Type BL-16V

Dynamic balancing machine

General computer measurement system an instruction manual

Xuanhua Beilun Balancing Machinery Co Ltd

catalog

Press the compound key”F 4 5 6” to enter the following full BL-16V vector solution mode

Pressing the compound key ”F 4 5 6” will return to the ABC solution mode of HP16 hard support

Bl-16v dynamic balancing machine general computer measuring system (hereinafter referred to as electrical measuring box) is suitable for the detection of unbalanced signals of various dynamic balancing machines.

This system is a special measuring instrument for computer controlled balancing machine.

The electric measurement system has the following functions: automatic sensitivity control, automatic (or manual) storage of rotor data, direct reading of measured data (size and angle of unbalance), keyboard input of rotor data, dynamic balance and static even balance selection.

Through the keyboard, the rotor data can be saved and extracted, up to 99 rotor data can be saved.

1. overview:

The electric measuring box is suitable for the detection of unbalanced signals of various dynamic balancing machines.

The input quantity of the electric measuring box is:

a. Two unbalanced vibration signals of two supporting surfaces (one is required for single-sided balancing machine).

b. A reference signal (sine wave or pulse) of exactly the same frequency as the rotor rotation output by a reference signal generator

The output of the electric measuring box is:

a. The main display part shows the unbalance mass and phase on the correction radius of the two correction planes of the rotor or the unbalance mass and phase of the static couple (the single-sided balancer only shows the unbalance mass and phase of one side). Other relevant information includes the way of adding and removing weight, rotor balance speed, etc.

b. The balance result can generate test report and transfer it to SD card. The balance result can be archived and printed by ordinary computer.

The electric measuring box adopts a novel electric measuring circuit and a reasonable structure layout, and adopts a single-chip computer circuit for linear sampling calculation, so that the operator can see the working state of the balancing machine at a glance.

The conversion accuracy is much higher than the previous hardware conversion. All the linear and digital integrated circuits are the international and domestic standard series of dual in-line package, which brings convenience to maintenance and significantly improves reliability.

The core circuit of the electric test box is the tracking band-pass correlation filter, which has good filtering and frequency tracking performance. Because of the wide tracking range, the electric measuring box only uses one speed range, which is convenient for users. In particular, the automatic bandwidth switching circuit is used to reasonably solve the contradiction between the rapidity and stability of the response of the electric measuring box, so that the electric measuring box has excellent low-speed performance.

2. The electric measuring box is suitable for the following working environment

2.1 the surrounding medium temperature is not higher than + 40 ℃ and not lower than 0 ℃.

2. 2 the air humidity is not more than 85% (+ 25 ℃)

2.3 power supply voltage is ～ 220V ± 10%

2.4 power frequency 50Hz

3. Main technical parameters

3.1 maximum value error ± 5%

3.2 maximum phase angle error is not more than 5 °

3.3 maximum error of plane operation ± 3%

3.4 maximum error of radius operation ± 3%

3.5 maximum range error ± 3%

3.6 maximum error indicated by tachometer ± 2%

3.7 when the electric measuring box leaves the factory, the indication value of the electric measuring box in the self inspection state of rotor 0 is:

Left value: gram right value: gram

Left phase: degree right phase: degree

Note: (1) the percentage error of the above parameters is the relative error of full amplitude;

(2) the above technical parameters shall be assessed according to the steps and methods specified in the test card of the electric test box;

(3) the display value when using other rotor numbers for self inspection is

different from that when using rotor 0. The self check signal is only used to check whether the electric measuring box works normally, and it is not used to check the accuracy of the electric measuring box.

(4) the indicating value of the electric measuring box in the self inspection state shall be filled in manually.

4. Instructions for use

The main accuracy index of the whole balancing machine: "the minimum can reach the residual unbalance Umar, and the unbalance reduction rate URR" is jointly guaranteed by the coordination and adjustment of the mechanical system, rotor characteristics, sensors, electrical measurement system and other links of the balancing machine. The failure and replacement of any link will affect the accuracy of the whole machine to varying degrees, so it should be avoided that the principle of the whole machine is not understood, Artificial fault caused by adjusting the adjustable elements in the electric measuring box casually.

The electric measuring box is a precision measuring instrument, which shall be operated and inspected by a specially assigned person, and the operators shall be trained.

