

**FA2004B Electronics Balance  
Operation Instructions**

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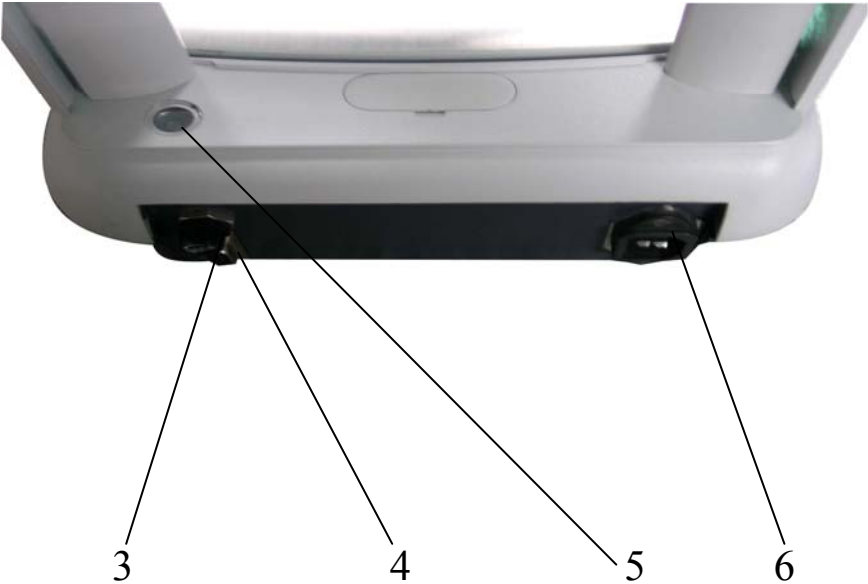
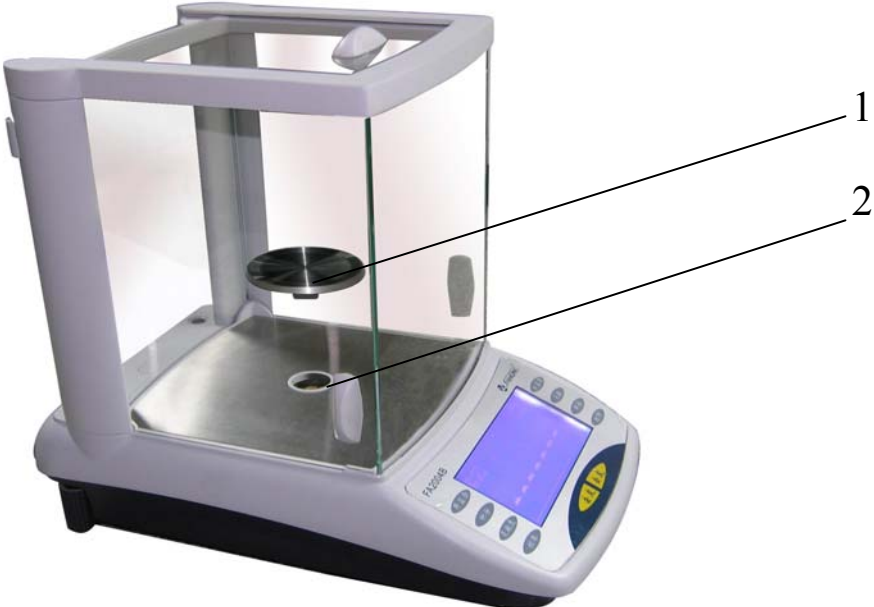
## **I. Outline**

The balance is a multifunction electronic balance adopting MCS-51 series single chip microprocessor. The weighing can be automatically calibrated, the integrating time can be adjusted and the sensitivity can be selected like common intelligent electronic balances. Besides, it has three weighing systems for users' choice: gram, metric carat and troy ounce (the metric carat and the gold and medicine ounce are for the exported balance). The data interface is provided with RS232C universal two-way serial inter face, which can be connected to the microprocessor and serial printer (e. g., TP $\mu$ P-T16S, etc.). The data output has also five modes for users' choice, including timing in three steps, continuous, and manual output.

