

Type YFW - 300

Hard Bearing Balancing Machine

Manual



Xuanhua Beilun balancing Machine
Manufacturing Co., Ltd.

Note:

The operator must be familiar with this manual carefully specify the methods of operation in accordance with instructions and precautions operation. To avoid unnecessary personal equipment failures and other unexpected accidents.

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1. Overview

1.1 Scope and basic functions

Type YFW-300 fan impeller balancing machine for rotating machinery (such as motors, fans, diesel engines, automobiles, aircraft) in the rotating parts and components of the balancing test the school. Especially for various types of fan impeller balancing school test. Detailed scope of work (parameters) see 2 chapters.

Under normal use, Type YFW-300 fan impeller balancing machine (hereinafter referred to as balancing machines) can be directly shown to be a balance of components (here in after referred to as the rotor) the size of unbalance (kg, grams or milligrams) and location (setting radius of the size, location of the display angle to set the size of length). Meter reading by the operator the location specified operating weight (weight method used see Appendix), the balance of the rotor can reach the required precision. See the detailed work and method of operation behind the content.

1.2 The necessity of using the balancing machine

With the increasing precision rotating machinery and high speed, making the machine to eliminate vibration problems have become increasingly important. The rotating rotating machinery parts and components will directly affect the vibration of the machine's efficiency, life and personal safety. The dynamic imbalance is one of the main vibration.

Therefore, in order to effectively solve the vibration problem, the rotation of the various types of machinery parts and components for balance testing, calibration is essential for the process measures.

1.3 Type YFW-300 fan impeller balancing machine main feature

Type YFW-300 fan impeller balancing machine, the company is specifically designed for the manufacture of fan and blowers manufacturing industry, a balance machine. This machine is designed for the horizontal hard bearing, universal joint transmission, digital table shows other common form. In addition to a common horizontal hard bearing balancing machines outside of all the features , but also the characteristics of specific fan impeller is given two important parameters. First: The maximum balance of the rotor diameter 1500 mm; Second: The maximum rotor mass of 300 kg.

2 . Basic parameters and the main technical indicators

2.1 The working parameters :

2 .1.1 Workpiece quality range of 5 ~ 300kg

2 .1.2 Each bearing bracket to be accidental overloading 180kg

2 .1.3 Maximum diameter of the workpiece 1500mm

2 .1.4 Range of supporting the workpiece journal 10 ~ 90mm

(Optional Add-wheel frame at up to 10 -180 mm)

2 1,5 The maximum length supported 2200mm

2 .1.6 Motor Power 2.2/3.3KW

2 .1.7 Balancing speed of 240,480,450 , 900 turn / min

2 .1.8 Speed limit: The user must comply with the instructions provided on the selected speed. Otherwise, it will directly affect the life of balancing machines, and even the equipment and personal accident. Details, see Appendix IV.

2 .2 Main Performance Indicators

2 .2.1 Minimum achievable residual unbalance $e_{\text{mar}} \leq 1\text{g. mm / kg}$

2 .2.2 Unbalance reduction ratio $\text{URR} \geq 90 \%$

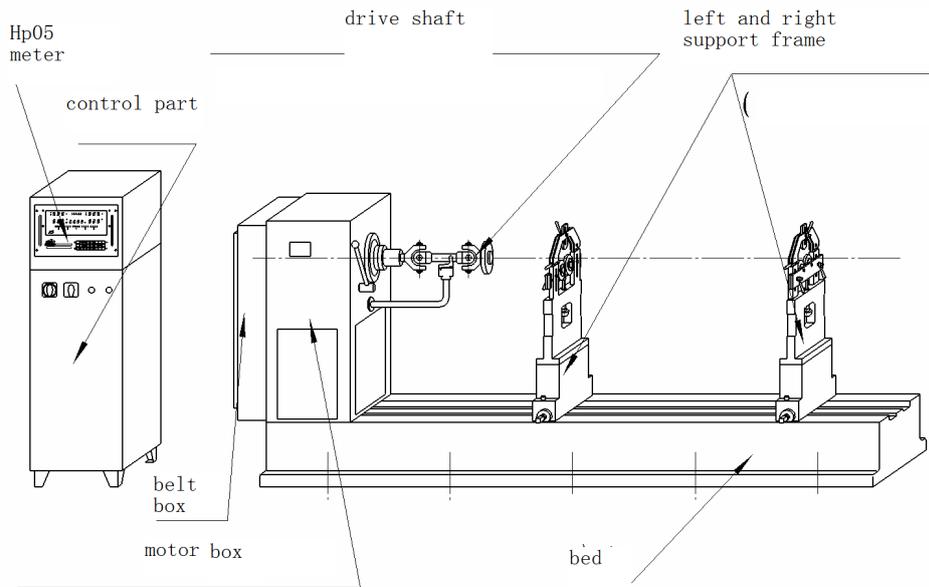


figure 1 Structural diagram of balancing machines facade

3. Balancer appearance of the structure and function Introduction

3.1 Structural diagram of balancing machines facade

(See figure1)

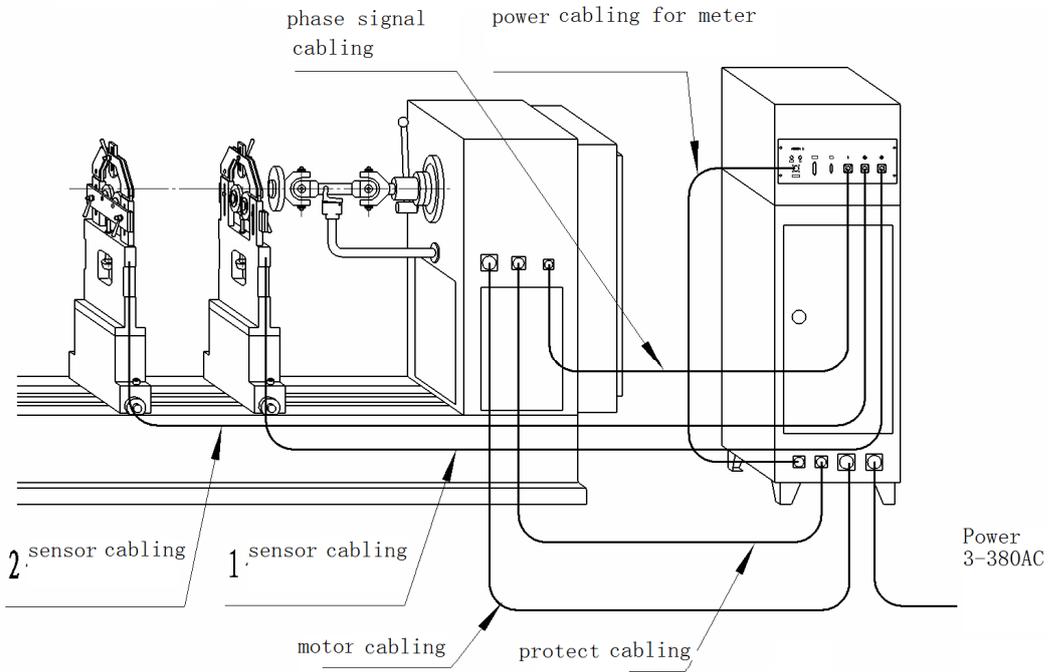


Figure II Balancing Machine and the wiring diagram behind the appearance of

3.2 Balancing Machine and the wiring diagram behind the appearance of

(See figure II)

3.3 Electrical Measurement Instrument operating functions and instructions

3.3.1 Electrical measuring instrument front panel functions and a brief description (see Figure III) :

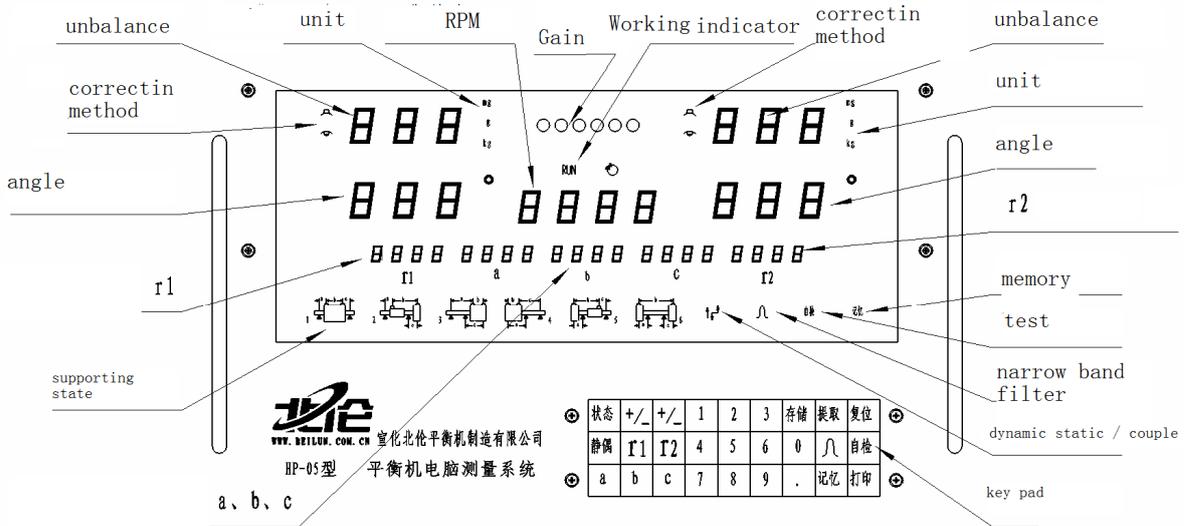


Figure III HP05 front panel functions and a brief description

(1) left and right angle and size of unbalance and unit:

Electrical measuring instrument properly displayed after measurement of the most important data. Corresponding to the left and right side weight of two.

Weight through a series of operations, when the unbalance is less than the balance of required accuracy indicators, this piece can be found to balance accuracy.

(2) left and right weight by:

Keyboard on the two " + / - "button corresponding to the left and right side weight of two.

Press once to display " $\overset{+}{\curvearrowright}$ ", Then a show " $\overset{-}{\curvearrowright}$."

" $\overset{+}{\curvearrowright}$ "Means that the weight point of surface display unbalance emphasis on the need to remove the weight of the technology of using weight. (For example: drilling, grinding, cutting, milling, etc.)

" $\overset{-}{\curvearrowright}$ "Means that the surface shows the angle of the weight lighter on the amount of unbalance, the process needs to add weight to weight. (Example: welding, paste, riveting, etc.)

(3) Balancing speed display:

When the rotor balancing machine normal rotation of a balance measurement, real-time display on the rotor operating speed balancing machines.

(4) Working indicator RUN :

" RUN "light and tachometer are in the normal direction under the premise of stability , electrical measuring instrument into the normal measurement state, after a few seconds after the data is stable (self-test when the same) .

(5) Gain Display:

The residual unbalance in a different state, "the gain shows" the number of different lights.

To meet with a different rotor or rotor unbalance in the balancing process of change in the size of the electrical measuring instrument with automatic gain tracking, to ensure the most appropriate and effective value display the size of unbalance.

Keyboard " . "and then press" 1 "to enter the fixed-gain state" 1 "file, press the keyboard" . "and then press" 2 "can enter the fixed-gain state of the" 2 "file, and so on, a total of 6 file. In certain situations, fixed-gain state can be significantly improved operational efficiency. However, the initial imbalance is large, you should use the automatic gain state.

Directly on the keyboard "0" to enter the automatic gain state. Then turn the power off, or press the "reset" button, electrical measuring instrument directly back to the automatic gain state.

(6) left and right counterweight radius r_1 , r_2 :

Respectively, left and right (①, ②) positive school adjustment radius (with the rotor position and the centerline distance weight), in millimeters.

Input data " r_1 "numerical method is: first click on the keyboard" r_1 "button, the corresponding character flashes, followed by the number key, wait several seconds or press the" Save "button, the character stops blinking, enter complete. For example: $r_1 = 135$, then key in the order: " r_1 " → " 1 " → " 3 " → " 5 " → " Memory. "

Input data " r_2 "numerical methods and input data" r_1 "is basically the same numerical methods: for example: $r_2 = 246$, then key in the order: " r_2 " → " 2 " → " 4 " → " 6 " → " Memory . "

"Store" button in a continuous operation can be omitted in the press.

Note : r_1 , r_2 can not be set to 0000 , or the corresponding character flashes, electrical measuring instrument will not be the next step.

(7) distance (length) dimensions a , b , c :

" a "① front of the school to ① bearing surface from the size, or static unbalance the school a positive distance to the bearing surface ① size.

" b "① front of the school to the distance between the front ② school size, or a dual unbalanced positive school distance between the dimensions.

Note : b may be set to 0000 , or the corresponding character flashes, electrical measuring instrument will not be the next step.

" c "② school positive to ② bearing surface from the size, or even unbalanced school a positive distance to the bearing surface ② size.

