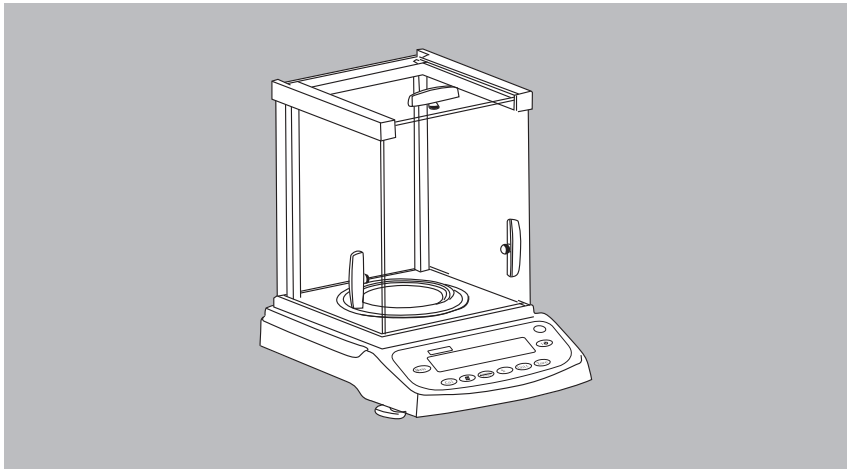
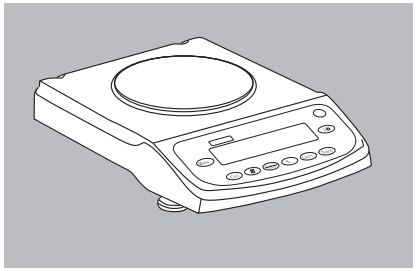
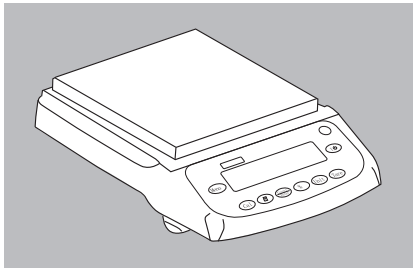
ES Series Electronic Balance

User Manual







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Signs in This Manual:

● Indispensable Porcedure
○ Procedure to be taken under certain condition
〉 Value displayed after some procedure
- Some item in the table of contents
※ Something needs special attention

Section One: Attentions and Safety Information

Safety

●To avoid unnecessary demage to the balance, please pay attention to the following tips,

※ Please do not use this balance in dangerous area

※ Only the trained technicians could operate this balance

※ Please turn off the power of the balance before connect it or disconnect it with other facilities

※ If the environment requires a higher safety standard, please follow the relevant installation instructions.

※ Excessive electromagnetic interference will make the displayed value in this balance change. Once the interference is dismissed, the balance could operate in normal way.

※ Please avoid any liquid on the surface of the balance. A piece of lightly damp cloth is allowed to wipe the balance.

Installation

※ Please make sure the local voltage is in line with the rated voltage on the name board.

－Please pay special attention when use Rs232 as the pins location might be incompatible with our facilities. Please check the pins locations before the connection and turn off the connection of different configuration.

※ If the facility or the power cord has apparent damage, please turn off the power, put it or them in a safe place and do not use it or them before they are fixed.

－This balance could only be connected to our accessories or optional fittings. We are not responsible for any modification the operator makes to our balance，including using the facilities and cable which are not supplied by us. However, we are always ready to offer the operation norms information.

○ Please do not open the balance. If the guarantee lable is damaged, our quality guarantee will automatically cease being effective.

○ If the balance does not work well, please contact your local distributor or our customer service center.

Section Two: Preparatory Works before Using

Storage

－This balance requires an environment which is free from excessive high or low temperature, corrosive, vibration, air current and collision.

Unfolding the Package

● Unfold the package and check if there is any outer damage of the balance

○ If there is outer damage, please refer to section “routain maintenance and troubleshooting”

○ Please keep all the package for possible transportation in the future. When pack the balance, please remove all the cables to avoid unnecessary damagre.

Package List:

－the balance

－weighing pan －pan support －power adapter

－user manual(guarantee card included) －bottom hook

－inspection certificate －dust shield －quality certificate

（the following is for ES120、ES200、ES320、ES410、ES500）

－wind shield －shield ring －shield plate

Installation

Put it in a proper place, please avoid the following situations,

－much heat and direct sunlight

－air currents

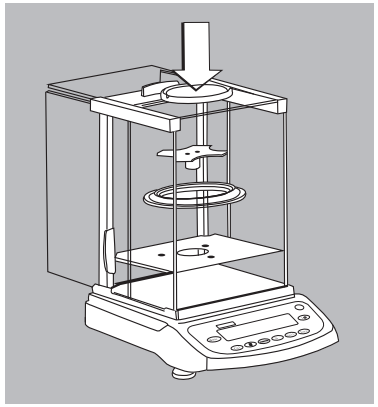
－vibration

－excessive moisture

Usage Conditions

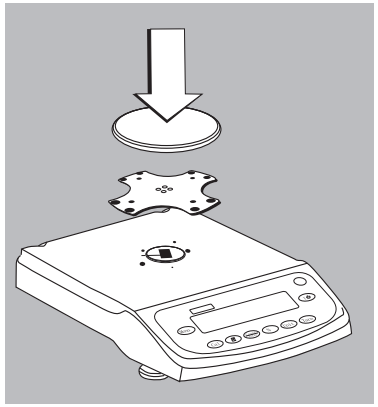
Please do not lay the balance in a quite damp palce for a long time. If the balance is transferred from a lower temperature environment to a higher temperature environment, please lay it there with power off for around 2 hours.

