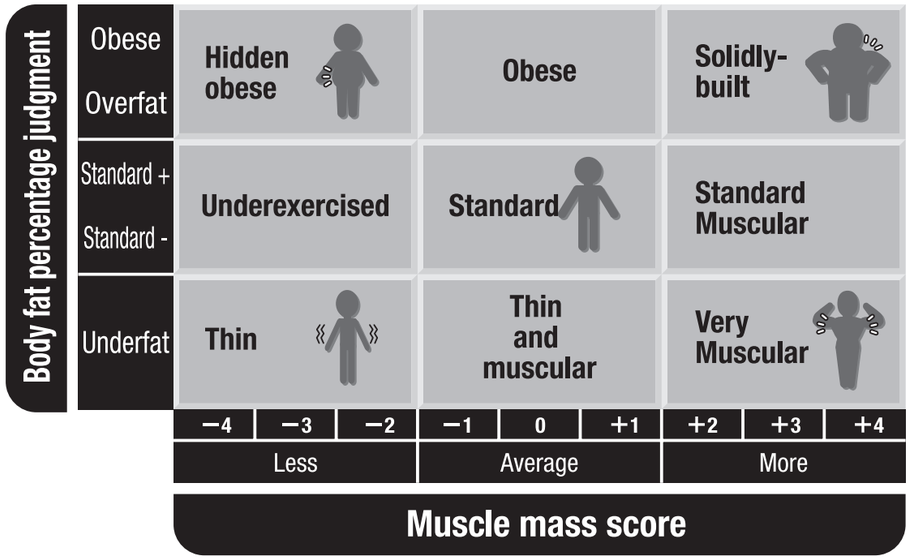
Muscles play an important role as they act as an engine in consuming energy. As your muscle mass increase, your energy consumption increases helping you reduce excess body fat levels and lose weight in a healthy way.

- What is physique rating?

This feature assesses your physique according to the ratio of body fat ad muscle mass in your body.

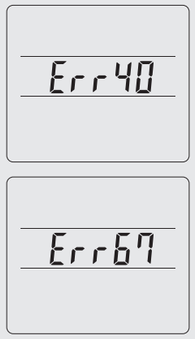
As you become more active and reduce the amount of body fat, your physique rating will also change accordingly. Even though your weight may not change, your muscle mass and body fat levels may be changing making you healthier and at lower risk of certain diseases.

Each person should set their own goal of which physique they would like and follow a diet and fitness program to meet that goal.



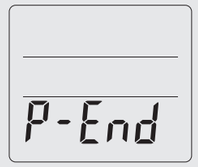
Troubleshooting

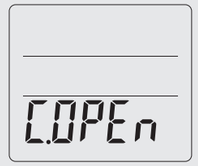
- Please check the following before asking for repair.





	Symptom	Please check
How to measure	Impedance measurement error Err40 Err67	• Measure with bare feet. • When the soles of your feet are dry, drop water for about 0.5 ml with the attached dropper on the electrodes before measurement. • Check the input information.
	Zero point error uuuuu	• Turn off the power, and remove the items on the platform and turn on the power again, and then redo the measurement.
	The measured weight is not stable.	• Is it installed at a place with vibrations? • Is the platform inclined? ⇨Keep the platform horizontal. (☞pages 6 and 7) • Is anything caught in the gaps of the platform? ⇨Remove anything caught in the gaps.
Display part	Nothing is displayed even after turning on the power.	• Check that the power supply is connected correctly.
	——————— is displayed.	• The weight to measure exceeds the measurement range.





	Symptom	Please check
Printer	Run out of print paper P-End	• Print paper is not supplied. ⇨Supply paper. ⇨In the case that the printer is not used, press CE and redo the initial setting.
	Printer cover open C.OPEn	• The printer cover is open. ⇨Properly close it. ⇨Check that the print paper is not slanted.
	Paper does not come out.	**Check the settings.** • Is 0 set for the number of sheets to print in the "determination of the number of sheets to print?" ⇨Press 1 – 3. (☞page 13) • The printer may be broken. ⇨Contact the agent from which you have purchased the product.
	The paper comes out, however, nothing has been printed.	• Is the reverse side of the print paper set? ⇨Set the paper properly. (☞page 9) • The printer may be broken. ⇨Contact the agent from which you have purchased the product.