5. Operation function and description

5.1 function and description of the operation panel (refer to the figure below, and follow the keyboard operation sequence)

(1) "Calibration" button: press the "calibration" button, the electric measuring box will enter the calibration state and exit the measurement state at the same time. After the calibration process is completed, the electric measuring box automatically returns to the normal measuring state. Press the "calibration" key again in the "calibration" state, and the electric measuring box will return to the measurement state (similar to the following).

(2) "Static couple" button: the selection key of static couple imbalance correction mode.

Press the "static couple" key once, the "static couple" display will be on, and the electric measuring box will enter the static imbalance and force couple imbalance correction mode.

Press the "static couple" key again, the "static couple" display is off, and the electric measuring box enters the dynamic balance mode of two plane separation.

On the static / even decomposition equilibrium method:

Any dynamic unbalance can be corrected by the method of two plane decomposition (dynamic balance) or the method of static couple decomposition. For the dynamic balance correction of some special rotors, the method of static couple decomposition is very convenient and reasonable.

The calibration (see the following content for the "calibration" operation) is the rotor measured in dynamic balance mode. In normal measurement, press the "static couple" button, the "static couple" display will be on, and the electric measuring box will work in the static / couple decomposition mode.

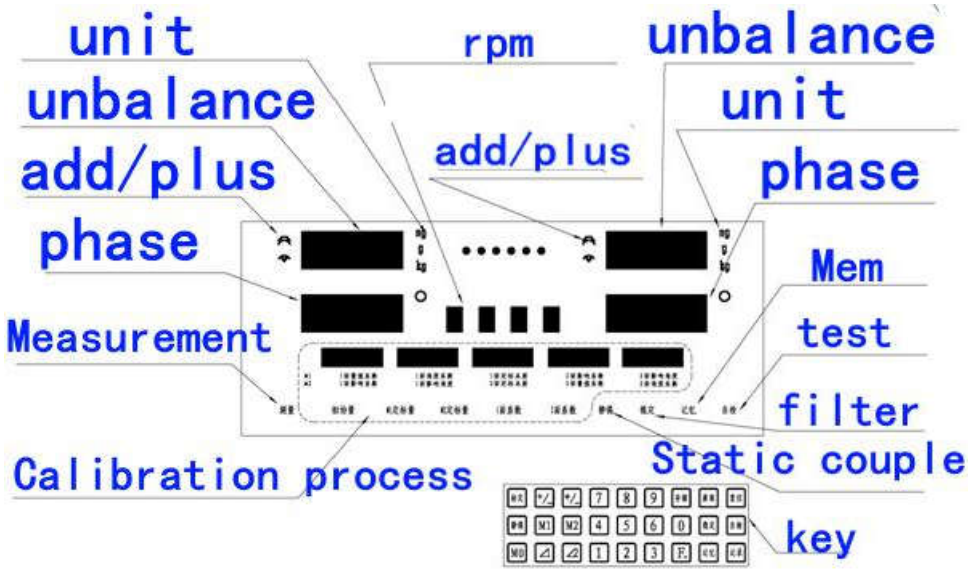
At this time, the indicated value of the left side table is static unbalance, and the indicated value of the right side table is right even unbalance. At this time, the static unbalance indicated by the left table can be corrected on the corresponding static unbalance correction front, and on the right even unbalance correction front, the even unbalance indicated by the right table can be corrected on the determined radius, and at the same time, the even unbalance indicated by the right table can be corrected on the same correction radius on the left even unbalance correction plane, but the correction direction is opposite (as indicated by the right table 180 degrees).

(3) The two "+ / -" buttons are the right and left (① ②) weighting and de weighting selection keys respectively.

Press the "+ / -" key, and the corresponding left or right correction front weighting and de weighting symbols will change in turn, so as to select the appropriate counterweight correction method.

When "  " is displayed, it means that the specified position of the correction plane is light, which needs to be corrected by weighting (welding, riveting, bonding and other methods of adding weight).

When "  " is displayed, it means the specified position weight of the correction plane, which needs to be corrected by weight removal (such as drilling, grinding, milling, etc.).



(4) A total of 5 keys M0, M1, M2, ∠ 1, ∠ 2 cooperate with the "calibration" key to complete the calibration operation. M0 corresponds to the initial quantity, M1 corresponds to the left standard quantity, M2 corresponds to the right standard quantity, 1 corresponds to the left angle, and 2 corresponds to the right angle. See the section on calibration operation for detailed operation.

