ES SERIES

ELECTRONIC LCD BALANCE

INSTRUCTION MANUAL

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1. INTRODUCTION

This manual covers installation, operation and troubleshooting for the ES Portable Advanced Electronic Balances, odels.ES-10(S),ES-20,ES-50, ES-120,ES-200,ES-200A,ES-300,ES-300A,ES-300S,ES-350A,ES-600, ES-1100,ES-1100S,ES-2100A,and ES-3000S ES-5000,ES-5000A. To ensure proper operation of the balance, please read this manual completely.

2. DESCRIPTION

The ES Portable Advanced balances are precision weighing instruments, designed to provide years of service with virtually no maintenance .The Portable Advanced housing is constructed of a material which is impact resistant. contains a one piece solid-state precision electronics PC board. and a five digit LCD display which is 0.5 inches in height. All Portable Advanced balances are initially factory set to measure in grams and can be set to measure in other units of measure as desired. Each balance operates through a series of menus which enable precise calibration and the selection of various parameters which enhance operation. A built in lock switch prevents calibration settings from being changed. Power is supplied through an AC adapter or batteries.

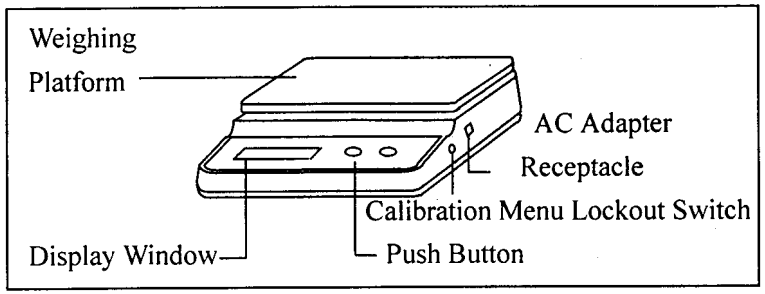
3. Portable Advanced balances contain two display menus which enable you to calibrate and configure the balance for specific operating requirements.

- CALIBRATION Menu–Allows the balance to be calibrated by using standard weights.
- SETUP Menu–allows the balance to be set for environmental conditions and customized for specific weighing functions.

When the balance is first turned on, it can be used to weigh in grams tare items without setting the menus. Refer to the individual menus in this manual for detailed descriptions and procedures for programming.

4. UNPACKING

All Portable Advanced balances are supplied with a weighing platform, some of which have been installed, AC power adapter, instruction manual.



5. INSTALLATION

Environment

Balance performance can be affected by excessive air currents, corrosives, vibration, temperature or humidity extremes.

5.1 DO NOT use the balance:

- Next to open windows or doors causing drafts or rapid temperature changes.
- Near air conditioning or heat vents.
- Near vibrating, rotating or reciprocating equipment.
- On an non-level work surface.
- Near corrosive vapors (example : nitric acid).

5.2 Power Options

The balance can be operated using 4AA alkaline (not included), or from any AC electrical outlet using the AC adapter supplied.

5.3 Battery Installation

(1) Turn the balance over.
(2) Press the tabs on the battery cover inward and lift the cover off.
(3) Remove the battery holder.

(4) Install the 4AA alkaline battery in the battery holder, orienting the Plus (+) and minus (-) ends as indicated on the holder.
(5) Replace the battery cover.

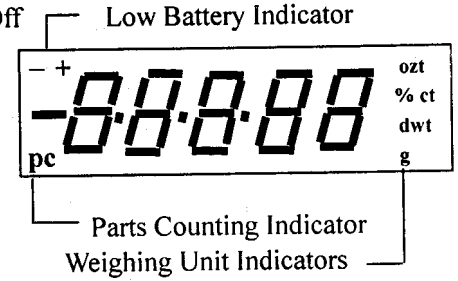
5.4 AC Adapter

Plug the jack from the adapter into the receptacle located on the right side of the balance. Plug the adapter into a 220v or 110v AC outlet.

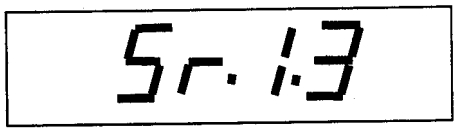
6 OPERATION

6.1 Turning the Balance On and Off

Will no load on the platform, press (ON TARE) All segments of the display will turn on, then the software version is displayed.



NOTE: Allow at least 5 minutes for the balance to temperature stabilize before using. If the balance is moved to a different temperature environment, allow additional time to stabilize.