Note

• In the case that an error is displayed other than the above, turn off the power once, and then measure again.
If the same error is displayed repeatedly, contact our customer service centre.

Connection with a personal computer

⚠Caution BC-420MA conforms to the IEC60601-1 safety standard. If you connect it to a computer, please connect it to one that conforms to IEC60950.

⚠ The RS-232C interface enables input and output from this equipment. This equipment is not capable of being remotely controlled by external equipment, such as a computer.

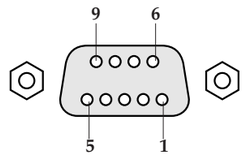
- Specifications

Communication standards	Compatible with EIA RS-232C
Communication method	Asynchronous communication method
Signal speed	9600 bps
Data bit length	8 bits
Parity	NONE
Stop bit	1 bit
Flow control	NONE
Terminator	CR+LF

- Signal Names and Connection Methods

Terminal Number	Signal Name
1	※ 1
2	RXD
3	TXD
4	※ 1
5	GND
6	※ 1
7	※ 2
8	※ 2
9	No Connection

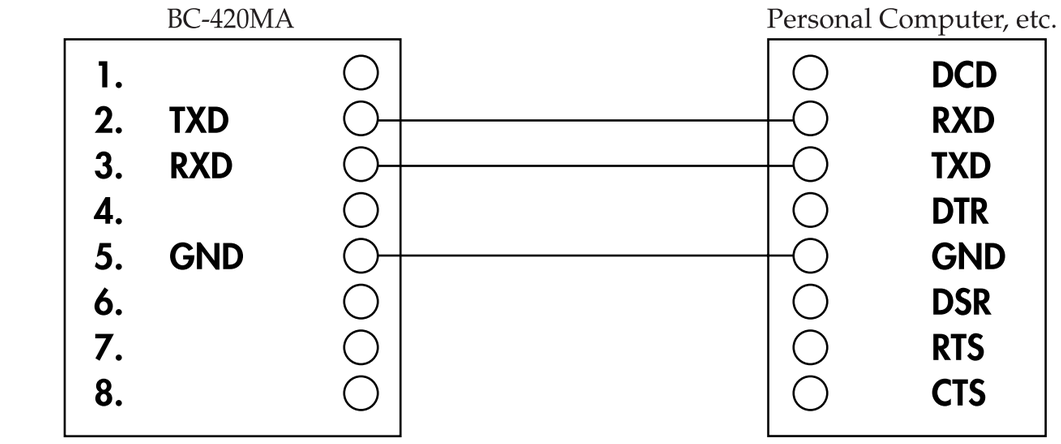
Option



*1: Pin Nos. 1, 4 and 6 are internal connections.
*2: Pin Nos. 7 and 8 are internal connections.

- Connection Example

Please be sure to use a straight cable when the equipment is connected to an external computer.



⚠ A modem cable cannot be used.

⚠Caution Transmission Data is output immediately after measurement regardless of the status of the receiving equipment (personal computer, etc.). Therefore the receiving equipment needs to be ready to accept the data before measuring.

- Transmit data

Transmit data is output immediately after measurement regardless of the state of the receiving side (personal computer, etc.). Therefore, the receiving side must always be ready to receive before measurement.

***PC mode is a mode to send personal data from the personal computer side and to receive measurement results.**

(1) Output data format

The measured data is output in the following format.

- Each piece data is with a comma-delimited (,).
- The terminator (the end of the data) is CR (ASCII code 0DH), LF (ASCII code 0AH). 0 herein is zero.