Input data " a , b , c "numerical methods and input data" r_1 , r_2 " Value is completely similar.

Note : the selected a , b , c size description:

a , b , c Triple a dimension in the electric measuring instrument within the proportional relationship, the unit can be arbitrarily selected , but the three dimensions must be consistent, for example : such as millimeters or centimeters. Or: a , b , c are three dimensions to allow the same time expand or shrink any proportion. It should be noted: r_1 , r_2 in millimeters, and changes can not be changed .

(8) supporting state:

Respectively 6 times on the keyboard "status" button to obtain the 6 types of supporting state. Corresponding to various types of rotor balancing machine in the supporting structure. More choice, see "Appendix IX: rotor support means and the corresponding a , b , c , r_1 , r_2 set method. "

(9) dynamic - static / couple unbalance correction mode selection:

Press the keyboard "static / even" a show "↕ ↖ ↗" Electrical measuring instrument into the static / even balance correction mode. then a no show locator way back to common dynamic balance adjustment.

For static / even balance correction mode theory in detail, see "Appendix IX: rotor support means and the corresponding a , b , c , r_1 , r_2 set method. "

(10) bandwidth selection:

Press the keyboard "⌚" A show "⌚" "Electrical test equipment for automatic bandwidth circuit. And then the keyboard" "⌚" "No one" "⌚" "Show, electrical test equipment for automatic bandwidth circuit to stop working.

When the calibration precision is very high unbalance , electrical measuring instrument automatically start the bandwidth of the circuit (from the damping effect), display some direct changes slowly, while the change in reduced numbers , to facilitate reading.

Note : This feature works only after the button for ten seconds , generally do not.

(11) self-test function:

In order to facilitate a separate check in the parking locator is normal , can self-test function. Press the keyboard "self test" a show "self", electrical measuring instrument into the self- check status. Press the keyboard "self test" a no show locator back to the normal measurement state.

Electrical measuring instrument into the self-test state , the electrical measuring instrument the measurement signal and cut off the external reference signal , turn the power generated within the measuring instrument unbalanced signal into a fake reference and measurement channels ,

from digital table shows a pair of unbalance . Self-balancing machine for each signal to determine the value determined at the time of the initial commissioning and record:

The electrical measuring instrument settings are: supporting state: " 1 ", $r1 = r2 = a = b = c = 100$, left and right counterweight means: "add"

The initial amount of self-test debug log: the left side weight: degrees° g

The initial amount of self-test debug log: the right weight plane: degrees ° g

Note: ① Check the power only for self-test signal box is working properly used , not the electric box accuracy assessment. ② Use the self-test function, should be turned off automatically stop the memory (if any). ③ self-test function can detect the electrical measuring instrument itself, most of the circuit. ④ self-tests can not detect the sensor status and sensor cable.

(12) Memory:

Normal balance machine detection data, to be read after the number of stable, according to a keyboard on the "memory" key, display "memory" of the words, unbalanced data in digital form on the display memory, and then shut down. During shutdown, the operator number table on the basis of the data memory imbalance correction.

A balancing test prior to the next, then a keyboard on the "memory" key, "Memory" the words no display, electrical measuring instrument back to measuring status.

Electrical measuring instrument with automatic stop when the memory function, do not do this. See 3.3.2 Article.

(13) Printing:

The electrical measuring instrument with the function of the printer driver. This machine is only suitable for Epson printer models such as the pin LQ1600 , LQ1600K , LQ300k . Print connection is commonly used in parallel. Properly connected to the printer, in accordance with a "memory" key and a "memory" display mode, press a keyboard on the "Print" button can be displayed at the main electrical measuring instrument information and other relevant information printed official test report.

3.3.2 Locator brief description of the rear panel

(see Figure IV) :

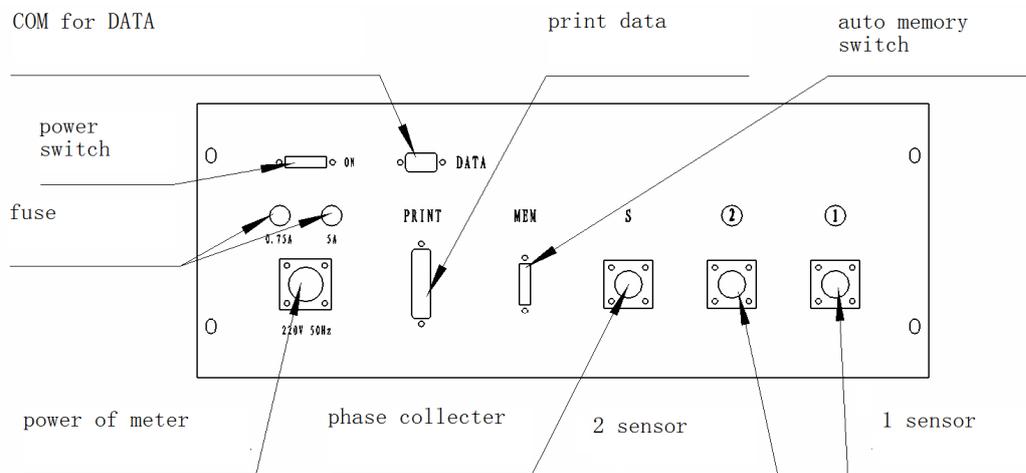


Figure IV Locator brief description of the rear panel

Balancing machines normal operation, the reference signal input socket and plug the sensor socket connection to one correspondence is good, open automatically stop the memory function select switch (some models such function). Then turn the power switch, front panel power indicator light, electrical measuring instrument will enter into normal operation.

Parking on the automatic memory function: ① memory function for auto-stop mass production. ② Taking into account the special needs of specific users, and some models do not

have this feature. ③ normal use of the balancing machine, automatic parking memory can replace the first3.3.1Article in " (11) memory function. " ④ to "self test" operation, turn off the automatic stop memory function.

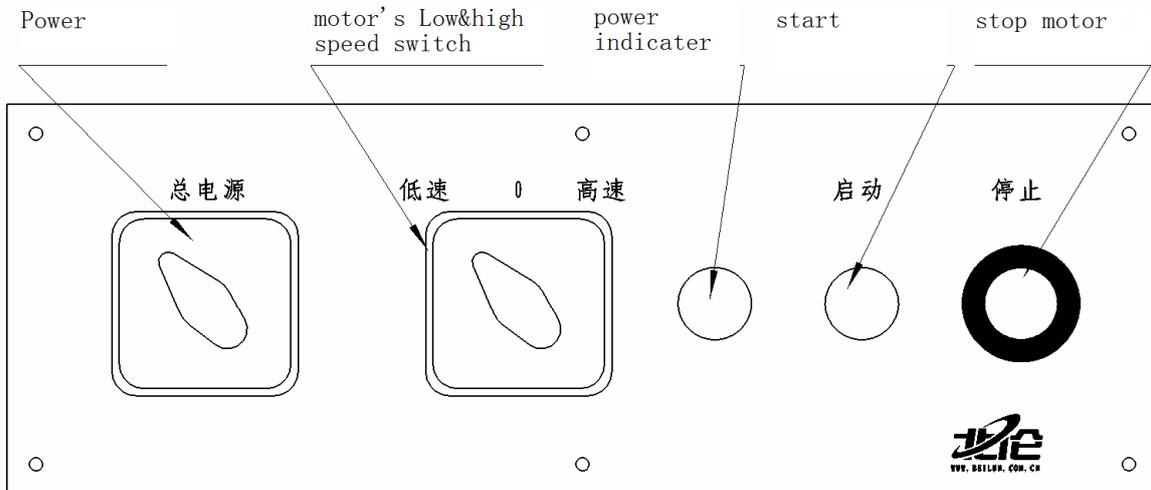


Figure V Electrical control box in front of operating functions and instructions

3.4 Function and operation of electrical control box instructions

3.4.1 Electrical control box in front of operating functions and instructions (see Figure V)

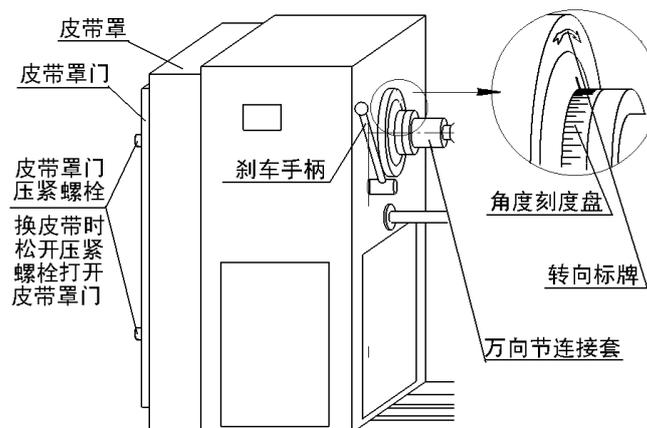
The power switch for the machine and electric control part of the power switch, turn the power switch, power indicator light;

High-speed switch for the selection of the switching speed of the rotor to balance work;

Start, stop buttons control the motor start, stop, that the operation and stop the rotor.

3.4.2 Electrical control box described later (see Figure II)

Maintenance of electrical control box behind the doors, equipped with special locks. Non-professional maintenance personnel shall not be opened. The following socket for each connection, there is connected lines refer to 3.2 behind the appearance of the article and the balancing machine wiring diagram. Electrical control box on the detailed instructions please refer to the manual section 4.1 section.



图六：车头箱及皮带罩部分简图

3.5 boxes and belt front cover part of the profile (see figure VI)

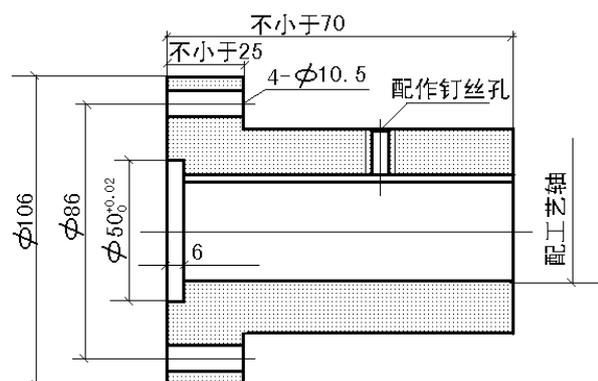
This section includes the motor, belt pulley, belt, drive shaft, brake mechanism, the angle dial and connected sets of universal joints and other components. Achilles Heel Open belt, you can replace the belt wheel on the tower location (see Replacing the belt4.1.1.5 bar), with section 3.4.1

referred to achieve high-speed switching four files work speed. Balancing machines normal operation, the belt should be covered pressed Achilles Heel .

3.6 universal coupling

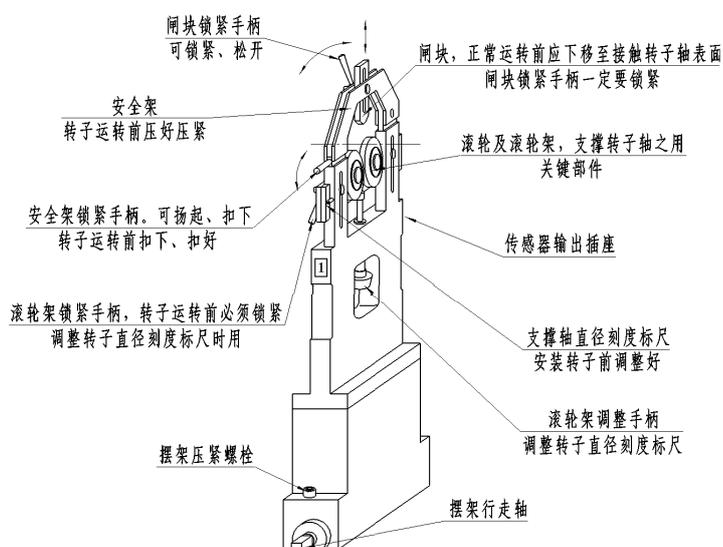
Driven in part through universal shaft coupling and drive the rotor. Rotor balancing during operation of the user, you should first set with a good connection (see Figure VII), connect one end of the connection set of universal coupling, the other end axis of the rotor shaft or rotor craft. Figure the size specified in the rotor weight and size are small and can be properly reduced material thickness, to reduce the added mass of the rotor balance accuracy.

3.7 left and right support frame (see figure VIII)



材料：45# 热处理调质HB265

图七：万向联轴器接套示意图



图八：左 ① 摆架简图

The icon left ① swing frame as an example:

About supporting the main frame have the following effects:

- I : support the rotor;
- II: the centrifugal force generated by the rotor rotation is converted to electrical signals by the sensor:

3.7.1 Security framework

Rotor operation, the safety from the safety role of the main frame to prevent rotor jump in non-normal conditions or other anomalies. In particular, greater emphasis is given when the rotor or the rotor outside the center of gravity in two swing frame, the safety of aircraft must be withheld, buttoned, pressed block gate.

