

ESJ SERIES

# ELECTRONIC BALANCE A II INSTRUCTION MANUAL



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## **1. brief introduction**

This manual is used for the Models of ESJ-4A Series Electronic Analytical Balances covering ESJ210-4A, ESJ200-4A, ESJ120-4A and ESJ110-4A.

To insure proper operation on the balance, please read this manual completely before you start to use your balance.

Please read the instruction manual carefully before using it

### **1.1 matters needing attention**

- A. The manual takes ESJ200-4A for example
- B. To make sure that the balance can provide a more accurate result before using the balance, plug in and preheat the balance at least for 30 minutes.
- C. Put the balance on a stable and flat platform. Be sure to adjust the balance to the level condition when using it.
- E. When weighing the heavy object, you have to handle it gently to avoid the strike on the pan. Otherwise it will lead to the problem of the mechanical system homing of the balance.
- F. When weighing the liquid, you have to do it carefully to avoid the liquid flowing into the inside of the balance.
- G. After the operation, please close the door of the weighing room and cover it with the dust cover to avoid the dust.

### **1.2 balance's features**

- A. Multiple weighing units and the made units for the customers
- B. counting weighing, The different counting cardinal number can be selected for the counting calibration. It supports the percentage weighing.
- C. Standard RS232 interface, it is easier for the user to connect the balance to a printer or computer or other external device.

D. Support the PRINT key to control the data output and command to control the data output for the convenience of the data collection of the external device.

E. Easy to operate and read results from a clear big LCD with a white back-ground light;

### 1.3 technical parameters

table 1

model	ESJ110-4A	ESJ120-4A	ESJ200-4A	ESJ210-4A	ESJ220-4A
capacity	110g	120g	200g	210g	220g
calibration weight	100g	100g	200g	200g	200g
sensor	electromagnetic force sensor				
readability	0.0001g				
repeatability error	$\pm 0.0002\text{g}$				
four-corner error	$\pm 0.0002\text{g}$				
linearity error	$\pm 0.0002\text{g}$				
stability time	3~5s				
pan size	$\Phi 90\text{mm}$				
weighing room size	190×155×210 mm				
dimension	460x205x280mm				
calibration mode	auto-calibration				
net weight	9kg				
interface	RS232				

power source	AC 220V 50/60Hz
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table 2

model	ESJ203-S	ESJ205-S	ESJ208-S
capacity	220g/30g	220g/50g	220g/80g
calibration weight	200g	200g	200g
sensor	electromagnetic force sensor		
readability	0.0001g/0.00001g		
repeatability error	$\pm 0.0002\text{g}/\pm 0.00003\text{g}$		
four-corner error	$\pm 0.0002\text{g}/\pm 0.00003\text{g}$		
linearity error	$\pm 0.0002\text{g}$		
stability time	3~7s		
pan size	$\Phi 90\text{mm}$		
weighing room size	190×155×210 mm		
dimension	460x205x280mm		
calibration mode	auto-calibration		
net weight	9kg		
interface	RS232		
power source	AC 220V 50/60Hz		

table 3

model	ESJ110-4B	ESJ120-4B	ESJ200-4B	ESJ210-4B	ESJ220-4B
capacity	110g	120g	200g	210g	220g
calibration weight	100g	100g	200g	200g	200g
sensor	electromagnetic force sensor				
readability	0.0001g(0.1mg)				
repeatability error	$\pm 0.0002\text{g}(0.2\text{mg})$				
four-corner error	$\pm 0.0002\text{g}(0.2\text{mg})$				
linearity error	$\pm 0.0002\text{g}(0.2\text{mg})$				
stability time	3~5s				
pan size	$\Phi 90\text{mm}$				
weighing room size	190×155×210 mm				
dimension	460x205x280mm				
calibration mode	external auto-calibration				
net weight	9kg				
interface	RS232				
power source	AC 220V 50/60Hz				

testing conditions: 20℃(room temperature),the environment without air flow, dry and dust.