Entire body data

Model		Serial No.		ID number		Date (dd/mm/yyyy)		Time	
MO	XXXXXX	SN	XXXXXXXX	ID	XXXXXXXXXX	Da	dd/mm/yyyy	Tl	hh:mm

Body type		Gender		Age		Height		Clothes (tare)	
Bt	0or2	GE	1or2	AG	XX	Hm	XXX.X	Pt	XX.XX

Weight		Body fat %		Fat mass		Fat free mass		Muscle mass	
Wk	XXX.X	FW	XX.X	fW	XXX.X	MW	XXX.X	mW	XXX.X

Muscle score		Bone mass		TBW		TBW %		BMI	
sW	XX	bW	XXX.X	wW	XXX.X	ww	XXX.X	MI	XXX.X

Standard body weight		Degree of obesity		Visceral fat rating		BMR (kJ)		BMR (kcal)	
Sw	XXX.X	OV	XX.XX	IF	XX	rb	XXXXX	rB	XXXXX

BMR score		Metabolic age		Rohrer's index		Target body fat %		Predicted weight	
rJ	XX	rA	XX	RO	XXXX.X	gF	XX	gW	XXX.X

Predicted fat mass		Fat to gain / lese		Impedance		Checksum	
gf	XXX.X	gt	XXXX.X	ZF	XXXX.X	CS	XX

* Each value is comma-delimited (,).

(2). Output data items

Item	Header	Format	Contents	Order of output			
				Body composition monitor			Scale
				Adult	Athlete	Child	
Control data	{0	Fix to 16	2 byte fixed length	1	1	1	1
Control data	˜0	Fix to 1	1 byte fixed length	2	2	2	2
Control data	˜1	Fix to 1	1 byte fixed length	3	3	3	
Control data	˜2	Fix to 1	1 byte fixed length	4	4	4	
Model	MO	"XXXXXX"	8 byte fixed length	5	5	5	3
Serial No.	SN	"XXXXXXXX"	10 byte fixed length	6	6	6	4
ID number	ID	"XXXXXXXXXX"	12 byte fixed length	7	7	7	5
Date (dd/mm/yyyy)	Da	"dd/mm/yyyy"	10 byte fixed length	8	8	8	6
Time	Tl	"hh:mm"	7 byte fixed length	9	9	9	7
Body type	Bt	0 or 2	0 byte fixed length (0: standard 2: athlete)	10	10	10	
Gender	GE	1 or 2	1 byte fixed length (1: male 2: female)	11	11	11	
Age	AG	XX	"1 – 2 byte variable length (unit: age, right-aligned)"	12	12	12	
Height	Hm	XXX.X	"4 – 5 byte variable length, to 1 place of decimals (unit: cm)"	13	13	13	
Clothes (tare)	Pt	XX.X	"3 – 4 byte variable length, to 1 place of decimals (unit: kg)"	14	14	14	8
Weight	Wk	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	15	15	15	9
Body fat %	FW	XX.X	"3 – 4 byte variable length, to 1 place of decimals (unit: %)"	16	16	16	
Fat mass	fW	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	17	17	17	
Fat free mass	MW	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	18	18	18	
Muscle mass	mW	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	19	19	19	
Muscle score	sW	XX	1 – 2 byte variable length (1-24)	20	20		
Bone mass	bW	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	21	21		
TBW	wW	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	22	22	20	
TBW %	ww	XXX.X	"3 – 5 byte variable length, to 1 place of decimals"	23	23	21	
BMI	MI	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	24	24		
Standard body weight	Sw	XXX.X	"3 – 5 byte variable length, to 1 place of decimals (unit: kg)"	25			
Degree of obesity	OV	XX.XX	"3 – 5 byte variable length, to 1 place of decimals (unit: %)"	26			
Visceral fat rating	IF	XX	1 – 2 byte variable length	27	25		
BMR (kJ)	rb	XXXXX	1 – 5 byte variable length (unit: kJ)	28	26		
BMR (kcal)	rB	XXXXX	1 – 5 byte variable length (unit: kcal)	29	27		
BMR score	rJ	XX	1 – 2 byte variable length	30	28		
Metabolic age	rA	XX	2 byte fixed length	31	29		
Rohrer's index	RO	XXXX.X	4 – 6 byte variable length			22	
Target body fat %	gF	XX	1 – 2 byte variable length	32	30	23	
Predicted weight	gW	XXX.X	3 – 5 byte variable length	33	31	24	
Predicted fat mass	gf	XXX.X	3 – 5 byte variable length	34	32	25	
Fat to gain / lese	gt	XXXX.X	3 – 6 byte variable length	35	33	26	
Impedance	ZF	XXXX.X	5 – 6 byte variable length	36	34	27	
Checksum	CS	XX	2 byte fixed length	37	35	28	10