To turn the balance off, press and hold (OFF MODE) until OFF is displayed, then release it.



6.2 Checking Calibration

Before using the balance, its calibration should be checked. The balance has been calibrated before shipment, however, calibration is influenced by factors such an:

(1) Variations in the earth gravitational field at different latitudes of the world.
(2) Rough handling.
(3) Changes in work location.

(4) Height above sea level.

To check the balance's calibration, place a known mass on the center of the platform and read the displayed weight.

If the displayed weight differs from the known mass by more than acceptable limits, refer to the Calibration Menu and the Specifications at the rear of the manual.

6.3 Weighing

(1) Press (ON TARE) to set the display to zero.

(2) Place the object to be weighed on the platform.

(3) Wait until the unit indicator appears before reading the displayed weight. When the unit indicator appears, the reading is stable.

6.4 Taring

When weighing samples that must be held in a container, taring enables the balance to subtract the weight of the container and display only the net weight of the sample.

(1) Press (ON TARE) with no load on the platform to set the display to zero.

(2) Place the empty container on the platform.. Its weight will be displayed.

(3) Press (ON TARE) . Zero will be displayed and the container's weight will be
stored in the balance's memory.

(4) Add the sample to the container and read its net weight on the display.

(5) When the container and its contents are removed, the container weight will be displayed as a negative number.

The tared weight will remain in memory until (ON TARE) is pressed again or the balance is turned off.

6.5 Parts Counting

Parts Counting must be enabled in the Setup menu before using This procedure. The balance will count parts based on the weight of a reference sample, 5, 10, 20, 30, 40 or 50 parts. For optimum results, the parts should be uniform in weight.

(1) Repeatedly press (OFF MODE) until pc CON is displayed.

(2) Place a container on the platform, then press (ON TARE) . the balance displays pcADD 5 which is the preset reference quantity. "5" shows the quantity of the reference sample.

(3) To change the reference quantity, repeatedly press (OFF MODE) until the desired quantity displayed.

Parts Counting Factory Settings
Parts Counting Mode ..... Disabled
P C Err ..... OFF

NOTE: If you need to exit or restart parts counting at any time, press (ON TARE) and hold unit pc CON is displayed, then release it. Return to step 2 to (OFF MODE) restart, or press for other weighing functions.



(4) Add the displayed number of parts to the container, then press (ON TARE) The balance will display the current number of parts.



NOTE: If PCErr is displayed, the sample is too small to provide accurate results within the selected parts counting error level (PCErr of the Setup menu).



(5) Add parts to the container as desired and read the quantity on the display. At this time, only "PC" counting signal is displayed.

NOTE: The reference quantity will remain in memory until it is changed or balance is turned off.

(6) To switch between viewing the quantity and weight of the parts, press (OFF MODE)

7 USING MENUS TO CONFIGURE THE BALANCE

The following illustration identifies the items in each menu and The factory default settings are shown in bold type.

SETUP

- RESET
  - Yes, No
- SEL (Unit selection)
  - g, oz, ozt, dwt, lb, t, %(ct) , PC
  - DFLT/USR
- AL (Averaging level)
  - 0, 1, 2
- Stb (Stability)
  - .5d, 1d, 2d, 5d
- AUtO 0 (Auto zero)
  - OFF, .5d, 1d, 3d
- CUnIt (Custom unit conversion faction)
  - Mantissa
    - 1.0000
  - Exponent
    - E0, E1, E2, E3
    - E-3, E-2, E-1
  - LSE
    - .1d, .2d, .5d, 1d
    - 2d, 5d, 10d
- PCErr (Parts counting error level)
  - OFF, 1, 2. 5, 5
- A. OFF (Auto off)
  - OFF, 60, 120, 180
- End

To access a menu, press and hold (ON TARE) until desired menu appears, then release it.

