JP-580 Industrial-contol electical
JP-580B Measuring instrument

Operation Manual

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CONTENTS

1. Overview

The powerful industrial -control measuring instrument of JP-580/B comes with high accuracy. It works perfectly with balancing machines of either one/two planes or soft/ hard bearings. It can be equipped with all kinds of velocity sensors or piezoelectric sensors easily as well.

The highly applicable and efficient software provides greater availability of measuring data. Thus, data output is possible via standard port.

Technological Parameters:

Rotation Range: 120-5000r/min

Minimum Resolution: 0.001mg

Shortest Measuring Time: 3s

Measuring Dynamic Range: 1:100000

Function Features:

Auxiliary assistance for correction, higher balance efficiency

- Inconsistent choice of correction mode on two planes.
- CCW-rotation measuring available, no need to adjust the wiring.
- Various correction solutions. Able to do auto-measuring of different keys, clumps and shaft accessories. Increased accuracy and efficiency of measuring.
- Component algorithm to balance rotors of blade types. Direct display of the unbalance amount on each blade.
- Drilling algorithm enables auto-conversion of the unbalance amount into the depth of drilling bores. Easy and direct-viewing to operate.
- Crankshaft algorithm. The four-cylinder or six-cylinder shaft algorithm automatically recommends the optimized and most effective balancing solution. It provides great convenience for new operators.
- Cursor's location indicates the angle. The curse in the vector-diagram indicates the current angle of the rotor, offering convenience to positioning the unbalance (extra hardware needed).

Higher accuracy, applicable to different machines

- Combined-coefficient calculation mode is used to make up the non-linearity of sensors and bearing pedestals. This helps minimize the measuring deviation resulting from the high and low speed measuring.
- DIY unit for the unbalance amount and angle. Optional accuracy choices makes the real-time switch of unit possible.
- Optional choices of dynamic balance, static balance or dynamic-static balance.
- Auto adjustment of system sensitivity by detecting sensor signals. This processes simultaneously with measuring. It causes no measuring delay or shift-skip, and extends the dynamic measuring range.
- Three more kinds of one-plane bearing mode and one-path one-plane measuring were introduced to broaden its versatility .
- The mathematics-calculation and physics-calculation modes can be applied to various balancing machines of hard-bearing or soft-bearing.
- Dual wave-filtration done by software and hardware ensures valid signaling. The dead-zone wave-filtration algorithm leads to a prompt track and stabilization of signal, make the measuring fast, steady and accurate.

Perfected debugging system, Safer operation

- One-key-tracking can be performed even before the rotation speed reaches the set value, providing convenience for debugging.
- Flexible ways for calibration. Calibration can be executed by adding one mass or two masses as well as modifying the coefficient in response to the field requirements.
- Professional calibration interface with easy maintenance. Calibration can be executed at any-time with up to 10 calibrating stages. Calibration factor is verified constantly while system-linearity diagram is displayed.
- Auto-diagnosis and auto-alarm of sensor disconnection to avoid false balance.
- Electric compensation. Regular rotors can be treated as a test rotor for verification, making the debugging more convenient.

Man-machine interface, easier operation

- Optional language display in English or Chinese.
- Combined display of number and vector diagram, indicating the unbalance amount and angle. The graduation scale can be set to different grades.
- Indications available for definition and range-setting of all parameters. The calibration process is guided as well for your convenience.
- It automatically judges the rotor to be balanced or not with indication of words, color and sounds.

Great versatility of data, easier to manage

- Database is set up for saving data of rotors, clumps, DIY algorithms and measuring records.
- Optional method for auto-recording of history data.
- High versatility of files and data. Manipulation of files in the system or MS Office can be executed easily.
- Various reports of measuring, balancing or one-plane balancing etc..
- Report printout in English or Chinese, corresponding to the display language.
- Remarks for rotors can be added and printed in the report.
- The database query software can execute manipulations such as "Find" "Count" "Filter" "Classify" or "Export".

2. Shortcut key list

Please use the software with mouse-click or short-cuts. See the short-cut list here:

Menu	Sub-menu	Short-cut
Measuring	Measuring	Space
	Stop	H
	Add/Remove Weight	Backspace
	Compensate	0
	Print	•
	Display	
	Rev Lockup	S
Rotor		S
System		Y
Record		D
Calibrate		C
Exit	Power-off	Q
	Exit	
	Version Info	
	System Backup	
	Back-up Lead-in/Lead-out	
"OK"		Enter
"Cancel"		Q

3.Operation Introduction

3.1 Switch On/Off

3.1.1 Switch on

1)Power on the master switch.