Under normal circumstances, should be withheld security framework, fastened, adjusted to block the gate with the rotor axis distance 1 mm Gap position and lock can be.

3.7.2 Wheel and wheel frame

Balancing machines normal operation, the rotor shaft (or process axis) placed directly between the two rollers. Support the rotor wheel and wheel set up role, while the centrifugal force generated by rotation of the rotor under test, through the swing frame inside the sensor is converted to electrical signals.

Use this section to normal operation should pay attention to:

To wipe clean the roller surface, and the wheel surface, add a little clean oil;

Before installing the rotor shaft under the rotor is supported at the size, scale see scale reading diameter of wheel frame, adjust the height of the two wheel frame and wheel frame fastening. After the rotor allowed to be installed this adjustment;

Non-barbaric operation;

Prohibited in the balance of the rotor welding machine, otherwise it will directly damage the roller surface and the wheel bearing inner raceway, resulting in key components - the wheel scrapped;

3.7.3 Walking and pressed swing frame

Release the swing frame bolts, using the attached ratchet wrench (or other wrench), can move in the balancing machine rails swing frame, when the swing frame will be set to move to the right place holder clamping bolts. Especially rotor balancing machine installed, be sure to check whether the swing frame bolts screw pressed well.

3.8 base

Base is the basis for the balancing machine parts. Normal use, balancing machines, you should always check whether the bolts loose. In addition to keeping a clean, oiled regularly rail surface rust.

4. balancing machine operation, the method Introduction

4.1 General fan rotor balancing during operation

This section will be shown in Figure IX fan rotor, for example, describes the general balance of the school measured fan impeller operation. Other types of rotor balancing school test can refer to this process.

4.1.1 Preparations

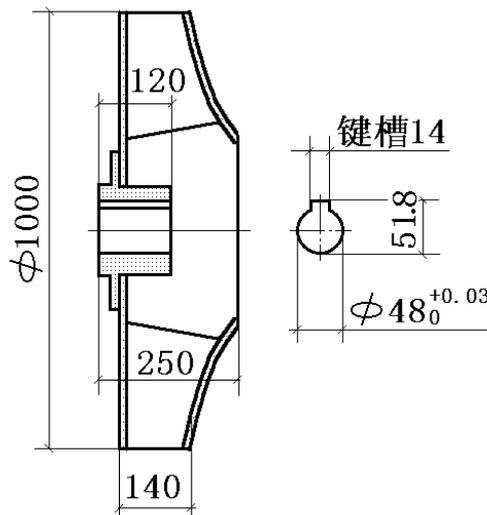
4.1.1.1 process should first make a good impeller shaft and connected sets. Technology shaft and connected sets of drawings, see back of map X, XI (Note: Picture shows size of the corresponding size of the impeller shown in Figure IX). Figure XI in the axial impeller with the double bond structure, please refer to "Appendix XII: Flip 180 ° high-precision balance method ", if not necessary, can be made into touch.

4.1.1.2 Check for loose bolts, if loose tight. Check other parts of the machine normally.

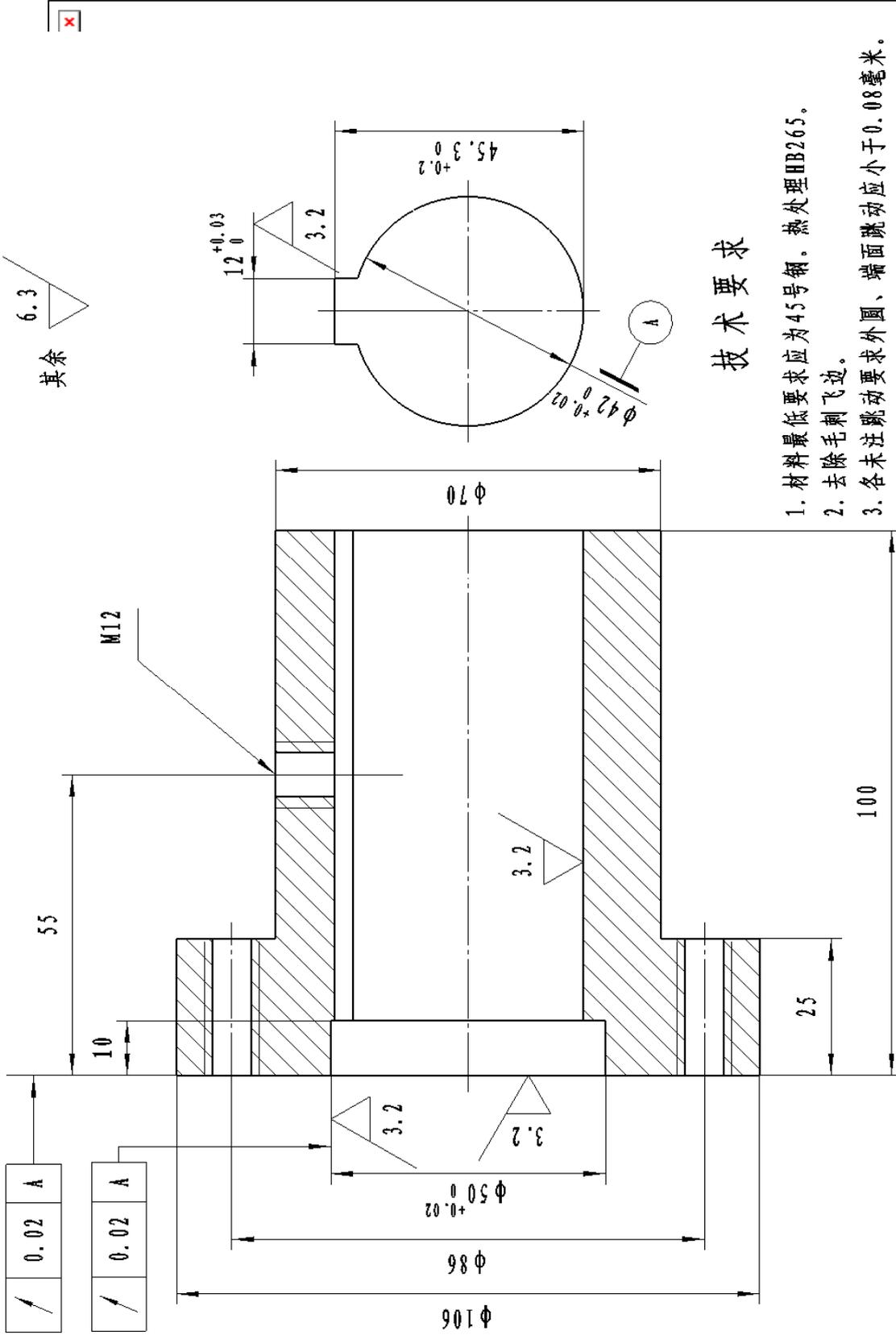
4.1.1.3 the electrical control box on the main power switch "0 "Position (open position).

4.1.1.4 Check the connection is connected properly. Note that the total power during the preparatory work shall not be energized.

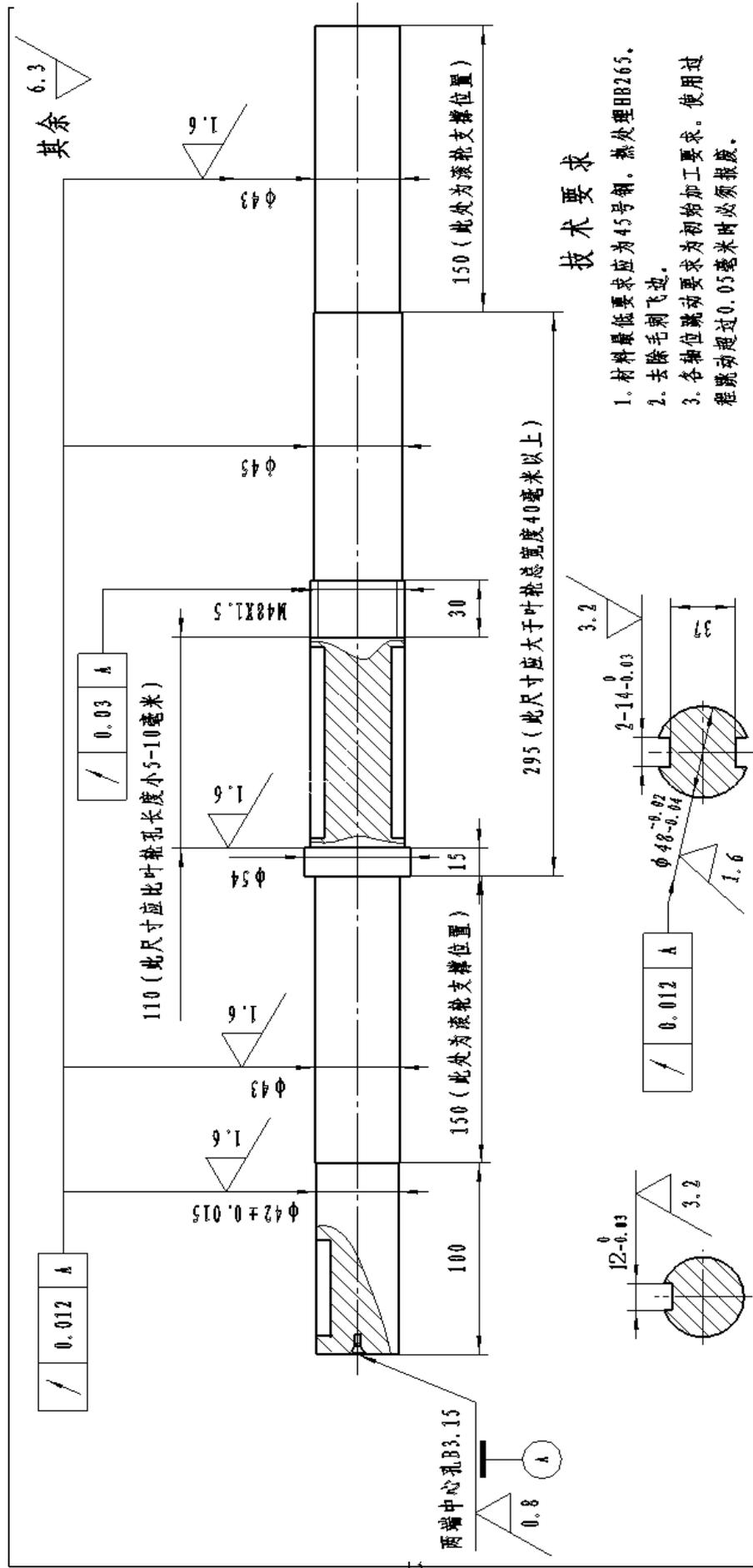
4.1.1.5 Achilles Heel open belt, the belt configuration to the low profile belt slot position (see Figure XII).



图九：示例转子简图



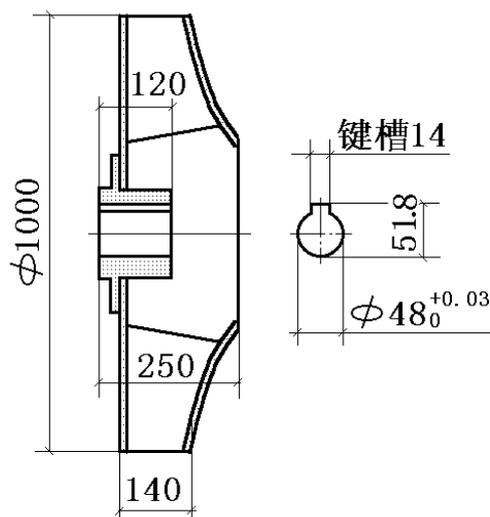
图十：接套图样（例）



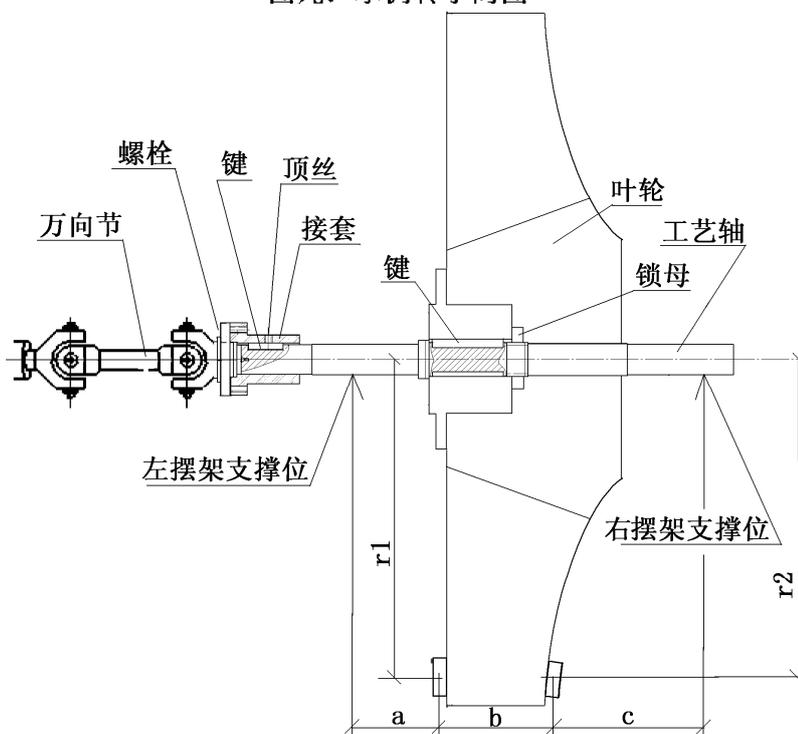
图十一：工艺轴图样(例)

4.1.1.6 scale adjusted to the wheel frame "43 "Position, tighten the wheel frame. Adjust the position of the two swing frame to fit the rotor, shaft installation process. As shown in Figure Thirteen installed and connected the impeller, process shaft, universal joint. Requirements of the couplings must be firmly connected.