## 2. Installation

### 2.1 installation detailed list

serial No.	content	quantity
1	balance body	1 piece
2	pan	1 piece
3	pan support	1 piece
4	draft ring (portion of models)	1 piece
5	dust guard (portion of models)	1 piece

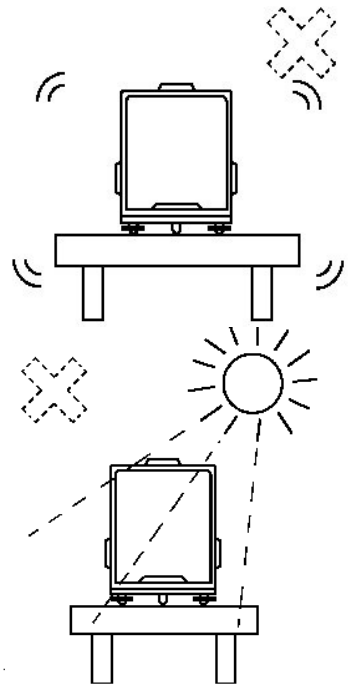
### 2.2 installation environment

The balance can get the reliable weighing result in the common environment of the laboratory and workshop. It can improve the work efficiency and boost the accuracy of the weighing result in the proper environment.

A. Put the balance on a stable and flat platform.

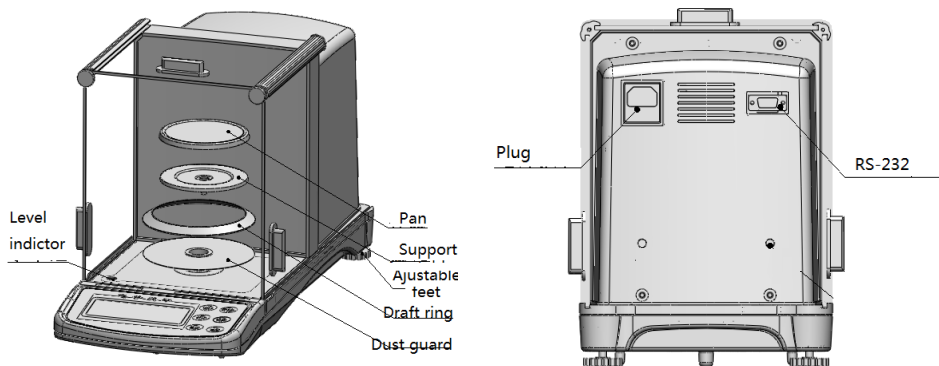
B. Do not put the balance:

- \*In a place with too much dust;
- \*In direct sunshine;
- \*In a place with temperature extreme;
- \*In a place with excessive air flow;
- \*Near electromagnetic field;
- \*In a place with excessive moisture;
- \*In a place with temperature difference fluctuation.



C. The best settlement site should be in a sheltered corner, on the stable marble platform and far away from door, window, radiator and the air outlet of the air conditioning equipment.

## 2.3 external schematic diagram and parts names

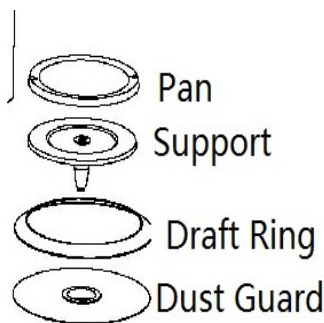


## 2.4 pan components installation

Install the pan components in order of the pan, pan support, draft ring and dust guard and then install the components on the pan erection column.

## 2.5 level adjustment

The balance is equipped with the bulb of level and 2 pieces of level adjusting feet for offsetting the affection of the weighing result due to the tiny uneven platform. Adjust bubble of the bulb of level to the center to keep the balance in the level condition. You have to adjust it when you move it each time.



## 3. application

### 3.1 basic weighing

#### A. preparation procedure



- a. The balance should be reheated for 30 minutes at least after each time of the power-on for the best weighing result.
- b. Keep the pan clean. Press ON/OFF key and it will display 0.0000g.
- c. Calibrate the balance (refer to the calibration section)
- d. If need to use other unit, or other weighing method, press [MODE] key to adjust the display data to other units or the data of other weighing method. The triangle symbol below the display screen indicates the other units or other weighing method.

#### **B. weighing procedure**

- a. Open the door of the weighing room and put the object on the center of the pan lightly. After then close the door lightly. The triangle symbol above “stabilization” on the display overlay represents the stable symbol. When it’s kept unchanged after the stable symbol displayed, it means that the data stabilized and after then it will read the data.
- b. Open the door and take out the object. After the balance returns to the zero and it displays 0.0000g and stabilizes, you can proceed with the next weighing. If not, please close the door of the weighing room avoiding the dust immersing into the inside of the balance.

### **3.2 container weighing**

- A. Put the container on the pan
- B. After the stable indicator displayed, press TARE key. After then it will display 0.0000g.
- C. Put the object in the container
- D. After the stable indicator displays, read the weight of object.