Section Three: Installation Instructions



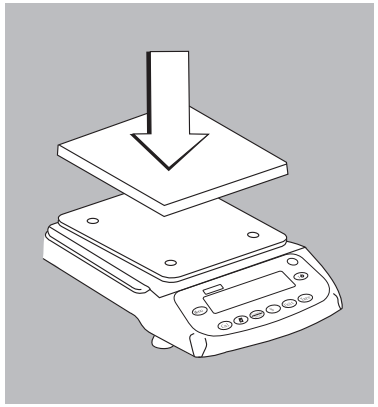
Install the balance with wind shield

● Installation Sequence
— shield plate
— shield ring
— pan support
— weighing pan



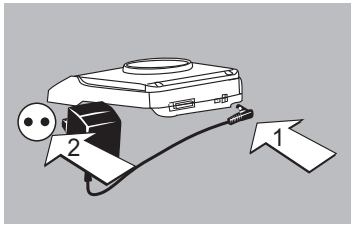
Install the balance with round weighing pan

● Installation Sequence
— pan support
— weighing pan



Install the balance with square weighing pan

● Installation Sequence
— pan support
— weighing pan
※Notice: when to set the weighing pan, put the rubber pat in the proper place and adjust the pan to make sure there is no connect between the balance shell and the weighing pan.



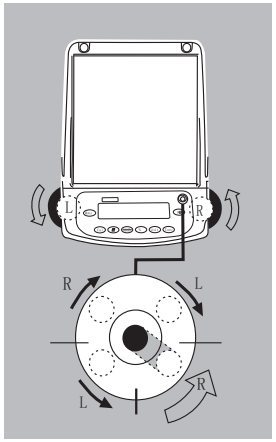
Connect the Power Adapter

Only the power adapter offered by us is allowed.

● connect the power adapter to the balance
● connect the power adapter to the power socket

Install the External Facilities

Turn off the balance before connect it or disconnect it with external facilities （such as the printer or the computer)



Warm-up Time

To assure the measure accuracy, the balance must be warmed up for 30 minutes before normal operation.

Adjust the Level Gauge
Purpose:

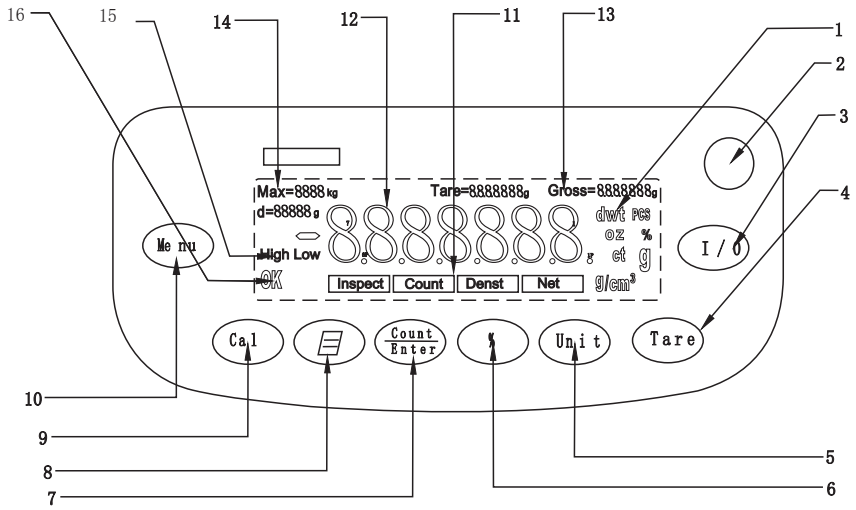
—adjust the level guage of the balance
The level guage needs to be adjusted once its place is changed. The two front bottom bolts are used to adjust the level guage.

●Spin the two bolts as shown in the figure until the bubble in the level gauge is in the ceter of the circle.

> Normally, it needs to be adjusted repeatedly.

Section Four: Operation

The Display and The Keys



Position	Name	Position	Name
1	Weighing Units	2	Level Gauge
3	Power Switch	4	Tare
5	Unit Conversion	6	Weighing Percetage Key
7	Count/Function Confirmation Key	8	Print/Output Key
9	Calibration/Adjustment Key	10	Menu Key

11 Weighing Mode Signs: Inspect: Inspect Mode
Count : Count Mode
Density: Density Mode
(※ES-Ⅱ series) Net: Tare Weight/Gross Weight/Net Weight

12 Displayed Weight Value

13 Tare Weight/Gross Weight Sign (※ES-Ⅱ series)

14 Capacity/Readability

15 High/Low warning sign

16 OK indicator (of stable display)

Display Information:

1. Ok: Reading shown is stable.
2. g: Reading shown is given in grams.
3. oz: Reading shown is given in ounces.1g=0.03527396200oz
4. Ct: Reading shown is given in carats. 1g=5.00000000000Ct
5. dwt: Reading shown is given in pennyweight. 1g=0.64301493100dwt
6. %: Reading shown is given in as a percent weight.
7. PCS: Reading shown is given in as a counting.
8. ------: The balance is developing a stable reading.
9. UNABLE: Error operation.
10. HHHHHH: The weight on the pan exceeds the capacity of the balance.
11. LLLLLL: The pan is not properly seated or has been removed.

Calibration

Purpose:

To decide the accuracy of the balance through test the difference between the reading and the actual weight of the object on the weighing pan.

※Prerequisite of calibration:

－There is no loading on the weighing pan.

－Press the Tare key.

－The interior signals are stable.

External Calibration

Procedure:	Key		Display
1. Adjust the level guage and warm it up for 25 minutes. 2. Press Tare key.	(Tare)		0.00g
3. Press Cal key, the balance will read its full range, such as 3000. Press Tare key repeatedly, it reads the calibration point within the range (such as 2000, 1000, ……)	(Cal)	(Tare)	3000

4. Choose one calibration point and place the right weight on the pan. Press Cal key, the balance reads CAL---.	Cal	CAL---
5. When the external calibration is finished, the balance reads the value of the weight on the pan (such as 3000).		3000.00g

Internal Calibration

(This procedure is for the models of CW with built-in autuomatic calibration weight.)
When the internal calibration begins, the built-in weight will be automatically loaded and unloaded.

