Rice Lake TE Series

Tuning Fork Enhanced Balance

Operation Manual

RICE LAKE
WEIGHING SYSTEMS

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All information contained within this publication is, to the best of our knowledge, complete and accurate at the time of publication. Rice Lake Weighing Systems reserves the right to make changes to the technology, features, specifications and design of the equipment without notice.

The most current version of this publication, software, firmware and all other product updates can be found on our website:

www.ricelake.com

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1.0 Introduction

This document describes how to operate the Rice Lake TE Series Tuning Fork Enhanced Balance.

Manuals can be viewed or downloaded from the Rice Lake Weighing Systems website at www.ricelake.com/manuals

1.1 Limited Warranty

The Rice Lake TE Series Tuning Fork Enhanced Balance comes with a five year limited warranty. For more information refer to the Rice Lake Weighing Systems website at www.ricelake.com/warranties

Figure 1-1. Rice Lake TE Balance

Part No.	Model No.	Description
186030	TE-623	620 g x 0.001 g
186034	TE-1203	1,200 g x 0.001 g
186035	TE-3202	3,200 g x 0.01 g
186036	TE-6202	6,200 g x 0.01 g
186037	TE-15001	15,000 g x 0.1 g

Table 1-1. Available Models

Part No.	Description
186074	Power supply 100-240VAC, 50-60 Hz
186075	In-use dust cover 1,200 g models and lower
186076	In-use dust cover 3,200 g models and higher
186077	Specific Density Measurement Kit
186079	Ethernet TCP/IP option card

Table 1-2. Available Options

1.2 Standard Features

- External weight calibration
- 7-segment (main)/16-segment (sub) display
- Operation modes: Weighing, Counting, Percentage, Coefficient, Specific Gravity, Statistics, Animal and Formulation
- Mono-Metal Tuning Fork Technology (MMTF) provides quick response and stability
- 30-step bar graph display
- 100-240 VAC adapter included
- AA dry-cell port, (150 hours continuous use with LCD back-light and communication signal ON)
- RS-232 & USB (Type B)
- Glass breeze break
- NTEP approved (COC 17-104)

Part No.	Model No.	Description
186030	TE-623	620 g x 0.001 g
186034	TE-1203	1,200 g x 0.001 g
186035	TE-3202	3,200 g x 0.01 g
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Table 1-3. Available Models

Part No.	Description
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186077	Specific Density Measurement Kit
186079	Ethernet TCP/IP option card

Table 1-4. Available Options

1.3 Safety

Safety Signal Definitions:

DANGER *Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.*

WARNING *Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.*

CAUTION *Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.*

IMPORTANT *Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.*

General Safety

Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

Failure to heed could result in serious injury or death.

Do not use balance in wet locations or with wet hands.

Review MSDS (Material Safety Data Sheets) when applicable.

Only use the specified power supply supplied by Rice Lake Weighing Systems.

Do not disassemble or modify the product. For inspection and adjustments, contact Rice Lake Weighing Systems.

Do not use in an explosive environment.

1.4 Front Panel

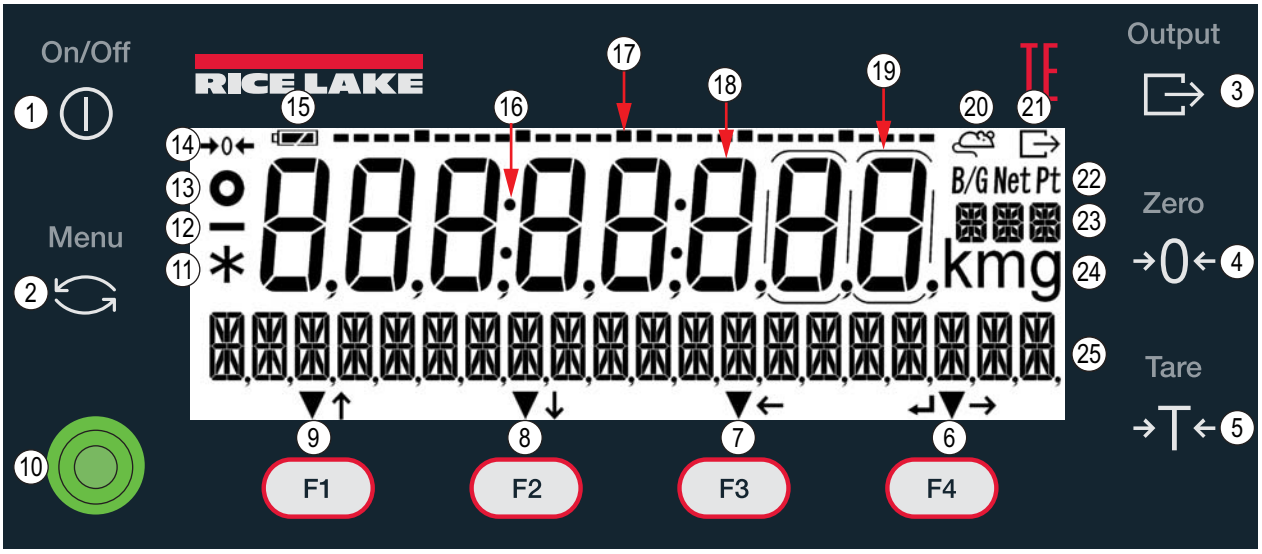


Figure 1-2. Display Overview

Item No.	Description
1	Power – press to turn unit on; a long press to turn off
2	Menu – press to enter/exit the setting menu; cancels setting value selection; returns to the measuring mode
3	Output – used for data outputting; data importing in the Statistics/Formulation mode
4	Zero – zeros the balance
5	Tare – allows the weight of a container/vessel to be removed from the Gross weight; leaving the Net weight displayed
6	F4 – select the mode, function or item; enter a menu; select digit to change; returning to the setting menu/weighing mode
7	F3 – select the mode, function or item; use for moving to the upper menu layer; or use for selecting the digit to change
8	F2 – use for selecting the mode, function or item; use for moving down to the menu/item selections; use for decrementing the numeric value
9	F1 – use for selecting the mode, function and item; use for moving up to the menu/item selections; use for incrementing the numeric values
10	Bubble Level – indicates when the balance is level and ready for use
11	Asterisk – lights in the standby status; indicates addition available status when the adding function is used.
12	Negative – indicates the negative weight value and numeric
13	Stable – indicates balance is stable when displayed
14	Zero – indicates the balance is at zero
15	Output – used for data outputting; used for data importing in the Statistics/Formulation mode.
16	Colon – used when the date and time display.
17	Bar Graph – indicates the present total amount relative to the weighing capacity defined as 100%; Indicates the state of span adjustment /calibration with internal weight.
18	7 Segment String – indicates the weight value; indicates the simplified character
19	Auxiliary balance Interval – lit when the auxiliary balance interval is displayed; not available in Legal for Trade
20	Animal Weigh Mode – displays when in animal weigh mode; not available in Legal for Trade
21	Output – displayed when data is being output to external devices.
22	Brutto/Gross – indicates gross weight is being displayed
	Net – indicates a tare weight is being subtracted; Indicates a preset tare weight.
	Preset Tare – indicates a preset tare weight
23	16 Segment String – indicates various units.
24	Units – indicates unit of value displayed; mg not available in Legal for Trade
25	16 Segment String – displays various messages

Table 1-5. Display Overview

2.0 Installation

IMPORTANT *Use the balance only in areas free from environmental conditions that could affect the accuracy.*

2.1 Measuring Environment Precautions

Temperature/air draft/humidity/atmospheric pressure

- keep the room temperature constant
- avoid exposure to airflow (air conditioner, heat ducts)
- avoid exposure to direct sun that can cause abrupt temperature changes
- low humidity can cause static electricity, resulting in inaccurate measurements
- avoid locations that are subject to dust

Vibration/shaking

- when possible, locate balance in a room on the first floor or basement.
- rooms near a road/railroad should be avoided
- place balance on a table/counter that is not affected by vibration
- placing a sheet of soft cloth or paper under the balance can cause shaking

Gravity

- The latitude and altitude of a measuring location can affect a weight reading due to changes in gravity
- Calibrate the balance at a measuring location to account for location gravity

Electromagnetic wave

- Avoid locations where strong electromagnetic wave generating objects are present.
- Avoid using tables that are subject to magnetism or static electricity

2.2 Balance Main Unit Precautions

Operating precautions

- if a dust cover is used, wipe with an anti-static agent or remove the cover
- for stability, turn on the balance 30 minutes or more and load the balance a few times with a weight equivalent to the weighing capacity prior to using

Adjustment

- calibrate balance periodically with an external adjustment weight or internal adjustment weight, external is more precise
- adjustment is needed when:
  - using the balance for the first time
  - using the balance after a long period of non-use
  - relocating the balance
  - a major change in temperature, humidity or atmospheric pressure has happened

Maintenance

- remove any dust or liquid from the pan and/or pan base prior to operation.
- ensure that no dust or liquid enters the balance when cleaning
- frequent cleaning of the balance is required

2.3 Unpack Balance

Unpack the balance and inspect the contents. Report missing or damaged components to the shipper and Rice Lake Weighing Systems immediately.

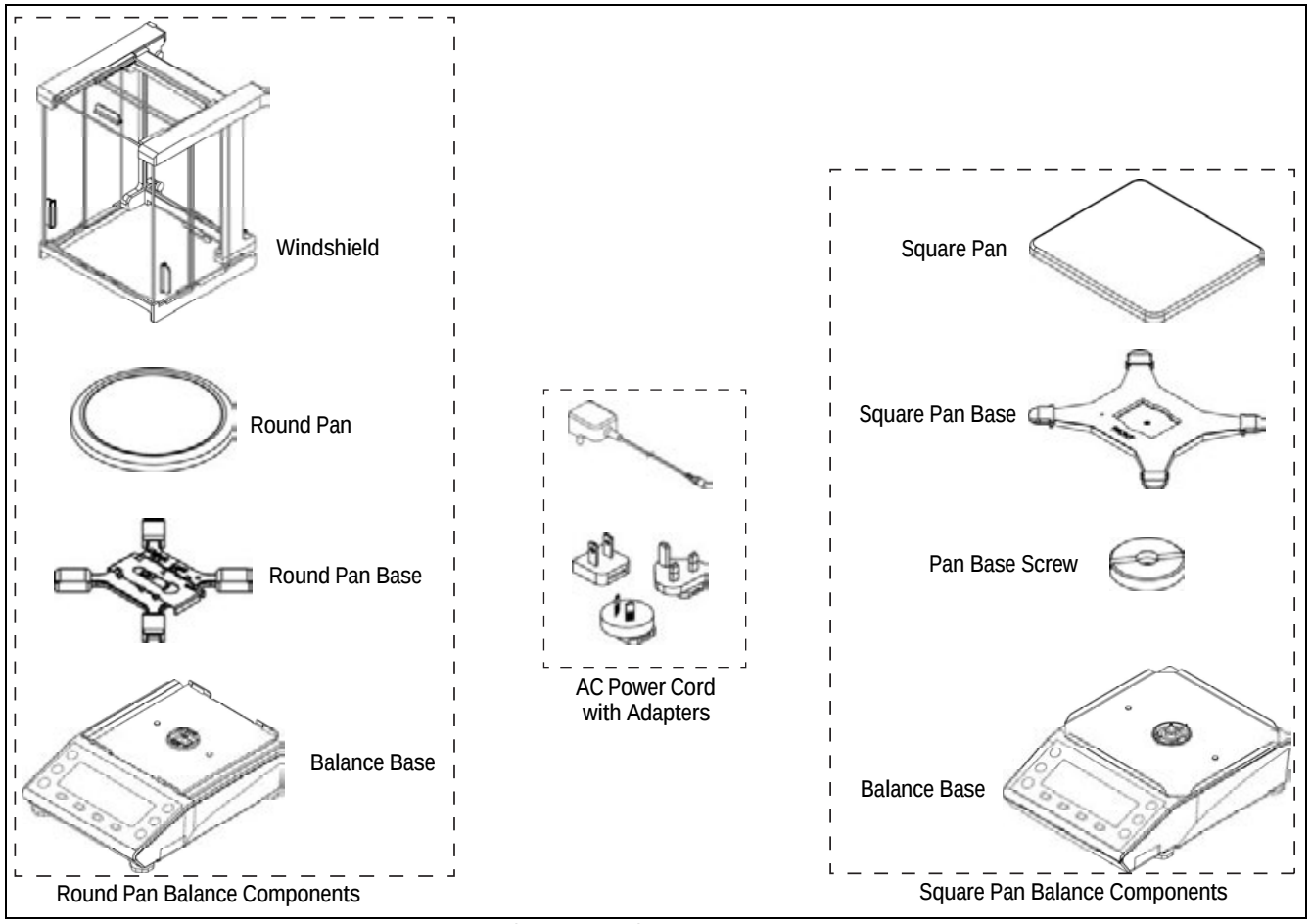


Figure 2-1. Balance Components

2.3.1 Connections and Part Locations

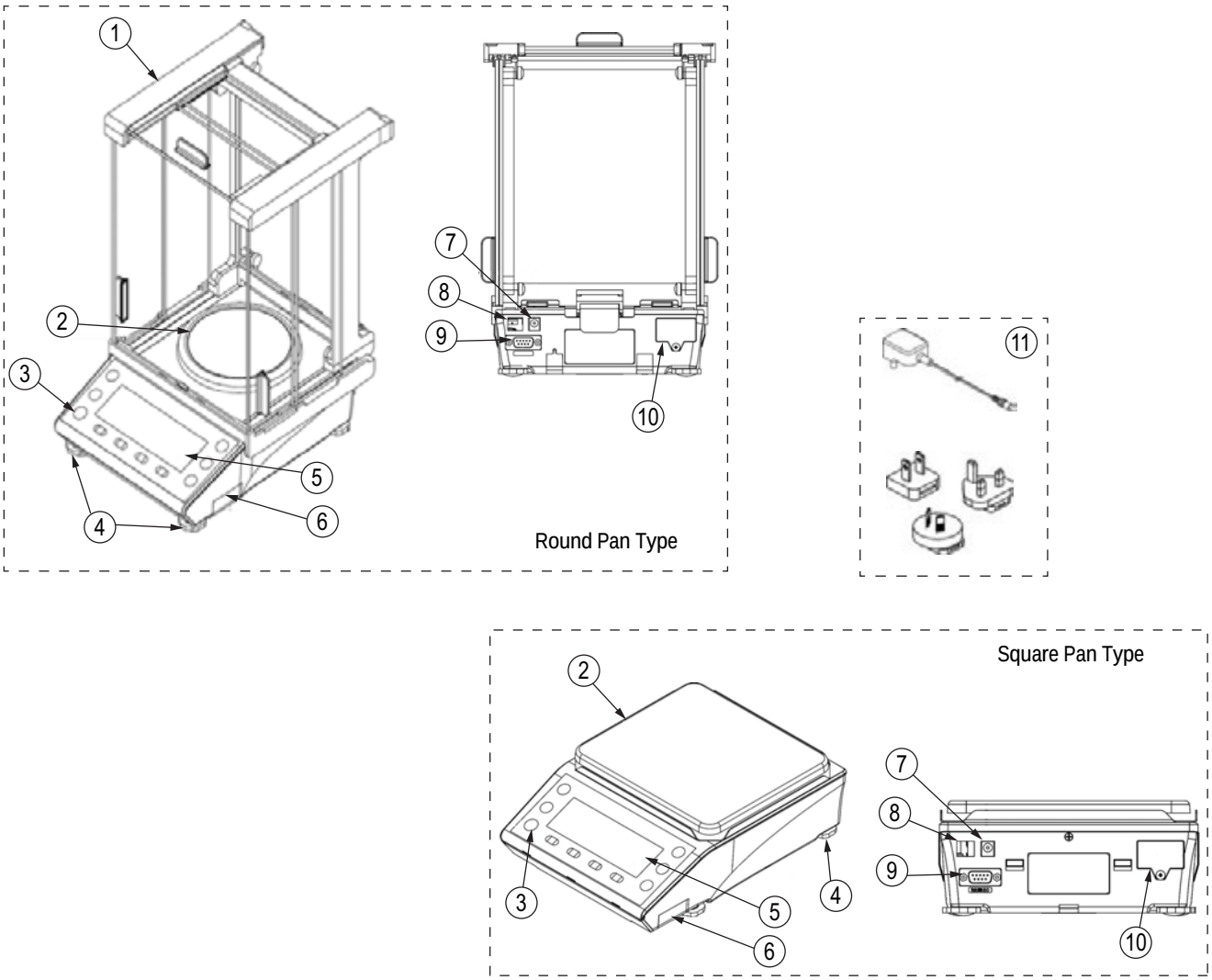


Figure 2-2. Connection and Part Locations

Item No.	Description
1	Windshield; see Section 2.7 on page 10
2	Weighing pan
3	Level
4	Feet/Adjusters
5	Display
6	Battery case
7	AC adapter jack
8	USB connector (Type B)
9	RS-232C connector (D-sub 9 pin male)
10	Option slot
11	Adapter with attachments

Table 2-1. Parts and Locations

2.4 Assemble Balance

Use the following steps to assemble the balance.

2.4.1 Round Base Assembly

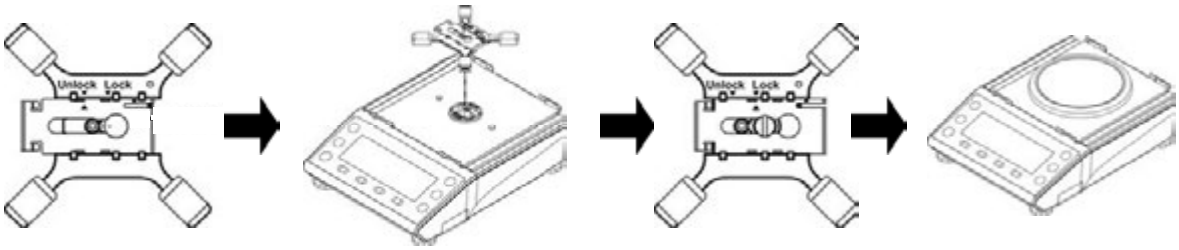


Figure 2-3. Assemble Base

1. Ensure the lock plate is in the unlocked position.
2. Set the pan base on the balance.
3. Slide the lock into the locked position.
4. Mount the weighing pan.
5. Connect the AC adapter or insert batteries. See Section 2.5.
6. Assemble and install the windshield. See Section 2.7 on page 10.

2.4.2 Square Base Assembly

Figure 2-4. Square Base Assembly

1. Ensure the word *Front* is aligned towards the display of the balance and attach the pan base to the balance.
2. Tighten the pan base screw firmly.
3. Place the weighing pan on the pan base.
4. Connect the AC adapter or insert batteries. See Section 2.5.