Body composition measurement by the BIA method.

Introduction

This equipment provides estimated values for each measured value of body fat percentage, fat mass, fatfree mass, muscle mass and bone mass by the DXA method, estimated value for the total body water measured value by the dilution method and estimated value for the visceral fat rating by MRI method using the Bioelectrical Impedance Analysis (BIA method).
For measurement, a mode must be selected based on body type.
1) Standard (for 5-99 years of age)
2) Athletic (for Athletic persons who exercise considerably more than non-athlete)
Making a distinction by body type in the measurement mode produces more reliable body composition measurements for athletic persons, whose body compositions differ from those of average persons.

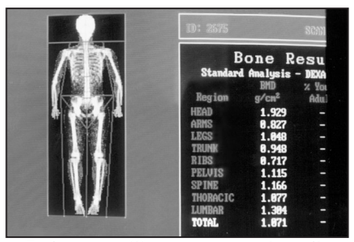
- Principles of body composition measurement

BIA is a means of measuring body composition – fat mass, predicted muscle mass, etc. – by measuring bioelectrical impedance in the body. Fat within the body allows almost no electricity to pass through, while electricity passes rather easily through water, much of which is found in muscles. The degree of difficulty with which electricity passes through a substance is known as the electrical resistance, and the percentage of fat and other body constituents can be inferred from measurements of this resistance.

The Tanita Body Composition Analyzer measures body composition using a constant current source with a high frequency current (50kHz, 90μA). The 8 electrodes are positioned so that electric current is supplied from the electrodes on the tips of the toes of both feet, and voltage is measured on the heel of both feet. The current flows into the upper limbs or lower limbs, depending on the body part(s) to be measured.

- What is the DXA method?

DXA was originally designed to measure bone mineral content, but in the full-body scan mode the body fat percentage, fat mass, and fat free mass of individual body parts (arms, legs, trunk) can also be measured. The image below shows one example of body composition measurement results obtained by DXA.



Body composition measurement results obtained by DXA (Lunar Co., Ltd; DPX-L)

- What is dilution method?

In the dilution method, a labeled substance for a known amount is given and the concentration in equilibrium diffusing evenly is measured to obtain the total amount of the solvent that dilutes the labeled substance.
To measure the total body water (TBW), deuterium oxide (D_2O) is generally used as the labeled substance. Deuterium oxide uses the overall total body water as dilution space so the total body water can be obtained. To obtain the extracellular fluid amount, sodium bromide (NaBr) is used as a labeled substance. Bromine (Br) is said to not enter the inside of cells, and uses extracellular fluid as the dilution space.

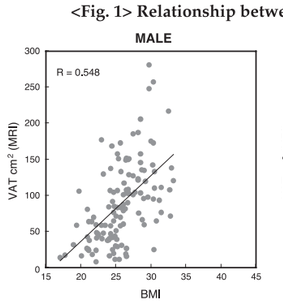
- What is the visceral fat?

Visceral adipose tissue (VAT) is fat that accumulates in the abdominal cavity and around internal organs. VAT is said to be more likely to cause lifestyle-related diseases than subcutaneous adipose tissue (SCAT). Accordingly, knowing and periodically checking the VAT accumulation risk serves as an important guide in the prevention of lifestyle-related diseases.