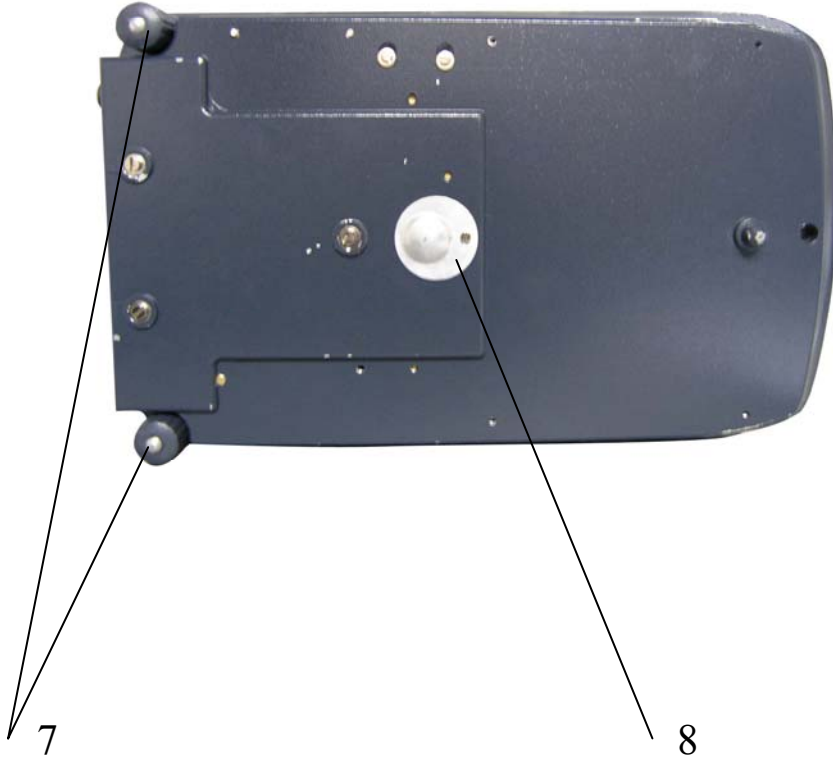
## II. Main Technical Parameters

<b>Model</b>	FA2004B
Weighing range	0 to 200g
Actual Scale Division Value	0.1mg
Taring Range	0 to 200g
Repeatability Deviation	0.0002g
Accuracy Degree	Ⓡ
Stable Time (typical)	≤8s
Integrating Time (adjustable)	2.5/5/10s
Pan Diameter (mm)	Φ80
Overall Dimensions (mm)	350×210×346
Net Weight	8.5kg
Power Supply	220± <sup>22</sup> 33V、50Hz
Power Consumption	12V.A
Auto Calibration Weight Range	200g
Warm-up Time	180min

**III. Drawings for Balance Installation**



- 1. pan
- 2. pan connector
- 3. fuse
- 4. data interface
- 5. level bubble
- 6. power socket



7. adjustable level leg

8. small round cover (hook inside)

## IV. Operating

### §1 Preparation

- Unpack the box and remove all the packing. Take out buffer sponge in the wind-proof cover and install pans.
- Put the balance on a stable working table free from vibration, sunshine and air flow.
- Ambient temperature: Balance of grade  $\text{I}$ :  $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ , with a fluctuation of temperature not greater than  $1^{\circ}\text{C}/\text{h}$ ;  $\text{II}$ :  $20^{\circ}\text{C}\pm 7.5^{\circ}\text{C}$ , with a fluctuation of temperature not greater than  $5^{\circ}\text{C}/\text{h}$ .
- Relative humidity: Balance of grade  $\text{I}$ :  $< 50\% \sim 75\%$ ;  $\text{II}$ :  $< 50\% \sim 80\%$ .
- Working voltage:  $220\text{V}\pm\frac{22}{33}\text{V}$ , 50Hz.