Procedure:	Key	Display
1.Press Tare key.	Tare	0.00g
2. Press Cal key, the balance reads its full range, Such as 3000. Press Tare key repeatedly until it reads Cal in.	Cal Tare	3000， Cal in
3. Press Cal key, the balance reads CAL---, then the built-in weight is automatically loaded.	Cal	CAL---
4. When the internal calibtration is finished, the built-in weight is automatically unloaded and it reads 0.00.		0.00g

Basic Weighing:

Features:

— Tare function

— Printing the Weight Value

Preparatory Works

● Power on: press I/O key.
● If necessary, press Tare key to deduct the tare weight

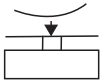
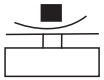
○ If necessary, modify the firm ware version: please refer to section “User Setups”.

Additional function:

○ Turn off the balance: press I/O key.

Example

Basic Weighing:

Procedure	Key/Instruction	Display/Print
1. Plug in the power, the balance will automatically proceed system initialization and deduct the tare weight.	I/O	0.00g
2. Place the container on the weighing pan		+55.5g
3. Press the Tare key	Tare	0.00g
4. Place the sample object in the container		1200.00g
5.Print the weight value		N+1200.00gs

Count Mode

Displayed Sign: PCS

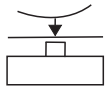
Purpose:

To decide the total number of the components of similar weights. First, get the weight of a known number of the components as a reference, then we could get the average weight of the compon ent. Then the amount of the components on the pan will be decided.

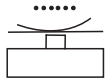
Change the amount of the reference samples:

Press Count/Enter key;
Choose the reference amount (10, 25, 50 …1000)

Example: Counting the number of the components with same weight

Procedure	Key	Display/ Output Data
1. Place the empty container on the weighing pan		50.55g
2. Press the Tare key	Tare	0.00g
3.Choose the amount of the reference samples.Press Count/Enter key, the balance reads “qTy10”. Press Count/Enter key, choose the number of the samples and place the right samples on the weighing pan or in the container. Press Unit key, the balance reads the amount number of the samples. The unit displayed on the LCD display is PCS.	Count/Enter  Unit	Qty 10 10

4. Assure the amount number of the samples and start the application. There are the amount numbers for samples, 10、25、50、100. The bigger the number, the more accurate for the counting. Press COUNT key repeatedly to choose any one of the numbers. The choosed reference number will be saved until a new reference number is set or the power is off.
5. Add the same components you want, you could read the value when OK is on the display.



100pcs

6. If necessary, the displayed value could be printed. 100pcs
7. Remove the components from the balance.
8. To repeat the counting, start from step 4.
9. Reference Data

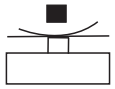
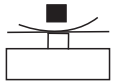
※Press Unit key to convert between counting mode and weighing mode. PCS indicates piece number. Press Uunit key to convert between the weighing units : g,Oz, Ct and dwt.

Percent Deviation:

Displayed Sign: %

Purpose: To calculate the percentage a weight varies from a reference.

Example: Percent Weighing

Procedure:	Key	Display/Output Data
1. Press the Tare key.	Tare	0.00g
2. Press the reference object on the weighing pan. When the reading is stable, press % key, it reads "100.000" or "100.00", which relates to the accuracy100.00% of the balacne. Meanwhile, it displays %.	 %	100.00%
3. Remove the reference object, the balance reads "0.000" or "0.00"。		
4. Place the goal object on the weighing pan.		67.89%
5.Wait for the "ok" on the LCD, read the display, the display indicates percent deviation from the reference.		
6.Press Unit key, the balance returns to normal weighing mode.	Unit	0.00g

To test the percentage a weight in a container varies from a reference, please follow the steps below,

1. Put an empty container on the weighing pan. Press the Tare key.
2. Place the standard object in the container.。
3. Press % key. Wait for the stable display, it reads "100.000" or "100.00"
4. Remove the container with standard object. Put another same container on the weighing pan, wait for the stable display, it reads "0.000" or "0.00".
5. Add the goal object in the container, wait for the stable display, the value displayed is the percentage the weight of the goal object varies from the standard weight.
6. Press Ubit key to return to basic weighing mode.
7. If necessary, the weight of the goal object could be printed out.

Inspecting Mode

Purpose: To decide if the weight of the goal object is within the set range.

Displayed Sign: LOW, HIGH (with warning sound of buzzer）or OK

Setup Parameters:
Set up the highest and lowest weight value and start the inspect mode (please refer to section "Inspect Setups").

Example:

Procedure	Key	Display/Output Data
1. Enter inspect program:	Menu	PrInT
Press Tare key repeatedly	Tare	InSPCT
until it reads INSPCT.	Count/Enter	SET HI
Choose inspect mode.	Count/Enter	0.（initialization value）
2.Set up the highest weight	Count/Enter	SET dP.
3.Set up the decimal position:	Tare	SET d.P
Press Tare key repeatedly	Count/Enter	0
until it goes to the right	Count/Enter	（initialization highest value）
decimal position. Confirm		
the accuracy.		
4.Set up the highest value	Count/Enter (to increase the value)	
Confirm the highest value	Tare (to decrease the value)	1500.0
	Menu	1500.0glittering
	Count/Enter	SET HI
5.Set up the lowest value	Tare	SET LO
Choose the decimal position:	Count/Enter	SET dP.
Press the Tare key repeatedly	Tare	SET d.P
until it goes to the right decimal	Count/Enter	0
position.		（initialization lowest value）
Confirm the accuracy.		
6.Set up the lowest value	Count/Enter（to increase the value）	
	Tare(to decrease the value)	1490.0
7.Confirm the lowest value	Menu	1490.01.Glittering
	Count/Enter	SET HI