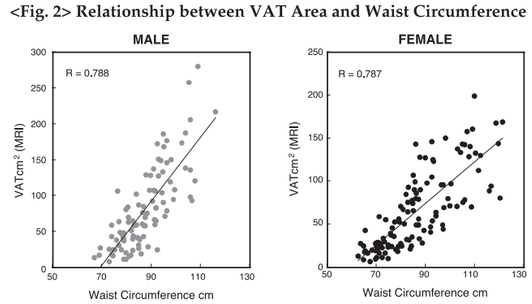
Tanita has developed the technology for measuring the VAT accumulation risk through bioelectrical impedance analysis (BIA) in comparison with image analysis applied to magnetic resonance imaging (MRI), in addition to the established technology for measuring the percent of body fat. The VAT accumulation risk is calculated by estimating the VAT area by the BIA method on the basis of MRI image processing. This method has a higher correlation than the estimation of the VAT accumulation risk based on BMI or abdominal circumference (waist circumference), allowing estimation that corresponds more precisely to individuals.
* The VAT area by MRI is calculated by carrying out an image processing of the cross section of the lumber vertebra L4-L5 regions.

(Fig. 1 - Fig. 3: Research results by N. Y. Columbia University and Jikei University Published by the North American Association for the Study of Obesity [NAASO] in 2004.)

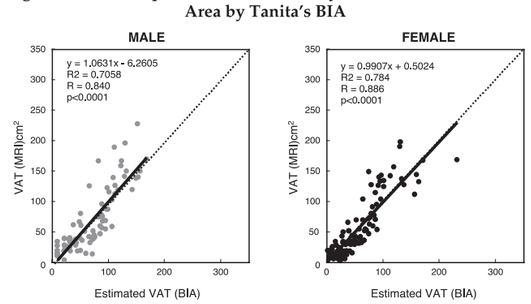
<Fig. 1> Relationship between VAT Area and BMI



<Fig. 2> Relationship between VAT Area and Waist Circumference



<Fig. 3> Relationship between VAT Area by MRI and Estimated VAT Area by Tanita's BIA



- Factors giving errors in measurement

In the BIA method, impedance is measured and the body composition is calculated based on the value. It is known that impedance changes by the amount of the total body water that occupies about 60% of weight and the change in its distribution and temperature change. Therefore, for the purpose of research or for daily repeating of measurements, the measurement conditions must be kept constant. Measurement under the changing conditions of temperature and total body water distribution or blood flow volume of extremities due to exercising, taking a bath, etc., affects the measurement result since the electric resistance in the body also changes.
Therefore, it is recommended to measure under the following conditions for stable measurement.

1) 3 hours have passed after getting up and normal lifestyle activities are carried out during this period. (The impedance transits staying at a high level if you remain sitting after getting up or drive a car, etc.)
2) 3 hours or more have passed after eating. (For 2 – 3 hours after eating, the impedance has a tendency to decrease.)
3) 12 hours or more have passed after vigorous exercise for measurement. (The tendency toward changes in impedance is not stable depending on the type and rigorousness of the exercise.)
4) If possible urinate before taking measurement.
5) For repeated measurements, measure at the same hour as much as possible. (At the same time of measurement of weight, the measurements can be made more stable by measuring at the same time of the day)

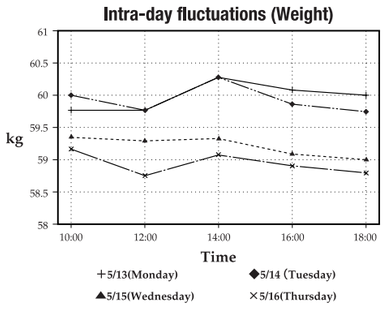
Very stable measured values can be obtained by measuring under the above conditions.
And in the development of this equipment, the following 6 items were set as conditions for the regression equation.