### §2 Operation

- Check the level meter before operation. If the bubble is not in the center, adjust the level legs to make the bubble in the center.
- The balance adopts soft touch buttons, so it can be controlled with multi-keyboards. It is easy to operate. Function change and selection can be realized simply by depressing the corresponding buttons.
- Introduction of the keyboard on the panel:
  - “ON” – key to switch on the display screen
  - “OFF” – key to switch off the display screen
  - “TAR” – key to set zero (taring)

**“INT”** – key to adjust the integrating time

**“ASD”** – key to adjust the sensitivity

**“CAL”**– key to calibrate the balance, confirm the count function (for detail see §5), and confirm the percent load (for detail see §7)

**“COU”** – key of count function (not count function for balance with dual range, this key is “RNG”. For detail see §6)

**“UNT”** – key for system conversion in balance with dual range (For detail see operation in §6)

**“PRT”** – key of output mode setting

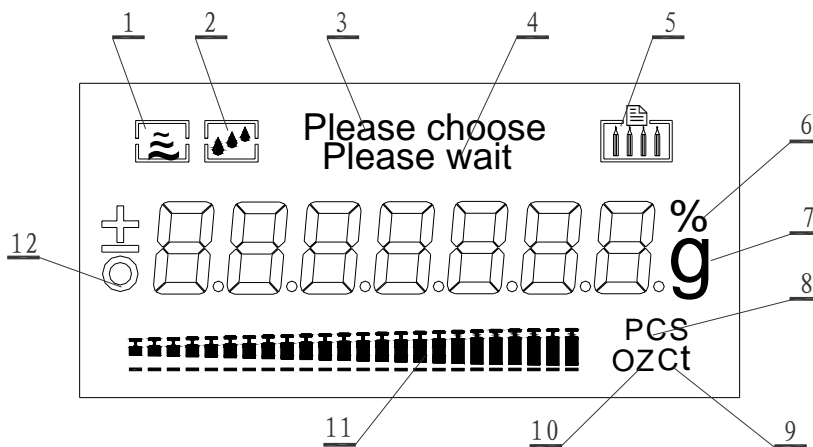
- Introduction of LCD panel (see the sketch):

1. Integrating time icon ---- when the integrating time is adjusted as “—INT—1”, only a wave is displayed on the button in the icon frame.
2. Sensitivity adjustment icon ---- when the sensitivity is adjusted as “—ASD—1”, only a drop is displayed on the left in the icon frame.
3. Display flickers when the user sets and selects the menu.
4. Display flickers when the user is asked to wait (pressing key “CAL” in the count function excluded. For detail see operation in §5 ).
5. Printing output mode icon ---- when the mode of “—PRT—1” is selected only a pen is displayed on the left in the icon frame.



- 6 – 10. Weighing system ----- e. g., “ct” is carat in the metric system and “oz” is ounce for gold and medicine.
11. Weighing icon ----- with the weighing increases the value indicated by the weights increases pro rata. When the weighing is full, all the display of the weights equals the dotted line below.
12. Stability mark ----- reading of the balance is accurate only when “o” goes out, otherwise, not.

Sketch of LCD panel



### §3 Start

- Select an appropriate line voltage and set the voltage switch to the corresponding position.
- Turn on the power on and the balance is ready to run (but the display doesn't work), normally warm-up is needed before the display panel can be operated. For accurate measurement, balance of grade  $\textcircled{\text{I}}$  needs to be powered three hours for warm-up, while graded  $\textcircled{\text{II}}$  needs one hour.

For emergency, weighing can be done through calibrating the balance before use for accurate measurement, if the warm-up time is not enough.

- Function of the keyboard

“ON” displays on

Depress slightly the button “ON”, the display will be lighted.

Check the function of the display, about 2 seconds later, the model of the balance will be displayed:

For example:

— 2 0 0 4 —

Then the weighing mode:

0 . 0 0 0 0 g    o r    0 . 0 0 0 g

“OFF” displays off

Depress slightly the button “OFF”, the display will go out (now the balance is still powered).

*If the balance will not be used for a long time, the power plug should be taken off.*

“TAR” sets zero

Put the container on the pan, the weight of the container should be displayed:

+ 1 8 . 9 0 0 1 g

Depress “TAR” button, the display will go out and the display will be all zero, the display will show that the container weight has been removed:

0 . 0 0 0 0 g

When the container is removed, a negative value of the container weight will be displayed:

- 1 8 . 9 0 0 1 g

Depress “TAR” again, the display will be all zero, i. e. the balance clears:

0 . 0 0 0 0 g

**§4 Balance Calibration**

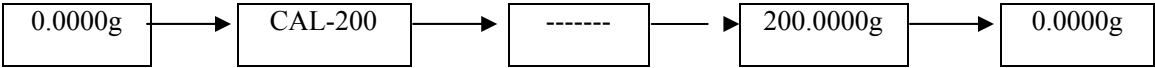
After a long period of storage, movement, change of environment, the weighing unit may not be displayed on the panel, one weight may be displayed on the left button of the display panel when there is no any weighting carried out. Normally, the balance should be calibrated before use in order to obtain precise measurement.