Use these buttons to step through menus and select submenus:

(OFF MODE) next selection

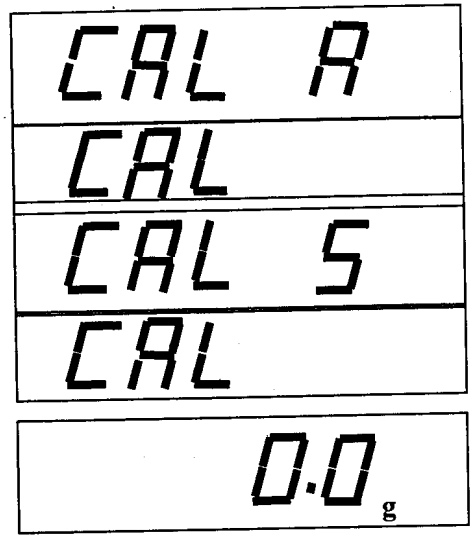
(ON TARE) select displayed item

7.1 Calibration Menu

All the Portable Advanced balances can be calibrated with standard masses. Dress and hold (ON TARE) with no load on the platform, until "CAL" is displayed, then release it. Access "CAL" menu. Balance will first display "CAL". In a few seconds, balance will



display "CAL A", then put the required calibration masses listed in the adjacent table center of the platform. Press (ON TARE), balance displays "CAL". In a few seconds, balance will display "CAL S". Take away the weight from the platform,



press (ON TARE), balance display "CAL". In a few seconds, balance will display zero, indicating that calibration ends. Normal weighing can be done.

7.2 Calibration Menu Lockout

(1) The Calibration menu may be locked out to prevent unauthorized access.

(2) When calibration end, turn the Lockout switch on the right side of the balance forwards.

calibration menu may be stored in balance memory forever unless calibration menu is changed.

(3) When the Lockout switch is turned backwards, calibration menu cannot be stored in memory. It will disappear with no electricity .

7.3 Calibration Masses

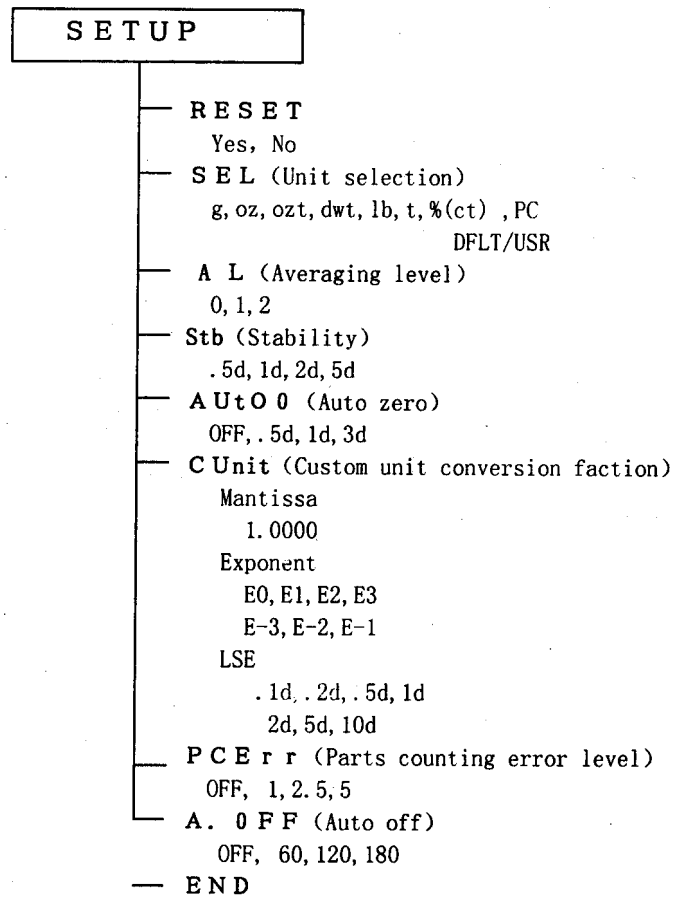
Before beginning calibration, make sure calibrated masses are on hand. If you begin calibration and realize masses are not available (masses are not accurate), either turn the balance off, or go through the procedure without masses. The balance will use previously stored

Required Calibration Masses	
MODEL	Span Masses
ES-10	10g
ES-20	10g or 20g
ES-50(A)	50g
ES-120	100g
ES-200(A)	100g or 200g
ES-300(A)	100g or 300g
ES-350A	100g or 300g
ES-300S	100g or 300g
ES-600	200g or 500g
ES-1100(S)	1000g
ES-2100A	1000g or 2000g
ES-3000A(S)	1000g or 3000g
ES-5000(A)	5000g

calibration date. Calibration should be performed as necessary to ensure accurate weighing.

8. SETUP MENU

The Setup menu is used to customize the operation of the balance for your specific requirements. It contains submenus which enable you to turn features on or off, and program balance parameters. The illustration below indicates in which submenus appear on the Setup menu.



8.1 Accessing the Setup Menu

To access the Setup menu, press and hold (ON TARE) until **SETUP** is Displayed, then release.