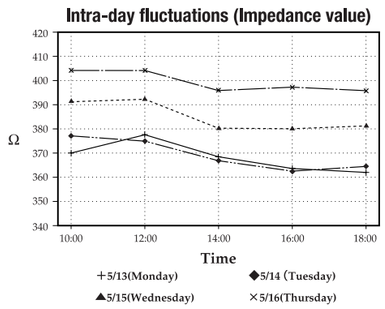
1) Prohibition of alcohol intake for 12 hours before measurement
2) Prohibition of excessive exercise for 12 hours before measurement.
3) Prohibition of excessive eating and drinking the day before measurement
4) Prohibition of eating and drinking for 3 hours before measurement
5) Avoidance of the menstrual period (women)

2) Inter-day changes

The diagrams below offer examples of actual measurements made of inter-day changes. A study was done to determine the degree of change in the impedance between the feet during dehydration; the first two days represent a normal daily routine, while in the latter two days a state of dehydration was induced using a sauna.

No significant inter-day change was measured in body weight, impedance between the feet, or body fat percentage during the normal daily routine. During the dehydrated state, however, a drop in body weight of 1kg was noted, with the impedance between the feet rising approximately 15Ω on the first day of dehydration and 30-35Ω on the second day. As a result, body fat percentage was up by around 1% on the first day of dehydration and by 1.5-2% on the second day.
As mentioned earlier, impedance increases when body weight is reduced (such as by dehydration), and decreases when body weight is increased through excess consumption of food and drink. The inter-day change in impedance is thus inversely proportional to the change in body weight.
These inter-day changes stem from such causes as:





1) Temporary increases in body weight (total body water) through overeating and overdrinking
2) Dehydration due to heavy sweating during vigorous exercise
3) Dehydration due to alcohol consumption or the use of diuretics
4) Dehydration due to heavy sweating during saunas, etc.

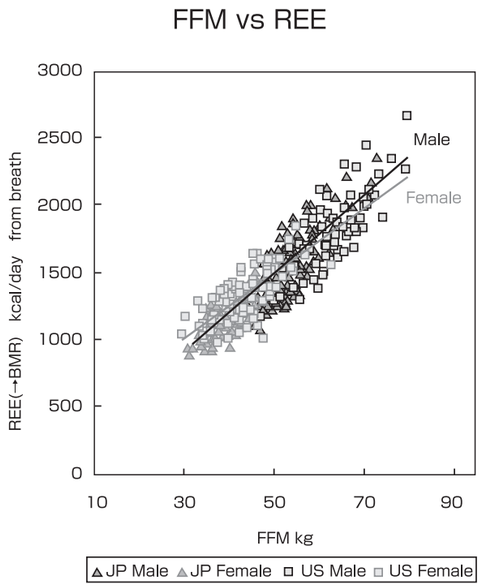
Accordingly, it is recommended that instructions be provided to the subject to help eliminate these causes when accurate measurements are needed.

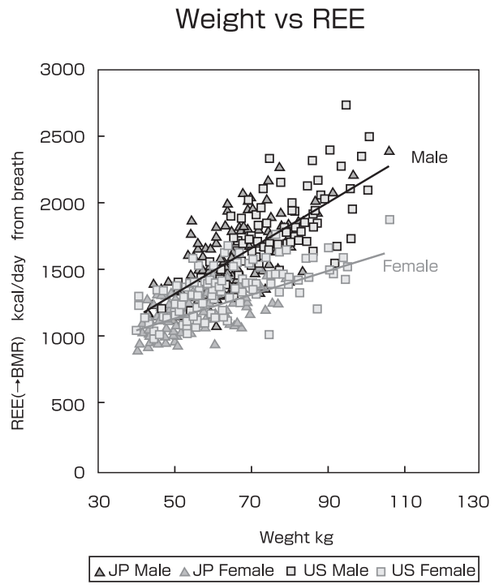
The New Regression Formula for Basal Metabolic Rate (BMR)