- Preparation for the balance calibration:

Take away all the objects to be weighed on the pan. For balance FA2004B, as an example, set modes Cou-0, INT-3, ASD-2, and UNT-0 (default when balance is on). Depress slightly “TAR” for clearing the balance.

- Calibration

Depress slightly “TAR” will be on the flash-display of “CAL-200”. Release the button, indicating a calibration is needed with a standard weight of 200g. Therefore, put the prepared 200g standard weight on the pan, waiting status of “Please wait” appears on the display panel, the flash-display of “CAL-200” will stop. After several seconds, “200.0000g” will displayed, while “Please wait” goes out. Remove the calibration weight, the display should indicate 0.0000g. The calibration is finished. If not, clear once again and repeat the above procedures. (Twice of calibration are recommended in order to get accurate result). The display sequence of the calibration is shown in the figure below:



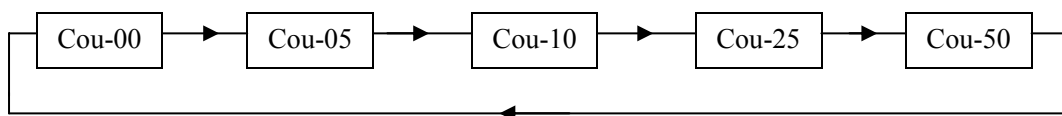
## §5 COU Count Function

There is no such function in the dual range balance.

The single range balance has a function of counting. The average numbers are in four steps of 5, 10, 25, and 50.

The setting of range of average numbers:

Only depress “COU” and hold, “Please choose” will appears on the display panel, while the menu display will be circulating continuously as the following:



It means the average value of 5, 10, 25, and 50 objects respectively.

If a normal weighing function is required, release when Cou-00 displays, and waiting status “Please wait” will be indicated, at last 0.0000g weighting status will be indicated.

If the average value of five is required, release when “Cou-05” displays, “Please wait” appears, then put 5 objects on the pan when “Please wait” goes off. Now “Please wait” appears again. Depress “CAL” once immediately before “Please wait” goes off again. Then, waiting status of “-----” and “Please wait” appear again. After several seconds, 5 will be displayed. Take away the objects to be weighed, “0” will be displayed on the panel. At that time the counting of the same objects to be weighed can be done. (Attention: the weight of the objects to be weighed must not be greater than the maximum weighing range of the balance).

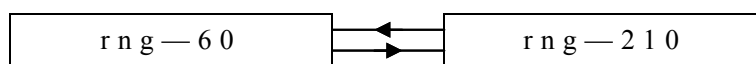
If you average over 10, 25, or even 50 objects, then the accuracy of counting will be higher.

## §6 RNG Weighing Range Conversion

The balance with due range has two reading accuracies. For example, balance FA2104SB: 0.1mg within range 0 to 60g. If the range is above 60g, the balance converts its reading accuracy to 1mg automatically. But through the function of taring of 0 to 210g, the accuracy will be 0.1mg for reading step by step if the total weight is below 210g, (the analysis quantity is below 60g); if the weight of the container is above 60g, depress slightly “TAR”, taring the weight of the container first, then weigh the object ( $\leq 60g$ ), the reading accuracy is still 0.1mg.

- Set the weighing range

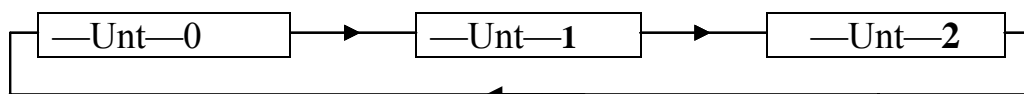
Depress “RNG” and hold, while the display is shown as the following figure, circulating continuously:



If the accuracy of the reading needs to be 0.1mg, release when the display is rng—60; and then appear waiting state “-----” and “Please wait”. After several seconds, weighing state will be shown at last. The setting is finished.