(5) 1、2、…… 9. 0 digital input key, used in conjunction with storage, extraction, stabilization and calibration processes.

(6) "F." key: the second function selection key.

(7) "Store" and "extract" buttons: "store" is used to save rotor data; "extract" is used to read rotor data.

Method of storing rotor: press the "extract" key once, the display number of balance speed will start flashing, and input the rotor number to be stored with the digital input key (1-99 range is optional). Press the "store" key again, and the current calibration parameters are stored under this rotor number (that is, the calibration parameters of the current rotor balance process). If the rotor number already has old calibration parameters, after pressing the "store" key, the new calibration parameters will be saved instead of the old ones.

Extraction method of rotor: press the "extraction" key once, the display number of the balance speed starts to flash, and input the rotor number to be extracted with the digital input key (1-99 range is optional). Press the "extract" key again, and the previously stored calibration parameters under a certain rotor number are extracted to the current operation interface (that is, the calibration parameters of the previously stored off the shelf rotor balancing process).

"Storage" and "extraction" can be used together to save the calibration parameters of the balance process of 99 rotors in the electric measuring box, which is a very convenient and quick use method. Generally, each rotor of different specifications should be "stored" in time after calibration to facilitate "extraction" in the future. In addition: it is recommended that the operator record the information of each "stored" rotor number and corresponding rotor drawing number name separately for future query.

The "store" key will also be used in other operations, and related contents will be mentioned later.

(8) "Stable" key, stable selection key. When the accuracy of the detected unbalance is very high or the data is relatively unstable, press this key to set a relatively long amount of time (seconds), the indication of the display part changes slowly and the number change decreases, so as to read.

Press the "stable" key once, the "stable" display will be on, the display number of "2-sided influence angle, 2-sided angle coefficient" will become 2-digit effective number (0-75), use the digital input key to input the desired time amount (seconds), then press the "storage" key once, the displayed number will exit, and the electric

measuring box will work "stably" with the set time amount.

Press the "stable" key again, the "stable" function exits, and the "stable" display goes out.

Note: generally, the time can be set to 10-15 seconds, and the maximum can be set to 75 seconds. It is better not to use, otherwise the operation efficiency will be affected.

(9) "Memory" button: use the balance machine to detect normally. After the unbalanced data can be read stably, press this button once, the unbalanced data will be memorized on the display digital meter, and the measurement will stop. Then stop the machine for imbalance correction. When the balancing machine is started next time, when the rotor reaches a certain speed, the electric measuring box will automatically exit the "memory" state.

When the balance speed specified by the calibration parameter is used for measurement, the unbalanced data will be automatically memorized on the display digital meter about 5 seconds after the display data is stable, and the measurement will stop. When the balancing machine is started next time, when the rotor reaches a certain speed, the electric measuring box will automatically exit the "memory" state.

Some balancing machines have the function of forced memory when they leave the factory. As long as the motor stops, the unbalanced data will be automatically memorized on the display digital table. The next time the motor is started, the electric measuring box will automatically exit from the "memory" state. Turn off the "MEM" switch on the back panel of the power-off test box to release the forced parking memory function.

(10) "Reset" button: the restart button of the computer software part, which is generally not used for normal operation.

(11) "Self check" button

In order to check whether the electric measuring box is normal or not, press this key once when the electric measuring box is stopped. At this time, the external

measuring signal and reference signal are cut off by the electric measuring box, and a group of false unbalanced signals are generated from the electric measuring box to enter the measuring channel, and a pair of unbalanced quantities are displayed from the digital meter. The self inspection signal of each balancing machine is the determined value, refer to the parameter table in section 3.7.

The self check signal is only used to check whether the electric measuring box works normally. It is not allowed to check the accuracy of the electric measuring box.

(12) Record button. The electric measuring box has the function of transferring and storing the balance results. If the user needs to record the test results in written form, or need to archive the test results, please follow the steps below: insert the SD card into the socket of the electric test box, press the "record" key, and the balance test results will be recorded on the SD card. The contents of SD card can be edited, archived and printed on ordinary computer.

(13) The upper left and upper right of the display part respectively show the size, angle and counterweight method of the imbalance of the left and right (① ②) two front sides.