2.5 Battery Installation

Use the following steps to install four AA batteries into the unit. Alkaline, manganese and nickel-metal hydride batteries can be used. Approximate battery life is 150 hours using alkaline batteries with the back-light and external output off.

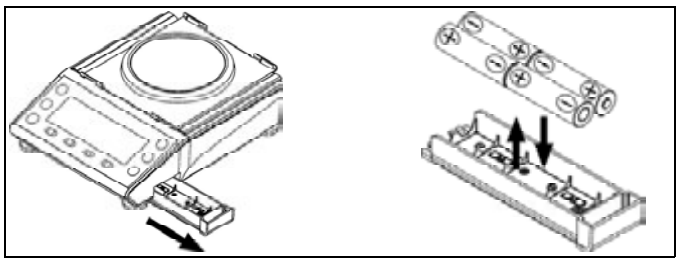


Figure 2-5. Install Batteries

1. Pull out the battery case.
2. Insert four AA batteries into battery case. Make sure to insert batteries with the positive and negative poles correctly inserted.

3. Insert battery case back into the unit until it clicks in place. When the balance is battery operated on of the icons display.

   Battery Icons:

   Full Charge

   Low Charge

   Replace Batteries

IMPORTANT *Observe the following statements when changes or replacing the batteries.*

**If the balance is not going to be used for long periods of time, remove the batteries.*

**Dispose of used batteries in accordance with state and local regulations.*

**Only use new batteries in the balance, never mix used and new batteries or different brands/manufacturers.*

2.6 Leveling the Balance

Use the following steps to level the balance.

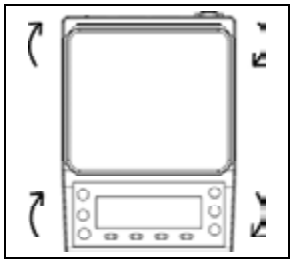


Figure 2-6. Unlock feet/adjusters

1. Turn the feet/adjusters as shown in Figure 2-6 to unlock them.

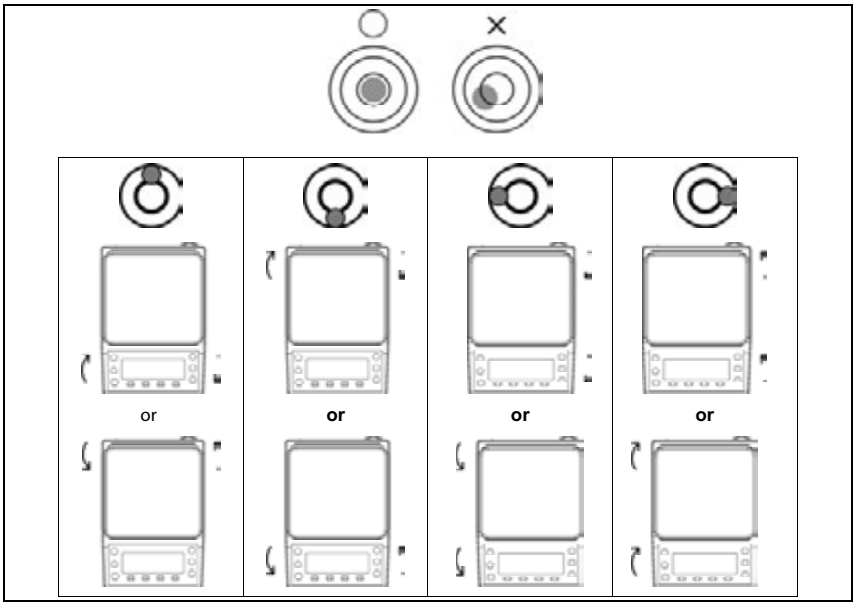


Figure 2-7. Level the Balance

2. Turn feet/adjusters until the bubble level is centered in the center circle. Figure 2-7 indicates directions to turn the feet/adjusters to move the bubble in the center.

2.7 Shield Assembly

The shield for the balance must be assembled using the following steps.

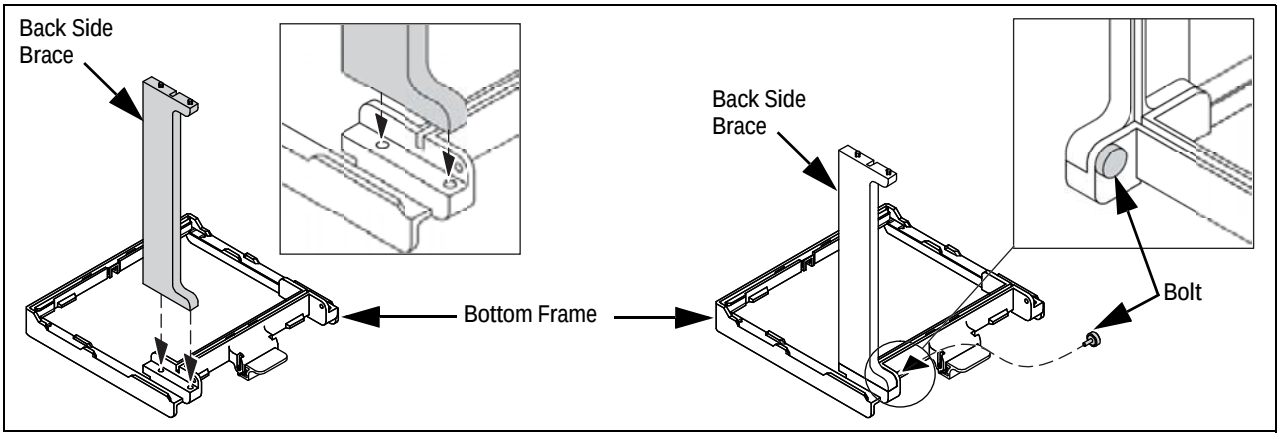


Figure 2-8. Install Rear Side Braces

1. Place the bottom frame on a flat level surface.
2. Insert one of the back side braces into the bottom frame as shown in Figure 2-8. Ensure the flat side is toward the outside.
3. Secure to the bottom frame with a bolt, included.
4. Repeat for the other side.

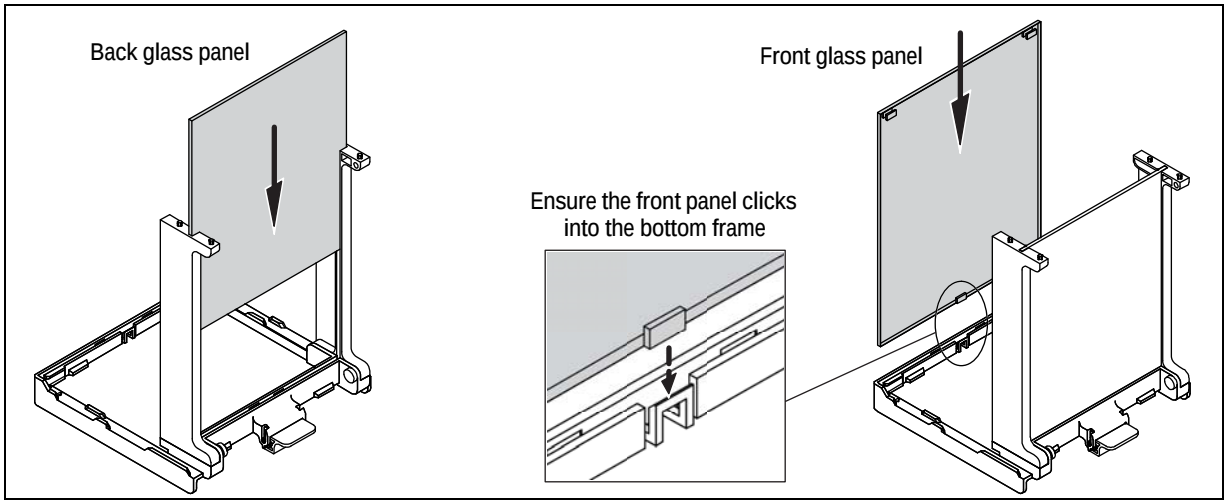


Figure 2-9. Insert Front and Back Panels

5. Insert the back glass panel into the slots of the back braces.
6. Insert the front glass panel into the bottom frame, ensuring it clicks into the frame as shown in Figure 2-9.

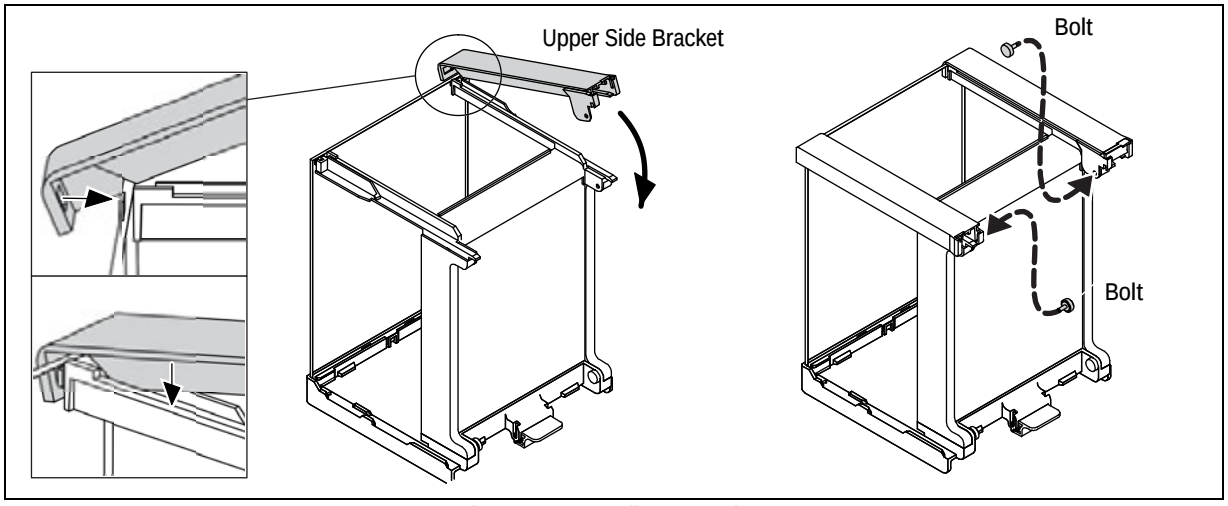


Figure 2-10. Install Top Brackets

7. Place the upper side brackets on the top of the assembly as shown in Figure 2-10.
8. Secure with bolts (included).

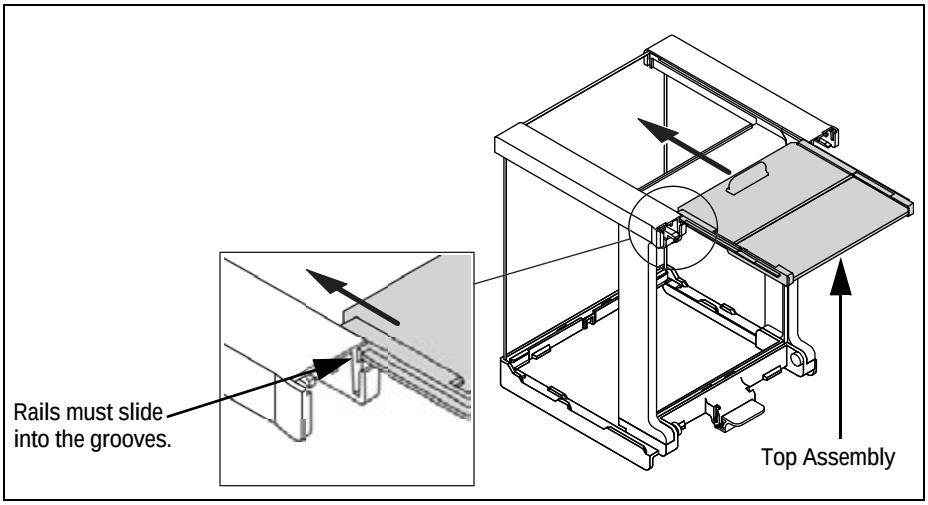


Figure 2-11. Install Top Panel

9. Slide the top glass assembly, with the handle towards the front, into the top brackets as shown in Figure 2-11. Ensure the side rails of the top assembly are in the grooves in the top brackets.

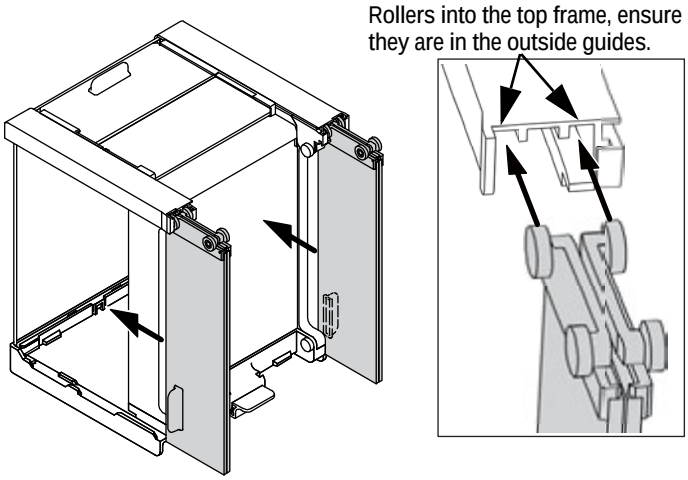


Figure 2-12. Insert Side Assemblies

10. Place the glass side panels together ensuring the rollers are on the outside. Use one panel with the handle and one without as a pair.
11. With the panel with the handle facing toward the outside and the panels held tightly together insert the rollers into the frame of the top assembly as shown in Figure 2-12.
12. Push the pair as far as they will go, there is a stop for the inside panel. Then push the outer panel to the front of the assembly.

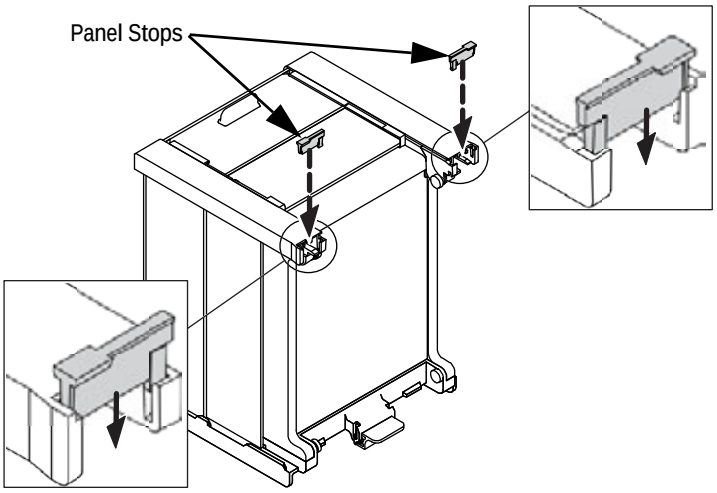


Figure 2-13. Insert Panel Stops

13. Insert the panel stops as shown in Figure 2-13. Orient them with the wider end on the stop to the outside.
14. Press them until they are seated completely in the top brackets.

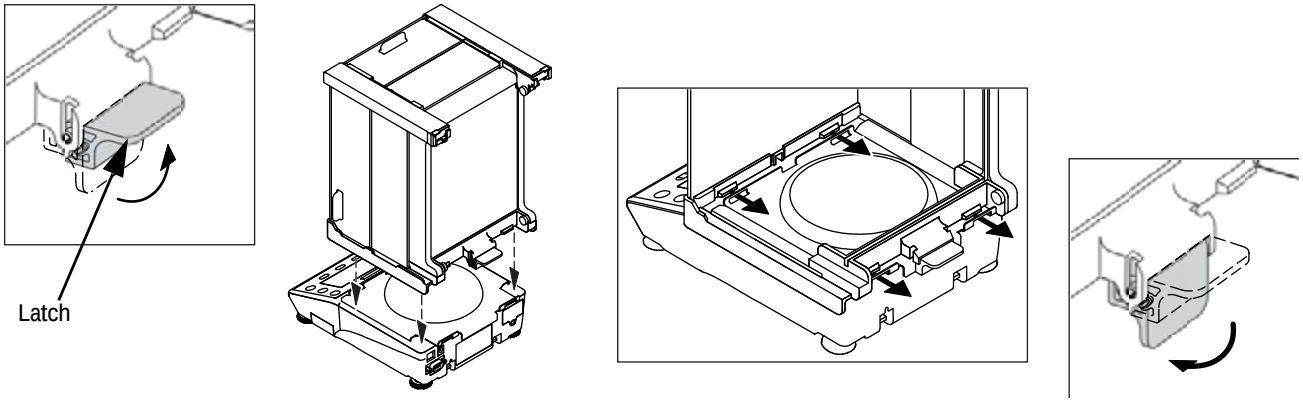


Figure 2-14. Install Shield on Balance

15. Ensure the latch on the back of the shield is in the up position.
16. Place the shield on the balance as shown in Figure 2-13.
17. Gently push it toward the back of the balance to seat it in the slots of the balance.
18. Rotate the Latch to the down position securing the shield to the balance.

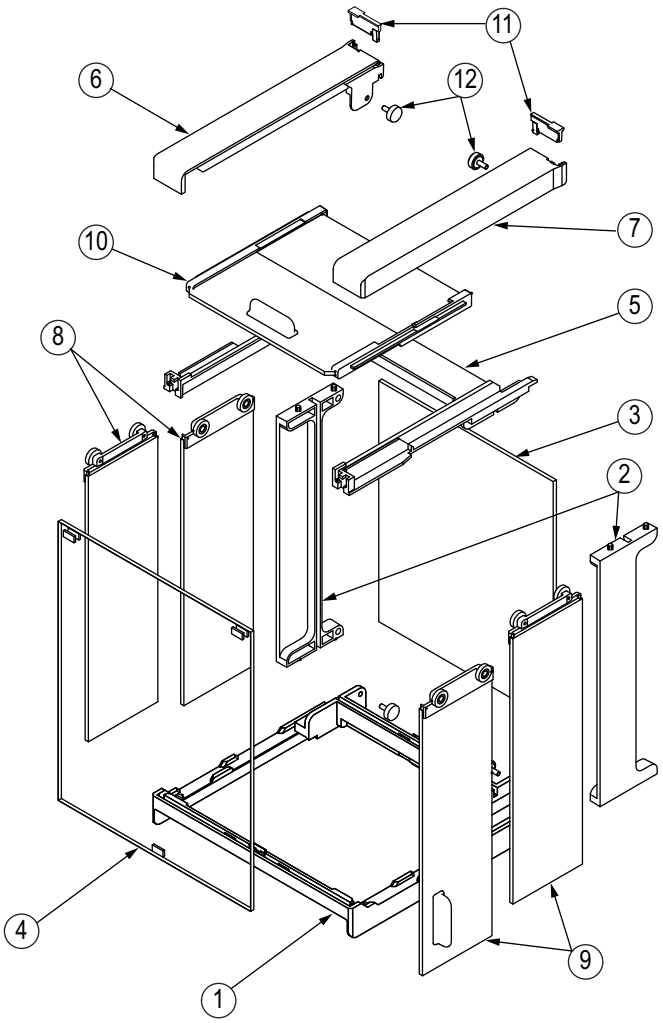


Figure 2-15. Shield Parts

Item No.	Description
1	Bottom Frame
2	Back Side Panels (Left and Right)
3	Level
4	Feet/Adjusters
5	Display
6	Battery case
7	AC adapter jack
8	USB connector (Type B)
9	RS-232C connector (D-sub 9 pin male)
10	Option slot
11	Adapter with attachments

Table 2-2. Shield Parts List

3.0 Operation

This section walks through using the eight modes of operation and the other functions used during the operation of the balance.