8.Set up no warning value without loading	Tare（repeatedly）	NoNres
	Count/Enter50	50（Default no warning for value lower than 50% of the lowest）
	Count/Enter（to increase the value）	
	Tare(to decrease the value)	20
	Menu	20（glittering）
	Count/Enter	SET HI
9. Activate the inspect mode	Tare（repeatedly）	ENABLE
	Count/Enter	0.00g
10. Press the Tare key	Tare	0.00g
11. Put the goal object on the weighing pan		1480.20g
12. If the balance reads “LOW”, it indicates		LOW

the goal weight is lower than the lowest value; if it reads “HIGH” also with buzzer warning sound, it indicates the goal weight is higher than the highest value. If the goal weight in within the lowest and the highest value, it reads “OK”.

13. If necessary, the inspect result could be printed out.

14. Remove the goal object from the balance.

○ To exit the inspect mode: press Menu key, it reads PRINT. Press Tare key repeatedly until it reads INSPECT. Press Count/Enter key, it reads SET HI. Press Tare key repeatedly until it reads dISAbLE. Press Count/Enter, the balance exits from inspect mode.

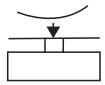
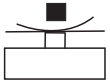
○ To clear the lowest and highest values: press Menu key, it reads PrInT. Press Tare key repeatedly unitl it reads InSPCT. Press Count/Enter key, it reads SET HI. Press Tare key repeatedly until it reads CLEAr. Press Count/Enter, then the balance clears the set values.

Net Mode (only for ES-Ⅱ series balance)

Purpose: To measure the net weight and gross weight with tare weight.

Sign displayed: NET

Example:

Procedure:	**Key**	**Display/Output Data**
1. Enter NET mode	Menu	PrInT
Press Menu key to enter NET mode. Press Tare key repeatedly until it reads nET.	Tare	nET
Press Count key to confirm.	Count/Enter	nET Y
Choose NET mode, it reads nET Y, press Count key.	Count/Enter	0.00(NET light)
2. Place the container on the weighing pan.		+55.50g
3. Press the Tare key.	Tare	NET= 0.00g Tare=55.50g Gross=55.50g
4. Place the sample in the container.		NET= 120.00g Tare=55.50g Gross=175.50g
5. Print out the weights.		N+120.00gs T+55.50gs G+175.50gs

To exit NET mode and return to basic weighing mode, please follow the procedures below,

1.Press Menu key, the balance reads PrInT. Press Tare key repeatedly until it reads NET.

2.Press Count/Enter key, the balance reads NET Y.

3.Press Tare key repeatedly until it reads NET N.

4.Press Count/Enter key, the balance reads 0.00 and return to basic weighing mode and NET does not show on LCD.

User Setups

The balance could be set up to meet individual requirement.