8.2 To access a submenu :

(1) Repeatedly press (OFF MODE) until the desired submenu is displayed.

(2) Press (ON TARE) to select the displayed submenu.



NOTE: You must use END to store any changes you make to the Setup menu.

The following sections Describe each item on the Setup menu in detail.

SETUP MENU FACTORY SETTING	
Unit Selection	g
Averaging level	1
Stability	1 d
Auto Zero	. 5 d
Conversion	
Mantissa	1. 0000
Exponent	0
LSD	1
PC Error Level	OFF
Auto Off	OFF

8.3 Reset to Factory Settings

This submenu enables you to reset all Setup menu selections to the original factory setting outlined in the adjacent table.

To reset to factory settings:

(1) Access the Reset submenu.

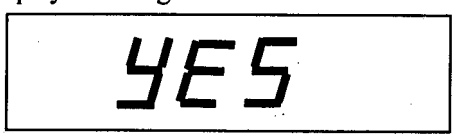
(2) Press (ON TARE) to enter RESET.

(3) Press (OFF MODE) repeatedly to change the setting from **YES** to **NO**.

Selecting YES resets the Setup menu to the original factory setting.

(4) Press (ON TARE) to accept the displayed setting.

8.4 Unit Selection





The Unit Selection submenu permits you to specify which weighing units and operating modes will be enabled for use during operation. The adjacent table lists the units and modes available on Portable Advanced balances.

(1) Access the Sel submenu.

(2) Press (ON TARE) , the display will show the grams unit indicator (g) along

with the current status (ON/OFF).
(3) Press to change the status.
(4) Press to accept the displayed status, when released, the display will show the next unit indicator along with the current status.
(5) Set each unit or mode ON or OFF as in steps 3 and 4.

8.5 Taels

If taels are enabled, you will be required to choose one of three different taels: Hong Kong, Singapore, or Taiwan.

(1) When the display shows TAEL1, press (OFF MODE) to change to another tael if desired.

(2) Press (ON TARE) to accept the displayed tael.

8.6 Unit Selection (Cont.)

Proceed through all of the weighing units in the same manner, setting each one as desired.

Custom Units

Custom Units can be set to one of the following:

DFLT Causes carats to be used as the custom unit.

USR Enables you to enter a conversion factor (to convert grams to some other unit of measure), and display weight in the desired custom units. The conversion factor is entered in the C. Unit submenu.

Display Indicator	Weighing units and Modes
g	grams
oz	ounces
ozt	troy ounces
dwt	pennyweight
lb	pounds
t	taels
%(ct)	custom unit
pc	parts counting





Hong Kong

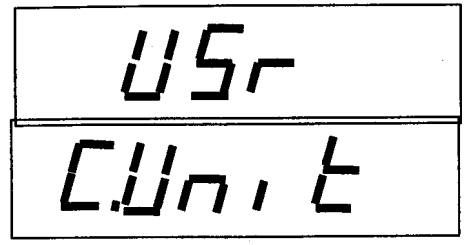


Singapore



Taiwan.





8.6.1 Custom Unit Conversion Factor

When you need to display weight measurements in a weighing unit Other than those provided standard with the balance, this feature can be used to create your own custom weighing unit. It permits you to enter a conversion factor which the balance will use to convert grams to the desired unit of measure.

One example is shown at the end of this section. It illustrates how to set the conversion factors to display weight in Grains.

SCIENTIFIC NOTATION

Conv. Factor	Number Between 0 and 9.9999		Power of10		Man-tissa	Exponent
1234	1.234	×	1000	=	1.234	10^3
123.4	1.234	×	100	=	1.234	10^2
12.34	1.234	×	10	=	1.234	10^1
1.234	1.234	×	1	=	1.234	10^0
.1234	1.234	×	.1	=	1.234	10^{-1}
.01234	1.234	×	.01	=	1.234	10^{-2}
.00123	1.23	×	.001	=	1.23	10^{-3}

Conversion Factor × Weight in Grams = Weight in custom unit

Conversion factors are expressed in scientific notation and entered into the balance in three parts:

- A number between 0 and 9 to four decimal places.
- A power of 10 called the exponent.
- A least significant digit (LSD).

Use the following procedure to enter conversion factors:

(1) Access the C. Unit submenu.

(2) The mantissa of the current conversion factor will be displayed. This will



FLASHING



FLASHING

be a number between 0 and 9. 9999 with the first digit flashing. For conversion factors outside of this range, the exponent will be used to move the decimal point.