IMPORTANT

Always adjust the level of the balance before use.

Calibrate the balance when it is installed or relocated.

3.1 Precautions Related to a Specimen

Static Electricity

- synthetic resin- and glass-made specimens are easily charged electrically
- weighing electrically charged specimens makes the displayed value unstable, reducing the reproducibility of a test result
- Neutralize electrically charged specimens before measurement

Magnetism

- specimens affected by magnetism weigh differently depending on the position on the pan, reducing reproducibility
- eliminate the magnetism or place the specimens on a container/plate to protect the weighing mechanism

Moisture Absorption/Evaporation

- wet or volatile specimens can cause the displayed value to continuously fluctuate due to evaporation
- Put these specimens in a container with a tight fitting lid to prevent evaporation during the weighing process

Specimen Temperature

- difference in temperature between specimens and the windshield interior generates convection flow causing errors
- if specimen temperature is excessively high or low, allow its temperature to stabilize at room temperature prior to measuring
- ensure the windshield interior temperature is equal to room temperature prior to measuring
- body temperature of operator affects measurement results, handle specimens with tweezers and refrain from putting hands in the windshield during operation.

3.2 Display Navigation

Use the F-Keys to navigate through the menus and enter numerical values.

- F1 = ↑ increments numeric values. Scrolls through menus/selections
- F2 = ↓ decrements numeric value. Scrolls through menus/selections
- F3 = ← select digits and returns to previous level
- F4 = ↵ or → enters the value or a level

3.3 Power On/Off

When balance is plugged in ✱ displays.

Press On/Off. A self-check runs, then 000000 displays.

- Do not press any buttons during the self-check.
- The balance starts in the last operation mode set; Legal for Trade balances always open in weigh mode.

Press and hold On/Off to put the balance into standby mode. ✱ displays.

3.3.1 Standby

When in standby, ✱ displays.

- Press On/Off. A self-check runs and weigh mode displays.
- Do not press any buttons during the self-check.
- Press and hold On/Off to place the balance into standby during operation.
- The balance starts in the operation mode it was in before it went into standby.
- If using battery power, is ✱ not displayed in standby.

3.3.2 Balance Operation Check

Press on the weighing pan lightly to see if the weight display changes.

3.4 Zero-Point Adjustment

A zero-point adjustment cannot be performed if the weight is over the zero-point adjustment range.

Note *On Legal for Trade balances, this setting is read only, the wait time cannot be changed.*

Use the following steps to do a zero-point adjustment.

1. Ensure the weigh pan is empty.
2. Press Zero →0←. *000000* displays.

The stability wait time can be set in the Applications menu, see Section 4.2 on page 33.

3.4.1 Zero-Point Adjustment Limits

The *Zero Point* limit is the threshold at which the operator can press Zero →0← and have it zero. There is an upper and lower threshold, outside of that, the balance cannot be zeroed.

Model	Lower Limit (g)	Upper Limit (g)
TE623(R)	-9.300	9.300
TE1203(R)	-18.000	18.000
TE3202(R)	-48.00	48.00
TE6202(R)	-93.00	93.00
TE15001(R)	-225.00	225.00

Table 3-1. Zero-Point Adjustment Limits

3.5 Tare Value

To weigh using a container, the container weight should be subtracted from the total value. Then results displayed are the weight of the product only.

Note *A Tare Value is included in the total maximum capacity.*

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

1. Place the empty container on the balance. The weight of the container displays.
2. Press Tare →T←. *000000* and the *Net* icon display.
3. Place the product to be weighed in the container. The net weight displays.
4. Removing the product and container from the balance.
5. Press Zero →0← to remove the tare.

3.5.1 Preset Tare

When a tare weight is already known, the tare subtraction can be configured as a *Preset Tare* parameter. Five preset tare values can be stored. See Section 4.4.2 on page 42.

To use a preset tare:

1. Press Menu. 

displays.
2. Press F1 or F2 to scroll to *USER INFO*.
3. Press F4. *31 PT MODE* and the current setting displays.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired preset tare number (1-5).
6. Press F4 to save the setting.
7. Press Menu to return to operation display. *NET PT* display in the upper right.

To exit a preset tare:

1. Ensure there is no weight on the balance.
2. Press Zero. *ZERO* flashes and display returns to weigh mode. *NET PT* is no longer displayed.

3.5.2 Check Tare Weight Using an F-key

If an F-key has been set to Tare, it can be used to see what the tare weight is.

1. Set an F-key to Tare. See Section 4.7 on page 48.
2. With tare in place press F4 until *TARE* is displayed above an F-key.
3. Press the *TARE* F-key. The tare weight displays.
4. Press F4 to return to operation mode.

3.5.3 Add to Product

To weigh additional product without the value of the existing product, use the following steps.

1. Place first product to be weighed on the balance.
2. Push Tare. 000000 displays.
3. Add additional product to the balance/container. The weight of additional product only is displayed.

3.6 Weigh Mode

The weigh mode is the basic mode for weighing product. Place the product on the tray, the weight will display in the units set in configuration.

Each mode of operation has F-key commands available.

Figure 3-1. Weigh Mode F-Key Commands

F-Key Selections	Description
mg	Switches to weight display to milligrams
g	Switches to weight display to grams
TIME	Displays current Time
TARE	Displays current Tare
HIGH	Displays current High Limit
LOW	Displays current Low Limit
LOW	Displays onW or NUM. Select onW to display current limit low, press NUM to enter a new limit low.
OK	Displays onW or NUM. Select onW to display current limit OK, press NUM to enter a new limit OK.
HIGH	Displays onW or NUM. Select onW to display current limit high, press NUM to enter a new limit high.
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-2. Weigh Mode F-Key Commands

3.7 Counting Mode

Counting mode counts the number of items placed on the balance. There are two methods to input the unit weight.

- Actual Value Setting Method – place the specified number of samples on the balance to record the average unit weight.
- Numeric Value Setting Method – input numeric value of the unit weight by key operation.

Figure 3-2. Counting Mode F-key Commands

F-Key Selections	Description
RMEM	Change the unit weight
PCSW	Unit Weight
g/P	Weight of samples/number of samples flash on display
ADD	Execute addition
TOTL	Total value
LOW	Displays onW or NUM. Select onW to display current limit low, press NUM to enter a new limit low.
OK	Displays onW or NUM. Select onW to display current limit OK, press NUM to enter a new limit OK.
HIGH	Displays onW or NUM. Select onW to display current limit high, press NUM to enter a new limit high.
WEIG	Press to display weigh mode

Table 3-3. Counting Mode F-key Commands

F-Key Selections	Description
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-3. Counting Mode F-key Commands (Continued)

3.7.1 Actual Value Setting – No Change

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

Press F3 or F4 to select No (change) or Yes (don't change). When there is no data recorded, this step is not available.

For *YES* (No Change):

1. Press F4 (*YES*).
2. Press F4 to scroll through the F-key commands until *OK* is displayed.
3. Press the *OK* F-key.
4. Place a container on the weigh pan and push Tare if needed. The zero-point adjustment or tare is set.
5. Add product for counting.

For *NO* (Change):

1. Press F3 (*NO*).Press F1 or F2 to scroll through selections.
   •ON 5: 5 PCS •ON 10: 10 PCS •ON 30: 30 PCS •ON 50: 50 PCS •ON 100: 100 PCS
   •ON VAR: 1-999 PCS •PCSWGT: Unit weight value input
2. With the desired selection displayed, press F4.
3. Place a container on the weigh pan and push Tare. The zero-point adjustment or tare is set.
4. Add product for total count.

3.7.2 Numeric Value Setting Method

Use the key operation to input a numeric value.

1. Press F3 or F4 to select whether or not to use the previous data.
   When there is no data record, this step is skipped.
2. Press F1 or F2 to scroll through the F-key commands until *OK* is displayed. When *OK* is selected, skip to Step 5.
3. Select the unit weight value input mode by pressing F1 or F2 to PSCWGT.
4. Use F1 or F2 to enter the weight/number of the product.
5. Press F4 to fix and the unit weight is recorded.
6. Place a container (tare) on the weighing pan and press Tare.
7. Place samples on the weighing pan and the count result is displayed.

3.8 Percentage Mode

The weight of a product to be weighed is shown in a percent relative to the reference weight.

There are two methods to enter the reference weight:

- Actual Value Setting Method [onW] – where placing the reference weight on the balance is done to record the weight.
- Numeric Value Setting Method [NUM] – inputing the numeric value of the reference weight is done by a key operation.

Figure 3-3. Percentage Mode F-Keys

F-Key Selections	Description
REF	Display reference value
TOUT	Tare value output
B/G	Gross
ADD	Executes addition
TOTAL	Total value
LOW	Displays onW or NUM. Select onW to display current limit low, press NUM to enter a new limit low.
OK	Displays onW or NUM. Select onW to display current limit OK, press NUM to enter a new limit OK.
HIGH	Displays onW or NUM. Select onW to display current limit high, press NUM to enter a new limit high.
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-4. Percentage Mode F-Keys Descriptions

Note *ADD and TOTL can be used when 14 ADDITION is set to Valid. See* Section 4.2 on page 33.

1. Press Menu, then press F4 to view the current operation mode.
2. If needed, press F4 and use F1 or F2 to scroll to *PCNT*.
3. Press F4, then press Menu to return to operation mode.
4. To use the previous data, press F4 (*YES*). Skip to Step 6. (when there is no data record, this step is skipped)
   or
   To set the percent, press F3 (*NO*).
5. Press F3 or F4 to set one of the following:
   - Actual value (*onW)* – placing the reference weight on the balance and press F4 (*OK*)
   - Numeric value (*NUM*) – use F1 or F2 to enter the reference weight and press F4 (*OK*)
6. Weigh the product, the ratio of the weight of the product to the reference weight is displayed in percent.

3.9 Coefficient Mode

Measured weight is multiplied by the preset coefficient. This mode is not available in Legal for Trade units.

Figure 3-4. Coefficient Mode F-Keys

F-Key Selections	Description
CSET	Set the Coefficient value • NO – allows the change of the current coefficient • YES – accept the currently set coefficient
F/*	Toggles between MUL and g
ADD	Executes addition
TOTAL	Displays total value
LOW	Displays onW or NUM. Select onW to display current limit low, press NUM to enter a new limit low.
OK	Displays onW or NUM. Select onW to display current limit OK, press NUM to enter a new limit OK.
HIGH	Displays onW or NUM. Select onW to display current limit high, press NUM to enter a new limit high.
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-5. Coefficient Mode F-Key Descriptions

Note *ADD and TOTL can be used when 14 ADDITION is set to valid. See* Section 4.2 on page 33.

1. Press Menu, then press F4. The current operation mode displays.
2. If needed, press F4. The currently displayed mode flashes.
3. Use F1 or F2 to scroll to *MULT*.
4. Press F4, then press Menu to return to operation mode.
5. To use the existing coefficient value, press F4 (*YES*). When there is no data record, this step is skipped.
   or
   Press F3 (*NO*) to set the coefficient value. See Section 3.2 on page 14.
6. Weigh the product, the weight is multiplied by the coefficient and the result displays.

The Coefficient can be changed at anytime using the *CSET* F-key.

3.10 Specific Gravity Mode

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

3.10.1 Menus Available in Operation Mode

Use F-keys to select and scroll through menu items.

Figure 3-5. Specific Gravity Mode F-Keys

F-Key Selections	Descriptions
RSET	Select the liquid • OTHER – any liquid other than water • H2O – using water
WAIR	Weight in air displays
WLIQ	Weight in liquid displays
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-6. Specific Gravity Mode F-Keys Descriptions

3.10.2 Materials Required in Specific Gravity Mode

Materials needed to measure a specific gravity include:

- water tank
- hanging string or wire
- basket for placing the sample
- thermometer

3.10.3 Prepare Equipment to Measure Specific Gravity

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

3.10.4 Measure the Specific Gravity Mode

1. Press Menu, then press F4. The current operation mode displays.
2. If needed, press F4. The currently displayed mode flashes.
3. Use F1 or F2 to scroll to *SPGR*.
4. Press F4, then press Menu to return to operation mode.

5. Select the reference liquid by pressing F3 or F4;
   - OTHER – liquid other than water
   - H20 – water
6. Enter the specific gravity of the reference liquid and press F4 to save.
7. Set the net/basket on the balance and press Tare.
8. Add material/liquid to the net/basket to measure the weight
9. Press F4 to save.
10. Remove the material/liquid on the net/basket and press Tare.
11. Lower the net/basket into the liquid.
12. Press Tare to compensate the buoyancy acting on the net/basket.
13. Put the material/liquid on the basket into the liquid and press F4 to save. The specific gravity of the specimen is automatically calculated and displayed.

3.11 Statistics Mode

The statistical operation function collects weight data and indicates maximum, average, and other statistical values. Not available in Legal for Trade balances.

- Only mg or g can be used.
- Each calculation result, except CV, follows the smallest readability used to record the weighing data.
- Up to 999 weight data can be saved.

3.11.1 Menus Available in Operation Mode

Use F-keys to select and scroll through menu items.

Figure 3-6. Statistics Mode F-Keys

F-Key Selections	Description
POUT	Print
DATA	Display data menu options
DEL	Delete data • ALL – deletes all store date for Statistics Mode • LAST – deletes only last data saved • RET - Return to operation mode
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-7. Statistics Mode F-Keys Descriptions

1. Press Menu, then press F4. The current operation mode displays.

2. If needed, press F4. The currently displayed mode flashes.
3. Use F1 or F2 to scroll to *STAT*.
4. Press F4, then press Menu to return to operation mode.
5. Choose to clear all of the data by pressing F3 (*YES*) or to retain the data by pressing F4 (*NO*) .
6. Place product on the weighing pan and press Output to store the weight.
7. Remove the specimen.
8. To collect and store more weighing data, repeat Step 6-7 until the required number of data items are collected.
9. To display the statistical operation results, press F2 (*DATA*). The statistical operation data menu displays.
10. Press F1 or F2 to toggle through the menu items available. Press F4 (*RET*) when ready to continue.

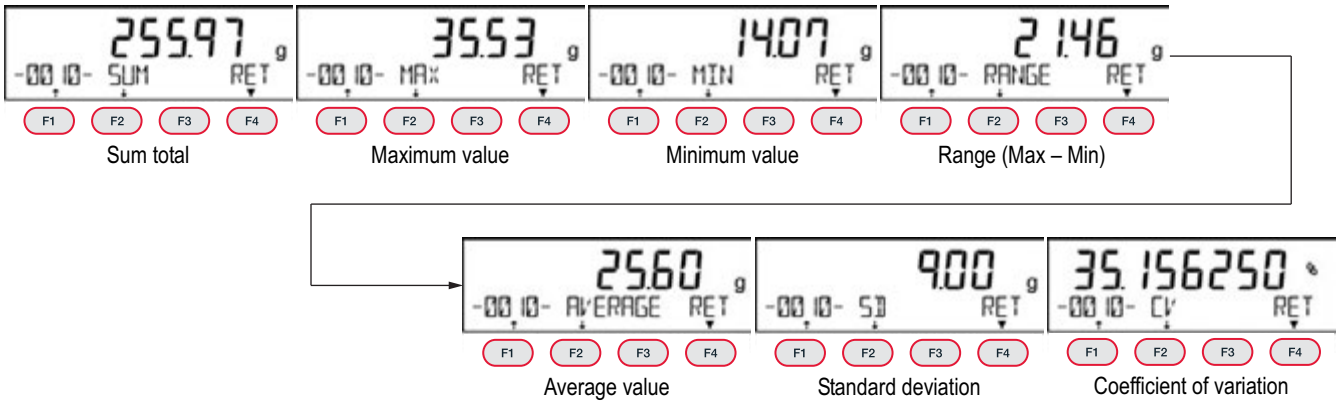


Figure 3-7. Statistics Mode – Data Menus

3.12 Animal Mode

The balance can accurately weigh animals and products that can move during measurement. Even when animals and other samples move during measurement, when weight variations fit within the set value range, the weight is held and displays. This mode is not available for Legal for Trade balances.

Figure 3-8. Animal Mode F-Keys

F-Key Selections	Description
FAST	Used for animals that continue to move quickly while on the balance
MID	Used for animals that continue some movements while on the balance
SLOW	Used for animals that are calm while on the balance
HOLD	Manually press to hold the weight
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-8. Animal Mode F-Keys Descrptions

When the external output is activated, the output condition is fixed as following:

- Output once after the indication is held except when the *HOLD* is pushed (step ???).
- Output once after Output is pressed during the indication is held.

1. Press Menu, then press F4. The current operation mode displays.
2. If needed, press F4. The currently displayed mode flashes.
3. Use F1 or F2 to scroll to *STAT*.
4. Press F4, then press Menu to return to operation mode.
5. Select the activity level by pressing F1 (*FAST*), F2 (*MID*) or F3 (*SLOW*).
6. Place the animal on the weighing pan. After the weight stabilizes within the set range the weight and *HLD* displays.
7. Remove the animal and the tare is automatically subtracted.

3.12.1 Weigh Animal Using Manual Hold

1. Press F4 to display the *HOLD* menu.
2. Place the animal on the balance.
3. Press F1 to hold the weight reading at the time *HOLD* was pressed. The weight and *HLD* displays.
4. Remove the animal and the tare is automatically subtracted.

3.13 Formulation Mode

Formulation mode stores and refers the weight of each component compounded. This mode is not available for Legal for Trade balances.

- Only mg or g can be used
- Up to 30 components can be stored
- Preset tare function cannot be used

The output timing is set to once at stable or once immediately after Output is pressed, regardless of the setting value of External input/output function in the Condition Menu.