## §7 UNT Unit Conversion

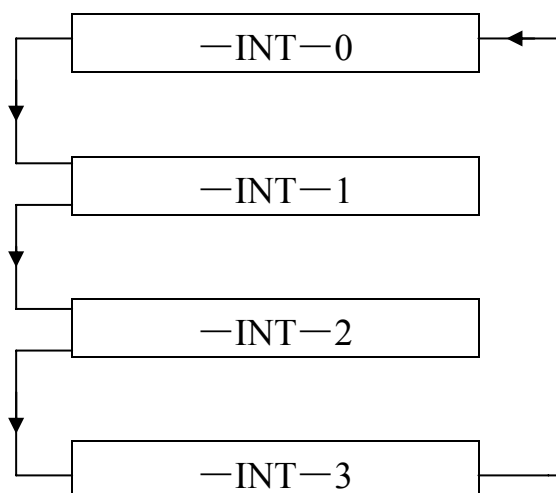
Depress “UNT” button and hold the display of “Please choose” will appear on the panel, while the following menu is circulating continuously:



“0” means the value is expressed in “gram”, “1” means the value is expressed in “ metric carat/ct”, and “ 2” means the value is expressed in “gold and medicine ounce/oz”. The unit will be set same as “RNG”.

## §8 INT Integrating Time Adjustment

Depress “INT” button and hold, “Please choose” will appear on the panel, while the display is shown as the following menu, circulating continuously:



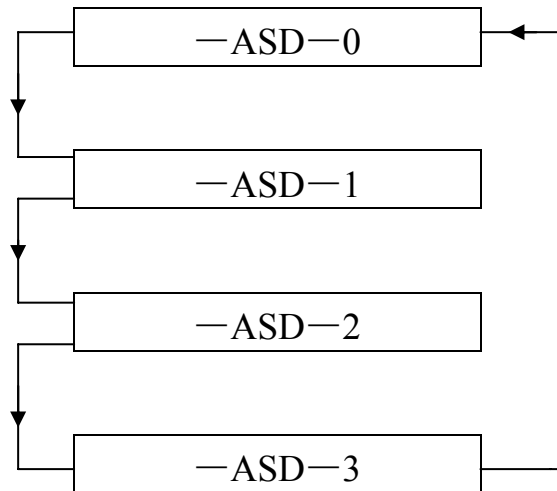
The corresponding integrating time is as follows:

-INT-0 fast, -INT-1 shorter, -INT-2 short, and -INT-3 longer.

The selection of the integrating time button “INT” will be the same as “RNG”.

## §9 ASD Sensitivity Adjustment

Depress “ASD” button and hold, “Please choose” will appear on the panel, while the display is shown as the following menu, circulating continuously:



The corresponding sensitivity will be:

-ASD-0 the highest, -ASD-1 high, -ASD-2 higher, and -ASD-3 low.

Where -ASD-0 is used for test run and not to be used by the users. The selection of sensitivity button “ASD” is the same as “RNG”.

Here is a list of ASD and INT for user’s reference only.

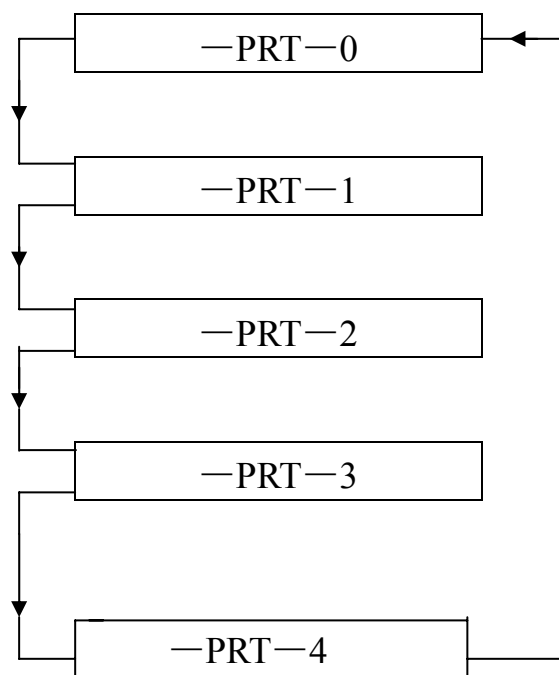
The fastest weighing:                   INT—1        ASD—3

**Normal:**                                    **INT—3        ASD—2**

With undesirable environment:        INT—3        ASD—3

### §10 PRT Output Mode Setting

Depress “PRT” and hold, “Please choose” will appears on the panel, while the display is shown as the following menu, circulating continuously:



PRT-0 is the mode of indefinite time output; slightly depress “PRT” once, the weighing result will be output on the output interface once. Attention: At this time you should depress the button slightly and quickly, otherwise, the next output mode will be displayed.