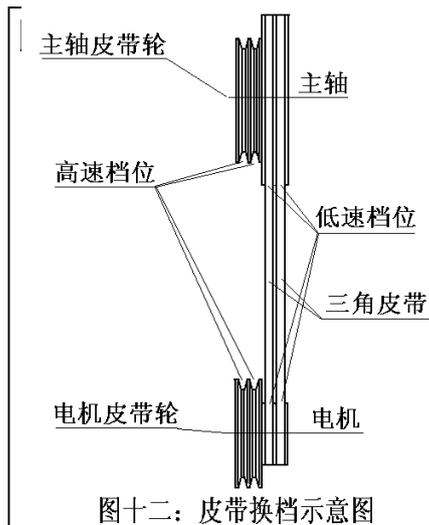
Swing frame adjustment process reference 3.7 Section entirety.



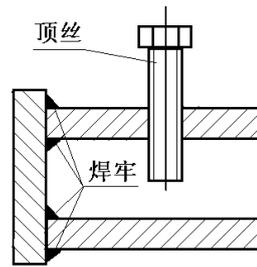
图九：示例转子简图



图十三：叶轮、工艺轴、万向节连接及a、b、c、r1、r2尺寸示意图

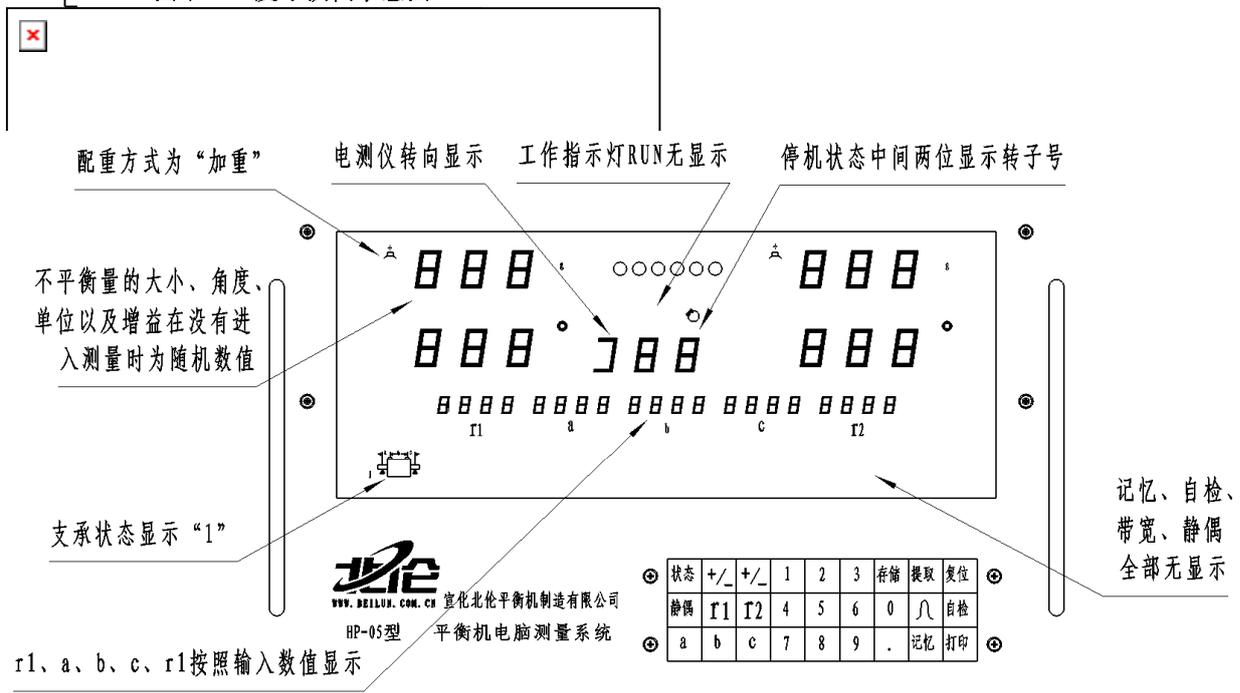


图十二：皮带换档示意图



夹子应制作成不同重量的一个系列，保证操作者有足够的选择余地。另外，也应保证夹子有足够的强度

图十五：夹子试重



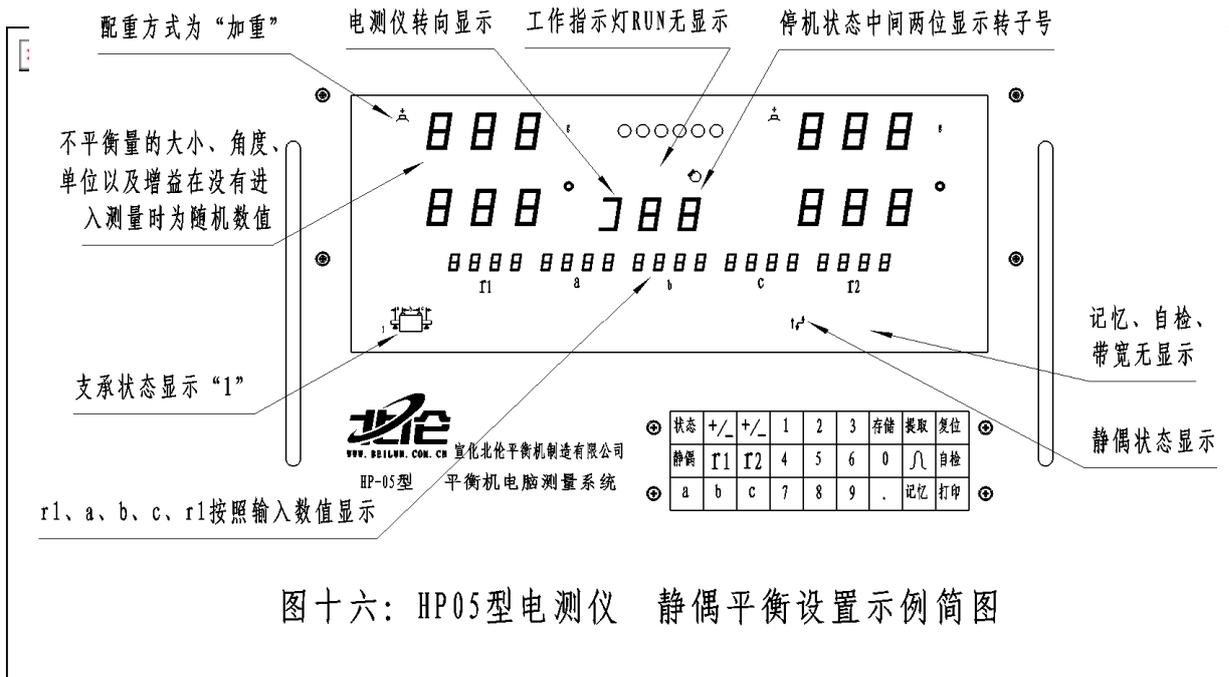
图十四：HP05型电测仪 设置示例简图

axle support level attention to clean technology, roller coated with the four little oil.

4.1.1.8 rotate impeller by hand to check for anomalies, confirm that all mechanical connections are reliable.

4.1.1.9 the total power switch "0" Position (open position). Check the connection is connected properly. High-speed switch to "low" position, and then to the whole transmission, power indicator light.

4.1.1.10 open the electric power measuring instrument, electrical measuring instrument in front of panels that display the letters " BEI LUN " , after a few seconds of electrical measuring instrument self-test process, the display items properly, enter the wait state measurement.



图十六：HP05型电测仪 静偶平衡设置示例简图

4.1.2 Unbalance detection process

4.1.2.1 Verify that all mechanical connection and reliable, as shown in Figure Thirteen, refer to 3.3.1 section (6), (7) content, measuring dimensions a , b , c , r1 , r2 are input to the locator.

Refer to Section 3.3.1 and Figure fourth section settings: supporting state "1", "Left and right weight approach to". "Remaining such as: static / couple, bandwidth, memory, self and other are not enabled. Automatic gain status not operation.

4.1.2.2 Check: Balancing machines work, the diameter of the rotor rotation direction, it is definitely not anyone there.

Note: a balancing machine normal use, must ensure that the right turn :

b balancing machine for the first time after installation, use and external power supply system balancing machine there is a change, all correct card balance machine working shift is correct. Method: Press "start" button, and then immediately press the "Stop" button, to see whether the direction of rotation of the rotor plate and the front part of the steering the same direction.

c validation process must be in the rotor turning during installation (4.1.1Section) upon completion.

4.1.2.3 the speed switch to "low" position. Confirm the rotation of the rotor diameter direction, and no one there. Click "Start" by twisting start balancing machines.

4.1.2.4 a few seconds after the rotor speed and stability, from the locator can be seen on the turn: a reading speed after the direction to a certain stability, b " RUN "light, c four digits table (the size of unbalance and angle) stability (or relatively stable) instructions.

4.1.2.5 normal state, the electrical measuring instrument in automatic gain state. If you need to gain and fixed gain automatic operation, see 3.3.1 of " (5) Gain display "the contents.Recommended the use of technology in the fan balance automatic gain state.

4.1.2.6 electrical measuring instrument according to the "memory" key (with memory function automatically stop balancing machines, do not press the memory key), then press the "stop" button, the rotor stops turning.

4.1.2.7 electrical measuring instrument according to the magnitude and direction angle of the rotor position of increase on the corresponding clamp test weight (see below as shown in Figure-fifth), the size and location of required accuracy, clamping firm . (This process is unbalance test removal)

4.1.2.8 locator again to the "memory" key (to enter the memory should be lifted before the measurement, the use of automatic memory function, not this), repeat 4.1.2.3 - 4.1.2.6 of the

above operating procedure, electrical measuring instrument according to instructions Change the value of validation test weight of the clip size and location are correct.

4.1.2.9 by moving the clip position (angle) and change the clip size (weight) to be adjusted so that the residual unbalance is small enough.

4.1.2.10 to do the installation location and position the clip with great little marker.

4.1.2.11 Remove the rotor welding with weights.

Note: a rotor balancing machine must not be welded in, otherwise it will create a balance machine fault!

b can be welded rotor shaft without removal process, but should pay attention to protection.

c with weights weight (including the electrode weight) should be accurate.

4.1.2.12 Repeat 4.1.2.2 - 4.1.2.11 of the above operating procedure, until the balance of the rotor required accuracy.

4.2 Axial, oblique flow fan rotor balancing during operation

In general, axial, diagonal flow fan rotor to balance the static balance check accuracy can be achieved. The following main test for the static balance than the process. If necessary, the operator can combine this section and a section on the dynamic balance school test.