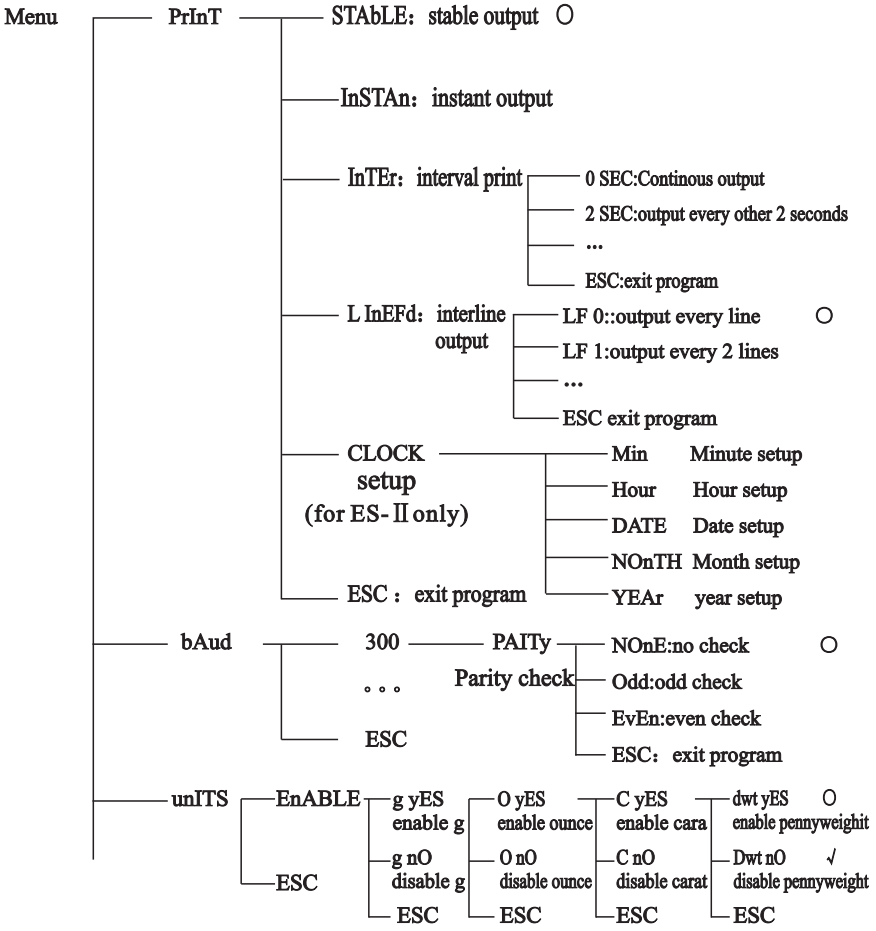
Keys's Function in User Setups

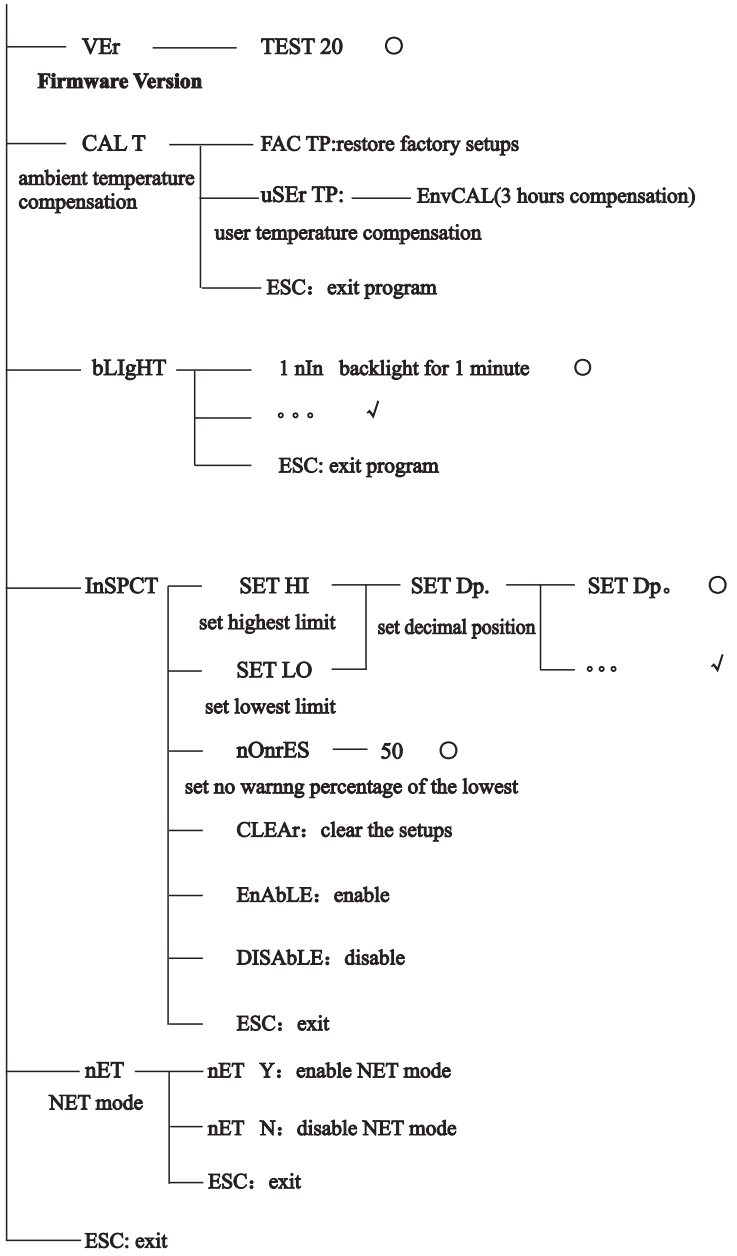
Press Menu key to enter setup program. Press Tare key to choose the item to be set up, then press Count/Enter to confirm. Anytime to exit the setup program, press Tare key, it reads "ESC", then press Count/Enter to confirm.

Menu Parameter Setups

○= Factory Default Setups √= Customer Setups

Level 1 Level 2 Level 3 Level 4 Level 5





Print Setups

There are three print types,

STABLE Print: print a stable reading when it is attained.
INSTANT Print: print immediately after press the Print key.
INTERVAL Print: print at predetermined time intervals.
The number of line feeds also is set for label printing.

Notice:

※The print function is separate from the line feed setup, i.e, set the print function first then set the number of line feeds.

To set the print type, use the following procedure:

1. Print Menu, the balance reads “PrInT”.
2. Pring Count/Enter key, the balance reads “STAbLE”, which indicates stable print as the default.
3. Press Tare key to choose the print type and press Count/Enter to comfirm.
4. Press Tare key until it reads “InTEr”, press Count/Enter, it reads “ SEC”. Press Tare key repeatedly to see the predetermined time interval and press Count/Enter to confirm. “0 SEC” indicates continuous print.
5. Print Count/Enter key to return to weighing mode.
6. After entering print setup, press Tare key repeatedly to choose line feed setup “LinEFd”.
7. Press Tare key repeatedly to see predetermined line feeds (1-18). Choose the proper line feeds, press Count/Enter key to return to weighing mode.

※ For ES-Ⅱ series balances, there is time data in the printing. It's necessary to adjust the time in line with local time first. The procedure is as follows,

1. Press Menu key, the balance reads PrInT.
2. Press Count/Enter key, the balance reads STAbLE.
3. Press Tare key until it reads CLOCK, press Count/Enter to confirm.
4. The balance reads Min. Press Count/Enter, the balance reads the minute time. If the time is right, press Menu key. Then the display glitters, press Count/Enter key to confirm and the balance returns to upper menu. If the time needs modified, press Count/Enter to Increase and press Tare key to deduce. When it reads the right time, press Menu key, the display glitters. Press Count/Enter key to confirm and the balance returns to upper menu with the reading "Min".
5. To modify the data of Hour, Date, Month and/or year, press Tare key, the balance reads Hour、DATE、NOnTH、YEAr, press Count/Enter key to confirm. Then refer to step 4 above for specific modification. To exit, press Tare key repeatedly until it reads ESC, press Count/Enter key to confirm.

Setting the Baud Rate

1. Press Menu key.
2. Press Tare key, the balance reads “bAud”.
3. Press Count/Enter key, the balance reads “300”.
4. Press Tare key repeatedly, the balance display the other buad rates. Choose the proper rate and press Count/Enter to confirm. The balance reads “ParITy” and begins parity check.
5. Press Count/Enter key, the balance reads “nOnE” (no check) for the first.
6. Press Tare key, it reads the other check types, “Odd” indicates odd check and “EvEn” indicates even check.
7. Choose the proper check type and press Count/Enter to confirm, the balance now returns to weighing mode.