2) Start the computer, enter the Windows, run the measuring software and reach the major interface(for measuring).

Note : It goes into the measuring state after switch-on while the menu bar is gray. Keys "S" "Y" "D" "C" don't function at this time. Please press Key "H" or click Menu [Measuring]/[Stop] for settings if necessary.

3.1.2 Switch off

1.) Press Key "Q" or click Menu [Quit]/[Power-off], and then click "OK" to exit the software. The Windows stops as well. Power off the master switch after the screen turns blank.

2.) Click Menu [Quit] and "OK" to exit the software while the Windows keeps working on. Go to Windows menu to power off the system and computer. Power off the master switch after the screen turns blank.

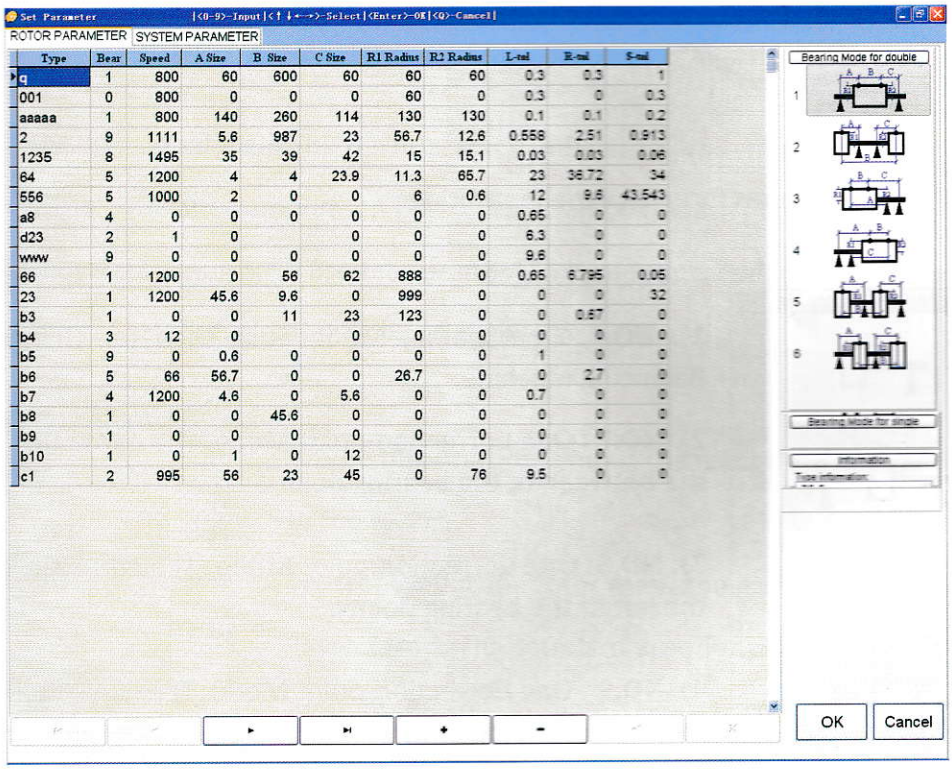
3.2 Set Rotor Parameters

Press Keys "H" "S" or click Menu [Rotor] under the measuring interface, to go to set parameters of rotors. Over ten thousand rotor data can be saved in forms while "Add" "Delete" or DIY naming can be executed.
Use "+" to add data, "-" to delete data, " √ " to save and "x" to cancel the modification of data. Press Key "Enter" to save and return, or press Key "Q" to cancel the current operation and return.

There are two kinds of calculation modes for JP-580 measuring instrument, the choice of which depends on the machine type and rotor type. The physics mode, namely the hard-bearing mode, is usually used. But please refer to the factory-setting or contact us for the choice of the calculation mode.

3.2.1 Physics Calculation Mode(a, b, c Algorithm)

Among the numerous rotor data, each row of data stands for one data-group.