(3) Press (OFF MODE) to change the value of the first digit.

(4) When the desired value is displayed, press (ON TARE) to accept it and the nest digit will begin flashing.

(5) Set the value of all digits in the same manner.

(6) After the last digit is entered, the display will show the current exponent. The exponent is shown on the display preceded by the letter E. There are 7 exponent values which you can choose from (see table).

(7) Press (OFF MODE) to change the exponent.

(8) Press (ON TARE) to accept the displayed exponent. When (ON TARE) is released, the display will show the current least significant digit.

The least significant digit is the digit in the last decimal place on the display. The selection you make causes the balance to count by 1's, 2's or 5's in this position. There are 7 LSD settings you can choose from (see table).

(9) Press (OFF MODE) to change the LSD.

EXPONENTS	
E-3	Moves decimal point 3 places to the left.
E-2	Moves decimal point 2 places to the lift.
E-1	Moves decimal point 1 place to the left.
E0	**Leaves decimal pointing normal position**
E1	Moves decimal point 1 place to the right.
E2	Moves decimal point 2 places to the right.
E3	Moves decimal point 3 places to the right.



LSD's	
LSD .1	Adds one decimal place And Display counts byl's
LSD .2	Adds one decimal place And Display by counts by 2's
LSD .5	Adds one decimal place Display counts by 5's
LSD 1	**Display counts by 1's (Normal Setting)**
LSD 2	Display counts by 2's
LSD 5	Display counts by 5's
LSD 10	Display counts by 10's

(10) Press (ON TARE) to accept the displayed LSD. When (ON TARE) is released, C. Unit will be displayed again and the Setup menu will be returned.

(11) Proceed to the next item on the Setup menu or use END to exit the Setup menu and save your selections.

8.6.2 Converting to "Grains"

(1) Determine the number of grains equal to one gram:

IF 1 grain = 0.0647989 grams

THEN 1 gram = 1 / 0.0647989

(2) Since the balance displays only 5 grains digits, round the number to the 5 most significant digits:

OR 1 gram = 15.43236

(3) Using this number, enter the conversion factor: "15432"

The display will indicate 1 unit for every grain placed on the platform.

Number = 1.5432

E = 1 (to move the decimal point one place to the right)

d = 1 (normal setting)

8.7 Averaging Level

Averaging level compensates for vibration or excessive air currents.



During operation, the balance continually takes weight readings from the weighing cell. Successive readings are then digitally processed to achieve a stabilized display. Use this submenu to specify how much processing you need to obtain stable results.

NOTE: Averaging level does not affect balance accuracy.

Select one of three averaging levels using the adjacent table as a guide.

To view or change the averaging level:

(1) Access the AL submenu.

(2) Press (ON TARE) to display the current setting.

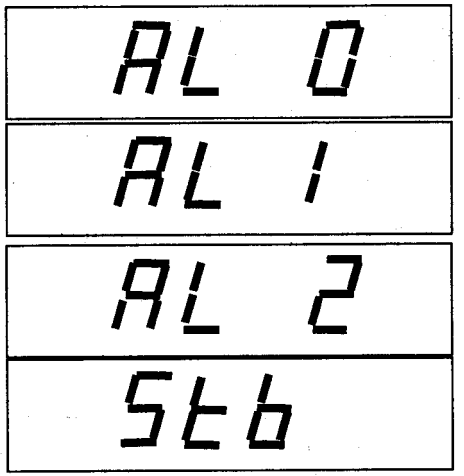
(3) Press (OFF MODE) to change the setting.

(4) Press (ON TARE) to accept the displayed setting, when released, AL will be displayed again.

AVERAGING LEVEL		
AL	0	Reduced stability, fastest stabilization time.
AL	1	Normal stability , normal stabilization time
AL	3	More stability , slow stabilization time.

8.8 Stability Range

The tability range specifies how much a displayed weight may change while the stability indicator (unit indicator) remains ON. When displayed weight changes beyond the allowable range, the stability indicator turns OFF indicating an unstable condition. Portable advanced balances permit you to select one of four stability ranges (in divisions) as shown in the table.



NOTE: When the RS232 interface is configured to print stable data only, the stability range also governs data output. Displayed data will only be output if it is within the selected stability range.

To view or change the stability range:

(1) Access the Stb submenu to display the current setting.

(2) Press (ON TARE) to display the current setting.