Enabling Units of Measure

The units function can be programmed to turn certain weighing units on or off.
To enable or disable certain units of measure, perform the following procedure.

1. Press Menu key, the display reads “PrInT”.
2. Press Tare key repeatedly until it reads “unIT”.
3. Press Count/Enter key, the display reads “g yes” which means g available for use. Press Count/Enter to confirm. To disable g as the unit, press Tare key, the display reads “g no”, press Count/Enter key to confirm.
4. Follow the steps above to enable or disable Oz, Ct or dwt as the unit of measure.

Restoring the Factory Default Setup

This step could reset the factory defaults.
Please follow the procedure below,

1. Press Menu key, the display reads “PrInT”.
2. Press Tare key repeatedly until it reads “InITIA”.
3. Press Count/Enter key to confirm, the display reads “BUSY” and then returns to weighing mode. Factory default setup is finished.

Backlight Setup

1. Press Menu key, the display reads “PrInT”.
2. Press Tare key repeatedly until it reads “bLgHT”, press Count/Enter to confirm, the display reads “1 nIn” which indicates the backlight will be off in 1 minute.
3. Press Tare key repeatedly to choose the desired time, 1、2、3、5、10、15、30、60 (min.are available to choose.
4. Press Count/Enter key to confirm and the balance returns to weighing mode.

Inspecting Setup

To set up the highest and the lowest weight limits, please follow the procedure below,

1. Press Menu key.
2. Press Tare key repeatedly until the display reads “InSpCT”.
3. Press Count/Enter to confirm then the balance enter limits setup and the display reads “SET HI” (to set the highest weight limit).
4. Press Count/Enter to confirm, the display reads “50” (initialization value).
5. Press Count/Enter, the display reads “SET dP” (to set the decimal position. Press Tare key repeatedly to choose the decimal position.
6. Press Count/Enter key to confirm the decimal position. The balance will display the initialization value. Press Count/Enter key to increase the value and press Tare key to decrease the value.
7. Set the desired value, press Menu key then the choosed value glitters. To continue the modification, press Tare key; to confirm the value, press Count/Enter key, the display reads “SET Hi”.
8. Press Tare key, the display reads “SET LO” (to set the lowest weight limit), then follow the steps above.
9. No warning setup: no warning when there is no loading on the balance or the weight is lower than the lowest weight limit.
   Press Menu key, press Tare key repeatedly until it reads “InSPCT”. Press Count/Enter key, the display reads 'SET HI', press Tare key repeatedly until it reads 'nOnrES', press Count/Enter, the display reads “50” (the initialization value which indicates no warning when the real weight is lower than 50% of the lowest weight). Press Count/Enter to increase the value, while press Tare key to decrease the value. Choose the disired value, press Menu key then the desired value glitters. Press Count/Enter key to confirm, the display reads “SET HI”.
10. Enabling the inspect setup: to start inspect setup, press Tare key repeatedly until the display reads “EnAbLE”, press Count/Enter key to confirm; to disable inspect setup, press Tare key repeatedly until the display reads “dISAbL”, press Count/Enter key to confirm, the balance returns to weighing mode.
11. Checking the highest and the lowest weight limits:

A.Press Menu key, the display reads “PrINT”, press Tare key repeatedly until it reads “InSPCT”.
B.Press Count/Enter key, the display reads “SET HI”.
C.Press Count/Enter key, the displays reads the highest weight limit.
D.Press Tare key, the display returns to reads “SET HI”.
E.Press Tare key, the display reads “SET LO”, press Count/Enter key, the display reads the lowest weight limit.

Notice:

※ To escape the menu setup anytime during the operation, press Tare key until the display reads “ESC”, press Count/Enter to confirm.
※ To clear the highest and the lowest weight limits, press Tare key repeatedly until the display reads “CLEAr”, press Count/Enter key, then the limits value both return to zero.
※ After any modification of the higest and the lowest weight limits, the balance needs to enter inspect mode again. Follow step 7 to step 10 to enable inspect mode.
※ The highest and the lowest weight limits would be saved in the balance. There is no need to set up the limits for the next start-up of the balance.

Section six: Additional Functions

Bottom Hook Weighing

There is a hole at the bottom of the balance for the weighing hook.

○ It is not allowed to use the bottom part to balance in legal metrology.
● Open the bottom cover of the balance
  Important Notice: Please lay the side of the balance downwards to open the bottom cover, do not make the upside down.
  To use the hook in the accessories: screw the hook clockwise in the bottom tapped hole. Stop at once to proceed if there is any resistance.
● A dhere the goal object to the bottom hook with a line a suspension line, for example.
○ If necessary, set a safety guard to avoid air current.

Density Measurement

Purpose:

This function is used to test the density of solid object with bottom weighing and buoyancy theory. For professional density measurement, please refer to user ma nual of ES-D series electronic density balance.

Application of Formula:

Sample Density = Liquid Density*Mass in Air/（Mass in Air Mass in Water）
As the liquid density varies with different temperatures, please measure the liquid temperature with the temperature meter and caculate the sample d ensity with the right water density value below.
Water Density under Different Temperature (℃)