### **3.3 counting weighing.**

- A. Select the samples quantity according to the system parameters table.
- B. Press TARE key. After the balance stabilizes it will display 0.0000g.
- C. Press MODE key to adjust the balance to the counting mode status.
- D. Put the object on the center of the pan and close the door of the weighing room.

- E. Press CAL key and the balance system will sample according to C1 parameter.
  - F. After the sampling, the balance will display the sample weight according to C1 parameter. Take out the sample. After the balance returns to zero and stabilizes the user can proceed with the operation of the counting weighing.
- Note. The readability of the sample quantity shouldn't be less than the minimum resolution.

### 3.4 percentage weighing

- A. Press TARE key. After the balance stabilizes it will display 0.0000g.
  - B. Press MODE key to adjust the balance to the percentage weighing status.
  - C. Put the object on the center of the pan and close the door of the weighing room.
  - D. Press CAL key, the balance system will take the sample as the reference object which is 100.00% basic value.
  - E. After the sampling, the balance will display 100.00%. Take out the sample. After the balance returns to zero and stabilizes the user can proceed with the operation of the percentage weighing.
- Note: The readability of the sample quantity shouldn't be less than the minimum re

### 3.5 Specifications

<b>ct</b>	<b>carat</b>
<b>lb</b>	<b>pound</b>
<b>oz</b>	<b>ounce</b>
<b>∴</b>	<b>piece counting mode</b>
<b>%</b>	<b>percentage mode</b>
<b>○</b>	<b>stable indicator</b>
<b>■</b>	<b>waiting calibration indicator</b>

<b>CAL--0</b>	<b>when calibration is “0”</b>
<b>CAL—F</b>	<b>load the calibration weight</b>
<b>--</b> <b>CAL— --</b>	<b>calibrating indicator</b>
<b>CAL—</b> <b>End</b>	<b>calibration is ended</b>
<b>Err--0</b>	<b>when calibration is “0” error</b>
<b>Err--1</b>	<b>calibration error</b>
<b>E</b>	<b>over the capacity</b>
<b>—E</b>	<b>under the readability</b>
<b>-----</b>	<b>【SET】 key available indicator</b>
<b>.....</b>	<b>balance is processing data</b>
<b>ct</b>	<b>carat</b>
<b>lb</b>	<b>pound</b>

## 4. parameters setting and command control

### 4.1 .parameter setting

When the balance is switched on, press **【SET】** key, then press **【PRINT】** key, “Cx—y” will be displayed, x’s values are 1-12, press **【PRINT】** key to view Cx’s value, y is the value set by Cx; press **【MODE】** key to change the value of x, after the setting is done, press **【TARE】** key, the balance will save and upgrade the setting and it is ready to be used.

<b>Cx</b>	<b>Cx—y</b>	<b>significance</b>
<b>C1:</b> <b>Calibration</b> <b>mode</b>	<b>*C1—0</b>	<b>auto calibration with inner weight</b>
	<b>C1—1</b>	<b>manual calibration with outer weight</b>

C2: Data selection of the basic sample in counting weighing state	*C2—0	number 10 as the basic sample quantity
	C2—1	number 20 as the basic sample quantity
	C2—2	number 50 as the basic sample quantity
	C2—3	number 100 as the basic sample quantity
	C2—4	number 1000 as the basic sample quantity
C3: ZERO tracking	C3—0	tracking state without ZERO point
	*C3—1	tracking state with ZERO point
	C3—2	manufacturer only
C4: selection of serial port baud rate	*C4—0	2400bps
	C4—1	1200bps
	C4—2	4800bps
	C4—3	9600bps
*C5:  Selection of data output mode	C5—0	back to ZERO stable output
	C5—1	firm output
	*C5—2	command control output
	C5—3	continuous output
C6: Key voice	*C6—0	no
	C6—1	yes
C7: anti- interference degree	C7—0	
	*C7—1	low
	C7—2	middle
	C7—3	high
C8: display power on	*C8—0	yes
	C8—1	no
C9: Time interval of auto calibration	C9—0	1 hour
	*C9—1	2 hour
	C9—2	3 hour

C10: Selection of checking weighing section	*C10— 0	Alarm of checking weight in the setting section with limit value
	C10—1	Alarm of checking weight in the setting section without limit value
C11: Selection of weighing state	*C11— 0	standard weighing
	C11—1	density weighing
	C11—2	statistics weighing
C12: Sampling data of Animal weighing	*C12— 0	100
	C12—1	200
	C12—2	300

#: reserving function according to the user request

\*: default status set at the factory

## 4.2 command control

The balance can be connected with the peripherals via serial port communication line to receive the command from the peripherals and execute the similar key operation according to the command.