(14) The middle position of the display part is the balance working tachometer. During the operation of "storage" and "extraction", the rotor number is displayed in "] 99" or "[99". Among them, "]" represents that the electric measuring box works in the normal designated rotor rotation direction, "[" represents that the electric measuring box works in the reverse direction of the normal designated rotor rotation direction (most balancing machines do not have the function of reverse direction operation when leaving the factory).
(15) The top center of the display part is indicated by the output level meter.
(16) Other display information will be described in the content of relevant operation process.

5.2 function and description of operation rear panel

(1) "Power" electric test box power switch.

(2) "220V, 50Hz" AC power inlet socket.

(3) "0.75a, 50Hz" AC power fuse, tube core 0.75a.

(4) "MEM" parking forced memory function switch (some models do not have this function).

(5) "Data" is a data line socket for communication with ordinary computers, with 232 serial port output.

(6) "Print" SD card socket.

(7) "S" reference signal input socket (reference signal with strictly the same frequency as rotor rotation).

(8) "②" right sensor signal input socket (pay attention to the left and right correspondence when connecting).

(9) "①" left sensor signal input socket (pay attention to the left and right correspondence when connecting).

6. Rotor calibration

6.1 operation process of dynamic balance calibration of rotor (for dynamic balance machine or dynamic balance mode)

When preparing to measure an unknown rotor that has not been calibrated, the electric measuring box needs to be calibrated before it can display the exact size and angle of the unbalance.

After the calibration process is completed, the rotor of this specification can be stored in the electrical measuring box in the form of rotor number. In the future, when the rotor of the same specification is balanced, the rotor number can be directly extracted without re calibration.

Before the calibration process, please refer to the instructions of the host machine, adjust the mechanical part, install and connect the rotor in good condition, and ensure that the whole machine and rotor reach the state before normal startup. Pay special attention to safety. After each part is adjusted and powered on, the following operations can be carried out.

6.1.1 press the "extract" key once, and then use the number key to input the new rotor number to be stored. The following calibration results can be stored in the electrical measurement system with this rotor number.

If you want to correct the calibration coefficient of the existing rotor number, you do not need to operate this step.

6.1.2 press the "calibration" key, the "measurement" display will be off, the "initial quantity" display will flash, and the electric measuring box will enter the calibration state.

6.1.3 start the balancing machine, and the electric measuring box starts to measure the initial unbalance of rotor (V10, V20). After the display data of the electric measuring box is stable, press the "store" key, the "initial quantity" display will be on for a long time, and the "M1 constant scalar" display will flash. Then stop the machine.

6.1.4 at this time, the electric measuring box only displays the size and angle (initially set as 100g-0 degrees) of the standard quantity (M1) to be added on the left side, and there is no display (n) on the right side.

A calibration mass block (calibration M1) is added on the left side. Use the keyboard to modify the size of the actual calibration mass block (calibration M1) and the angle to be added. Press "M1" and then press the number key to modify "mass". Press "∠ 1" and then press the number key to modify " phase ".

Start the balancing machine, and the electric measuring box starts to re measure the unbalance (V11, v21). After the data is stable, press the "storage" key, and then the "M1 constant scalar" display of the electric measuring box will be on for a long time, and the "M2 constant scalar" display will flash.

Pay attention to observe the data displayed in "1 calibration quality - 2 calibration quality". When the data is less than 30, it indicates that the calibration accuracy is not high. It is necessary to increase the quality of "M1" on the premise of ensuring safety, or re calibrate the rotor after rough balancing.

Stop the machine and remove the calibration M1 added on the left side.

6.1.5 at this time, the electric measuring box only displays the size and angle (initially set as 100g-0 degrees) of the standard quantity (M2) to be added on the right side, and there is no display (n) on the left side.

Install the calibration mass block (standard quantity m2) on the right side. Use the keyboard to modify the mass of the actual calibration mass block (calibration m2) and the added phase. Press "M2" and then press the number key to modify "mass". Press "∠ 2" and then press the number key to modify "phase".

Start the balancing machine, and the electric measuring box starts to re measure the unbalanced quantity (v12, V22). After the data is stable, press the "storage" key, then the "initial quantity", "M1 fixed scalar", "M2 fixed scalar" display of the electric measuring box is all off, the "measurement" display is on for a long time, and the "memory" display is on for a long time.