T/℃	0. 0	0. 1	0. 2	0. 3	0. 4	0. 5	0. 6	0. 7	0. 8	0. 9
10	0. 99973	0. 99972	0. 99971	0. 99970	0. 99969	0. 99968	0. 99967	0. 99966	0. 99965	0. 99964
11	0. 99963	0. 99962	0. 99961	0. 99960	0. 99959	0. 99958	0. 99957	0. 99956	0. 99955	0. 99954
12	0. 99953	0. 99951	0. 99950	0. 99949	0. 99948	0. 99947	0. 99946	0. 99944	0. 99943	0. 99942
13	0. 99941	0. 99939	0. 99938	0. 99937	0. 99935	0. 99934	0. 99933	0. 99931	0. 99930	0. 99929
14	0. 99927	0. 99926	0. 99924	0. 99923	0. 99922	0. 99920	0. 99919	0. 99917	0. 99916	0. 99914
15	0. 99913	0. 99911	0. 99910	0. 99908	0. 99907	0. 99905	0. 99904	0. 99902	0. 99900	0. 99899
16	0. 99897	0. 99896	0. 99894	0. 99892	0. 99891	0. 99889	0. 99887	0. 99885	0. 99884	0. 99882
17	0. 99880	0. 99879	0. 99877	0. 99875	0. 99873	0. 99871	0. 99870	0. 99868	0. 99866	0. 99864
18	0. 99862	0. 99860	0. 99859	0. 99857	0. 99855	0. 99853	0. 99851	0. 99849	0. 99847	0. 99845
19	0. 99843	0. 99841	0. 99839	0. 99837	0. 99835	0. 99833	0. 99831	0. 99829	0. 99827	0. 99825
20	0. 99823	0. 99821	0. 99819	0. 99817	0. 99815	0. 99813	0. 99811	0. 99808	0. 99806	0. 99804
21	0. 99802	0. 99800	0. 99798	0. 99795	0. 99793	0. 99791	0. 99789	0. 99786	0. 99784	0. 99782
22	0. 99780	0. 99777	0. 99775	0. 99773	0. 99771	0. 99768	0. 99766	0. 99764	0. 99761	0. 99759
23	0. 99756	0. 99754	0. 99752	0. 99749	0. 99747	0. 99744	0. 99742	0. 99740	0. 99737	0. 99735
24	0. 99732	0. 99730	0. 99727	0. 99725	0. 99722	0. 99720	0. 99717	0. 99715	0. 99712	0. 99710
25	0. 99707	0. 99704	0. 99702	0. 99699	0. 99697	0. 99694	0. 99691	0. 99689	0. 99686	0. 99684
26	0. 99681	0. 99678	0. 99676	0. 99673	0. 99670	0. 99668	0. 99665	0. 99662	0. 99659	0. 99657
27	0. 99654	0. 99651	0. 99648	0. 99646	0. 99643	0. 99640	0. 99637	0. 99634	0. 99632	0. 99629
28	0. 99626	0. 99623	0. 99620	0. 99617	0. 99614	0. 99612	0. 99609	0. 99606	0. 99603	0. 99600
29	0. 99597	0. 99594	0. 99591	0. 99588	0. 99585	0. 99582	0. 99579	0. 99576	0. 99573	0. 99570
30	0. 99567	0. 99564	0. 99561	0. 99558	0. 99555	0. 99552	0. 99549	0. 99546	0. 99543	0. 99540

Example:

Testing the sample solid density with water as the buryancy liquid.

The water density under 20℃ is 0.99823g/cm3.

Proceduer	Key/Instruction	Display
a) Hang the sample solid with the suspension line		
b) Press the Tare key	Tare	0.00g
c) Measure the mass of the sample in air: Put the sample on the weighing pan.		
d) Write down the mass of the sample in air.		
e) Remove the sample from the balance.		
f) Measure the mass of the sample in solid: Put the sample in the container of liquid.		
g) Write down the mass of the sample in lquid.		
h) Caculate the sample density with the data above.		

Appendix

Communication with a Computer

The balance keyboard functions can be accessed via the RS232 interface. The following commands are available:

U：Unit ····· units conversion

T：Tare ····· deduct the tare weight

C：Cal ····· calibration with external standard weight

P：Print ····· print function

%：% ····· percent function

：# ····· instant print

M：Count····· counting function

When a balance is connected to a computer, it is suggested that immediate print (#) be used. In response to this command the balance will transm it whatever number or message appears on the balance display.

The string format output is shown below:

A B C D E F G H I J K L M

A： +/- signs field; usually no display as a space when it is a positve number, - is displayed when it is a negative number.

B~G： number and decimal field; spaces are used when there are less than six digits.

H~I： spaces field

J： unit field; it describes the units of the number being transmitted. Your balance will transmit G for grams, O for ounces, C for carats.

K： stable character; it corresponds to the “OK” indicator on the display. S means the reading is stable, space means the reading is not stable.

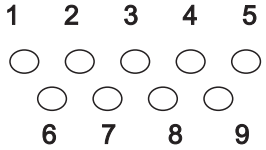
L： return character

M： line feeds character; it indicates the line feeds.

The RS232 Interface Hardware:

This balance adopts the transmit and receive lines of standard RS232.
The data format is 1 start bit
8 data bits include parity
1 stop bit

The instruction to connect the balance to external device is as follows,



RS232 pins

PIN DESCRIPTION
2：TXD---- scale transmits data
3：RXD---- scale receives data
5：GRD---- signal ground

Notice:

※ “handshake” signals, such as “clear to send” (CTS) are not used. The peripheral must have a minimum buffer (15 characters).

※ It is suggested that the maximum recommended cable length is 15 meters; the load impedance of the device connected should be between 3000 and 7000 ohms with no more than 2500 pf shunt capacitance.

Routine Maintenance and Troubleshooting

Service

If you request, our company could supply the sole service contract.

Troubleshooting

Only the trained professionals are allowed to do repair work. There is risk for the user if non-professionals do the repair.

Clearance

- Turn off the balance and unplug the data cables.

※ Avoid the liquid into the balance.

※ Any corrosive cleaner (solvent) is forbidden to use.

- Wipe the balance with a piece of soft cloth.
  Remove the weighing pan before wipe the balance.
- Remove the shield ring and pan support with the weighing pan which helps avoid damage to the weighing system.