Settings:

- ON – Once at stable after [Output] key is pushed
- OFF – Once immediately after [Output] key is pushed

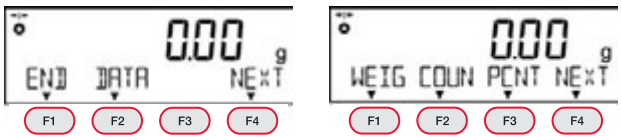


Figure 3-9. Formulation Mode F-Keys

F-Key Selections	Description
END	
DATA	Display data menu options
WEIG	Press to display weigh mode
COUN	Press to display count mode
PCNT	Press to display percent mode
NEXT	Press to move between menu selections

Table 3-9. Formulation Mode F-Keys Description

1. Press Menu, then press F4. The current operation mode displays.
2. If needed, press F4. The currently displayed mode flashes.
3. Use F1 or F2 to scroll to *FORM*.
4. Press F4, then press Menu to return to operation mode. *MEM CLEAR YES NO* displays.
5. Choose to clear the memory data by pressing F3 (*YES*) or save it by pressing F4 (*NO*).
6. Place the weighing container on the balance and press Tare to store the tare weight.
7. Put a specimen on the container and press Output to store the sample. Now Sampling flashing, then Tare followed by Net IMPORTED and the number of specimens.
8. Repeat steps 6-7 for all samples to be compounded.

Clear Data from Operation Mode

To end the formulation process and remove the stored data:

1. Press F1 to end the formulation. *MEM CLEAR YES NO* displays.
2. Press F3 (*YES*) to clear all data.

3.13.1 Data Review

1. To review the data, press F2.
2. Press F1 or F2 to scroll the data for listed formula.
   - Net – net weight for listed formula
   - Tare – tare for listed formula
   - Net Total – total net weight of all net weights
   - Tare Total – total tare weight of all net weights
3. Press F3 to change the formula.
4. Press F4 to return to operation mode.

3.14 Unit setting

There are many units types available. In Legal for Trade balances, only *g* and *ct* are available. See Section 4.2.2 on page 35 for more information and a complete list of available units.

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *UNIT*.
4. Press F4 to change the display unit.
5. Press F1 or F2 to scroll to the desired unit. See Table 4-2 on page 35.

6. Press F4 to save the operation mode.
7. Press Menu to return to operation display.

3.15 Comparator Function

The comparator Function is used to preset threshold values (limits) and determine if a measured value is within the preset range. This function can be used in Weigh mode, Percentage mode, Counting mode and Multiplied by Coefficient mode.

How to Perform Discrimination

Set the lower and the upper limits and whether the weight of a specimen to be weighed is *LOW* (lower than the lower limit), *OK* (appropriate) or *HIGH* (higher than the upper limit).

For setup information, refer to Section 4.2.3 on page 36.

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

Table 3-10. Messages

The discrimination is performed according to the following criteria:

Absolute value: The discrimination is performed based on the upper and lower limit values that have been set in advance.

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

Example:

- *Two-point (upper and lower limits) setting*
- *Reference value = 1000.00g*
- *Lower limit value = 900.00 g, Upper limit value = 1200.00 g*

Discrimination Method	Reference Value	Lower Limit Value	Upper Limit Value
	1000.00 g	900.00 g	1200.00 g
Absolute value		900.00 g	1200.00 g
Relative value	1000.00 g	-100.00 g	200.00 g

Table 3-11. Example

3.16 Addition Function

The Adding function is used to weigh several specimens in sequence and indicate the total value. The adding function can be used in Weighing mode, Percentage mode, Counting mode and Multiplied by Coefficient mode.

The adding function includes two ways of calculating method.

- Addition accumulating: specimens are weighed, removed and new specimens weighed
- Net adding function: specimens are weighed, then more specimens added without removing previous

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *ADDITION*.
4. Press F4 to enter the menu. *ACTIVATE* displays with current setting.
5. Press F4. The current setting begins to flash.

6. Press F1 or F2 to select desired setting.
7. Press F4 to save the setting.
8. Press F1 or F2 to scroll to *OPERATION*.
9. Press F4. The current setting begins to flash.
10. Press F1 or F2 to select desired setting.
11. Press F4 to save the setting.
12. Press F1 or F2 to scroll to *DIRECTION*.
13. Press F4. The current setting begins to flash.
14. Press F1 or F2 to select desired setting.
15. Press F4 to save the setting.
16. Press Menu to return to operation display.

3.16.1 Plus Side Addition

Set ADD to F1 and TOTL to F2 for this function. See Section 4.7.2 on page 49.

1. Place a specimen to be weighed on the balance. Wait for ✱ to display.
2. Press F1. The weighed value is stored and *SUM TOTAL* displays momentarily.

For Addition Accumulating

1. Remove the first specimen and wait for 0.00 to display.
2. Place the next specimen on the balance. Wait for ✱ to display.
3. Press F1. The weighed value is stored and *SUM TOTAL* displays momentarily.
4. Repeat this procedure until all additions have been completed.

For Net Addition

1. Perform steps 1-2 under Section 3.16.1.
2. Without removing the previous specimen, add the next specimen to be weighed.
3. Once ✱ displays, press F1. *SUM TOTAL* displays momentarily.
4. The weight is displayed, followed by an automatic tare. Repeat this procedure until all additions have been completed.

3.16.2 Weighing with Minus Side Addition

Set ADD to F1 and TOTL to F2 for this function. See Section 4.7.2 on page 49.

1. Place a first specimen to be weighed. ✱ displays.
2. Press Tare. 0.00 displays.

For Addition Accumulating

1. Perform steps 1-2 under Section 3.16.1.

2. Remove the specimen. ✱ displays.
3. Press F1. The weighed value is stored and *SUM TOTAL* displays momentarily.
4. Repeat this procedure until all additions have been completed.

For Net Addition

1. Perform steps 1-2 under Section 3.16.1.
2. Add a specimen to be weighed.
3. Once ✱ displays, press F1. *SUM TOTAL* displays momentarily.
4. The weight is displayed, followed by an automatic tare. Repeat this procedure until all additions have been completed.

3.16.3 View/Delete Total Value

Press F2. The total value displays.

Press F3. The total value is deleted.

3.17 Tare-Subtraction Reminder Function

If the Tare-subtraction Reminder is activated, *PUSH TARE* displays when a container placed on the balance.

If the Zero-point-adjustment Reminder is activated at the same time, it has priority.

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

- *T Reminder 1* indicates the weigh display is over the zero-point-adjustment range.
- *T Reminder 2* indicates the weigh display is over the zero-point-adjustment range before tare subtraction, and the net display is negative after tare subtraction

3.17.1 Set Tare-subtraction Reminder Function

1. Press Menu. Func APPLICATIONS displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *T REMINDER*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired setting.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

3.18 Zero-Point-Adjustment Reminder Function

If the Zero-Point-adjustment Reminder is activated, *PUSH ZERO* is displayed if the load returns to within the zero point adjustment range after the load was over the range.

Place the specimens on the weighing pan. When they are removed, PUSH ZERO displays. Press Zero →0← and 0.00 displays

3.18.1 Set Zero-Point-Adjustment Reminder Function

1. Press Menu. Func APPLICATIONS displays.

2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *Z REMINDER*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired setting.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

3.19 Stabilization Wait Function

The Stabilization Wait Function indicates when the weighed value displays after a zero-point adjustment or tare, either after or before the weighed value stabilizes.

- OFF: function is not available
- ON: balance always waits for stabilization before displaying weighed value after the zero-point adjustment or tare

3.19.1 Set Stabilization Wait Function

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *WT STABLE*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired setting.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

3.20 Bar Graph Display

The bar graph is displayed above the weight display when set to on.

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *BARGRAPH*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select *ON* or *OFF*.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

3.21 Back Light Display

The back light can be set to *3MIN*, *5MIN*, *10MIN*, *30MIN*, *ON* or *OFF*. The back light will be on for the set number of minutes or always on if *ON* is selected. If *OFF* is selected, there is no back light.

This function does not work under if:

- a menu is displayed
- a specimen is placed on the weighing pan and the display is not stable

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *BACKLIGHT*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired time.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

3.22 Auto Off Function

The Auto Off function is used to set an amount of time for the balance to remain on with no activity. Once the set time is reached the balance will automatically turn off. It can be set to *3MIN*, *5MIN*, *10MIN*, *30MIN* or *OFF*. If set to *OFF*, the balance remains on indefinitely.

This function does not work under if:

- a menu is displayed
- a specimen is on the weigh pan and the display is not stable

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *BACKLIGHT*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired time.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

3.23 Simple Self Counting System (SCS) method

1. Put a set number of samples in place.
2. Put up to two times the set number of additional samples in place. The balance will automatically update the average sample weight.
3. Repeating this allows accurate counting.

3.23.1 Set SCS Method

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *SIMPLE SCS*.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select ON or OFF
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

4.0 Configuration

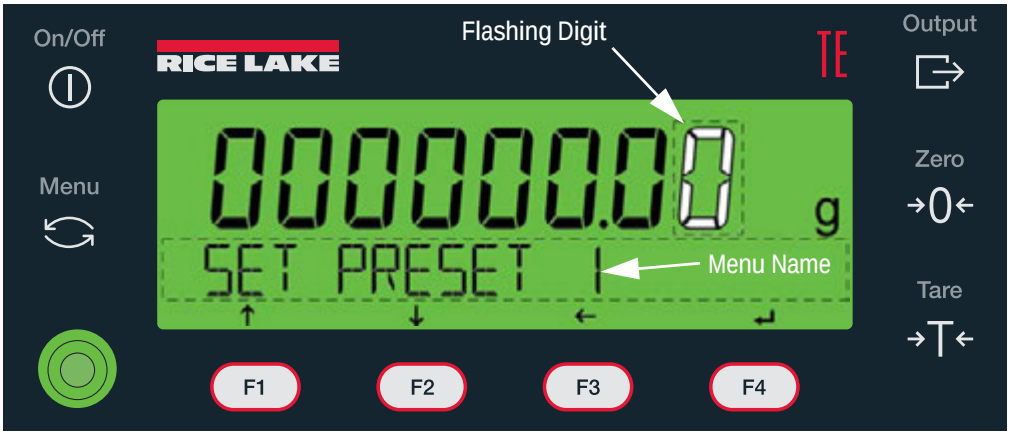


Figure 4-1. Navigation for Configuration

Use the keys to navigate through the menus and settings.

- Menu enter menu, cancels an input value, returns to previous menu, returns to weigh mode
- Tare input a decimal point in *Multiplied by Coefficient* mode
- On/Off use for changing polarity
- F1 = ↑ increments numeric values. Scrolls through menus/selections
- F2 = ↓ decrements numeric value. Scrolls through menus/selections
- F3 = ← select digits and returns to previous level
- F4 = ↵ or → enters the value or a level

4.1 General Navigation

1. Press Menu to enter menu structure.
2. Press F1 or F2 to scroll through the main menus.
3. Press F4 to enter a displayed menu.
4. Press F1 or F2 to scroll through settings.
5. Press F4 to enter the displayed setting. The current selection will flash.
6. Press F1 or F2 to scroll through selections.
7. Press F4 to select the displayed selection, it stops flashing.
8. Press F3 to return to main menu.
9. Press Menu to return to weigh mode.

Note *Press* Menu *at anytime to cancel and return to the operation mode.*

4.2 Application Menu

The Application menu is used to set operational parameters.

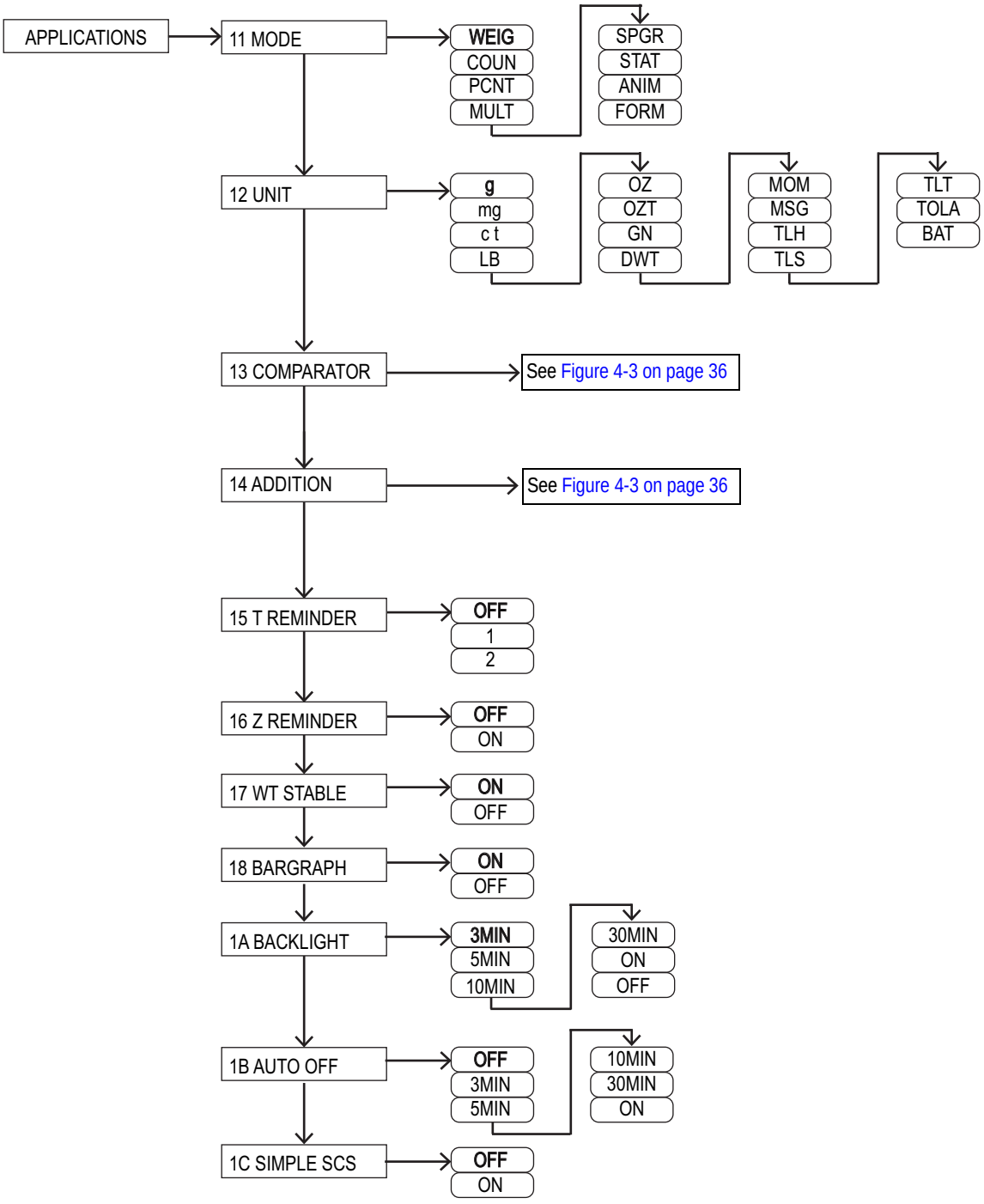


Figure 4-2. 1-Applications Menu Layout

Menu	Parameters	Description
11 MODE	Select operation mode, see Section 4.2.1 on page 34	
	WEIG	Weigh Mode
	COUN	Counting Mode
	PCNT	Percentage Mode
	MULT	Multiplied by a Coefficient
	SPGR	Specific Gravity Mode
	STAT	Statistics Mode
	ANIM	Animal Weighing Mode
	FORM	Formulation Mode
12 UNIT	Set the unit for weight, see Section 4.2.2 on page 35	
	g	Gram
	c t	Carat
	LB	Pound
	OZ	Ounce
	OZT	Troy Ounce
	GN	Grain
	DWT	Penny Weight
	MOM	Momme
	MSG	Mesghal
	TLH	Tael (Hong Kong)
	TLS	Tael (Singapore, Malaysia)
	TLT	Tael (Taiwan)
	TOLA	Tola
	BAT	Baht
	mg	Milligram
13 COMPARA-TOR	Comparator Function; see Figure 4-3 on page 36	
14 ADDITION	Adding Function; see Section 4.2.4 on page 37	
15 T REMINDER	Tare on Reminder	
	OFF	Disabled
	1	Activate the MODE 1
	2	Activate the MODE 2
16 Z REMINDER	Zero on Reminder	
	OFF	Disabled
	ON	Enabled
17 WT STABLE	Stability Waiting	
	ON	Enabled
	OFF	Disabled
18 BARGRAPH	Bar Graph Indication	
	ON	Enabled
	OFF	Disabled
1A BACKLIGHT	Back Light timer, time the backlight remains on	
	3MIN	3 minutes
	5MIN	5 minutes
	10MIN	10 minutes
	30MIN	30 minutes
	ON	Always on
	OFF	Disabled
1A AUTO OFF	Auto Power Off, time the balance is inactive before it powers off	
	OFF	Disabled
	3MIN	3 minutes
	5MIN	5 minutes
	10MIN	10 minutes
	30MIN	30 minutes
1C SIMPLE SCS	Simplified SCS	
	OFF	Disabled
	ON	Enabled

Table 4-1. Applications Menu Parameters

4.2.1 Operation Modes

Set the balance to desired operation mode.

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F4 to change the mode if needed.
4. Press F1 or F2 to scroll to the desired mode of operation.
5. Press F4 to save the operation mode.
6. Press Menu to return to operation display.

4.2.2 Units

Use Table 4-2 when setting the display units. Not all units are available in Legal for Trade balances.

Display	Unit	Conversion coefficient	Model Weighing Capacity and Readability by Unit				
			TE623 (R)	TE1203 (R)	TE3202(R)	TE6202(R)	TE15001(R)
g	gram	1.00000000E+00	620 0.001	1200 0.001	3200 0.01	6200 0.01	15000 0.1
ct	carat	5.00000000E+00	3100 0.01	6000 0.01	16000 0.1	31000 0.1	75000 1
LB	pound	2.20462260E-03	1.3 0.00001	2.6 0.00001	7 0.0001	13 0.0001	33 0.001
OZ	ounce	3.52739610E-02	21 0.0001	42 0.0001	110 0.001	210 0.001	520 0.01
OZT	troy ounce	3.21507460E-02	19 0.0001	38 0.0001	100 0.001	190 0.001	480 0.01
GN	grain	1.54323580E+01	9500 0.1	18000 0.1	49000 1	95000 1	230000 10
DWT	penny weight	6.43014930E-01	390 0.001	770 0.001	2000 0.01	3900 0.01	9600 0.1
MOM	momme	2.66666670E-01	160 0.001	320 0.001	850 0.01	1600 0.01	4000 0.1
MSG	mesghal	2.16999761E-01	130 0.001	260 0.001	690 0.01	1300 0.01	3200 0.1
TLH	Hong Kong tael	2.67172510E-02	16 0.0001	32 0.0001	85 0.001	160 0.001	400 0.01
TLS	Singapore, Malaysia tael	2.64554710E-02	16 0.0001	31 0.0001	84 0.001	160 0.001	390 0.01
TLT	Taiwan tael	2.66666670E-02	16 0.0001	32 0.0001	85 0.001	160 0.001	400 0.01
TOLA	tola	8.57353240E-02	53 0.0001	100 0.0001	270 0.001	530 0.001	1200 0.01
BAT	baht	6.59630607E-02	40 0.0001	79 0.0001	210 0.001	400 0.001	980 0.01
mg	milligram	1.00000000E+03	620000 1	1200000 1	3200000 10	6200000 10	15000000 100

Table 4-2. Unit Conversion Weighing Capacity and Readability

To set the desired unit displayed:

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *UNIT*.
4. Press F4 to change the display unit.
5. Press F1 or F2 to scroll to the desired unit.
6. Press F4 to save the operation mode.
7. Press Menu to return to operation display.