It has long been said among medical and nutritional specialists that "The Basal Metabolic Rate (BMR) is more determined by the Fat Free Mass (FFM) than by the body weight" (Persons of a given body weight with a higher FFM will have a higher BMR), and that from the aspect of evaluating the body composition, should be estimated from the FFM. In addition, in cases of simple estimation formulae which can calculate from the height, weight and age, without evaluating the body composition, there was a problem with excessively high evaluations being given to obese persons with large body weight, and conversely excessively small BMR evaluations given to muscular athletes, though these are not as many in number.
Currently, the BMR estimation recursion formula developed by Tanita, the manufacturer of body composition analyzers, based on their research, works by multiple regressive analysis using this FFM, and has a higher degree of accuracy in the individual differences in body composition. In order to derive the BMR, resting respiratory metabolism (Resting Energy Expenditure: REE) was measured using a breath gas analysis device, and this estimation recursion formula was created based on this data.

<Figure 1> The Relationship Between Resting Energy Expenditure (REE) According to Breath Gas Analysis and Weight, FFM
(Presented at Nutrition Week, Held in San Diego in 2002)

As shown in Figure 1: the REE (BMR) has a stronger relationship to the FFM than to body weight, and a difference is visible between males and females in the distribution trends. We see that in principle that we should calculate from the FFM rather than by the old formula centered on the relationship with weight.

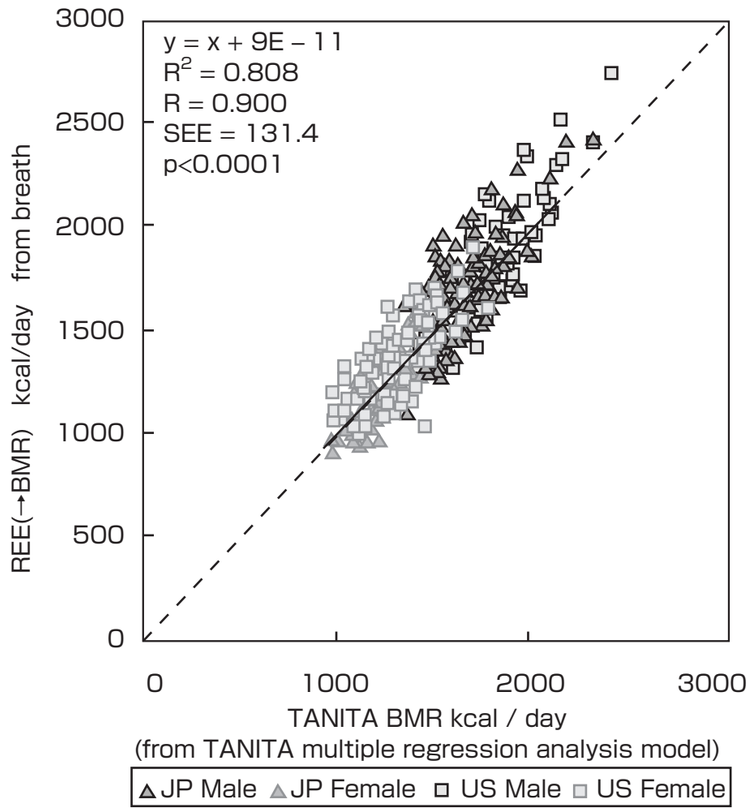




<Figure 2> Comparison of BMR Values from the TANITA Multiple regression model and Breath Analysis
(Presented at Nutrition Week Held in San Diego in 2002)

The current BMR retrogression formula is a formula which acts on the principle of using the FFM value from the results of body composition measurement according to the BIA, A good relationship is shown in the BMR value based on actual breath analysis REE or R=0.9 ($p<0.0001$). These results were presented at the First Annual Nutrition Week (American College of Nutrition, American Society for Clinical Nutrition, American Society for Parenteral and Enteral Nutrition, North American Association for the Study of Obesity) held in 2002 in San Diego.

NOTE: This model has been calibrated for those between ages of 18-84. Those individuals outside of this age range may not be obtain accurate readings.