Pay attention to observe the data displayed in "1 calibration quality - 2 calibration quality". When the data is less than 30, it indicates that the calibration accuracy is not high. It is necessary to increase the quality of "M2" on the premise of ensuring safety, or re calibrate the rotor after rough balancing.

Stop the machine and remove the calibration M2 added on the left side.

6.1.6 if it is necessary to select a new rotor number for storage, first press the "extract" key once, then input the new rotor number, and then press the "store" key, the calibration coefficient will be stored in the electrical measurement system with the new rotor number.

To directly modify the calibration coefficient of the existing rotor number, you can

directly press the "store" key. This calibration coefficient will cover the existing rotor number and store it in the electrical measurement system.

6. 1.7 now the balancing machine has returned to the normal "measurement" state, and the imbalance displayed by the electrical measuring box is the size and angle of the initial imbalance (U10, U20) of the calibrated rotor. According to this data, the operator can eliminate the imbalance.

If there is a rotor of the same specification, the dynamic balance mass production can be carried out directly in this calibration state, without recalibration.

6.1.8 in the middle of the calibration process, if it is necessary to exit from the "calibration" state, or there are other needs and unexpected situations, directly press the "calibration" button or the "reset" button, and the electric measuring box will return to the state before the "calibration" operation.

6.2 single side balancing calibration process of rotor (for single side balancing machine or single side balancing mode)

When preparing to measure an unknown rotor that has not been calibrated, the electric measuring box needs to be calibrated before it can display the exact size and angle of the unbalance.

After the calibration process is completed, the rotor of this specification can be stored in the electrical measuring box in the form of rotor number. In the future, when the rotor of the same specification is balanced, the rotor number can be directly extracted without re calibration.

Before the calibration process, please refer to the instructions of the host machine, adjust the mechanical part, install and connect the rotor in good condition, and ensure that the whole machine and rotor reach the state before normal startup. Pay special attention to safety. After each part is adjusted and powered on, the following operations can be carried out.

6.2.1 press the "extract" key once, and then input the new rotor number to be stored with the number key. The following calibration operation results can be stored in the

electrical measurement system with this rotor number.

If you want to correct the calibration coefficient of the existing rotor number, you do not need to operate this step.

6.2.2 press the "calibration" key, and then press the "static couple" key. The display of "measurement" is off, the display of "initial quantity" is flashing, and the electric measuring box enters the single-sided calibration state. At this time, the measurement value on the right side is off (n), and the angle is 0.

6.2.3 start the balancing machine, and the electric measuring box starts to measure the initial unbalance (V10) of the rotor. After the data displayed by the electric measuring box is stable, press the "store" key, the "initial quantity" display will be on for a long time, and the "M1 constant scalar" display will flash. Then stop the machine.

6.2.4 at this time, the electric measuring box only displays the size and angle (initially set as 100g-0 degrees) of the standard quantity (M1) to be added on the left side, and there is no display on the right side.

A calibration mass block (calibration M1) is added to the counterweight surface. Use the keyboard to modify the size of the actual calibration mass block (calibration M1) and the angle to be added. Press "M1" and then press the number key to modify "size". Press "1" and then press the number key to modify "angle".

Start the balancing machine, and the electric measuring box starts to re measure the unbalanced quantity (V11). After the data is stable, press the "storage" key, and then the "initial quantity" and "M1 constant scalar" display of the electric measuring box is all off, the "measurement" display is on for a long time, and the "memory" display is on for a long time.

Pay attention to observe the data displayed in "1 calibration quality - 2 calibration quality". When the data is less than 30, it indicates that the calibration accuracy is not high. It is necessary to increase the quality of "M1" on the premise of ensuring safety, or re calibrate the rotor after rough balancing.

Stop the machine and remove the calibration M1 added on the left side.

6.2.5 if it is necessary to select a new rotor number for storage, first press the "extract" key once, then input the new rotor number, and then press the "store" key, the calibration coefficient will be stored in the electrical measurement system with the new rotor number.

To directly modify the calibration coefficient of the existing rotor number, you can directly press the "store" key. This calibration coefficient will cover the existing rotor number and store it in the electrical measurement system.

6.2.6 now the balancing machine has returned to the normal "measurement" state, and the unbalance displayed on the left side of the electric measuring box is the size and angle of the calibrated initial unbalance (U10) of the rotor. According to this data, the operator can eliminate the imbalance.

If there is a rotor of the same specification, the dynamic balance mass production can be carried out directly in this calibration state, without recalibration.