4.2.3 Comparator Menu

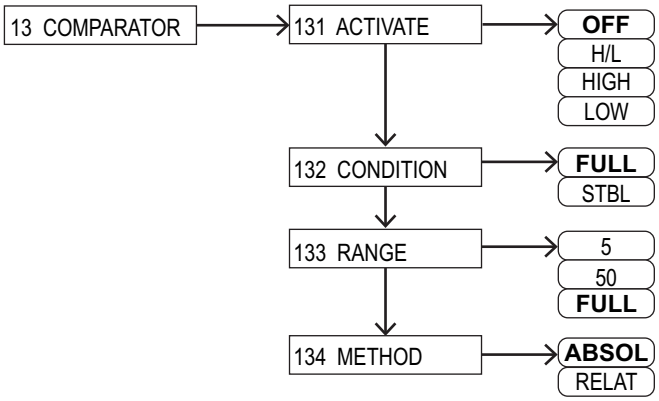


Figure 4-3. Applications Comparator Menu Layout

Menu	Parameters	Description
131 ACTIVATE	Activates the comparator function	
	OFF	Disabled
	H/L	Valid upper and lower limits
	HIGH	Valid upper limit
	LOW	Valid lower limit
132 CONDITION	Discriminant condition	
	FULL	Always
	STBL	Only at stable times
133 RANGE	Discriminant range	
	5	+5 (e/d) or more
	50	+50 (e/d) or more
	FULL	Entire area
134 METHOD	Discriminant method	
	ABSOL	Absolute value method
	RELAT	Relative value method

Table 4-3. Applications Comparator Parameters

See Section 3.15 on page 26 for user information.

1. Press Menu. Func APPLICATIONS displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *COMPARATOR*.
4. Press F4 to enter the menu. *ACTIVATE* displays with current setting.
5. Press F4. The current setting begins to flash.
6. Press F1 or F2 to select desired setting (*OFF*, *H/L*, *HIGH* or *LOW*).
7. Press F4 to save the setting.
8. Press F1 or F2 to scroll to *CONDITION*.
9. Press F4. The current setting begins to flash.

10. Press F1 or F2 to select desired setting.
11. Press F4 to save the setting.
12. Press F1 or F2 to scroll to *RANGE*.
13. Press F4. The current setting begins to flash.
14. Press F1 or F2 to select desired setting.
15. Press F4 to save the setting.
16. Press F1 or F2 to scroll to *METHOD*.
17. Press F4. The current setting begins to flash.
18. Press F1 or F2 to select desired setting.
19. Press F4 to save the setting.
20. Press Menu to return to operation display.

4.2.4 Addition

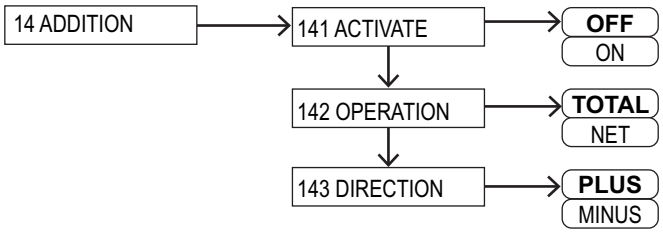


Figure 4-4. Applications Addition Menu Layout

Menu	Parameters	Description
131 ACTIVATE	Activates the addition function	
	OFF	Disabled
	ON	Enabled
132 OPERATION	Adding operation	
	TOTAL	Addition accumulated
	NET	Net addition
133 DIRECTION	Adding direction	
	PLUS	Plus side addition
	MINUS	Minus side addition

Table 4-4. Applications Addition Parameters

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *ADDITION*.
4. Press F4 to enter the menu. *ACTIVATE* displays with current setting.

5. Press F4. The current setting begins to flash.
6. Press F1 or F2 to select desired setting.
7. Press F4 to save the setting.
8. Press F1 or F2 to scroll to *OPERATION*.
9. Press F4. The current setting begins to flash.
10. Press F1 or F2 to select desired setting.
11. Press F4 to save the setting.
12. Press F1 or F2 to scroll to *DIRECTION*.
13. Press F4. The current setting begins to flash.
14. Press F1 or F2 to select desired setting.
15. Press F4 to save the setting.
16. Press Menu to return to operation display.

4.3 Performance Menu

Set the balance display stability, response and Zero Track speed.

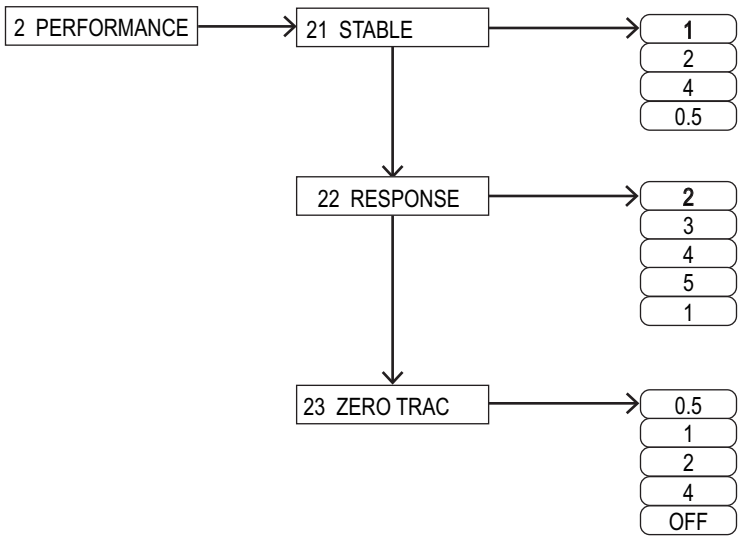


Figure 4-5. Performance Menu Layout

Menu	Parameters	Description
21 STABLE	Stability discrimination width	
	1	1d
	2	2d
	4	4d
	0.5	0.5d
22 RespOnse	Response speed	
	1	Fast
	2	Medium fast
	3	Medium
	4	Medium slow
	5	Slow
23 ZERO TRAC	Zero Tracking	
	0.5	0.5d
	1	1d
	2	2d
	4	4d
	OFF	Invalid

Table 4-5. Performance Menu Parameters

4.3.1 Stability

When the larger numeric value is set in this setting menu, the laxer stability judgment is applied and the balance displays O in more unstable conditions.

Note *Selections 2 and 4 cannot be selected in Legal for Trade balances.*

1. Press Menu. 

displays.
2. Press F1 or F2 to scroll to *PERFORMANCE*.
3. Press F4. *21 STABLE* and the current setting displays.
4. Press F4. The current setting begins to flash.
5. Press F1 or F2 to select desired setting.
6. Press F4 to save the setting.
7. Press Menu to return to operation display.

4.3.2 Response Speed

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

1. Press Menu. 

displays.
2. Press F1 or F2 to scroll to *PERFORMANCE*.
3. Press F4. *21 STABLE* and the current setting displays.
4. Press F1 or F2 to scroll to *22 RESPONSE*.

5. Press F4. The current setting begins to flash.
6. Press F1 or F2 to select desired setting.
7. Press F4 to save the setting.
8. Press Menu to return to operation display.

4.3.3 Zero Tracking

The zero tracking function makes it possible to automatically correct the zero-point fluctuation when 0 is displayed, through which the 0 display is maintained.

Note *Selections 1, 2 and 4 cannot be selected in Legal for Trade balances.*

1. Press Menu. 

displays.
2. Press F1 or F2 to scroll to *PERFORMANCE*.
3. Press F4. *21 STABLE* and the current setting displays.
4. Press F1 or F2 to scroll to *23 ZERO TRAC*.
5. Press F4. The current setting begins to flash.
6. Press F1 or F2 to select desired setting.
7. Press F4 to save the setting.
8. Press Menu to return to operation display.

4.4 User information

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

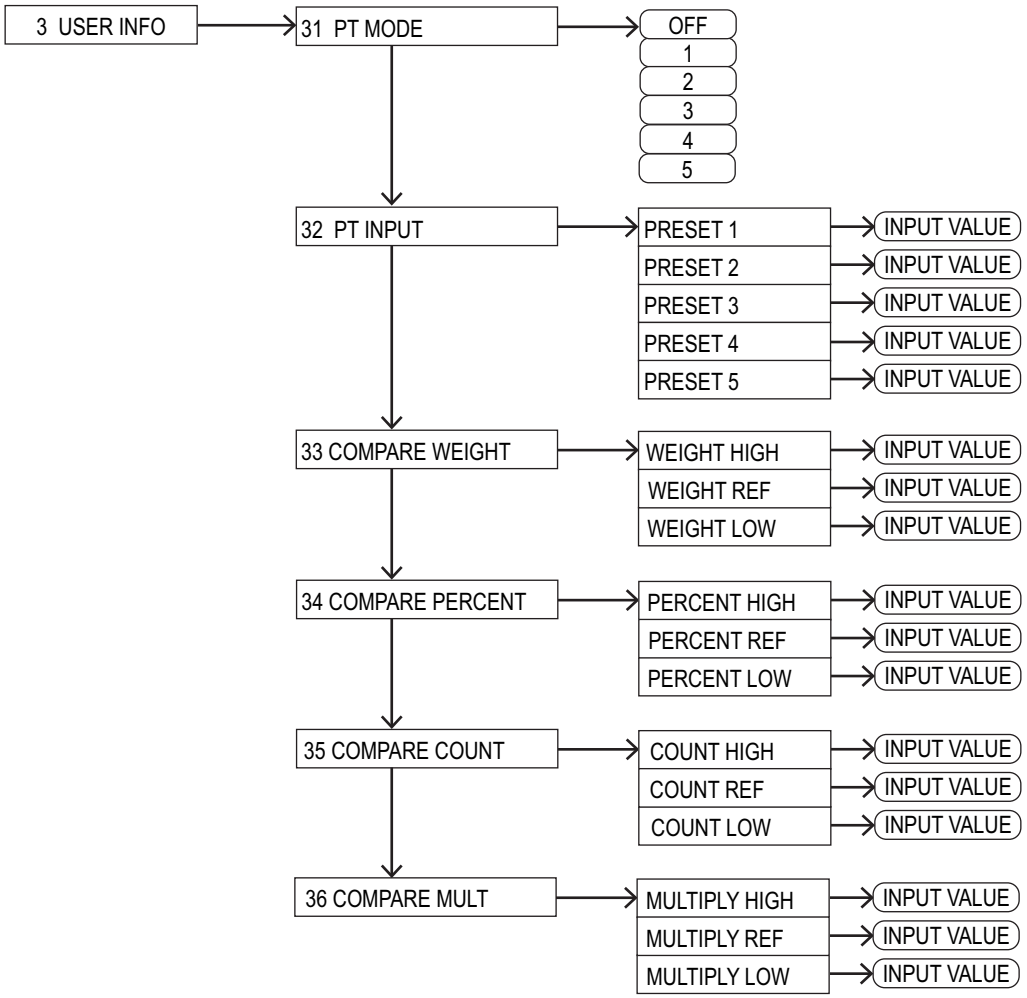


Figure 4-6. User Information Menu

Menu	Parameters	Description
31 PT MODE	Preset Tare Execution	
	Off	Invalid
	Setting 1-5	Execute
32 PT INPUT	Preset tare weight setting	
	Preset 1-5	Setting value input
33 COMPARE WEIGHT	Weight Comparator	
	Weight High	Setting value input
	Weight Ref	
	Weight Low	
34 COMPARE PERCENT	% Comparator	
	Percent High	Setting value input
	Percent Ref	
	Percent Low	
35 COMPARE COUNT	Comparator Counting	
	Count High	Setting value input
	Count Ref	
	Count Low	
36 COMPARE MULT	Multiple Comparator	
	Multiply High	Setting value input
	Multiply Ref	
	Multiply Low	

Table 4-6. User Information Menu

4.4.1 Preset Tare Mode

A preset tare can be selected prior to weighing. See Section 3.5.1 on page 16 for more information.

4.4.2 Input Preset Tare Value

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

- Actual value setting method (onW) – weighing a sample with a scale and then making it a setting value
- Numeric value setting method (NUM) – inputting a setting value directly via key operation

To enter a preset tare:

1. Press Menu. 

displays.
2. Press F1 or F2 to scroll to *USER INFO*.
3. Press F4. *31 PT MODE* displays.
4. Press F1 or F2 to scroll to *31 PT INPUT*.
5. Press F4. *PRESET 1* displays.
6. Press F1 or F2 to select desired preset tare (1-5).
7. Press F4. *SET PRESET onW NUM* displays.
8. Select F3 for *onW* or F4 for *NUM*.

   If *onW* is selected, place the container on the scale, when weight is stable, press F4 to save

   If *NUM* is selected use F1 or F2 to enter known value, press F4 to save
9. Press Menu to return to operation display. *NET PT* display in the upper right.

4.4.3 Set the Discrimination Value of Comparator Function

There are two ways of inputting a reference value and upper and lower limit values.

- Actual value setting method (onW) – weighing a sample with a scale and then making it a setting value
- Numeric value setting method (NUM) – inputting a setting value directly via key operation

The discrimination is performed according to the following criteria:

Absolute Value

The discrimination is performed based on the upper and lower limit values that have been set in advance.

Relative Value

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

Example:
Two-point (upper and lower limits) setting, Reference value = 1000.00 g
Lower limit value = 900.00 g, Upper limit value = 1200.00 g

Discrimination Method	Reference value	Lower limit value	Upper limit value
	1000.00 g	900.00 g	1200.00 g
Absolute value		900.00 g	1200.00 g
Relative value	1000.00 g	-100.00 g	200.00 g

Table 4-7. Relative Value Example

To enter a value in the comparator function:

1. Press Menu. 

displays.
2. Press F1 or F2 to scroll to *USER INFO*.
3. Press F4. *31 PT MODE* displays.
4. Press F1 or F2 to scroll to the comparator function to be set.
5. Press F4 to enter the function.
6. Press F1 or F2 to select the parameter to set.
7. Press F4. Current function and *onW NUM* display.
8. Select F3 for *onW* or F4 for *NUM*.

   If *onW* is selected, place the container on the scale, when weight is stable, press F4 to save

   If *NUM* is selected use F1 or F2 to enter known value, press F4 to save
9. Press Menu to return to operation display. *NET PT* display in the upper right.

Repeat this section for each of the comparator settings:

- Comparator setting for Weighing mode: *33 COMPARE WEIGHT*
- Comparator setting for Percentage mode: *34 COMPARE PERCENT*
- Comparator setting for Counting mode: *35 COMPARE COUNT*
- Comparator setting for Multiplied by Coefficient mode: *36 COMPARE MULT*

4.5 External Input/Output Functions

This function is used for communication through the external peripheral devices. There are RS-232C (D-SUB 9P) and USB (Type B) interface as standard equipment, and each interface slot for option. See Section 5.0 on page 52 for setup.

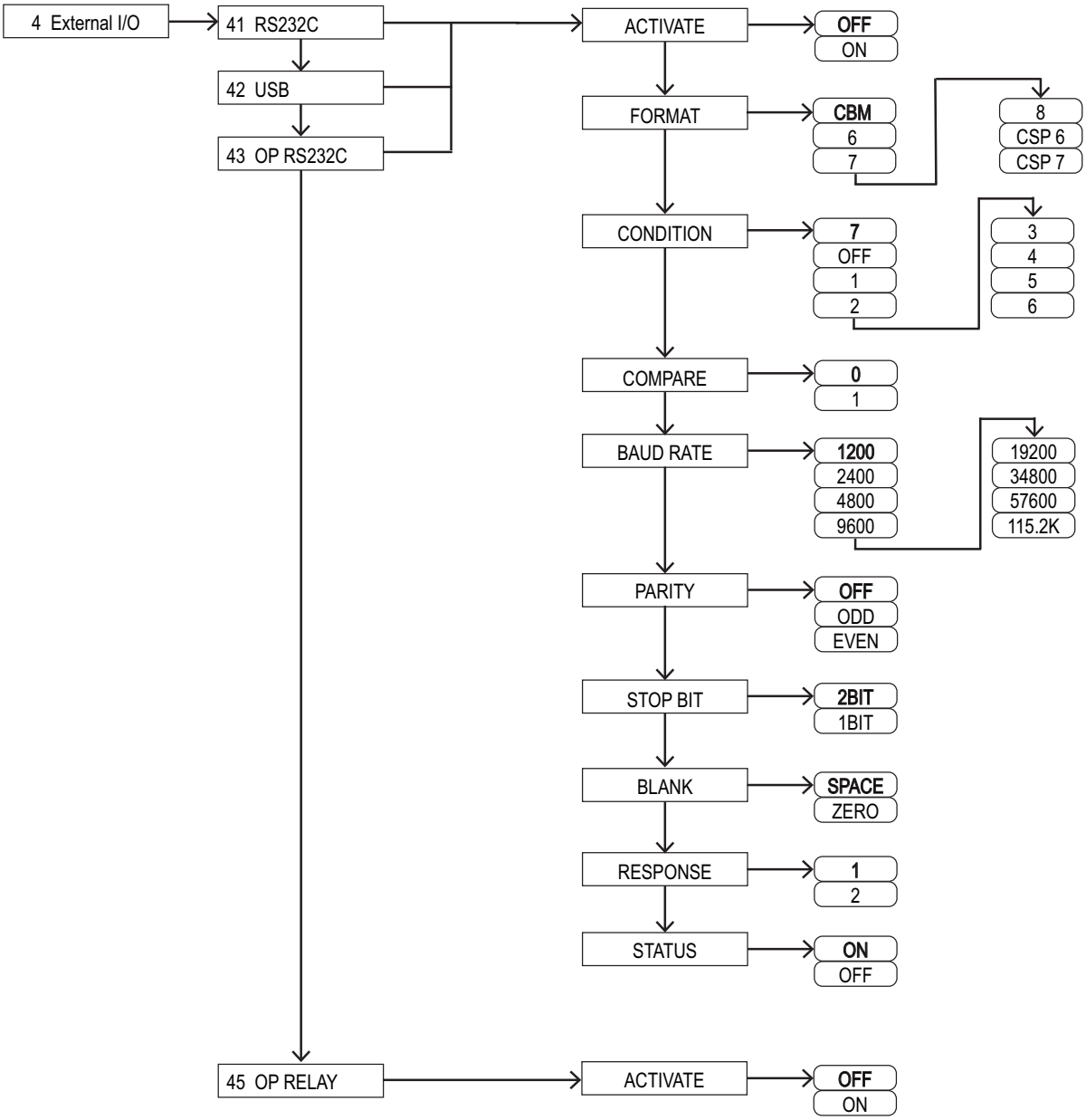


Figure 4-7. External Input/Output Menu Structure

Type	Menu	Parameters	Description
RS232C (Standard) USB (Standard) OP RS232C (Expanded Option)	ACTIVATE	OFF	Stop
		ON	Operation
	FORMAT	CBM	CBM Format
		6	6 Digit Format
		7	7 Digit Format
		8	8 Digit Format
		CSP 6	CSP Format 6 digits
		CSP 7	CSP Format 7 digits
	CONDITION	7	Push down (output key) for one time output at stable times
		OFF	Output Stop
		1	Continuous output at all times
		2	Continuous output as stable
		3	Push down (output key) for one time instant output
		4	Auto output
		5	One time output at stable times
		6	One time output at stable times
	COMPARE	0	Per output setting
		1	Output when discrimination result is okay or absent
	BAUD RATE	1200	1200 bps
		2400	2400 bps
		4800	4800 bps
		9600	9600 bps
		19200	19200 bps
		34800	34800 bps
		57600	57600 bps
		115.2K	115200 bps
	PARITY	OFF	NONE
		ODD	Odd Number
		EVEN	Even Number
	STOP BIT	2BIT	2 Bit
		1BIT	1 Bit
	BLANK	SPACE	Fill with a blank space (0 x 20)
		ZERO	Fill with 0 (0 x 30)
	RESPONSE	1	A00 Exx format
		2	ACK, NAK format
	STATUS	OFF	Not added
		ON	Append
OP LIMIT (Option) *Relay Output*	ACTIVATE	ON	Operation
		OFF	Stop

Table 4-8. External Input/Output Parameters

4.6 Lock Functions

Limitations can be imposed on key operation and in accessing menu items.