(3) Press (OFF MODE) to change the setting.

(4) Press (ON TARE) to accept the displayed setting, when released, Stb

will be displayed again.

8.9 Auto-Zero

Auto-Zero minimizes the effects of temperature changes and shift on the zero reading. By defining a threshold level in divisions, the balance maintains the zero display until the threshold is exceeded. This submenu permits you to select one of three threshold levels, or turn the feature OFF. Auto-Zero only functions when the display reads zero.

.5d	Smallest range: stability indicator is ON only when displayed weight is within. 5 division.
1d	**Normal range.**
2d	Increased range.
5d	Largest range: stability indicator is ON with displayed weight changes Up to 5 division.

To view or change the auto-zero setting:

(1) Access the Auto 0 submenu.

(2) Press to display the current setting.

(3) Press to change the setting.

(4) Press to accept the displayed setting, when released, auto 0 will be displayed again.

8.10 Parts Counting Error Level

The parts counting error level is based on the resolution (readability) of the particular model balance and sample weight. The adjacent table lists error levels that you can choose from.

To view, change or disable the parts counting error level:

(1) Access the PC Err submenu.

(2) Press to display the current setting.

(3) Press to change the setting.

(4) Press to accept the displayed setting, when released, PC Err will be displayed again.

8.11 Auto Off

Auto Off permits the selection of either OFF, 60 seconds, 120 seconds or 180 seconds. When this function is selected, the balance will turn off if it is idle for the selected period of time (60, 120 or 180 seconds). This feature is especially useful when the balance is operated from internal batteries.

To view, change or disable the auto off feature:

(1) Access the A. Off submenu.
(2) Press to display the current setting.
(3) Press to change the setting.
(4) Press to accept the displayed setting. When is released, A. Off will be displayed again.

8.12 END

You must use End to exit the Setup menu. Changes you made in the Setup menu are only stored in memory if you use End.

To exit the Setup menu and store your settings, press when END is displayed. When is released, the balance will be returned to normal weighing operations.

9. CALIBRATION LOCK-OUT PROTECTION

Access to the Calibration menu can be disabled using the lock out Switch located on the right side of the balance.

(1) Turn the balance off and unplug the power cord.
(2) Locate the access hole on the right side of the balance where the switch is located and remove the plug from the hole.
(3) Using a small screwdriver, slide the switch to the front of the balance for LOCKED or towards the rear of the balance for UNLOCKED.
(4) Replace the plug in the access hole.

Plug in the power cord and turn on the balance.

10. CARE AND MAINTENANCE

To keep the balance operating properly, the housing and platform should be kept clean and free from foreign material. If necessary, a cloth dampened with a mild detergent may be used. Keep calibration masses in a safe dry place.

Unplug the AC Adapter when not in use. For long term storage, remove the batteries.

11. TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY
No Display	Power Adapter not connected. Batteries are dead.	Connect power Adapter. Replace batteries
LO BAT Indicator	Batteries are weak	Replace batteries
Incorrect Weight Reading	Balance was not re-zeroed before weighing Balance has not been	Press ON TARE with no weight on the platform, then weigh item.
Calibration Procedure does not work	Incorrect weights being Used	Use correct weights.
Unable to display Weight in a particular weighing unit	Weighing unit not Enabled in Setup menu.	Use Unit Selection submenu to set desired units ON (see Setup menu).
Unable to access C. UNIT in Setup menu to enter Conversion Factor	Custom Units (•) not Enabled in Setup menu, or not set to USR.	Use Unit Selection submenu to set Custom Units (•) to USR.
Balance won't store Selections made in Setup menu	END selection was not used to exit Setup menu.	You MUST use END to Exit Setup menu and Save selections.

12. Error Codes

The following list describes the various errors which can appear on the display and the suggested remedy.

Display Description

Err 0 With the platform on, this indicates the platform is too light, make it heavier properly. If this error still occurs, the sensor or the circuit board may be destroyed. The balance must be sent to the manufacturer to be serviced.

Err 1 Sample being weighed exceeds the capacity of the balance. If error occurs when the sample is within the balance capacity, balance may be incorrectly calibrated.

Err 2 This indicates there is no platform or the platform is too light when turning the balance on. Please put the platform on before turning on the balance.

Err 3 This indicates there has been weight on the platform when turning on the balance. Remove the weight from the platform before turning on the balance.

Err 4 Value is too large to display; exceeds 99999 counts. Possibly caused by an invalid custom unit conversion factor.