6.2.7 in the process of calibration, if it is necessary to exit from the "calibration" state, or there are other needs and unexpected situations, directly press the "calibration" button or the "reset" button, and the electric measuring box will return to the state before the "calibration" operation.

6.3 method of checking calibration coefficient

After calibration, when the balancer is in normal measurement state,
press M1 key to display the left calibration coefficients C11, ∠ 11, DP1, C12, ∠ 12.
Press M2 key to display the right calibration coefficient C21, ∠ 21, DP2, C22, ∠ 22.

(press M1 key only for single-sided balance calibration, and only C11, ∠ 11, DP1 can be displayed)

C11:1 side value coefficient ∠ 11: 1 side phase

C12:2 influence coefficient ∠ 12: 2 influence phase

Dp1:1 side calibration quality dp2: 2 side calibration quality

C21:1 surface influence coefficient ∠ 21: 1 surface influence phase

C22:2 side value coefficient ∠ 22: 2 side phase

The above parameters are only displayed for 8 seconds. After exiting the parameter display, the middle parameter table (calibration quality) displays "calibration speed". When measuring the same rotor again, it is required to measure it with "rated speed" (speed error is allowed to be ± 10%).

The electric measuring box has the function of automatic memory only when it is measured at the rated speed.

6.4 about rotor 0

A special "No.0 rotor" is set for the electric measuring box at the factory. After extracting the rotor No. 0, the unbalance data measured by the electric measuring box is the equivalent unbalance of the plane where the two sensors are located.

At this time, the error of "quite unbalanced quantity" may be large, and the accuracy of angle is not high, so the operation efficiency is low. However, rotor 0 can be used for rough balance before calibration or similar rough balance work.

No. 0 rotor can ensure that the general rotor can be balanced to a certain accuracy, but it does not guarantee that its balance accuracy meets the requirements.

The parameters of rotor 0 have been solidified in the electrical measuring box, and the normal operation of the operator will not damage the parameters of rotor 0. Rotor 0 will not be used unless required.

6.5 mathematical calculation of calibration process and definition of each parameter

Calibrate the front parameters UL and ur (the final result to be obtained)

Sensor output parameters VL, VR (signals input by balance electromechanical measuring instrument)

Vector representation of influence coefficient: (coefficient to be calculated for electric box)

C11:1 side value coefficient ∠ 11:1 side phase

C12:2 influence coefficient ∠ 12:2 influence phase

Dp1:1 side calibration quality dp2:2 side calibration quality

C21:1 surface influence coefficient ∠ 21:1 surface influence phase

C22:2 side value coefficient ∠ 22:2 side phase

Initial output of sensor: vl0 on the left and vr0 on the right,

Input M1 measurement value and angle, measurement value V1 (VL1 on the left, VR1 on the right)

Input M2 value and angle of secondary test weight m2, measurement value V2 (VL2 on the left, VR2 on the right)

Calibration quality factor DP1 = | V1 / vl0% | the percentage ratio of standard quantity to initial quantity

DP2 = | V2 / vr0% | when it is less than 30%, it is considered that the calibration is insufficient.

Vector calculation formula

UL=C11*VL+C12*VR

UR=C21*VL+C22*VR

The stored parameters of each rotor are 11 values:

C11 ∠11 C12 ∠12 dp1 dp2 C21 ∠21 C22 ∠22 n

Exit the calibration state and exit the calibration state after the calibration is completed.

Display result of instrument: (vector calculation result)

UL0∠UL0=C11∠11*VL0∠L0+C12∠12*VR0∠R0

UR0∠UR0=C21∠21*VL0∠L0+C22∠22*VR0∠R0

7. Maintenance

The electric measuring box shall be placed in a ventilated, dry and clean room. There shall be no strong electromagnetic interference nearby. The electric measuring box that is not frequently used shall be powered on by a specially assigned person 2-3 times a week under the self inspection state, each time for 2-3 hours.

During the period when the electric measuring box is out of service, it shall be covered with dust cover. The cover plate of the box shall be opened every 3-6 months to replace the desiccant. Every 1-2 years, all indicators shall be checked according to the technical requirements of the electric measuring box, and the accuracy of the machine shall be adjusted with the cooperation of the mechanical and electrical equipment. The maintenance of the balance mechanical and electrical measuring system is the key to ensure the balance machine works well.

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