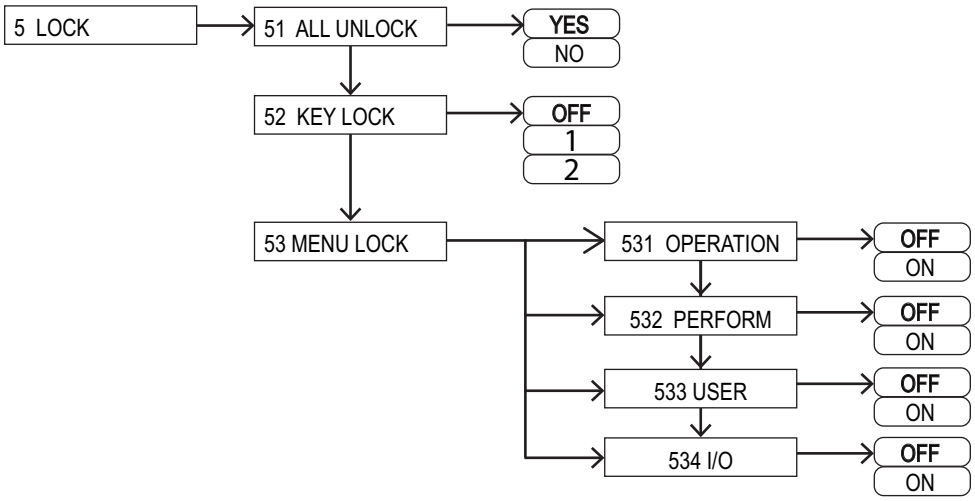


Figure 4-8. Lock Menu Structure

4.6.1 Total Lock Release

Use the following steps to release all the locks that have been set.

1. Press Menu.  displays.
2. Press F1 or F2 until  displays.
3. Press F4.  displays.
4. Press F4.  displays.
5. Press F3 (*YES*) or F4 (*NO*).
6. Press Menu. To return to the weigh mode.

4.6.2 Key Lock Function

Use the following steps to lock key operation.

1. Press Menu.  displays.
2. Press F1 or F2 until  displays.
3. Press F4.  displays.
4. Press F1 or F2 until  displays.
5. Press F4. *OFF* starts flashing.

6. Press F1 or F2 to desired setting.
   - *OFF* – all keys are available
   - *1* – On/Off locked for power off
   - *2* – All keys are locked (except Menu; when in menu mode all keys are available)
7. Press F4. The chosen setting displays.
8. Press Menu to return to the weigh mode.

4.6.3 Menu Lock Function

Various setting menus can be locked.

1. Press Menu. 

displays.
2. Press F1 or F2 until 

displays.
3. Press F4. 

displays.
4. Press F1 or F2 until 

displays.
5. Press F4. 

displays.
6. Press F1 or F2 to display the menus available for locking.
   - 531 OPERATION : Function related to the operation <1 APPLICATIONS>
   - 532 PERFORM : Function related to the performance <2 PERFORMANCE>
   - 533 USER : User information setting <3 USER INFO>
   - 534 I/O : External input/output functions <4 EXTERNAL I/O>
7. Press F4 at each menu to be locked/unlocked. The current setting flashes.
8. Press F1 or F2 to display *ON* or *OFF*.
9. Press F4. Setting stops flashing.
10. When all menus are set, press Menu to return to the weigh mode.

4.7 Admin/Adjust Menu

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

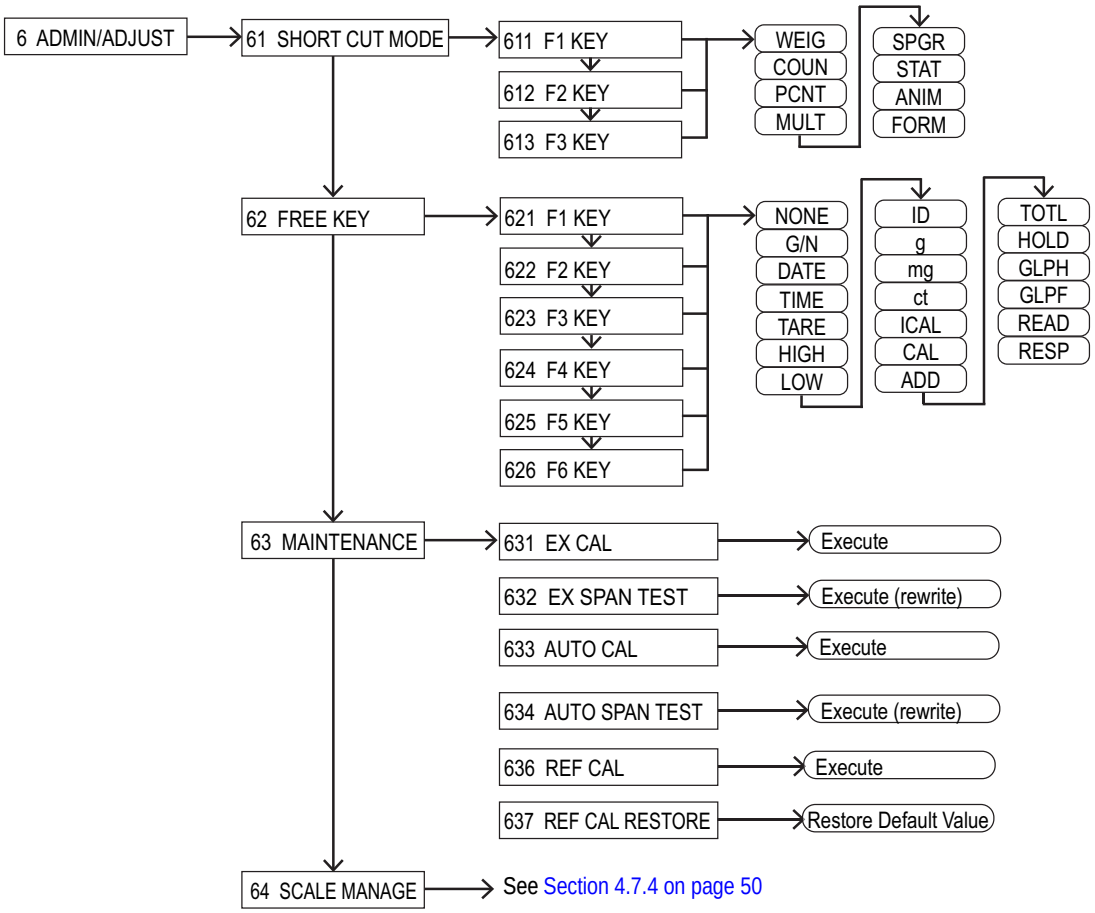


Figure 4-9. Controlling and Adjusting Menu Layout

Menu	Sub-Menu	Parameters – Description
61 SHORT CUT MODE	Key assignment for mode selection	
	611 F1 KEY – WEIG (default)	WEIG – weigh mode; COUN – counting mode; PCNT – percentage mode MULT – multiplied by a coefficient; SPGR – specific gravity mode; STAT – statistics mode ANIM – animal weighing mode; FORM – formulation mode
	612 F2 KEY – COUN (default)	
	613 F3 KEY – PCNT (default)	
62 FREE KEY	Free key assignment; F1-F3 at layer 1; F4-F6 at layer 2;	
	621 F1 KEY – G/N (default)	G/N – gross/net; DATE – date indication; TIME – time indication; TARE – tare indication; HIGH – upper limit value; LOW – lower limit value; ID – ID number indication g – unit setting; mg – unit setting; c t – unit setting; ICAL – internal span adjustment CAL – external span adjustment; ADD – adding execute; TOTL – total indication HOLD – measurement indication hold; GLPH – GLP header printing GLPF – GLP footer printing; READ – designation of readability (d) RESP – response speed; NONE – disabled
	622 F2 KEY – DATE (default)	
	623 F3 KEY – TIME (default)	
	624 F4 KEY – TARE (default)	
	625 F5 KEY – HIGH (default)	
	625 F6 KEY – LOW (default)	
63 MAINTENANCE	Maintenance settings	
	631 EX CAL	External Span Adjustment – Execute
	632 EX SPAN TEST	External Span calibration – Execute (rewrite)
	633AUTO CAL	Internal Span Adjustment – Execute
	634 AUTO TEST SPAN	Internal Span calibration – Execute (rewrite)
	636 REF CAL	Calibrating with internal weight – Execute
	637 REF CAL RESTORE	Internal weight restore – Restore default value

Table 4-9. Controlling and Adjusting Parameters

4.7.1 Set Short Cut Mode

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *ADMIN/ADJUST*.
4. Press F4. The current sub-menu displays.
5. Press F1 or F2 to *SHORT CUT MODE*.
6. Press F4. The current F-key displays.
7. Press F4. The current setting begins to flash.
8. Press F1 or F2 to select desired setting.
9. Press F4 to save the setting.
10. Press Menu to return to operation display.

4.7.2 Set Free Keys

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.
3. Press F1 or F2 to scroll to *ADMIN/ADJUST*.
4. Press F4. The current sub-menu displays.
5. Press F1 or F2 to *FREE KEY*.
6. Press F4. The current F-key displays.
7. Press F1 or F2 to scroll to desired F-key.
8. Press F4. The current setting begins to flash.
9. Press F1 or F2 to select desired setting.
10. Press F4 to save the setting.
11. Repeat Steps 5-9 until all Free Keys are set.
12. Press Menu to return to operation display.

4.7.3 Maintenance Settings

1. Press Menu. 

displays.
2. Press F4. *11 MODE* and the current operation mode displays.

3. Press F1 or F2 to scroll to *ADMIN/ADJUST*.
4. Press F4. The current sub-menu displays.
5. Press F1 or F2 to *MAINTENANCE*.
6. Press F4. The current parameter displays.
7. Press F1 or F2 to scroll to desired parameter.
8. Press F4. The current selection displays.
9. Press F1 or F2 to select desired selection.
10. Press F4. The current setting begins to flash.
11. Press F1 or F2 to select desired setting.
12. Press F4 to save the setting.
13. Press Menu to return to operation display.

4.7.4 Balance Manage Menu

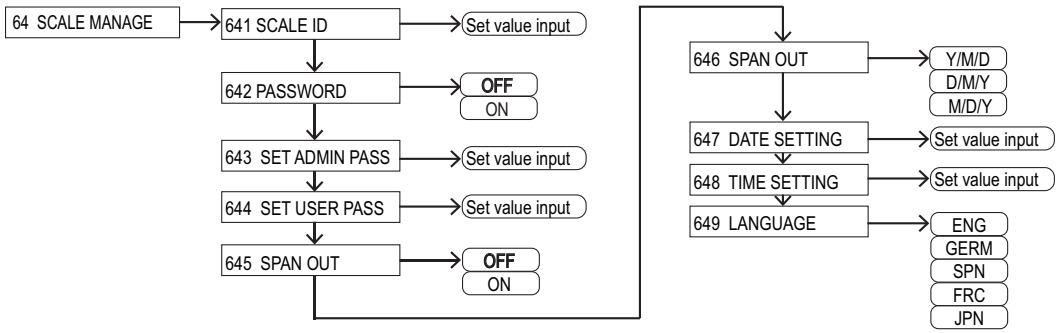


Figure 4-10. Controlling and Adjusting – Balance Manage Menu Layout

Menu	Parameters	Description
641 SCALE ID	Balance ID – enter ID value	
642 PASSWORD	Password Control	
	OFF	Disabled
	ON	Enabled
643 SET ADMIN PASS	Administrators password registration – enter password value	
644 SET USER PASS	User password registration – enter password value	
645 SPAN OUT	Output of the span adjustment test	
	OFF	Disabled
	ON	Enabled
646 DISP DATE	Date display format	
	Y/M/D	Year, month, day
	D/M/Y	Day/month/year
	M/D/Y	Month/day/year
647 DATE SETTING	Enter date	
648 TIME SETTING	Enter time	

Table 4-10. Controlling and Adjusting – Balance Manage Parameters

Menu	Parameters	Description
649 LANGUAGE	Printed Language	
	ENG	English
	GERM	Deutsch
	SPN	Espanol
	FRC	French
	JPN	Japanese
64A SPACING	Readability setting	
	1	1d
	2	2d
	5	5d
	10	10d
64B START CAL	Span adjustment with internal weight at power on	
	OFF	Disabled
	FORCE	Enabled
	SELEC	Selectable
64C DIRECT ST	Direct start setting	
	OFF	Disabled
	ON	Enabled
64D INITIALIZE	Initialize	
	YES	Cancel
	NO	Execute

Table 4-10. Controlling and Adjusting – Balance Manage Parameters

5.0 Communications

The balance can be connected to a computer using a compatible third party software program. Connections can be made using RS-232 or USB interfaces. Basic specifications include:

- RS-232C full duplex or USB half duplex
- Asynchronous communication
- RS-232C: EIA-232-D/E or USB: USB2.0
- Baud Rate: 1200 - 115200 bps
- Transmission: 1 start bit, non/odd/even number parity, 8 data bit, 1-2 stop bits

5.1 RS-232 Connections

The balance can be equipped with an optional RS-232 feature for communication with printers and computers.

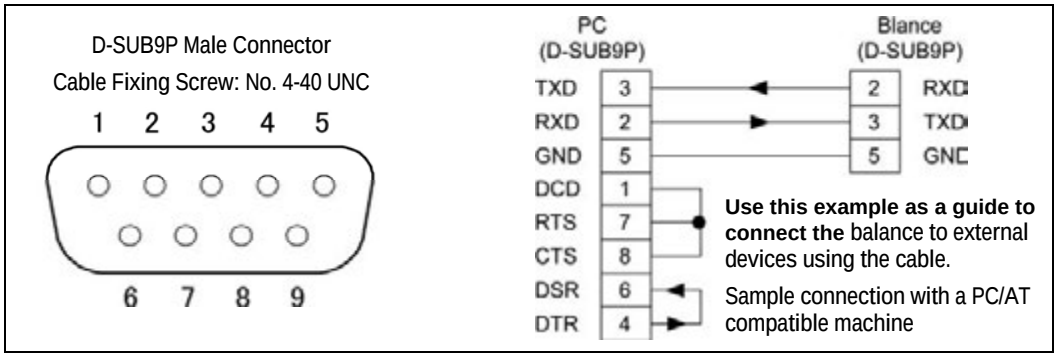


Figure 5-1. RS-232 Connection

Pin Number	Signal	Input/Output	Function
1	-	-	-
2	RXD	Input	Receive Data
3	TXD	Output	Transmit Data
4	DTR	Output	High (when the balance is powered on)
5	GND	-	Signal Grounding
6	-	-	-
7	-	-	-
8	-	-	-
9	Ext. Tare	Input	External Tare Range Setting

Table 5-1. Pin Connections

Note

The DB-9 connector can set a tare range or adjust the zero point from an external device by connecting a contact or a transistor switch between the pin for externally setting a tare range (pin 9) and the signal ground (pin 5).

Allow at least 400 ms for connection (ON) time (Maximum voltage: 15 V when the balance is turned OFF, sink current: 20 mA when it is turned ON).

5.2 USB Connections

Figure 5-2 shows the USB connection pins for the balance.

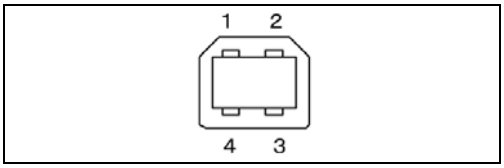


Figure 5-2. USB Connection Pins

Pin Number	Signal	Function
1	VBUS	Bus power input Rating 4.75 V - 5.25V
2	D-	Data signal
3	D+	Data signal
4	GND	Signal grounding

Table 5-2. USB Pin Assignments

5.3 Basic Data Output Format

Date bit: 8 bit, Parity bit/Stop bit: Can be changed.