After the balance receives the command, it will post back the received command to the external device at once and inform the external device of the successful response command. If the wrong command posts back the “Err” to the external device, it means what the external device received is the illegal command.

Effective command as follows

A. O <CR><LF> ON/OFF command.

The function is the same as the function of **ON/OFF** key on the overlay (4F 0D 0A);

B. T <CR><LF> TARE command.

The function is the same as the function of **TARE** key on the overlay (54 0D 0A);

C. C <CR><LF> CAL command.

The function is the same as the function of **CAL** key on the overlay (43 0D 0A);

D. M <CR> <LF>MODE command

The function is the same as the function of **MODE** key on the overlay (4D 0D 0A);

E. P <CR> <LF>PRINT command

The function is the same as the function of **PRINT** key on the overlay. If only the balance receives this command, it will output a group of current important data to the external device (50 0D 0A).

<CR> <LF> the significance as follows

<CR>: carriage return (0D)

<LF>: line break (0A)

## 5. calibration operation

### 5.1 calibration reason

The balance is designed and manufactured based on the “electromagnetic force equilibrium principle”. Among of the numerous factors which has an effect on the precision, the earth gravity effect is the most prominent. The different areas and different earth gravity will cause the measuring error. In this case the balance should be calibrated to eliminate these errors.

After the use for long time, there will be subtle error caused by the temperature, humidity, placing and operation. So the balance must be recalibrated and adjust its level.

If you use the new balance or after changing the locating place of the balance, you have to adjust the level and recalibrate it.

### 5.2 Full Auto-Calibration(ESJ-A)

#### 5.2.1 Full Auto-Calibration

According to parameter setting and parameter setting table, set C1 to C1—0. Under full auto-calibration status, according to the changes of the time, temperature system will calibrate automatically.

**NOTE: when there is an object on the pan or internal weight is on the internal weighing system, calibration cannot be processed, the information will be displayed to show you that you need to calibrate; when the object is removed from the pan or internal weight is not on the internal weighing system, the balance will carry on calibration.**

### **5.2.3 Manual Calibration**

According to parameter setting and parameter setting table, set C1 to C1—1, when “C1—1” is displayed, press [CAL] key, the value of internal weight will be displayed, press [MODE] key to increase the value, press [PRINT] key to decrease the value, by pressing [MODE] key or [PRINT] key change this value into 200.0000 or the value of the external weight, then press [CAL] key to go back to C parameter setting status, press [CAL] key again to save the value in balance’s internal memorizer. When the user does not want to do manual calibration, the value 200.0000 or other value need to be changed back to factory setting, factory setting is at the back of the balance.

- Remove the object from the pan, and make sure internal weight is not on the internal weighing system, 0.0000g will be displayed
- Press [CAL] key, “CAL--0” will be displayed, after about 3 seconds, “CAL--F” will be displayed
- Put 200g (Level F1) external weight on the centre of the pan, then close the door of weighing room
- Press [TARE] key, “CAL--F” will be displayed, after 5s~10s, calibration is done, the value of external weight will be displayed.

If the difference between displayed value and the real value of external weight is more than  $\pm 1$ , the user need to calibrate again until the difference is less than  $\pm 1$ .

## **6. RS232 interface**

During the user operates the balance, sometimes the user will print out the weighing data via printer or input it into the computer or other external devices.

In order to meet the user's requirement, we installed RS232C or USB-B data communication interface on JD series electronic balances with the multi-function and high precision.

Among them, RS232C is the standard equipped interface. USB-B can be installed as the user requests.

## 6.1 technical parameters

baud rate: 1200, 2400, 4800, 9600

data bits: 8

check bit: no

stop bit: 1

start bit: 1

output code: ASCII code

Data output format: FXXXX.XXXXXKKK<CR> <LF>

Significance as below

“F”: sign bit “+”or“-”

“X”: 0-9 weight data

“.”: decimal point

“K”: reserved three-digit weighing units symbol with right alignment.

If it's short of three-digit weighing units, we can supplement it with blank.

<CR>: carriage return

<LF>: line break

The data format which the value of the quantity data (+10.0000g) goes through the serial port is +0010.0000g<CR><LF>.

The judgment method of stable data output and unstable data output: When the data output of the unstable weight “KKK”, the non-unit bit indicating bit in the data string, is the blank. When the stable data out puts it will out put the unit information.