Specifications

Model		BC-420MA
Accuracy Grade		MDD: CLASS IIa
		NAWI: CLASS III
Power source		AC adapter (included) Centre Minus MODEL SA165A-0950U-3 CLASS 2
		Input Voltage: 100-240 VAC 50/60 Hz 1.5A Output Voltage: 7 VDC
		Rated Current: 4 A No Load Input Voltage: 7VDC
Power Consumption		28 W
Impedance Measurement	**Measurement System**	Tetra polar Bioelectrical Impedance Analysis
	Measurement Frequency	50 kHz
	Measurement Current	90 µA
	Electrode Material	Pressure Contact Stainless Steel Foot Pads
	Measurement Style	Between Both Feet
	Measurement Range	150 - 1200Ω
	Accuracy at first calibration	± 2%
Weight Measurement	**Measurement System**	Strain Gauge Load Cell
	Maximum Capacity / Minimum Graduation	270 kg / 0.1 kg
	Accuracy at first calibration	± 0.2 kg
Input Items	**Clothes Weight**	0 - 10 kg / 0.1 kg increments
	Gender	Male / Female
	Body Type	Standard (5 - 99 years) / Athletic (18 - 99 years)
	Age	5 - 99 years old / 1 year increments
	Height	90 - 249.9 cm / 0.1 cm increments
	Target Body Fat %	4 - 55 %

Output Items	**Display**	**Target Body Fat %**	4 - 55 %
		Weight	0 - 270 kg / 0.1 kg increments
		Gender	Male / Female
		Body Type	Standard / Athletic
		Age	5 - 99 years old / 1 year increments
		Height	90 - 249.9 cm / 0.1 cm increments
		FAT%	3 - 75% / 0.1% increments
	Print-out	**Logo**	TANITA LOGO (240x64 dot)
		Model Name	BC-420MA
		Date and Time	2005 / 1 / 1 - 2099 / 12 / 31
		Serial No.	00000000 - 99999999
		ID	0000000000 - 9999999999
		Body Type	Standard (5 - 99 years) / Athletic (18 - 99 years)
		Gender	Male / Female
		Age	5 - 99 years old / 1 year increments
		Height	90 - 249.9 cm / 1 cm increments
		Clothes Weight	0 - 10 kg / 0.1 kg increments
		Weight	0 - 270 kg / 0.1 kg increments
		FAT%	3 - 75% / 0.1% increments
		Fat Mass	0.1 kg increments
		FFM	0.1 kg increments
		Muscle Mass	0.1 kg increments
		TBW	0.1 kg increments
		TBW%	15 - 85% / 0.1% increments
		Predicted Bone Mass	0.1 kg increments
		BMR	1 kJ increments / 1 kcal increments
		Metabolic Age	1 years increments (12 - 90 years)
		Visceral FAT Rating	1 Level increments (1-59 Level)
		BMI	0.1 increments
		Predicted Weight	0.1 kg increments
		Desirable range	3 - 75% / 0.1% increments
		FAT % Graph	
		BMI Graph	
		Visceral FAT Level Graph	
		Muscle Mass Graph	
		BMR Graph	
		Physique Rating	
		Impedance	150 - 1200Ω
Display			3 Rows, 5 Digits LCD
Output Data Interface			RS-232C (D-sub 9 pins Female Connector) or USB
Temperature Range of Usage			0 - 35˚C
Relative Humidity			30 - 80% (without condensation)
Weight of Equipment (Remote Display Version)			6.8 kg
Weight of Equipment (Column Mounted Version)			12.1kg
Size	**Weighing Platform**		372 × 375 × 101 mm
	Height (Column Mounted Version)		1024 mm

GB

CE 0123

This product meets the following requirements ;
1.Medical Device Directory Standard (93/42/EEC)
Safety Standard : EN60601-1:1990, AM No.1:1993, AM No.2:1995
IEC60601-1:1988, AM No.1:1991, AM No.2:1995
EMC Standard : EN60601-1-2:2001
IEC60601-1-2:2001
2.Non-Automatic weight Instruments (90/384/EEC)

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