6-Digit Numeric Format

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

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

7-Digit Numeric Format

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

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

8-Digit Numeric Format

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

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

5.3.1 Data Description

Symbol		Code		Description
P1 (one character) indicates the polarity of the data				
+		0x2B		Zero or positive data
-		0x2D		Negative data
D1 to D7/8/D9 (seven or eight or nine characters) stores the numeric data				
0-9		0x30-0x39		0 to 9 (numeric)
.		0x2E		Decimal point (floating)
(SP)		0x20		A space at the top of a numeric value Output to the least significant digit in the absence of a decimal point Unused high-order digit
U1, U2 (two characters) indicates the unit used to show numeric data				
M	G	0x4D	0x47	mg (milligram)
(SP)	G	0x20	0x47	g (gram)
C	T	0x43	0x54	ct (carat)
M	O	0x4D	0x4F	mom (momme)

Table 5-3. Data Description

Symbol		Code		Description
O	Z	0x4F	0x5A	oz (ounce)
L	B	0x4C	0x42	lb (pound)
O	T	0x4F	0x54	ozt (troy ounce)
D	W	0x44	0x47	dwt (penny weight)
G	R	0x47	0x52	GN (grain)
T	L	0x54	0x4C	tlH (Hong Kong tael)
T	L	0x54	0x4C	tlS (Singapore, Maylaysia tael)
T	L	0x54	0x4C	tlT (Taiwan tael)
t	o	0x74	0x6F	to (tola)
M	S	0x4D	0x53	MSG (mesghal)
B	A	0x42	0x41	BAt (baht)
P	C	0x50	0x43	PCS (parts counting)
(SP)	%	0x20	0x25	% (percentage weighing)
(SP)	#	0x20	0x23	# (multiplied by the coefficient)
(S1) (one character) indicates the judgement result when the limit function is used				
L		0x4C		Shortage (low)
G		0x47		Proper (ok)
H		0x48		Over (high)
(SP)		0x20		No judgement result or data type specified
e		0x65		Net weight
f		0x66		Tare weight
P		0x50		Preset tare weight
T		0x54		Total value (accumulated value)
U		0x55		Unit weight
d		0x64		Gross
S2 (one character) indicates the status				
S		0x53		Data stable
U		0x55		Data unstable
E		0x45		Data error (indicates that data other than S2 is invalid)
(SP)		0x20		No status specified

Table 5-3. Data Description (Continued)

5.4 CBM Data Output Format

Consists of 26 characters, including terminators (CR=0xDH/LF=0xAH).

(Data bit: 8, Parity: stop, stop bit: can be changed

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

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

5.4.1 Data Description

Symbol						Code						Description
[S1] (1 character) Represents the status.												
(SP)						0x20						Data stable
*						0x2A						Data unstable
[C1] (1 character) Represents the result of comparator function.												
(SP)						0x20						Comparator result: Proper (OK) or No result
H						0x48						Over (HIGH)
L						0x4C						Shortage (LOW)
[T1-T6] (6 characters) Represents the type of the data.												
(SP)	(SP)	(SP)	(SP)	(SP)	(SP)	0x20	0x20	0x20	0x20	0x20	0x20	Net weight (not tared)
N	E	T	(SP)	(SP)	(SP)	0x4E	0x45	0x54	0x20	0x20	0x20	Net weight (tared)
P	T	(SP)	(SP)	(SP)	(SP)	0x50	0x54	0x20	0x20	0x20	0x20	Preset tare weight
T	A	R	E	(SP)	(SP)	0x54	0x41	0x52	0x45	0x20	0x20	Tare weight
T	O	T	A	L	(SP)	0x54	0x4F	0x54	0x41	0x4C	0x20	Total value (Accumulated value)
G	R	O	S	S	(SP)	0x47	0x52	0x4F	0x53	0x53	0x20	Gross
U	N	I	T	(SP)	(SP)	0x55	0x4E	0x49	0x54	0x20	0x20	Unit weight
[D1-D12] (12 characters) Numeric value data is stored.												
+						0x2B						When the data are 0 or positive
-						0x2D						When the data are negative
0-9						0x30 – 0x39						Numeric value (0 – 9)
.						0x2E						Decimal point (floating decimal point)
[						0x5B						The number surrounded by '['and ']' means auxiliary indication
]						0x5D						
(SP)												Spaces fill the top of the data Output to the least significant digit in the absence of a decimal point Unused high-oder digit

Table 5-4. Data Description

Symbol		Code		Description	
[U1, U2] (2 characters) Represents the unit of numeric value data.					
M	G	0x4D	0x47	mg	(milligram)
(SP)	G	0x20	0x47	g	(gram)
C	T	0x43	0x54	ct	(carat)
M	O	0x4D	0x4F	mom	(momme)
O	Z	0x4F	0x5A	oz	(ounce)
L	B	0x4C	0x42	lb	(pound)
O	T	0x4F	0x54	ozt	(troy ounce)
D	W	0x44	0x57	dwt	(penny weight)
G	R	0x47	0x52	GN	(grain)
T	L	0x54	0x4C	tlH	(Hong Kong tael)
T	L	0x54	0x4C	tlS	(Singapore, Malaysia tael)
T	L	0x54	0x4C	tlT	(Taiwan tael)
t	o	0x74	0x6F	to	(tola)
M	S	0x4D	0x53	MSG	(mesghal)
B	A	0x42	0x41	BAt	(baht)
P	C	0x50	0x43	PCS	(parts counting)
(SP)	%	0x20	0x25	%	(percentage weighing)
(SP)	#	0x20	0x23	#	(multiplied by coefficient)

Table 5-5. Data Description (continued)

5.5 Input Commands

Input commands can be entered from an external device. Table 5-6 displays measuring mode input commands.

Commands			
Measuring Mode	Zero-point Adjustment Tare Subtraction Date/time Output	Output Control Comparator Setting Preset Tare Setting Interval Time Setting	External Contact Input
Weighing	x	x	x
Counting	x	x	x
Percentage	x	x	x
Multiply	x	x	x
Specific gravity	x	-	x
Statistics	x	-	x
Animal	x	-	x
Formulation	-	-	-

Table 5-6. Transmission Procedure

Select an input command. The balance sends normal completion response or the requested result data.

- The balance transmits an error response if the operation is unsuccessful or if the command is invalid.
- In normal display mode, the balance sends a response within one second of receiving the command. A response is sent for tare range, span adjustment or span test commands.
- Do not send a command to the balance until a response from the previous command is received from the balance.

The balance needs additional response time in some situations:

- The balance waits for stability after receiving a tare or a zero-point adjustment command if <17 WT STABLE> is <ON>.
- If the balance receives a command when setting a function, when it is under span adjustment or if it is busy for other reasons, the command is executed after the current operation is completed.

5.5.1 Input Command Composition 1

This is composed of four characters including the terminator (CR=0xDH/LF=0cAH).

C1	C2	CR	LF

5.6 Command Formats

IMPORTANT *Do not confuse the alphabetical O for Arabic number 0 (Zero).*

C1	C2	Code (C1)	Code (C2)	Description	Response	
					A00/Exx format	ACK/NAK format
T	(SP)	0x54	0x20	Tare	A00: Normal response E01: Abnormal response	ACK: Normal response NAK: Abnormal response
Z	(SP)	0x5a	0x20	Zero-point adjustment		
O	0	0x4f	0x30	Stop output		
O	1	0x4f	0x31	Continuous output		
O	2	0x4f	0x32	Continuous output (no output when unstable)		
O	3	0x4f	0x33	Press output key for one-time output		
O	4	0x4f	0x34	Auto output		
O	5	0x4f	0x35	One-time output when stable		
O	6	0x4f	0x36	One-time output when stable		
O	7	0x4f	0x37	Press output key for one-time output when stable		
Commands O0 to O7: • have the same functions as the output control set by the setting menu. • once commands are executed, that state is maintained. The status is reset to the setting menu when the balance is turned on again.						
O	8	0x4f	0x38	One-time output		
O	9	0x4f	0x39	One-time output after stability is obtained		
Command O8 to O9: • are used to request data from the balance • after the command is executed, it returns to O0						
O	A	0x4f	0x41	Interval function (Output each time the output time has elapsed)		
O	B	0x4f	0x42	Interval function (Output when stable each time the output time has elapsed)		
When OA or OB command is sent, the interval function starts and must be sent again to end the function						

Table 5-7. Zero Point Adjustment/Tare/Output Control Setting Command

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

Table 5-8. Data Output Request and Time Output Request

5.6.1 Input Command Composition 2

This is composed of 15 characters including the terminator (CR=0xDH/LF=0xAH).

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

C3 has a 10 digit maximum (including the polarity +/-, comma and point). Do not include the measuring unit.

Example: Upper limit input 1200.00g: LA,1200.00
Preset tare input 1000.00g: PT,1000.00
Interval time input 12:34:56: IA,12,34,56 (marked off by commas)

The Input command can be entered when Weighing mode, Percentage mode, Counting mode or Multiplied by Coefficient mode are being used. If input when in an other modes, the outputs an abnormal response.

If the input value is not correct, the balance outputs an abnormal response.

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

Table 5-9. Comparator Setting Command

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

Table 5-10. Preset Tare Value Setting Command

When the normal response, the preset tare value is input in 321 PRESET 1 and the balance operates Preset tare.
If the input value is 0 at Preset tare setting value command, the preset tare operation is canceled

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

Table 5-11. Interval (Output) Time Setting Command

5.7 Response

The Response Command Format consists of five characters including terminators.

1	2	3	4	5
A1	A2	A3	CR	LF

Table 5-12. Response Command Format (A00/Exx format)

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

Table 5-13. Response Command

Response Command Format consists of one character without a terminator.

1
A1

Table 5-14. Response Command Format (ACK/NAK format)

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

Table 5-15. Response Command

5.8 External Contact Input

D-sub9 connectors can set a tare range or adjust the zero-point from an external device by connecting a contact or a transistor switch between the pin for externally setting a tare range (Pin 9) and the signal ground (Pin 5). Allow at least 400 ms for the connection (ON) time.

Maximum voltage: 15 V when the balance is turned off. Sink current: 20 mA when it is turned on.

Note

While external contact input is selected, command input is not available.

There is no response command corresponding to external contact input.

5.9 Communication Settings

Set the communication source desired:

Standard RS232C

Standard USB Communication

Extension RS232/Ethernet (Optional)

Relay Contact Output (Optional)

Note

Output condition, 413 CONDITION 1,3,6, cannot be selected.

433 CONDITION 1,3 and 6 cannot be selected only when Extension RS232C option is connected.

41A STATUS, 42A STATUS and 43A STATUS cannot be selected. The net value status is always appended.

Use the following steps to activate the desired communication source.

1. Press Menu. Func APPLICATIONS displays.
2. Press F1 or F2 to select *EXTERNAL I/O*.

3. Press F4. The current setting displays.
4. Press F1 or F2 to select the communication source desired.
5. Press F4 to enter the menu.
6. Press F1 or F2 to display *ACTIVATE*.
7. Press F4. The current setting begins flashing.
8. Press F1 or F2 to select *OFF* or *ON*.
9. Press F4 to save the setting.
10. Press Menu to return to operation display.

5.10 Set Communication Parameters

To set the parameters for the communication source:

1. Press Menu. 

displays.
2. Press F1 or F2 to select *EXTERNAL I/O*.
3. Press F4. The current setting displays.
4. Press F1 or F2 to select the communication source desired.
5. Press F4 to enter the menu.
6. Press F1 or F2 to display the parameter to set.
7. Press F4. The current parameter setting begins flashing.
8. Press F1 or F2 to select desired setting.
9. Press F4 to save the setting.
10. Repeat process until all parameters have been set.
11. Press Menu to return to operation display.

See Section 4.5 on page 44 for parameters and settings that are available.

5.10.1 Relay Contact Output (Option)

When using the Relay Contact Output, the *COMPARE* parameter in the *Extension RS232/Ethernet (Optional)* communication source, must be set to:

0: AA's per the comparator setting. See Section 3.15 on page 26.

1: Output when discrimination result is OK or absent

Set the *EXTERNAL I/O* to *OP RELAY*. See Section 5.9.

5.11 USB Communication and Bus Power Inputs

The balance can communicate using a USB connection or a bus power input.

CAUTION *The internal calibration device cannot be driven with power supplied from the USB.*

1. Download the USB driver to the PC and install it. Download at http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx
2. Connect the balance to the PC.
3. Turn on the PC.
4. Configure the communication settings of the PC.
   - Windows® 7 – open the device managers window by going to the Start menu, right clicking the computer, selecting properties and selecting device manager
   - Click the port (COM and LPT) to open the thread and double click the Silicon Labs SP210xUSB to UART Bridge (COM) to open the properties window
   - Go to the Port tab
   - Input the communication setting in accordance with the communication settings of the balance
5. Set the USB power setting of the PC to avoid unexpected shut down of the balance
   - Windows® 7 – go to the power management tab of the Silicon Labs SP210xUSB to UART Bridge (COM) to open the properties window
   - Un-check the *Allow the computer to turn off this device to save power*, check-box, then press the *OK* key

5.12 Print Examples

English

```
TYPE:

S/N:
ID:

START
DATE:  .  .
TIME:     :
```

Spanish

```
TIPO:

No S.
ID. :

INICIO
FECHA  .  .
HORA:     :
```

GLP Header

English

```
END
DATE:  .  .
TIME:     :

SIGNATURE


**********
```

Spanish

```
FIN
FECHA  .  .
HORA:     :

FIRMA


**********
```

GLP Footer

English

```
DATE:  .  .
```

Spanish

```
FECHA  .  .
```

English

```
TIME:     :
```

Spanish

```
HORA:     :
```

Time & Date

English

```
SAMPLE SP GR

SAMPLE WEIGHT

WATER TEMP
```

Spanish

```
MUESTRA SP.GR

PESO MUESTRA

TEMP. DE AGUA
```

Specific Gravity measurement mode
(water temperature input)

English

```
SAMPLE SP GR

SAMPLE WEIGHT

MED.LIQ SP GR
```

Spanish

```
MUESTRA SP.GR

PESO MUESTRA

MED.LIQU.SP.GR
```

Specific Gravity measurement mode
(liquid input)

English

```
**STATISTICS***

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

**********
N
SUM
MAX
MIN
R
AVE
SD
CV
**********
```

Spanish

```
* ESTADISTICAS*

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

**********
N
SUM
MAX
MIN
R
AVE
SD
CV
**********
```

Statistics mode header

English

```
**CALIBRATION**

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

CAL.EXTERNAL
REF:


COMPLETE
DATE:  .  .
TIME:     :

SIGNATURE


**********
```

Spanish

```
**CALIBRACION**

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

CAL. EXTERNA
REF. :


COMPLETADA
FECHA  .  .
HORA:     :

FIRMA


**********
```

Span adjustment result output
(external weight)

English

```
**CALIBRATION**

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

CAL.INTERNAL
REF:


COMPLETE
DATE:  .  .
TIME:     :

SIGNATURE


**********
```

Spanish

```
**CALIBRACION**

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

CAL. INTERNA
REF. :


COMPLETADA
FECHA  .  .
HORA:     :

FIRMA


**********
```

Span adjustment result output
(internal weight)

English

```
****REF.CAL****

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

REF:


COMPLETE
DATE:  .  .
TIME:     :

SIGNATURE


**********
```

Spanish

```
**REF.CAL.  **

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

REF. :


COMPLETADA
FECHA  .  .
HORA:     :

FIRMA


**********
```

Calibration result output
(internal weight)

English

```
***SPAN TEST***

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

CAL.EXT.TEST
REF:

ERROR:


COMPLETE
DATE:  .  .
TIME:     :

SIGNATURE


**********
```

Spanish

```
PRUEBA AMPLITUD

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

PRUE. CAL. EXT.
REF. :

ERROR:


COMPLETADA
FECHA  .  .
HORA:     :

FIRMA


**********
```

Span test result output
(external weight)

English

```
***SPAN TEST***

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

CAL.INT.TEST
REF:

ERROR:


COMPLETE
DATE:  .  .
TIME:     :

SIGNATURE


**********
```

Spanish

```
PRUEBA AMPLITUD

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

PRUE. CAL. INT.
REF. :

ERROR:


COMPLETADA
FECHA  .  .
HORA:     :

FIRMA


**********
```

Span test result output
(internal weight)

English

```
**FORMULATION**

DATE:  .  .
TIME:     :

TYPE:

S/N:
ID:

**********
```

Spanish

```
**FORMULACION**

FECHA  .  .
HORA:     :

TIPO:

No S.
ID. :

**********
```

Formulation mode header

English

```
N
T TOTAL

N TOTAL


SIGNATURE


**********
```

Spanish

```
N
TOTAL TARA

TOTAL NETO


FIRMA


**********
```

Formulation mode footer

English

```
N
```

Spanish

```
N
```

English

```
T
```

Spanish

```
T
```

Formulation mode
Net value and tare value output

6.0 Troubleshooting and Maintenance

This section covers basic troubleshooting and maintenance of the balance.

IMPORTANT *Observe proper disposal.*

**This balance including accessories may not be disposed of in domestic waste in conformance with the specific requirements of the country, county and local jurisdictions. When disposing of the product, contact local authorities and ask for the proper method of disposal.*

**Do not use volatile solvents on the balance.*

**Unplug the AC adapter from the receptacle when the balance is not going to be used for a long period of time.*

6.1 Precautions Related to the Main Unit of the Balance

Operating Precautions

- If equipped with a dust cover, the balance may be unstable due to static electricity charged on the cover at low humidity. Wipe the cover with a wet cloth, use an anti-static agent, or use the balance with the cover removed.
- For more stable measurements, it is recommended to turn the balance on for at least 30 minutes and load the balance a few times with a weight equivalent to the weighing capacity before measurement.

Adjustments

- Calibrate the balance periodically with a test weight or use an internal adjustment weight.
- Turn the balance on for at least 30 minutes and load the balance a few times with a weight equivalent to the weighing capacity before measurement.
- Adjustments are also needed in the following cases:

  Using the balance for the first time.

  Using the balance after a long period of non-use.

  Changing the location of the balance.

  There is a large change in temperature, humidity or atmospheric pressure.

Maintenance

- Dirt or liquids on the weighing pan can cause errors or an unstable weight reading.
- Clean the balance frequently, ensuring that dust or liquids don't enter into the internal parts of the balance.