The other data output format can be programmed as the user's requests.

## **6.2 output mode**

### **A. the stable output mode of back-to-zero**

In the stable output mode of zero, the pan must be unloaded when weighing the sample each time. After it displays the stable zero value, put the sample on the pan. When the displayed value becomes stable, it will output a group of data. The parameter is set as C5-0.

### **B. the stable output mode**

In the stable output mode, the data output doesn't depend on any other condition. When the weighing value becomes stable (It will display the stable symbol.) it will output a group of data. In this mode, it can output its own weight of the sample which has been tared. And also it can output the total weight value together with the tare weight or the cumulative weight of the sample. The parameter is set as C5-1.

### **C. The continuous output**

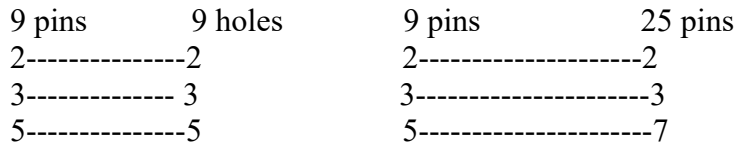
In the continuous output mode, the balance transmits the weight data to the external device every 0.3s. The parameter is set as C5-3.

### **D. printing key output mode/command control output**

In the printing key output mode, only when pressing PRINT key or the balance receives the printing command from the external device it can output a group of current weighing data. The parameter is set as C5-2.

### 6.3 connecting with external device

electronic balance   computer   electronic balance   printer with  
serial port



The connection diagram of the electronic balance with the  
computer and printer

## **7. care and maintenance**

- A. The user should often calibrate the balance to be sure that its sensitivity is in the best condition.
- B. Don't touch the key using the pointed stuff or the shaggy stuff like the stick (something like the pencil, ball-point pen).
- C. Avoid the object falling down on the pan from the highs so as not to damage the weighing mechanism.
- D. Avoid the balance exposing to the high temperature or dust for a long time.
- E. Keep the balance chamber clean. If some stuff fell inside, you have to clear it away on time.
- F. After each use of the balance, it's better to cover it to avoid the dust incursion.
- G. For long time if you don't use the balance, it's better to store it for the moment.
- H. If the balance broke down, you have to examine and repair it on time. It's not allowed to use it with the faults.
- I. Avoid using overloaded operations so as not to damage the balance.
- J. Keep the balance clean and dry.

### **matters needing attention when cleaning**

- A. Pull out the power line before cleaning;
- B. Don't use corrosive cleanser (like solvent). You can use a piece of wet cloth with the neutral detergent (soap) to clean it.
- C. Avoid the water or other liquid splashing into the inside of the balance.
- D. Wipe dry the balance with dried, soft cloth after cleaning.

## 8. failures and solution

fault	cause	solution
no display	<ul style="list-style-type: none"> <li>●no power supply</li> <li>●fuse broken</li> <li>●damaged AC/DC adaptor</li> </ul>	<ul style="list-style-type: none"> <li>●plug in power cord</li> <li>●change fuse</li> <li>●replace adaptor</li> <li>●Broken again after changing, be repaired in the maintenance dept.</li> </ul>
unstable display value	<ul style="list-style-type: none"> <li>●bad work environment</li> <li>●weighing room door not close properly</li> <li>●touching of pan with machine shell or foreign matter between them</li> <li>●unstable power supply, beyond allowable value</li> <li>●unstable weighed object ( as it absorbed moisture or moisture evaporated )</li> </ul>	<ul style="list-style-type: none"> <li>●improve the work environment, keep away from vibration and airflow disturbance</li> <li>●Take out the foreign matter. Turn the pan avoiding the touch.</li> <li>●Connect an external AC power regulator</li> </ul>
Discrepancy between displayed value and actual weight	<ul style="list-style-type: none"> <li>●Not calibrate</li> <li>●No zero clearing before weighing</li> <li>●Not adjust level</li> </ul>	<ul style="list-style-type: none"> <li>●Calibrate the balance</li> <li>●Press TARE key for zero clearing</li> <li>●Adjust the level</li> </ul>

## **9. guarantee repair**

Warranty period; 1 year

Except of one of the items below

1. Warranty period expired.
2. The balancer was damaged because of the user's fault.
3. The balance was damaged because the user operated it not according to the instruction manual.
4. The balance was damaged by reason of exposing to the environment with the radioactive and corrosive materials.
5. The balance was damaged caused by the unauthorized disassembly or repair by other maintenance personals not appointed by our company.



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