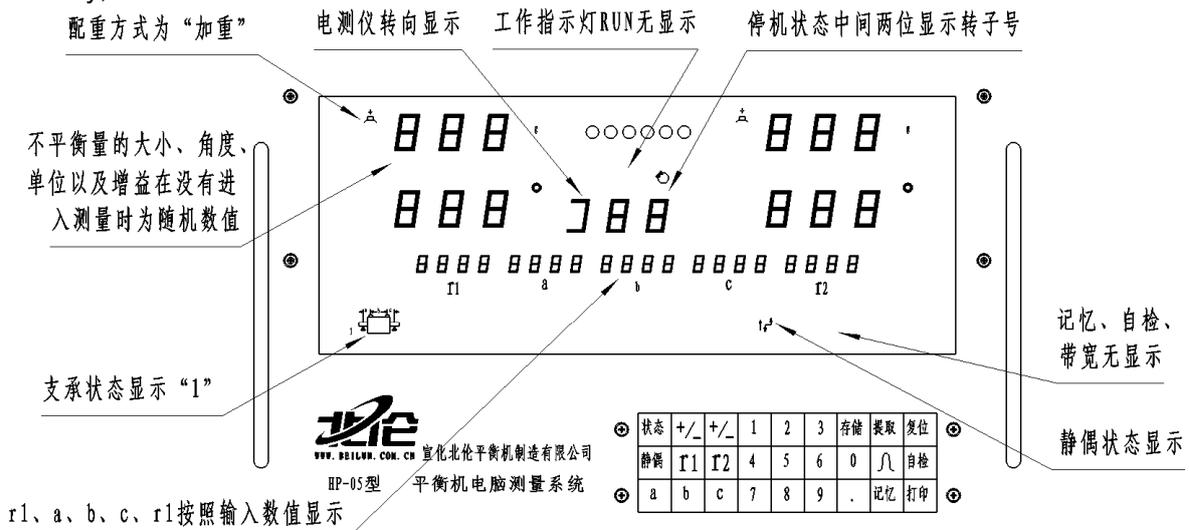
4.2.1 Process for production of the impeller shaft and connected sets of such preparations. Technology shaft and connected sets of drawings shown in Figure X, XI (Note: Picture shows size of the corresponding size of the impeller shown in Figure IX, corresponding to the different rotor shaft and connecting different sets of processes. size should be matching with the corresponding rotor).

4.2.2 Other preparations of basic and 4.1, the same or similar section.

4.2.3 All preparation and rotor installation is complete, turn the impeller by hand to check for anomalies, confirm that all mechanical connections are reliable. Check the connection is connected properly.

4.2.4 Verify that all mechanical connection and reliable, according to figure below, reference 3.3.1 section (6), (7) content, measuring dimensions a , b , c , r1 , r2 are input to the locator. Refer to Section 3.3.1 and Figure section sixteen, seventeen, eighteen settings: supporting state "1", "Left and right weight approach to" $\bar{\Delta}$ ", Press the keyboard" static / even "a show" \uparrow \leftarrow "Electrical measuring instrument into the static / even balance correction method. The rest, such as: bandwidth, memory, self and other are not enabled. Automatic gain status not operation.

4.2.5 Start the measurement process in accordance with the 4.1 section, the reading is stable memory, shut down.

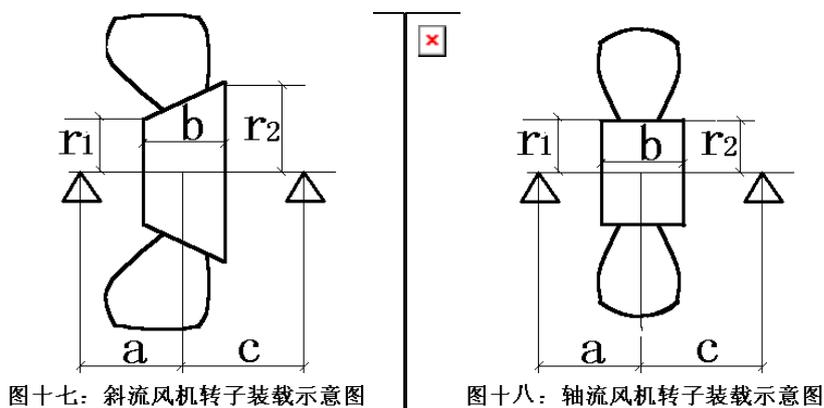


图十六：HP05型电测仪 静偶平衡设置示例简图

4.2.6 Static / even balance adjustment mode display is: the left table shows the number of size and angle of static unbalance, the right table shows the number of even size and angle of unbalance (see Figure XVI). Digital form by the left indicate the size and angle of static equilibrium weight operation. Commonly used in the proper position the rotor chamber shell welding methods with weights weight. Weight should also be tested with the process of re-operation. The left side of the table indicates the static digital balance to an accuracy of unbalance within the school that the rotor balance test to complete.

4.2.7 In axial, oblique flow fan rotor balancing during operation, even the right number of tables display the size of unbalance can operate without the weight.

Even if you want to be imbalance in the amount of weight operation, the school should be measured in the static unbalance is complete, refer to 4.1 sections (Balancing) content, re-adjust the a , b , c size, then press the keyboard "static / even "one-to does not display "↑↑←"(Figure XIV), electrical measuring instrument way back to balancing correction. Strictly in accordance with the 4.1 section (Balancing) method, until the accuracy requirement.



图十七：斜流风机转子装载示意图

图十八：轴流风机转子装载示意图

4.3 high-speed rotor balance fan operation

Fan speed fan rotor and the rotor generally similar. However, large diameter, width, size is relatively small, it should first adopt static / even balance method (see 4.2 section) check, after passing the static unbalance, and then take Balancing (see 4.1 section) check, until fully qualified.

4.4 Other rotor balancing during operation

4.4.1 Common rotor, crankshaft balancing operation, etc.

Such a rotor can be 4.1 section describes the methods, process imbalance detection. Pre-test to balance the needs of processing units corresponding to the universal joint connection. Directly to the rotor bearing bit position as the balance of the support process. In the absence of process shaft itself in error, the actual balance is better than a technology -axis in the rotor balancing.

4.4.2 Flywheels, gears and other disc type rotor balancing operation

Such a rotor can be 4.2 section describes the methods, process imbalance detection. Pre-test to balance the needs of processing the corresponding universal joint sockets and process axis. When the length and diameter ratio of less than 1 : 10 , you can only measure the static unbalance of the school.

5. Balancer handling precautions, operational procedures and simple operation

5.1 Notes

5.1.1 For larger rotor (>20kg), Must have the appropriate supporting lifting equipment to facilitate safe operation, to avoid unnecessary accidents.

5.1.2 Balancing machine must be shown by a solid foundation based on the results of the data or the balance of his unstable, untrue.

5.1.3 Around each balancer to be a security fence, the fence from the balancing machine size is generally 500 mm to 1000 mm.

5.2 Practice

5.2.1 The operator must be familiar with the equipment of the basic performance and technical requirements.

5.2.2 Before starting the power cable is intact, the cable is properly connected.

5.2.3 Regular inspections and other fastening bolt connection is loose, if any looseness in time compression.

5.2.4 Should be closed after the completion of balancing machine power switch, preferably at the same time off the external power supply.

5.2.5 Not in balance or equilibrium plane near the unit such as pollution of the rotor balancing machine sanding operations.

5.2.6 Rotor balancing machine must not be welded in!

5.2.7 Regular cleaning balancing machine, the top coat of oil is not commonly used in rail protection.

5.3 safety operation

5.3.1 When the balancing machine work, the rotation of the rotor diameter in the direction of any person must not exist!

5.3.2 Balancing machine operator, from start to record data, downtime must be one person operation. Large balancing machine operation, operator other than the workers must obey the command of operatives to install the rotors, balancing machine must not touch any buttons.

5.3.3 Rotor balancing machine must not be welded in!

5.3.4 Before lifting the rotor, regulate the balance of machines bearing frame, including the location of diameter rod bearing and bearing bracket location. After the rotor into the bearing shelf above do not allow the re-adjustment.

5.3.5 Use a larger rotor speed balance. Smaller high-speed rotor balance, the initial volume of the small rotor imbalance is also first with a low balance.

5.3.6 Balancing machines are instrumentation products, rotor unbalance and the complete testing process, should always pay attention to the balance of machine maintenance. Does not allow barbaric operation.

5.4 rotor installed properly balance after a brief sequence of operations for the machine:

5.4.1 Hand try to install the rotor is appropriate.

5.4.2 Check the rotation of the rotor diameter direction of any person must not exist.

5.4.3 Start balancing machines.

5.4.4 Measuring, recording data.

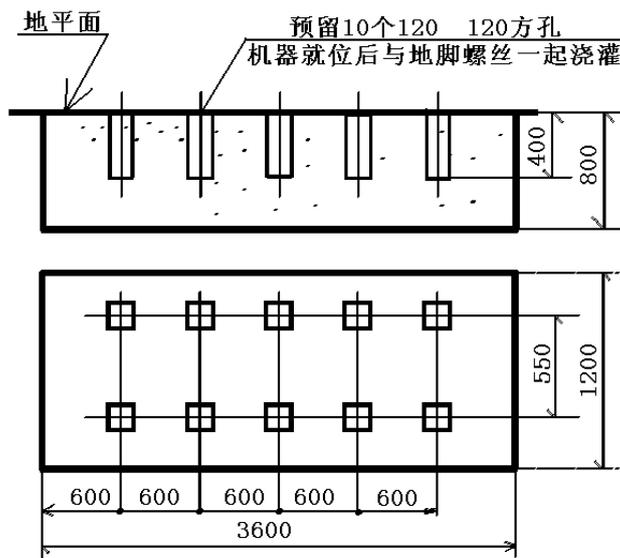
5.4.5 Downtime.

5.4.6 The unbalance test removed.

5.4.7 Retest measurement value.

5.4.8 After removing the welded rotor balance block (or other weight means the operation).

Appendix A : Balancing machine foundation, installation and adjustment of the level of



YFW-300平衡机地基图

Balancing machine as far as possible to avoid the installation of the

external vibration source and the strong power of interference, such as driving or other frequent starting and stopping the machine can affect the reading of instability, the best little power can interfere with the power connected to the circuit.

The basis of balancing the quality of machine foundation general requirements: the biggest piece should be the quality of balance machine 15 times.

Balance in the general foundation installation, the application level meter calibration standards to the level of degree of vertical and horizontal directions to achieve two 0.5/1000 requires less. After adjusting the level required to fight the nut tight. Gap filled with concrete.

Foundation made the following order:

Based on photos with concrete to the system of the main foundation.

To be the main foundation of concrete completely solidified, the machine with bolts and adjust the horn placed connected, the initial adjustment of the level, the second square feet watering hole.

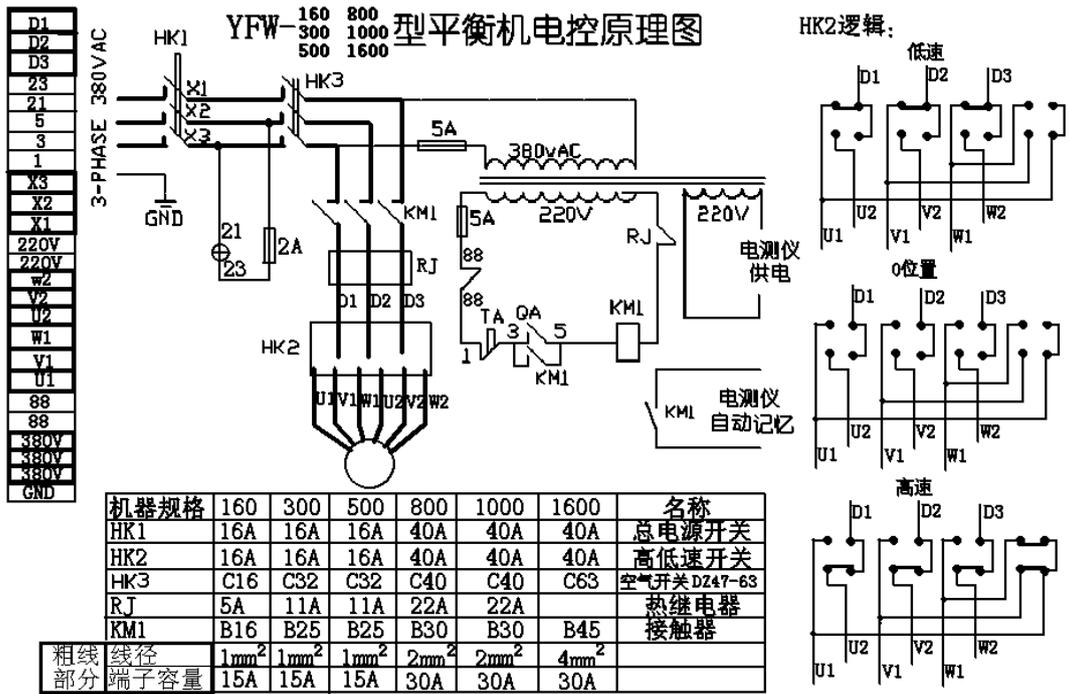
Poured concrete to be completely solidified after the second fine tune the level to the request, the bolt clamping pressure is good, fight tight. Gap filled with concrete.

Note: Before installing, you should carefully check the underside of the bed and the cement foundation, during which there is any debris not allowed to affect machine life.

Operator should always check the bolt is loose, if any looseness in time compression. Otherwise it will directly affect the accuracy of the final balance.

Appendix II: Principles of balancing machines and electrical control schematic

The electrical control part of the theory, see electrical control schematics.



B

balancing machines put into use before the formal external power supply system and balance the machine there is a change, all correct card balance machine working shift is correct. Authentication methods, see 4.1.2.2 .