6.2 Error Messages

Error Message/ Error Code	Cause	Solution
OVER ERROR	Weight exceeds maximum capacity	Split load into several smaller loads and weigh them Replace the tare with a lighter one
	Result exceeds the maximum display digit	Clear the calculation result, if the calculation results exceed the maximum display digit, it will continue to do so
UNDER ERROR	The load is below the lower limit	Check the position of the weigh pan and re-seat if necessary Check for contact with other objects; use the included pan base only
DATA MAX ERROR	Amount of data exceeds memory	Clear the data
DISPLAY ERROR	The result exceeds the maximum display digit	If calculation results exceed the maximum display digit, it will continue to do so, unless something is changed
LOWER ERROR	The specimen weight/reference weight in Counting/Percentage mode is below the lower limit	Ensure the specimen weight/reference weight are higher than the lower limit
ERR001 ERR099	System error	Record the error code and notify the dealer or Rice Lake Weighing Systems
ERR703	Operation key pushed when unit in standby Hardware issue	Ensure operation key is not pushed when unit is in standby or starting up from standby Record the error code and notify the dealer or Rice Lake Weighing Systems
ERR705	Initial zero adjustment error Initial zero adjustment was not completed during startup due to the unstable load	Ensure weigh pan is properly seated Check for contact with other objects Check for wind or vibration
ERR706	Load is out of initial zero adjustment range	Ensure load pan is empty when balance is powered on
ERR709 ERR710 ERR711	Load is unstable at zero adjustment/tare subtraction Span adjustment time-out error	Improper setting of the weighing pan or pan base is suspected Check for contact with other objects Check for wind or vibration
ERR717	Mass of calibration weight differs from designated mass by 1% or more in external span adjustment	Check the calibration value of the weight and use the proper calibration weight
ERR718	The mass of the calibration weight is under 50% of the maximum capacity at span adjustment or internal span adjustment weight adjustment by external calibration weight	Use a calibration weight which is equal to the maximum capacity
ERR719	Adjust value by external span adjustment or internal span adjustment is over 1% of maximum capacity	Execute a *637 REF CAL RESTORE*, then execute an internal span adjustment Check the mass of the weight used for the external span adjustment Perform a *636 REF CAL*
ERR722	Tare key is pushed during the preset tare operation	Ensure Tare key is not pushed during preset tare operation
ERR723	Out of Zero adjustment range (1.5% of maximum capacity)	Ensure weigh pan is empty while performing a zero adjustment
ERR724	Out of Tare subtraction range (0 g to maximum capacity)	Ensure tare weight is within the tare subtraction range
ERR734	Weight of the sample is out of the importing range at actual value setting method at Percent weighing mode (lower limit to maximum capacity)	Load the sample of which weight is within the importing range
ERR735	Time-out error of importing the sample weight in the actual value setting method at Percent weighing mode.	Improper setting of the weighing pan or pan base is suspected Check for contact with other object Check for any wind or vibration
ERR736	The setting value is out of the setting range at numeric value setting method at Percent weighing mode (lower limit to maximum capacity)	Set the value within the range

Table 3-1. Error Codes

Error Message/ Error Code	Cause	Solution
ERR737	Sample weight in the air is out of importing range at specific gravity mode (over 0g to maximum capacity). Sample weight in the water/liquid is out of the importing range at specific gravity mode (0 – maximum capacity to maximum capacity)	Divide the sample so its weight in the air is within the importing range.
ERR738	Time-out error in importing the sample weight in the water/liquid at specific gravity mode	Ensure weigh pan is properly seated Check for contact with other object Check for draft or vibration
ERR739	Time-out error of importing the sample weight of the value setting method of Preset tare setting	Ensure weigh pan is properly seated Check for contact with other objects Check for any draft or vibration
ERR740	The setting value is out of the setting range at numeric value setting method or actual value setting method at Preset tare setting (0g to maximum capacity)	Set the tare within the tare subtraction range
ERR741	*631 EX CAL* is executed while the external span adjustment function is disabled	Contact the dealer or Rice Lake Weighing Systems
ERR742	*633 INT CAL*, *634 INT SPAN TEST* or *636 REF CAL* executed while the balances power is supplied from the USB only	Connect to AC adapter; or insert dry cell batteries and disconnect the USB cable
	Internal span adjustment device is not working	Contact the dealer or Rice Lake Weighing Systems
ERR743	Battery power is too low to execute *633 INT CAL*, *634 INT SPAN TEST* or *636 REF CAL*	Replace batteries
ERR747	When importing a specimen weight in comparator function value setting method, there is a time-out error	Ensure weigh pan is properly seated Check for contact with other objects Check for draft or vibration
ERR748	The setting value is out of the setting range at numeric value setting method or actual value setting method at Comparator mode (*0 – maximum capacity* to *maximum capacity*)	Set value within range
ERR749	When importing a specimen weight in adding function value setting method, there is a time-out error	Ensure weigh pan is properly seated Check for contact with other objects Check for draft or vibration
ERR750	Weight of added sample is out of range (*0 – maximum capacity*)	Choose sample within importing range
	The total value exceeds maximum display digit	Clear total value
ERR751	Weight of sample is lighter than the minimum interval of the balance in Counting mode	Choose a sample which unit weight is more than minimum interval of the balance
ERR752	Weight of sample is 0g or under in Counting mode	Choose sample which unit weight is more than the minimum interval of the balance Counting mode cannot operate subtractive counting
ERR753	Time-out error of importing the unit weight at Counting mode	Ensure weigh pan is properly seated Check for contact with other objects Check for draft or vibration
ERR754	Deleted the latest data then executed deleting operation of the second latest data at statistic mode	Only the latest data can be deleted Select <ALL> to delete all the other data
ERR755	Time-out error of importing the sample weight at Statistics/Formulation mode	Ensure weigh pan is properly seated Check for contact with other objects Check for draft or vibration

Table 3-1. Error Codes (Continued)

Error Message/ Error Code	Cause	Solution
ERR756	Weight of the sample is out of the importing range at Statistics/Formulation mode (0g to maximum capacity)	Choose sample which weighs within the importing range
ERR757	Bluetooth connection error	Disconnect and reconnect the Bluetooth communication
ERR758	Bluetooth hardware error	Contact dealer or Rice Lake Weighing Systems
ERR760	Adding operation is executed while the Adding function is disabled	Set *141 ACTIVATE* ON then execute the adding operation
ERR761	An error occurred at *636 REF CAL*	Re-execute *636 REF CAL*
ERR763	Calculation error in specific gravity of the sample in specific gravity mode	Re-execute the specific gravity function
ERR764	External weight used for *631 EX CAL* is different from selected weight range at *SELECT WEIGHT*	Use a weight that is within the selected range

Table 3-1. Error Codes (Continued)

6.3 Basic Maintenance

Use the following instructions to complete general maintenance on the TE balance.

6.3.1 Cleaning - Round Pan Type

1. Remove the windshield. Refer to Section xx windshield assembly instructions to remove the windshield.

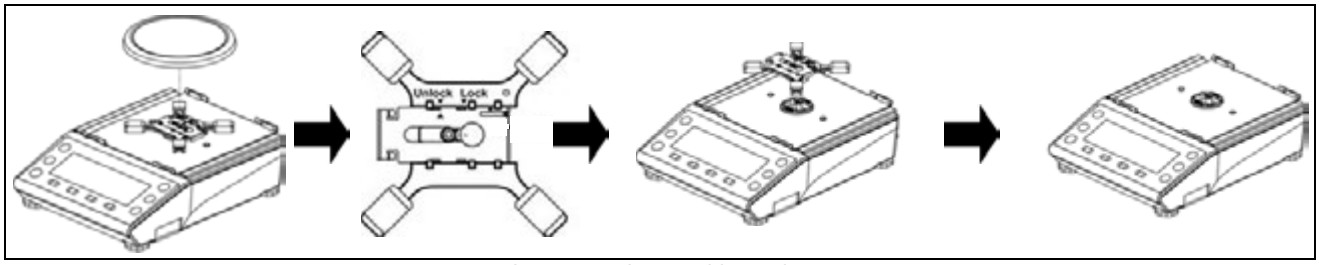


Figure 6-1. Disassemble to Clean

2. Remove the round pan.
3. Move the slider to the unlock side.
4. Remove the pan base.
5. Wipe away dirt with a dry, soft clean cloth. If heavily soiled, remove the weigh pan and the pan base and clean with a clean cloth slightly dampened with a neutral detergent or solvent.

6.3.2 Cleaning - Square Pan Type

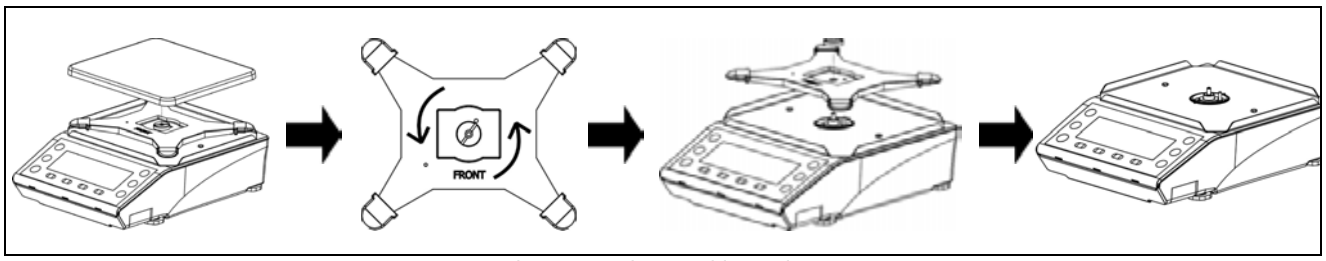
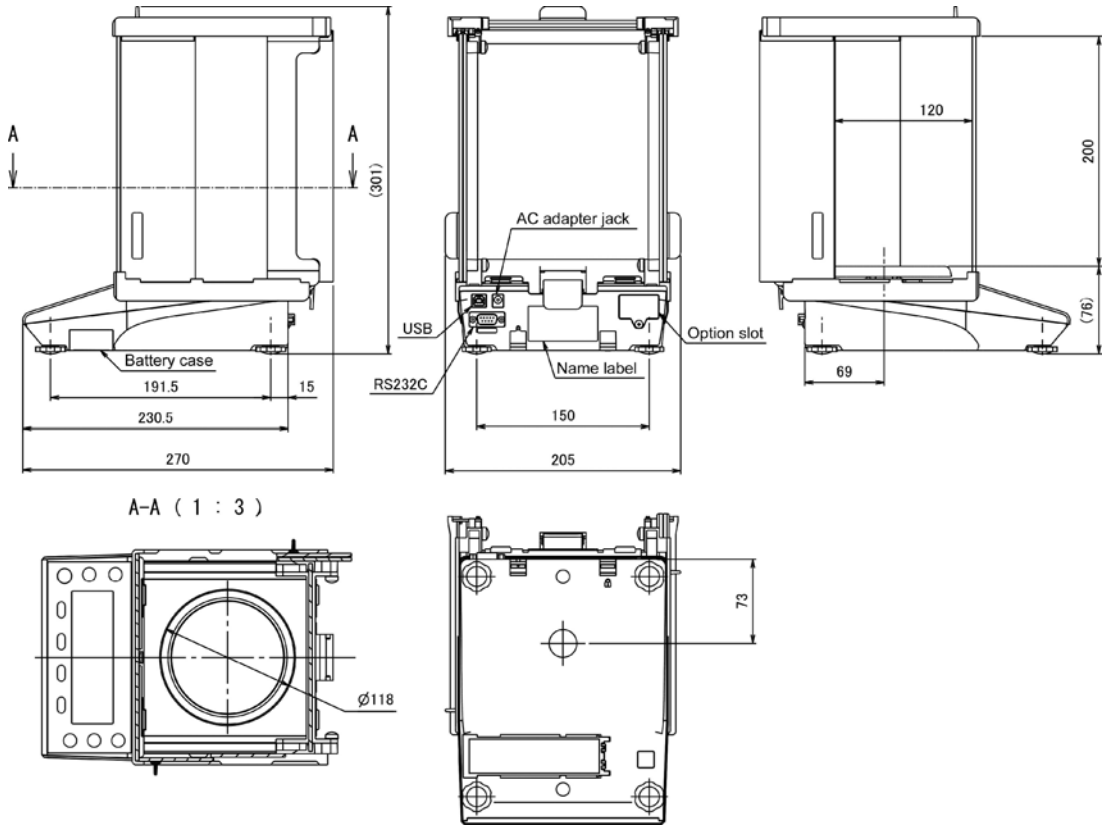


Figure 6-2. Disassemble to Clean

1. Remove the square pan.
2. Remove the pan base.
3. Wipe away dirt with a dry, soft clean cloth. If heavily soiled, remove the weigh pan and the pan base and clean with a clean cloth slightly dampened with a neutral detergent or solvent.

6.4 Dimensions

TE-223
TE-1203



TE-1502
TE-15001

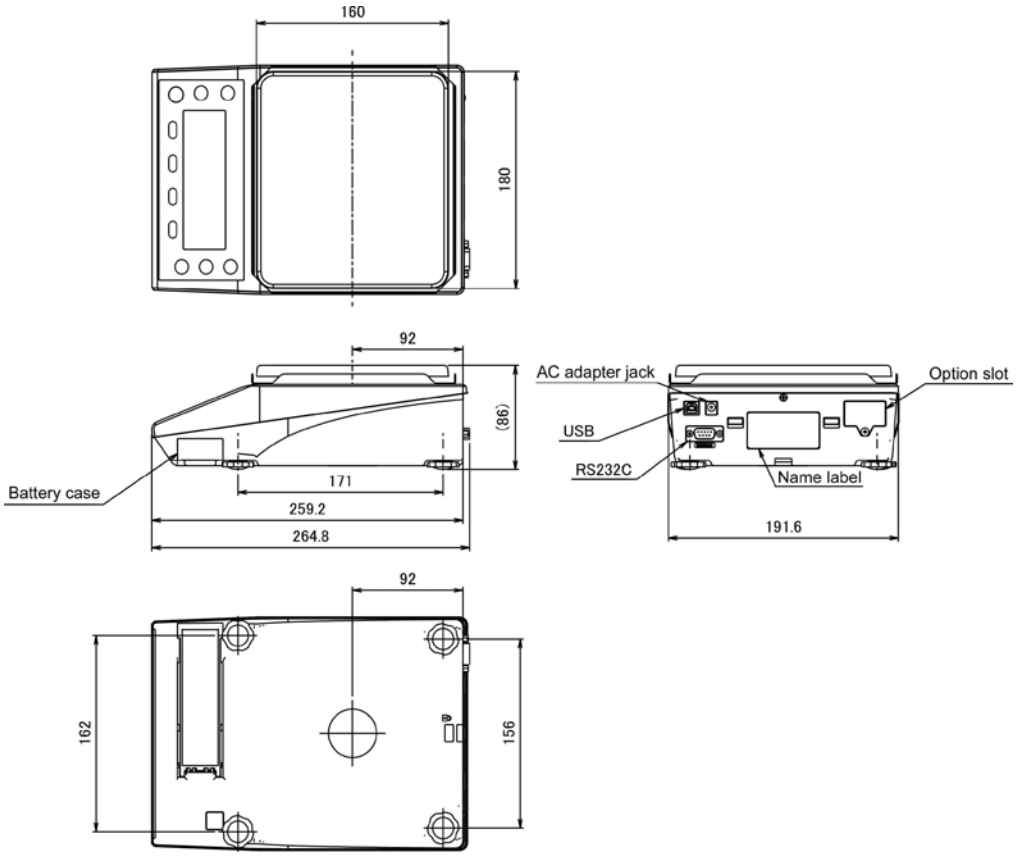


Figure 6-3. TE Model Dimensions

6.5 Specifications

6.5.1 Basic Communication Specification

Communication Method

RS-232C. . . . . Full-duplex communication method
USB . . . . . Half-duplex communication method

Synchronization Method

Asynchronous communication method

Electrical Specification

RS-232C. EIA-232-D/E
USB USB2.0

Baud rate

1200/2400/4800/9600/19200/38400/57600/115200bps

Transmission Code Composition

Start bit. . . . . 1 bit
Parity bit . . . . . None/Odd number/Even number
Data bit. . . . . 8 bit
Stop bit . . . . . 1 bit/2 bit

6.5.2 Per Model Specifications

Model	Max (g)	e (g)	d (g)	Weighing Range (g)	Accuracy Class	Windshield	Span Adjustment
TE623	620	0.01	0.001	0 - 620.090	II	X	External
TE1203	1200	0.01	0.001	0 - 1200.090	I		
TE3202	3200	0.1	0.01	0 - 3200.90	II	--	
TE6202	6200	0.1	0.01	0 - 6200.90			
TE15001	15000	1	0.1	0 - 15009.0			
TE623R	620	0.01	0.001	0 - 620.090	II	X	Internal and External
TE1203R	1200	0.01	0.001	0 - 1200.090	I		
TE3202R	3200	0.1	0.01	0 - 3200.90	II	--	
TE6202R	6200	0.1	0.01	0 - 6200.90			
TE15001R	15000	1	0.1	0 - 15009.0			

Table 6-1. Model Specifications

6.5.3 Functional Specifications

Item	Description
Weighing System	Tuning fork vibration method
Weighing Modes	Weighing/counting/percentage/multiplied by coefficient/animal/specific gravity/statistical/formulation modes
Functions	Functions related to the operation — comparator/adding/tare-subtraction reminder/zero-point adjustment reminder/stability waiting/bar graph/backlight/auto power off/simple SCS
	Function related to the performance — stability discrimination width/response speed/zero tracking
	User information settings — preset tare/weight/percentage/counting/multiplied by coefficient comparator
	Functions related to the lock — total lock release/key lock/menu lock
	Controlling and adjustment functions — key assessment for mode selection/free key/balance ID/password/ ISO/GLP/GMP output (English, German, Spanish, French, Japanese)/date and time setting/designation of minimum indication/span adjustment at power on/direct start
Display	LCD with backlight 7-segment: maximum 8-digit/segment height up to 16.5 mm 16-segment: maximum 20-digit/segment height up to 8.5 mm Bar graph: 40 step
Tare range setting	Weight subtraction with the tare key
Zero tracking	Enabled (can be disabled in settings)
Display when overloaded	When the indication limit is exceeded, <OVER ERROR> is indicated.
Output	RS-232C compliant output is equipped as standard (D-sub9P male connector) USB (type B connector)
Span adjustment	TE type: External span adjustment and calibration
Counting mode minimum unit weight	TE-223 -TE-1203: 0.001 g TE-3202 - TE-6202: 0.01 g TE-15001: 0.1 g
Percentage mode weight limit	TE-223 - TE-1203: 0.1 g TE-3202 - TE-6202: 1 g TE-15001: 10 g
Power	Dedicated AC adapter (100-240 VAC / 50-60 Hz) Dry cell batteries USB bus power: connected with PC in which the driver is installed
Ratings	AC adapter: 4-6VDC 0.3A Battery box (4 AA): 4-6VDC 0.3A USB: 5VDC 0.3A
Dimensions of weighing pan	TE-223 - TE-1203: 118mm TE-3202 - TE-15001: 160 x 180mm
Balance weight (net)	TE223 - TE1203: 2.6 kg TE1502 - TE15001: 2.7 kg
Operating conditions	Temperature: 5-35 degrees C Humidity: 85% or lower (no condensation) Pollution degree: 2 Altitude: 2000m or less above sea level Location of use: indoor
Option	Extension RS-232C, relay contact, Ethernet

Table 6-2. Functional Specifications

RICE LAKE®
WEIGHING SYSTEMS

230 W. Coleman St. • Rice Lake, WI 54868 • USA
U.S. 800-472-6703 • Canada/Mexico 800-321-6703 • International 715-234-9171 • Europe +31 (0)26 472 1319