PRT-1 output once every half a minute.

PRT-2 output once every minute.

PRT-3 output once every two minutes.

PRT-4 output continuously.

The setting of “PRT” is the same as “RNG”.

## §11 Operation of Weighing, Taring, Add Objects, Read Deviations

- Weighing:

After selection of the above modes by the user, (the default when the balance is powered is: “INT-3, ASD-2, and PRT-4) depress “TAR”, zero displays. Put the object to be weighed on the pan. When the number is stable, i. e. “0” and “Please wait” indication on the left of the display goes out, the number displayed will be the weight of the object.



- Taring:

Put the container on the pan, the weight will display. Depress “TAR”, zero display. That is taring. Put the object to be weighed into the container, the value displayed is the net weight of the object to be weighed.

- Accumulative weighing:

Put the objects to be weighed on the pan one by one with taring method and tare and clear for each one. Take away all the objects to be weighed, the absolute value displayed is the total weight of the objects to be weighed.

- Add Objects

Set the mode of “INT-0, ASD-0” and put the container on the pan, then tare. Add the objects to be weighed (liquid or loose objects) into the container one by one. The continuous reading value can be obtained quickly. When the added objects reach the required weight, “0” and “Please wait” indication on the left on the display goes out and the number displayed is the weighing value required by the user. When adding the mixed objects, the net weight of each object can be measured by taring method.

- Reading deviations:

Put the reference weight (or sample) on the pan and tare. Then take off the reference weight. The negative value of weight displays. Put the object to be weighed on the pan. The corresponding plus or minus deviation will display, comparing the weighed object with the reference weight.

- Unload:

Loose the screws of the bottom cover, reveal the hook. Put the balance on a working table with a hole. Level and calibrate the balance. An object can be weighed with the hook.

## V. Maintenance and Troubleshooting of the Balance

- Maintenance:

The balance should be used carefully. Clean the pan and the case frequently with soft cloth and toothpaste. Don't wipe the balance with strong agent.

- Troubleshooting:

No.	Trouble	Cause	Remedy
1	Display not fully lit	<ul style="list-style-type: none"> <li>· Power in not on</li> <li>· Display switch is not on</li> <li>· Instant interference</li> <li>· Micro fuse broken</li> </ul>	<ul style="list-style-type: none"> <li>· Check and turn it on again.</li> <li>· Depress "ON" button.</li> <li>· Switch on again and replug power cord.</li> <li>· Replace the fuse. If broken again, send it to the service center.</li> </ul>
2	Display the upper half only "-----"	<ul style="list-style-type: none"> <li>· Overload</li> <li>· The calibration in the internal memory may be damaged</li> <li>· The pan is not installed correctly</li> </ul>	<ul style="list-style-type: none"> <li>· Reduce the load immediately.</li> <li>· Recalibrate according to the above procedures. About 8 seconds after the standard weight has been put on, the calibrated result may be displayed. A certain stable time is necessary.</li> <li>· Take out the pan and reinstall the pan.</li> </ul>
3	Display the lower half only "-----"	<ul style="list-style-type: none"> <li>· The pan is not installed correctly</li> <li>· Without pan, too light</li> </ul>	<ul style="list-style-type: none"> <li>· Take out the pan and reinstall the pan.</li> <li>· ditto.</li> </ul>
4	The weighing result is not stable (data changed swiftly)	<ul style="list-style-type: none"> <li>· Due to air flow</li> <li>· The working table is not stable</li> <li>· The integrating time is too short</li> <li>· Room temperature fluctuates</li> </ul>	<ul style="list-style-type: none"> <li>· Close the windproof cover.</li> <li>· Place the balance on a stable working table.</li> <li>· Select longer integrating time.</li> <li>· Control room temperature.</li> </ul>