Electric control part of the normal operation as follows:

The machine used two-speed motor drive motor. Open HK power switch, power indicator light on the button. In the body of the 4.1 part of all the work is completed, make sure the rotor and the universal joint, bearing frame and so on, connected, installed circumstances, the motor speed switch to "low" position, press the "start" switch, then the motor to require a normal direction of rotation (if any unusual sounds, immediately press the "stop" switch.) Then you can enter measured. Determination of good data and memory, press the "stop" switch, you can balance the weight of the craft.

Similarly, the motor "speed" switch to "high speed" position, press the "start" switch, then start the motor direction normal to require high-speed operation.

When you press "stop" switch after the TA, KM1 stop working, electrical power failure, the rotor lost power, and inertia of rotation, such as its own shutdown. Can also be manually brake.

Appendix III: Introduction and Advanced Electrical Test Equipment Operation

HP- 05 type hard bearing balancing machine measuring system for hard bearing balancing machine unbalance vibration signal detection.

The electrical measuring system is a computer-controlled balancing machine for measuring instruments.

The electrical measuring system with: Automatic sensitivity control, the rotor automatic data storage, measurement data (size and angle position) directly read out, the rotor keyboard input data, dynamic balance and static - even balancing selection functions.

Save and extract the rotor through the keyboard data.

Rotor data No. 1 ---- 99 .

1. Overview :

Electrical Test Box for the hard-bearing balancing machine unbalance vibration signal detection. The input power for the Test Box :

- a. two sensor output bearing surface of the rotor unbalance two vibration signals.
- b. a reference signal generator output and the rotor rotating frequency reference signal with the strict (sine wave or pulse)

Measured output power for the box :

- a. the main display section displays the rotor, respectively, the radius of the two calibration correction on the plane and phase unbalance, or even static unbalance and phase.

Other relevant information, including supporting state (6 species), r1 , r2 , a , b , c , increase, de-emphasis, the balance of the rotor speed.

b. balance of the test results and printed reports.

Electrical measuring the electrical box using a novel test structure and reasonable layout of the circuit, using single-chip computer circuit, linear sampling calculation, abc r1 r2 and supporting means of direct visual input directly display mode, the operator at a glance the work of balancing machines state.

Conversion accuracy greatly improved over previous hardware. All Department of linear and digital integrated circuits have been produced internationally domestic dual in-line package, standard series, to bring the convenience of maintenance and reliability has improved significantly.

Electrical Measurement box with the core circuit is tracking through the relevant filters , and frequency of the filter has a good tracking performance. The tracking range is wide , electrical measuring box just a block scope of work speed , convenient for users. Especially the use of automatic bandwidth switching circuit , a reasonable solution to the electric response of the Quick Test Box and stability of the contradiction between , so that the electrical measuring box has excellent low speed performance.

2. Electrical Measurement box for the following work environment

2.1 The ambient temperature is not higher than +40 °C And not less than 0 °C .

2.2 air humidity is not more than 85 % (+25 °C)

2.3 supply voltage is ~ 220V \pm 10 %

2.4 Power frequency 50Hz

3. The main technical parameters

3.1 Maximum value error \pm 5 %

3.2 maximum phase angle error \geq 5 °

3.3 Plane computing the maximum error \pm 3 %

3.4 radius of the operator maximum error \pm 3 %

3.5 the maximum error range of \pm 3 %

4. Terms of Use

Hard-bearing balancing machine with a , b , c and permanent calibration characteristics of isolated , abandoned the soft bearing balancing machine compensation, separation, calibration and a series of complicated steps , greatly improving efficiency.

The whole of the major technical indicators : minimum achievable residual unbalance Umar, reduced rates of unbalanced URR was measured by the sensors and electronic systems with the adjustment of the various aspects of the joint undertaking of , any of a link failure and replacement will be affected to different degrees machine precision , so do not understand the whole principle should be avoided because , easily adjust the adjustable components inside the electrical measuring human error caused.

In the operating parameters of the r1, r2, b of the settings do not allow 0000 position. Otherwise the 3 groups of data bits flash, electrical measuring system does not work.

Electrical Test Box is a precision measuring instruments , shall be hand operation and regular inspection , the operator should be professionally trained.

5. Principles of Electrical Measurement System Introduction and digital table

5.1 Introduction Principles of Electrical Measurement System

Power supply parts : the transformer supply 220V AC converted to \pm 15V DC for the measurement systems.

MCH pulse forming device : the input reference signal after the phase-locked frequency , by processing the digital circuit unit , to provide tracking band -pass correlation filter and the speed required to form a variety of pulse signal , and generating self-test signal and automatically switch the bandwidth (damping) signals.

Prefilter part : the ① and ② ① to ② sensor input signal prefilter bearing surface , also measured or self-test switch.

Some of the main filter : obtained by pre-filtering, the processed ① or ② the school a positive correction radius of the signal after filtering , the output of a set of orthogonal unbalanced DC component into the computer part of the realization of a , b , c , r1 , r2 operations , and to achieve the bandwidth switch , memory and other functions.

The adjustment of the two sensors, and all matched by computer processing.

5.2 Digital Form

Table shows two figures left ① ① flat plane unbalance and phase unbalance is located.

Table shows two figures on the right plane unbalance and ② ② plane where the phase unbalance.

The middle four digits of the table measure the rotor speed, the unit is: turn / min.

6. Maintenance

Electrical measuring box should be placed in ventilated, dry, clean interior. There should be close to strong electromagnetic interference. Not often used by hand every week since the state seized under the power 2 ~ 3 times , each time 2 ~ 3 hours. Power is disabled during the test case , application of dust cover to cover , every 3 ~ 6 months, should open the case cover replacement of the desiccant , at intervals of 1 ~ 2 years electrical box should check the technical requirements of the indicators , and mechanical and electrical tie check the machine precision.

7. advanced operations

7.1 Reset

The electrical measuring instrument to set the "reset" button. Misuse or other causes the bug, you can press the "reset" button resets to the normal measurement state.

7.2 Save and extract the rotor data capabilities

The electrical measuring instrument can be a rotor loading data (dimensions a , b , c , r1 , r2 , supporting the state, with heavy way, dynamic - static / even, etc.) is stored as a rotor or rotor number is 1 to 99 No, that is: save up to 99 a rotor.

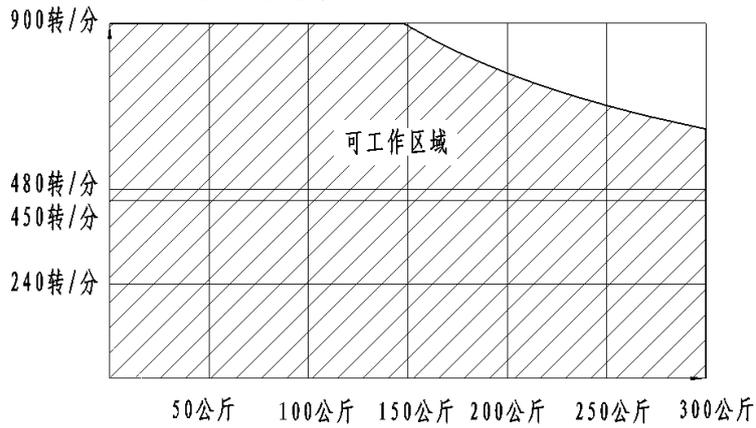
7. 2.1Rotor data storage: Make sure to store the data of a rotor mounted to a specific number of the rotor, the first loading of the data currently displayed in the correct data set, and then click "Extract" button, the number starts flashing display speed, and then and through the keyboard number keys to enter numbers to store the rotor, and finally click "Save" button.If the number stored in the rotor that there are data, then the stored procedure will use the new data completely overwrites the original data, original data will be lost.

7. 2.2Extract the rotor data: the premise of the rotor has been stored, press the "Extract" button, the number starts flashing display speed, the keyboard number keys to enter numbers to read the rotor, the input is completed, click "Extract" button to specific to the current operation of the rotor extraction panel.

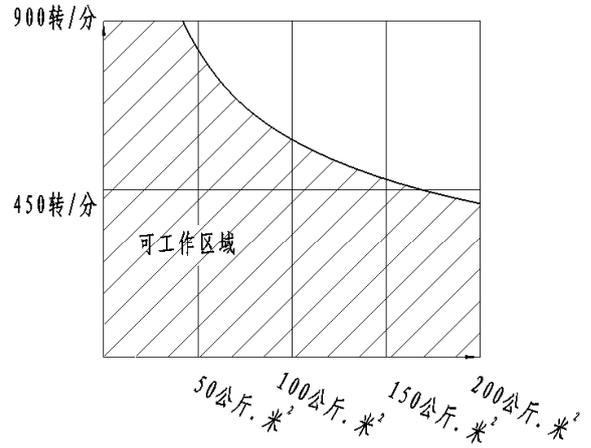
7. 2.3Xiugai rotor data: Make sure to modify the current rotor number is set to load data, first load the data currently displayed in the correct data modification is good, press the "Save" to save the changes.The operation will be completely covered with new data the original data, the original data is lost.

Fault feature	Causes	Inspection and troubleshooting
No power indication That all the light does not shine	① no power supply Bad power plug ② ③ bad rear panel fuse ④ DC power supply failure	① Please first check the external power supply ② Check the plug and seat ③ Check and replace fuse ④ Please DC power supply part of the professional service
Normal operation of the rotor when the RUN light does not shine or (and) tachometer indicates instability	① reference signal box did not enter the Electrical Measurement ② benchmark "photoelectric" sensor failure ③ PLL loss of lock signal in the frequency ④ MCH circuit fault	① Check the reference signal and the cable socket is working ② Check the baseline (optical) sensors, including: cleaning the dust, check the connections, etc. ③ photoelectric sensor to adjust the position or the reference signal generator , the frequency of this signal should be the same frequency with the rotor rotation ④ Please maintenance professionals in MCH part of the circuit
Since the state seized , but even under the normal state machine is not working properly under	① reference signal problem ② sensor and cable issues ③ Other process issues	① Ibid ② Check and correct connection of the sensor connection ③ reference to other sections of the examination process issues and operational issues
POST RUN lights indicate normal speed , but the value is not displayed correctly	① Manual Gain problems ② "memory" lock	① the body of the first reference to the manual3.3.1Section " (5) Gain display "the contents of the manual gain value or for changes to the automatic gain state ② self test should be removed manually "memory" state, and turn off the automatic memory function
Normal operation of the rotor when the RUN light indicates normal speed , but no values show	① Manual Gain problems ② "memory" lock ③ sensor and cable issues	Ibid ① ① ② Measurement of the normal operation of the rotor, the should be removed manually "memory" state. (Automatic memory function does not affect the measurement) ③ Check and correct connection of the sensor connection
Poor plane separation , the two schools face serious interference	① loose internal parts of the actual rotor ② loading parameter setting problem ③ sensitivity of the sensor changes	① rule out loosening the internal rotor (including the process axis) ② carefully check each load parameters (size of a , b , c , r1 , r2 , support methods) ③ self-test function by comparing the actual testing process to determine the sensor state of balance, if necessary, replace the sensor
Display value and actual value of the error is too large	① Ibid ② change of system parameters	① Ibid ② recalibration

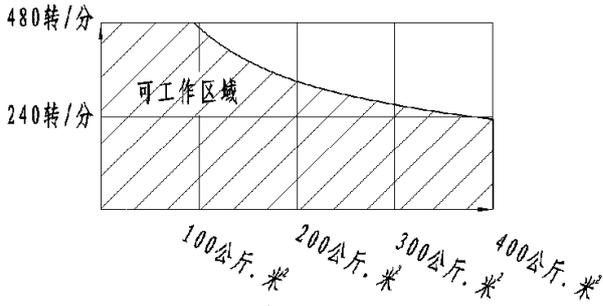
重量-转速限值



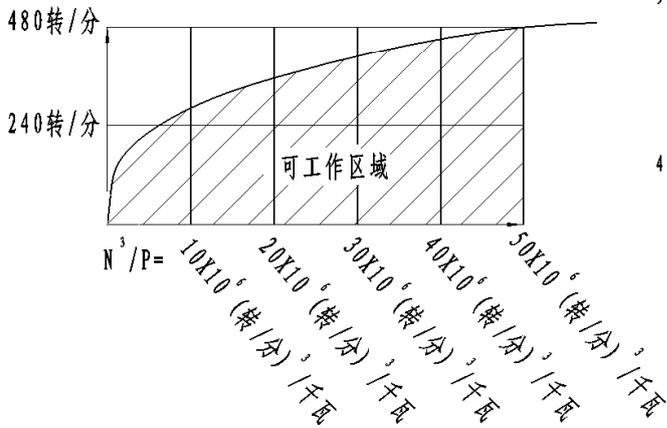
转动惯量-转速限值(用电机高速档3.3千瓦时)



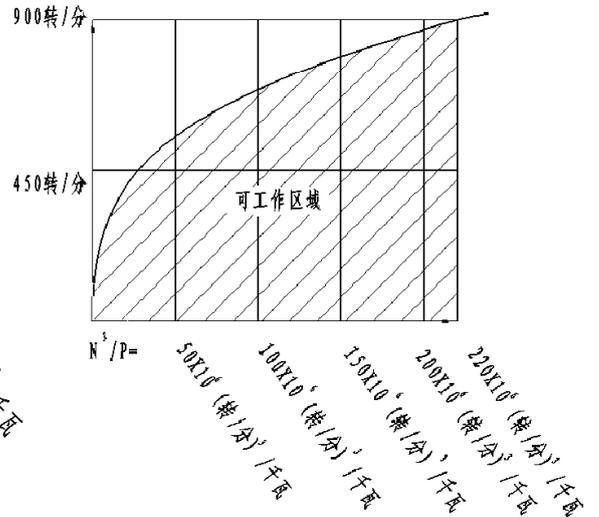
转动惯量-转速限值(用电机低速档2.2千瓦时)



风阻因素限值(用电机低速档2.2千瓦时)



风阻因素限值(用电机高速档3.3千瓦时)



Appendix V: Selection of common rotor balance accuracy, principles and methods of computation
Balancing machine measuring device to accurately measure the small amount of unbalance. Moreover, the accuracy of measuring devices is usually much higher than the user's balance is always accuracy.