Clearing the Stainless Steel Surface

All the stainless steel components need to clean regularly. Remove the weighing pan and thoroughl clean it with a damp cloth or sponge. The cleaner applicable to stainless steel are recommended. Wipe the stainless steel surface of the balance first and then clear the stainless weiging pan. Make sure there is no dirt and then wipe the stainless steel component again. Dry the balance by air. If necessary, smear the proper oil on the surface as additional protection.

Notice:

※ After remove the weighing pan and the pan support, avoid any liquid or solid pellet into the installation hole.

Safety Check

If the balance could not work normally,

- Cut off the power immediately, keep and do not use it again.

〉 Keep it in a safe place to make sure it won't be used for the moment.

〉 Inform the nearest service center or the distributor. The repairman must have had professional training.

Troubleshooting

The common troubles and the corresponding solutions are as follows,

Display	Reason	Solution
--------	the balance could not get a stable reaading or the transducer is damaged	contact your local service center
HHHHHH	the real weight is 5% higher than its capacityor the transducer is damaged.	unload or contact your local service center
LLLLLL	a. the weighing pan is not on b. there is wrong connect with the pan c. the tranducer is damaged	install the right weighing pan and press the Tare key clear the connect contact your local distributor
NOCAL	calibration is unresponsive	refer to calibration section, check if it is the right calibration weight
UNABLE	lack of data or wrong data with which the balance could not perform the function	refer to user manual
Unstable Reading	unstabel the ambient environment (excessive vibration or air current) or there is wrong connect with the pan	put the balance in another place clear the wrong connect
No Display	no work voltage no connection with transformer	check the power supply circuit and the instrument; connect the transformer
Apparent Wrong Weighing Display	no calibration or the tare weight is deducted	calibrate the balance deduct the tare weight before weighing

If there is any other trouble, please contact your local distributor or service center .

Quality Assurance

Our company warrant the balance to be free from defects in materials and workmanship. During the warranty time, we offer free repaire or replacement for the defects below,

1. The balance is under normal use with the instructions we offer, kept well and there is no accidental damage, no wrong installation or maintenance.
2. No one beyond our company or not authorized by our company has ever repaired or replaced the balance.
3. The product serial number is complete without defect or alteration.
4. The defect is during normal installation, use and maintanence, and confirmed by our company.
5. Before the balance is returned, our company needs to be informed and freight-to-collect is not accepted.

Our company are not responsible for the following situations:

1. Damage which results from wrong use or accident;
2. Damage which results from unauthorized service;
3. Damage during the transportation;
4. Damage which results from the experiment of other special purpose;
5. Damage during normal use when it is out of the warranty date.

Our company are responsible for the defects during the warranty time. If we could not repair or replace the produt, the payment of the product would be returned to the purchaser. And we are not responsible for any defects out of user's wrong installation. Our responsibility is only for the products which have defects. Our company are not responsible for the accident or the chain loss.

Our company offer an one-year quality warranty from the purhcase date. Any agency or individual is not authorized with the warranty above.

Summary 2

Technical Conditions

Built-in automatic calibration weight	for CW series balances only
AC power, voltage, AC frequency	AC-DC adapter, input 220V/110V, output 7.5V (+15% to -20%) 48~60HZ
Power Consumption	Maximam=16W, Average=8W

Ambient Environment Condition

The technical conditions must be assured in the environment situations below,

work temperature range	+10℃ to +30℃（50° F to 86° F）
temperature range allowed	+5℃ to +40℃（41° F to 104° F）

The balance could assure the normal work during +5℃ (41° F) to +40℃ (104° F).

Technical Parameter

Model	ES120	ES200S	ES320	Es410	ES500
Capacity	120g	200g	320g	410g	500g
Readability	0.001g	0.001g	0.001g	0.001g	0.001g
Tare Range	120g	200g	320g	410g	500g
Repeatability ≤ (standard deviation)	±0.001g				
Reponse Time s (average value)	2.5				
External Calibration Weight (Minimum Accuracy Level)g	100(F1)	200(F1)	200(F1)	200(F1)	500(F1)
External Calibration Point	100	100，200	100，200	100，200 300，400	100，200 500
Net Weight/kg	4.0				
Weighing Pan Size/mm	Φ115				
Interior Shield Height/mm	230				
Shape Size/mm	230X310X330				

Model	ES1200	ES2000	Es3200	ES4100	ES5000
Capacity	1200g	2000g	3200g	4100g	5000g
Readability	0.01g	0.01g	0.01g	0.01g	0.01g
Tare Range	1200g	2000g	3200g	4100g	5000g
Repeatability ≤ Repeatability	±0.01g				
Reponse Time s (average value)	2.5				
External Calibration Weight (Minimum Accuracy Level)g	1000(F1)	2000(F1)	2000(F1)	2000(F1)	5000(F1)
External Calibration Point	1Kg	1Kg, 2Kg	1Kg, 2Kg 3Kg	1Kg, 2Kg, 4Kg	1Kg, 2Kg,5Kg
Net Weight/kg	2.2				
Weighing Pan Size/mm	Φ160				
Shape Size/mm	230X310X90				

Model	ES1200K	ES2000K	ES3200K	ES4100K	ES5000K
Capacity	1200g	2000g	3200g	4100g	5000g
Readability	0.01g	0.01g	0.01g	0.01g	0.01g
Tare Range	1200g	2000g	3200g	4100g	5000g
Repeatability(standard deviation)	≤	±0.01g			
Reponse Time(average value)	s	2.5			
External Calibration Weight (Minimum Accuracy Level)g	1000(F1)	2000(F1)	2000(F1)	2000(F1)	5000(F1)
External Calibration Point	1Kg	1Kg, 2Kg	1Kg, 2Kg 3Kg	1Kg, 2Kg, 4Kg	1Kg, 2Kg,5Kg
Net Weight/kg	2.3				
Weighing Pan Size/mm	180x180				
Shape Size/mm	230X310X90				