5	The result is not correct	<ul style="list-style-type: none"> <li>· Not zeroing before weighing</li> <li>· Use the balance without calibration or the calibration weight is not accurate</li> <li>· The line voltage is not correct</li> </ul>	<ul style="list-style-type: none"> <li>· Depress “TAR” button.</li> <li>· Recalibrate the balance.</li> <li>· Change to the correct voltage.</li> </ul>
6	Display remains at a certain digit or indicates nonsense symbol	<ul style="list-style-type: none"> <li>· Possible instant interference</li> <li>· Wrong line voltage</li> </ul>	<ul style="list-style-type: none"> <li>· Turn on the balance once again or replug the power cord.</li> <li>· Change to normal line voltage.</li> </ul>
7	The stable mark “o” and “Please wait” do not go out	<ul style="list-style-type: none"> <li>· A higher balance sensitivity</li> <li>· Undesired environment, such as strong air flow, vibration, or severe room temperature fluctuation</li> </ul>	<ul style="list-style-type: none"> <li>· Set to a lower sensitivity.</li> <li>· Improve environment.</li> </ul>
8	Remain at waiting status “Please wait”	<ul style="list-style-type: none"> <li>· The balance position is not correct, e.g. with strong air flow, vibration or great fluctuation of room temperature</li> <li>· The selected sensitivity is too high</li> </ul>	<ul style="list-style-type: none"> <li>· Improve the environment.</li> <li>· Set to ASD-3.</li> </ul>
9	“Err-1” or “Err-2” displays	<ul style="list-style-type: none"> <li>· Instant interference</li> <li>· Something wrong with the balance</li> </ul>	<ul style="list-style-type: none"> <li>· Turn on the balance once again or replug the power.</li> <li>· Sent it to the service center.</li> </ul>
10	“CAL-Err” displays	<ul style="list-style-type: none"> <li>· There is an object on the pan before calibration</li> <li>· Calibration weight is not correct</li> <li>· Not clear before calibration</li> <li>· “CAL” button is pressed before weighing mode displayed</li> </ul>	<ul style="list-style-type: none"> <li>· Take away the object, clear and recalibrate.</li> <li>· Clear and recalibrate.</li> <li>· ditto</li> <li>· Change to weighing mode.</li> </ul>
11	Weighing unit is not displayed on the panel and there is a weight icon on the left below of the panel	<ul style="list-style-type: none"> <li>· Not calibrated</li> <li>· The calibrated number in the internal memory of the balance has been erased</li> </ul>	<ul style="list-style-type: none"> <li>· Calibrate the balance.</li> <li>· ditto</li> </ul>
12	“Cou-Err” displays	<ul style="list-style-type: none"> <li>· No constant be set before operating counting function</li> <li>· Overload when setting constant</li> <li>· Under load when setting constant</li> </ul>	<ul style="list-style-type: none"> <li>· Set average number.</li> </ul>

## VI. Data Interface

Data interface adopts the standard 9-core RS232C socket equipped with RS232 universal serial two-way interface output (parallel interface not equipped). For the convenience of the user to connect the system computers or multi-terminals equipment, it also can be connect with micro-processor and printer. The pin and the corresponding signals are as follows:

PIN	SIGNAL	ILLUSTATE
2	SI	input signal.
3	SO	serial output signal. (baud rate is 1200)
5	GND	

## VII. Balance Serial Single (RS232C)

The connection method between the scale and computer serial port is as follows:

Computer (9-core)	Scale (9-core)
2	3
3	2
5	5

- (1) The baud rate of the serial port of scale is 1200.
- (2) The data format is 10 digits, one start digit is (0), 8 digits are data positions (ASCLL Code, low digits in the front), 1 stop digit (1).
- (3) No odd-even check.

A detailed output frame is as follows:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Type	Space	* / Space	+ / -	data	data	data	dot	data	data	data	data	Unit 1	Unit 2	CR	LF

### VIII. Random Accessories

- |                                       |          |
|---------------------------------------|----------|
| 1. 200g (or 100g) calibration weights | 1 box    |
| 2. Wire with both-side plug           | 1 piece  |
| 3. 0.25A fuse                         | 3 pieces |
| 4. Weights tweezers                   | 1 piece  |
| 5. Handkerchief                       | 1 piece  |
| 6. Operation Manual                   | 1 copy   |
| 7. Certificate                        | 1 copy   |