The balance in determining the accuracy of the workpiece rotation, in addition to a special experiment, the rotor is not necessary balance to the limits of accuracy.

According to the characteristics of different types of mechanical and practical experience, the following table lists the International Organization for Standardization (ISO) promulgated the "typical rigid rotor balancing precision level," as a balance of precision in the choice of a reference.

Accuracy class G	$e \omega$ (Mm / sec)	Rotor type of example
G630	630	Rigid installation of marine diesel engine crankshaft-driven components; rigid installation of the large four-stroke engine crankshaft-driven pieces.
G250	250	Installation of high-speed rigid crankshaft drive four-cylinder diesel engine parts.
G100	100	Six-cylinder and multi-cylinder diesel engine crankshaft-driven pieces. Cars, trucks and locomotives used (gasoline, diesel) engine machine.
G40	40	Car wheels, round hoop, wheel the whole; cars, trucks and motorcycles driven by the engine's crankshaft parts.
G16	16	Crushers, agricultural machinery parts; cars, trucks and locomotives used (gasoline, diesel) engines of individual parts.
G6.3	6.3	Ship (Merchant) Main worm drive gear; centrifugal separator, the pump impeller; fan; aero gas turbine rotor components; flywheel; machine parts in general; normal motor rotor; the special requirements of individual engine parts.
G2.5	2.5	Gas and steam turbines, including the Ship (Merchant Shipping) rigidity of the main turbine generator turbine rotor; turbine supercharger: machine-driven piece; the special requirements of medium and large motor rotor; small rotor; turbo pump.
G1	1	Tape recorder and record player-driven pieces; grinder drive parts; the special requirements of small armature.
G0.4	0.4	Precision grinding spindle, grinding wheels and armature, gyroscopes.

When the rotor balance accuracy than G2.5 must be a self-drive or very close to the actual working state of the driver, supporting balanced way, be possible to get good balance effect.

General fan rotor can choose G6.3 level, with the process axis balance can G5.6 calculated.

Choose a good level of accuracy, the method can be converted to weight the following process surface.

The following detailed calculation.

Assuming the rotor weight is W (unit: kg kg) ;

Practical rotor speed n (unit: turn / min) ,

The actual work that is angular velocity $\omega = 2 \times \pi \times n / 60 = n / 9.549$ (unit: 1 / sec) ;

If the accuracy of rotor balancing selection G6.3 level, ie $e \omega = 6.3$ mm/ sec

That Mody , the rotor allows the weight shift $e = 6.3 \times 9549 / n$ (μ m)

By the formula $e \times W = M \times r$ deduced:

Surface of the rotor weight in the specified radius of the specified maximum allowable unbalance $M = e \times W / r$

Or:

$$M = (9549 \times G \times W) / (r \times n) \approx (10,000 \times G \times W) / (r \times n)$$

(units: g)

The above type in:

M - rotor plane correction r radius of the unbalanced mass, grams (g)

G -balancing precision grade, such as: fans, pumps, etc. 6.3 level

W -rotor mass, kilograms (kg)

r - unbalanced mass m is located at the radius, mm (mm)

n - rotor speed in the actual work, turn / min

e - the focus of the rotor plane correction offset (μm), or call ratio unbalance (g .mm / kg)

Operator as long as the rotor balance to index m or less, you can balance that the rotor has reached the required precision.

Balance accuracy of the original designers of the rotor should be presented and other relevant documents in the drawings or indicated. Proposed balancing accuracy requirements, meet the relevant standards should be recommended or required.

Appendix VI: rotor shaft balance the technical requirements of the process

The balancing machine specifications, there is a precision parameter:

$$e_{mar} = 1 \text{ g} \cdot \text{mm} / \text{kg} (\mu\text{m})$$

The significance of this parameter means that the measurement precision balancing machine number in the micron level, while the average geometric precision machining in a wire - 10 between the wire, ie $10 \mu\text{m} - 100 \mu\text{m}$.

Of magnitude from this specific sense, it can be said: the balance of the impeller rotor craft precision depends on the impeller shaft and mounting holes of the geometric precision. The following will illustrate the process the relationship between the accuracy and balance shaft.

Assumptions:

The quality of the rotor $W = 30 \text{ kg}$

The actual work of the rotor speed, $n = 2900 \text{ turn / min}$

Technology axis runout $50 \mu\text{m}$, which can cause the rotor positioning eccentricity $e = 25 \mu\text{m}$

Weight of the rotor radius $r = 200 \text{ mm}$

Then, the allowable residual unbalance the rotor:

$$M \approx (10,000 \times 6.3 \times 30) / (200 \times 2900) = 3.26 \text{ grams}$$

The beating caused by the process shaft unbalance

$$e \times W / r = 30 \times 25 / 200 = 3.7 \text{ grams}$$

It can be said: the process in terms of balance, balancing machines and even on how close reading of zero, the axis error process alone has resulted in the amount of residual unbalance tolerance.

5 wire has such a great influence accuracy, and for general machining, the 5 wire has been difficult to guarantee. From this, a balance shaft machining process must be through the grinding process, to ensure there is sufficient balance shaft geometric precision, so as to ensure that the final balance of the real accuracy.

Amendment to balance the axial fan limit process: when the beat is greater than 5 wire, must be amended, or balance the effect of false balance.

Similarly, if the balance between technology and the rotor shaft has an oval or tapered bore phenomenon, the rotor shaft can not be solid and balanced combination of technology, will lead to smaller amount of unbalance can not be accurately detected.

In addition, the balance shaft material technology to 45 # steel, and through the transfer of heat treatment for the minimum requirements. To ensure the effective life of balance shaft technology

Appendix VII: various types of rotor weight method applicable

Balance weight in the process approach to welding, riveting, paste (add method) or drilling, grinding (to weight method) the most common method, the special rotor also can be used to adjust the location of the weight way to carry out the block. Common method of rotor weight corresponding to the following categories:

a: General General fan rotor, can take the front and back end near the outer cylindrical plate position welding methods with weights weight.

b: there are various types of explosion-proof requirements of fan rotor, but to take grinding (grinding machines, belt machine) the method of weight.

c: the types of FRP fan rotor, the selected location in the same material paste and the method of the rotor weight.

d: Axial and oblique flow fan rotor, can take their proper place in the rotor chamber shell welding methods with weights weight.

e: Luo Heights fan rotor, the general fan does not affect the end performance at a place where heavy weight (drilling, milling, etc.).

f: small and medium rotor, generally in the cage at both ends of riveting methods with weights weight.

g: large-scale rotor, the general design of the weight ring slot. Used in the weight ring with weights adjusted tank location, size, or added and the method with weights weight.

h: micro-motor rotor, the general position at both ends of the appropriate method of paste epoxy weight of epoxy resin material directly as a counterweight.

i: common crankshaft rotor, generally designated location in the method of drilling weight, unbalance is too large, you can milling.

j: CV rotor shaft tube in the middle to both ends of welding methods with weights weight.

k: General automobile wheel, the wheel hub outer edge of the Stuttgart system with weights for weight.

Various types of weight method should be selected according to the characteristics of the rotor. Should first ensure that no damage to the rotor performance, taking as much as possible in this premise is simple and feasible method of balancing process.

Weight position and weight method is best made by the rotor and the original designer of the process in the relevant documents stated.

Appendix VIII: Hard-bearing balancing machine for measuring principle

The balancing machine from the front box, universal coupling, swing frame, sensors, electronic control box base, electrical measuring instruments and other components. Drag the front belts with a triangular spindle motor rotates the spindle by rotating the rotor drag coupling. Rotor unbalance generated by the rotation of unbalanced force, passed the sensor into electrical signals. Sensor output signal fed to the electrical measuring instrument. On the other hand, the central spindle is installed in the optical signal generator, with the spindle rotation speed of spindle rotation will have the same frequency with the pulse signal (the pulse of electrical machines as a balanced 0°), while the signal and sensor signal input to the power Tester, in the locator Canon treatment calculations and figures were driven around the table, showing that the correction surface about the size and phase unbalance.

Hard Bearing Balancing Machine working principle :

In the hard-bearing balancing machines, due to great support stiffness, rotation of the rotor unbalance of the centrifugal force generated, only the stiffness of aircraft produced insignificant swing, you can ignore the direction of the rotor and the bearing frame by the vibration levels of migration, Thus inertia is also negligible, so the support reaction force and unbalanced force is balanced. So they where in the horizontal plane axis line, left and right rack support their efforts to zero. Which can be derived: the conditions described above, any rotation of a rigid unbalanced rotor force solver can be equivalent to the rotor plane of any two do not coincide.

First, in balancing machines put the shelves of the two sensor output signals representative of the imbalance in the two vector bearing surface, through the locator signal processing calculations to determine the surface of a rigid rotor in a considerable imbalance in the amount of support.

Since the sensor is installed in the support rack, and the balance of the rotor in the actual process, the surface of the rotor weight is under process, therefore, required to determine the balance correction process allows the two planes, which requires the support frame considerable imbalance in the determination of the amount of signal, calculating the correction process allows the two surfaces. This forced the Vector Synthesis can be achieved.

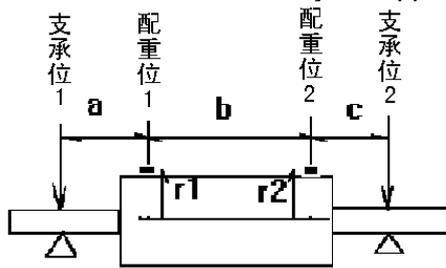
Different forms of support according to the rotor can be adjusted in accordance with its plane and the relative position between the supporting frame can be mounted in six different forms. Simulation can be obtained by calculating the four equations.

Rotor support means and the corresponding a , b , c , r_1 , r_2 and other parameters of the setting method, see Appendix.

Operator can be based on the above principle, in accordance with the method of operation described in this manual, electrical measuring instrument panel through the various settings on the operation of the rotor to achieve a variety of data set. To balance the results directly to the specified weight imbalance in the amount of surface craft.

Appendix IX: rotor support means and the corresponding a , b , c , r1 , r2 setting method

Below is the standard way of supporting a , b , c , r1 , r2 diagram:

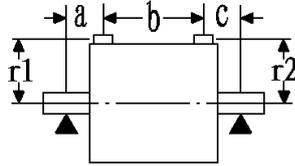


标准支承方式示意图

a , b , c , r1 , r2 five set match the number of selected

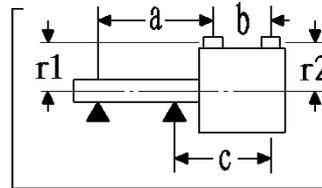
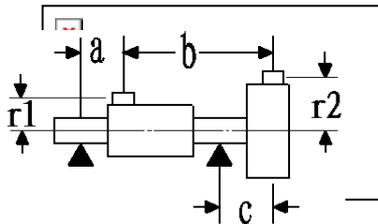
key support state and dynamic / static and couple unbalance correction mode selection button to set all kinds of support by:

Supporting a variety of methods were introduced following the mechanical relationships and a , b , c given the size principle:

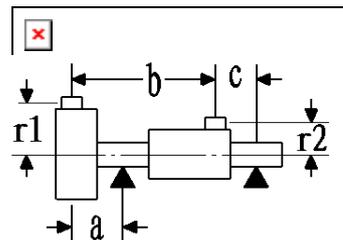
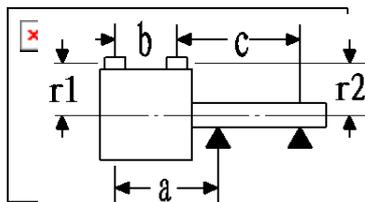


I : 1 Balance - the standard way of supporting

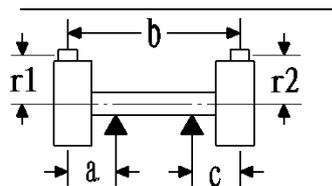
II : 2 , 3 dynamic balance - the right way to support overhangs



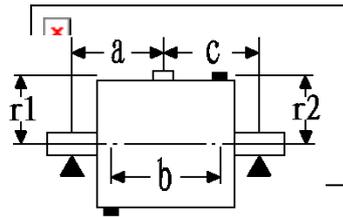
III: 4 , 5 dynamic balance - left hanging outside the supporting means



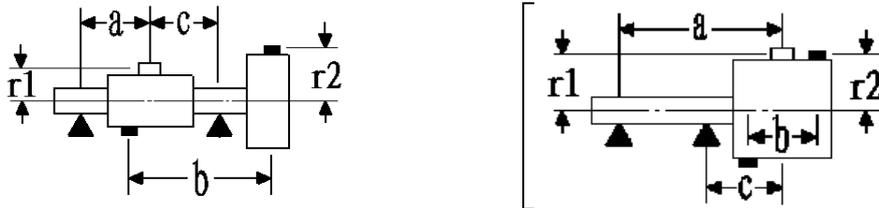
IV: 6 Balancing - Supports dual way of hanging outside



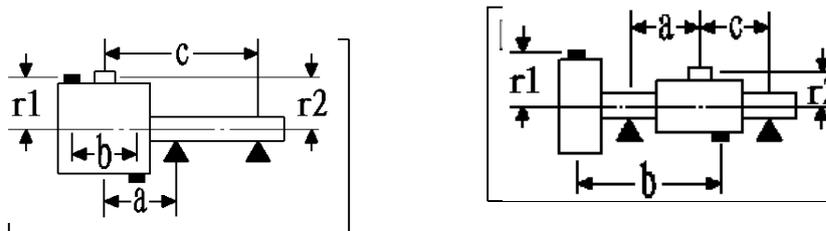
V : 7 Static / even balance - the standard way of supporting



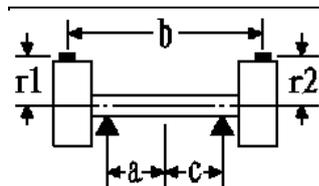
VI: 8 , 9 static / even balance - the right way to support overhangs



VII: 10 , 11 Static / even balance - left hanging outside the supporting means



VIII: 12 Static / even balance - supporting means double overhangs



Above the figure, labeled \square Position: static balance or dynamic balance weight position; marked \blacksquare Position: even balance weight position I , II , III , IV for the dynamic balance (two-plane separation) calibration method, V , VI , VII , VIII even for the static equilibrium (static - even isolated) correction method.

The amount of any dynamic imbalance, can use a method of balancing both sides of decomposition to be correct, can also be static dual decomposition of the static / even balance method correction, for some special rotor dynamic balance adjustment, the use of static dual decomposition method is very convenient and reasonable.

The balancing machine for static dual decomposition, according to plans set abc parameters, AC support to the imbalance of left and right, respectively, positive school distance, $a + c$ equal to the distance between the two, b is an even balance the school a positive distance between , r_1 is the radius of static unbalance correction, press the "static / even "and show r_1 "Make electrical measuring instrument into the static / even balance measurement state.

At this point the display of measured values: the left table indicates the value of static unbalance, the right table indicates the amount of unbalance is even the right, then to the corresponding surface of the static unbalance correction, the correction in determining the radius of the left table indicates the static unbalance; couple unbalance correction in the right plane, the

radius of the correction in determining the right direction even unbalance the table; the same time the plane left even the same imbalance correction correction correction radius of the right table on the instructions of the dual inequality measure, but the correction in the opposite direction.

Appendix X: General balancing machine fault diagnosis

I . the motor does not start

I .1 Check the universal joint following stent protection switch. This switch is not connected to the rotor shaft coupling, motor starting limits to protect the universal joint at the end of the rotation will not be when there is no connection in order to avoid accidents.

I .2 check the brake lever-controlled protection switch. This switch is under pressure in the brake handle, stop and limit the motor starting to ensure that the motor does not force the hand brake boot.

I .3 with two checks on the control line is properly connected .

I .4 In case of troubleshooting, Troubleshooting and elimination of such professional electrician should be asked to avoid personal injury.

I .5 Check the motor connection is properly connected (see 3.2 section behind the appearance of the balancing machine and wiring diagram.)

I .6 with a multimeter, the electronic control box the power switch into the line -side check the three-phase four-wire power supply is normal.

I .7 check all the fuse box electric fuse is normal.

I .8 in Appendix II balancing machine diagram, please electrician conduct a comprehensive inspection and maintenance.

II . balancer display value, the angle is not accurate, the normal balance of the rotor can not operate

II .1 First check all the connections are properly connected (see 3.2 section behind the appearance of the balancing machine and wiring diagram.) Especially the two sensor connections must be properly connected, and correspondence, are not interchangeable.

II .2 balance the machine normal operation of measurement and there are still large residual unbalance of the rotor case, a sensor unplug the cord, to see whether the meter display changes in values. If significant change, then prove that this sensor line everything is normal. If no change, then prove that this a problem with the sensor line. Users can find a professional electrician to repair the control line of another sensor.

II .3 to reduce the value of shaking , the workpiece supporting shaft, should be avoided with the wheel diameter (wheel diameter101 mm) The same or close to the diameter, radius , so as to avoid interference. For example,33 mm,50 mm,100 mm.

II .4 and process the rotor shaft with the state, the availability of loose, oval, or taper, which are not normal. Any of the above phenomenon will cause this failure. (Please refer to Appendix VI: rotor shaft balance the technical requirements of the process)

II .5 Check the rotor (technology-axis) and the wheel with the Department of State, if the rough shaft, or roller blade surface pattern was injured, will cause this failure.

II .6 under section 4 steps to check the balance of the provisions of Chapter machine operation is correct, tighten the bit all the requirements set is securely fastened. Also check the connection location of all the requirements including the fastening nuts are tightened securely to the foot.

II .7 under section 4 steps to check the balance of the provisions of Chapter machine operation, electrical measuring part of all of the settings are correct.

II .8 Upon completion of all inspections, there are still problems. Appendix XI can balance the machine fault diagnosis four-point method. Such as balancing machines can be up to the requirements stated in Annex XI is considered to balance the machine without any problems. Such as balancing machines to approximate to the requirements stated in Annex XI is considered to balance the machine has a slight problem of calibration is not accurate. This problem usually caused by a decline in operating efficiency, without causing large errors. Such as balancing machines are obviously not accurate, users can click About Appendix III locator troubleshooting common method of exclusion, but also inform the manufacturer for processing.

II .9 In addition, after this failure occurs, you should first switch to a different specification, size of the rotor (and the process axis, then set), the balance of the school test. If the troubleshooting, the problem is proven technology in the original rotor and shaft, then put on.

III . Balancer display precision rotor balance, but the real shock after the installation is still running

III .1 first by all the items on an order of examination.

III .2 Refer to Appendix VI: rotor shaft balance the technical requirements of the process the contents of inspection process in balancing machine with the shaft of the rotor shaft run out. Run out accuracy of this election in the balance of 6.3 grade generally should not exceed 0.05 mm To balance the amount of higher accuracy requirements when the beating should be increased accordingly.

III .3 actual installation of the rotor shaft status, such as: jumping, taper, oval, roughness, run out should not exceed 0.03 mm.

III .4 actual installation of the rotor and the rotor frame, shell, etc. are produced by the formal drawings, and the quality good.

III .5 or requests for small rotor residual unbalance of the rotor is very small, can refer to Appendix XII to flip 180 ° high-precision balance.

III .6 , if necessary, to balance the machine according to Annex XI four-point method for diagnosis.

IV . Electrical Measurement does not indicate

IV .1 If the electrical measuring significant part of their failure, can be Appendix III: Introduction to part locator for processing.

Appendix XI: four-point balancing machine fault diagnosis method

Special circumstances, can balance the machine fault diagnosis four-point method. Such as balancing machines can approximately meet the following requirements, that there was a slight balancing machine calibration inaccuracies. This problem may cause a decline in operating efficiency, without causing large errors.

The following under section 4.1 section provides examples of the rotor as an example, four-point method fault diagnosis.

Operator to do the following, the best data in the whole process will be recorded. If necessary, and the balancing machine manufacturers to communicate on technical issues, these data have targeted the manufacturer for technical services is very helpful.

The rotor under paragraph 4.1, section operation, a balance to be able to achieve the highest accuracy (precision balance at this time is not necessarily true, correct, but they indicate the relative stability of the following actions can be carried out. In addition, the smaller the residual shown in Well, at least the balance should be close to the precision of the rotor).

Both sides of the weight way to select "↻" To re-approach.

Either side of the rotor position of the specified weight circumference at 0, add a known point of weight (the weight block weight by assuming 100 grams), This weight is the weight the best clips (see 4.1.2.7).

Under section 4.1 section operation start balancing machines, balancing machines should be instructed in the 35 - 5 degrees, 90 - 110 grams (By 90% to re-rate, following the same.)

Remove the weight after stopping the rotor installed on the same side of the circle at the location specified weight of 90 degree angle.

Under section 4.1 section operation start balancing machines, balancing machines should be instructed in the 85 - 95 degrees, 90 - 110 grams.

Remove the weight down and then installed on the same side of the rotor position of the specified weight circumference at 180 degree angle.

Under section 4.1 section operation start balancing machines, balancing machines should be instructed in the 175 - 185 degrees, 90 - 110 grams.

Remove the weight down and then installed on the same side of the rotor position of the specified weight circumference at 270 degree angle.

Under section 4.1 section operation start balancing machines, balancing machines should be instructed in the 265 - 275 degrees, 90 - 110 grams.

Similarly, the other side of the rotor position of the specified weight circumference at four angles in order to install this on a weight check.

If there was a slight balancing machine calibration inaccuracies, the user can press the Introduction Appendix III locator common troubleshooting methods in the exclusion, but also inform the manufacturer for processing.

Such as balancing machines do not meet the above requirements, the user shall notify the manufacturer for processing.

Such as balancing machines can be up to the requirements stated above is considered to balance the machine without any problems.

Appendix XII: Flip 180 ° high-precision balance method

Current general machining means can achieve the most accurate, are built on 10 micron (commonly known as wire or Road). The balancing machine measuring device can accurately measure the center of the rotor eccentricity micron error. The balance of user requirements, such as high precision, only to take the following two ways:

a : try to improve the process axis, then sets and other related parts of the balance of precision and accuracy.

b : This appendix provides the flip by 180 ° equilibrium.

Note: In addition to the special needs of each rotor is not necessary to have the flip 180 ° equilibrium operation.

To this manual section 4.1, the rotor section an example, flip 180 ° high-precision balance method and principle of operation is as follows:

1. First, under section 4.1 section to the rotor balance to be able to achieve the highest accuracy .
2. The rotor shaft assembly and technology position in the circumferential direction of turning 180 ° . (Note: Section 4.1 Section XI in the axis of symmetry Figure dual keyway, which is designed specifically for this purpose.)
3. Verify that all mechanical connection and reliable measure to start the machine, then the memory, shut down.
4. on the surface of the rotor weight to the two semi-weighted action .

The so-called semi-weighted action means: Assuming the right side with the weight10 grams Partial weight, then What weight operation to remove only half the weight of this bias - that5 grams. Similarly, if the left side with the weight6 gramsPartial weight, then Why remove only3 grams.

The semi-weighted action should pay attention to the accuracy of the angle. The remaining half of the residual unbalance angle and the semi-weighted the same as before the operation.

5. In the process axis, the weight of the remaining half of the side removed.
6. Repeat steps 2-5 until the turn 180 ° after the display of the unbalance of high precision to meet the requirements or can not continue to balance the weight operation.
7. If consecutive flip 180 ° showed no unbalance the law and no longer continue to balance the weight operating conditions, then Why not think the time has reached the status of the corresponding conditions are now the highest balance of precision.
8. If the final show of the emphasis on quantity to meet the requirements, the requirement that the precision of the rotor has reached equilibrium. And most important: for the same structure size, the same weight of the rotor, the balance of the process shaft, connected sets, and so the balance has reached the best. After rebalancing the same structure size, the same weight of the rotor, no need to flip 180 ° balance method is still able to achieve the same accuracy.
9. If the partial weight of the final display can not meet the requirements, then that process shaft, connected sets, and so the connection accuracy, in particular, should focus on checking process with the precision of the rotor shaft and the wheel axis and the contact process accuracy.

Note: This procedure also applies the principle of universal coupling of the balance. Only in the universal coupling and then sets the connection flange on the respective semi-weighted action.

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