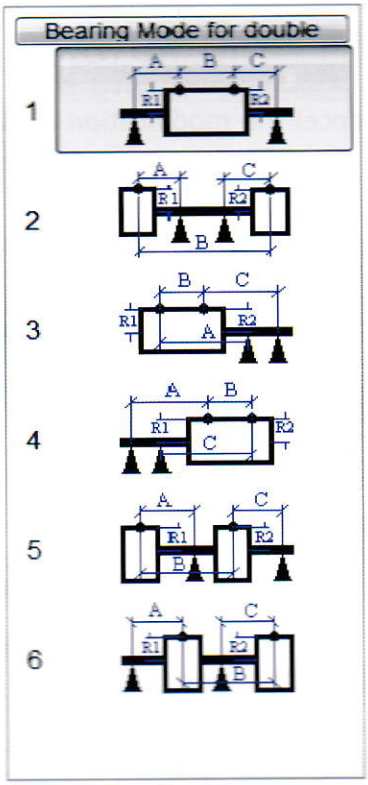


The cursor stops at the currently-used data line(Line Type) after reaching this interface. Move the cursor with direction keys to choose or modify an item.

1.Type : DIY type name is OK. For example, the rotor model number.

2.Bearing Mode : Type into the serial number or click diagram from the right meter.

There are six bearing modes for two-plane measuring, which are classified and differentiated by the relative positions of the two bearing points and correction points.



1). N0.1: It is used when both correction points lie in between of the two bearing points.

2). N0.2: It is used when both correction points lies out of the two bearing points.

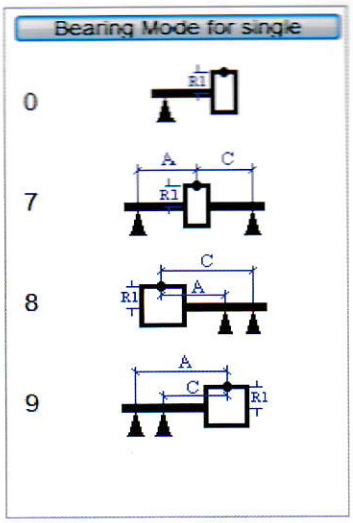
3.) N0.3: It is used when both correction points lies on the left of the two bearing points.

4) .N0.4: It is used when both correction points lies on the right of the two bearing points.

5) .N0.5: It is used when one correction point lies out of the left bearing point and the other correction point lies in between of the two correction points.

6). N0.6: It is used when one correction point lies out of the right bearing point and the other correction point lies in between of the two correction points.

There are four bearing modes for one-plane measuring:



1). NO.0: One-bearing Mode. It is used for One-plane Vertical Balancing Machine.

2). NO.7 : One Correction-point Mode. The correction point lies in the between of the bearing points.

3). NO.8: One Correction-point Mode. The correction point lies on the left of the bearing points.

4) .NO.9 : One Correction-point Mode. The correction point lies on the right of the bearing points.

3.Revolution : Measuring Rev stands for the actual rotation speed of the rotor. Only when the rotation speed reaches the set Rev can the system start measuring. (Unit: rev/min)
Note : The parameter is neither used to adjust the motor rev nor equal to rotor's real working speed.

4. **Size A :** Size A refers to the length from the center of the left bearing point to the center of the left correction point. (Unit: mm)

5. **Size B:** Size B refers to the length from the center of the left correction point to the center of the right correction point. (Unit: mm)

6. **Size C:** Size C refers to the length from the center of the right bearing point to the center of the right correction point. (Unit: mm)

7. **Left Radius:** Left radius refers to the length from the left correction point to the axis line. (Unit: mm)

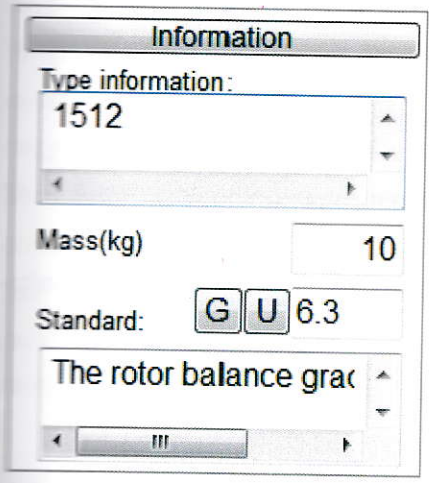
8. **Right Radius:** Right radius refers to the length from the right correction point to the axis line. (Unit: mm)

9. **Left Permissible Unbalance:** The residual unbalance amount permissible on the left plane. (Unit: g)

10. **Right Permissible Unbalance:** The residual unbalance amount permissible on the right plane. (Unit: g)

11. **Static Permissible Unbalance:** The residual static unbalance amount permissible(Unit: g). The sum of permissible unbalance amount on both correction planes are generally input here.

Remark: The rotor data is normally used for printout, or used for calculating the permissible unbalance amount. Click "Information" on the right to open it.



" Type Information": Input the rotor data here and they display in the report.

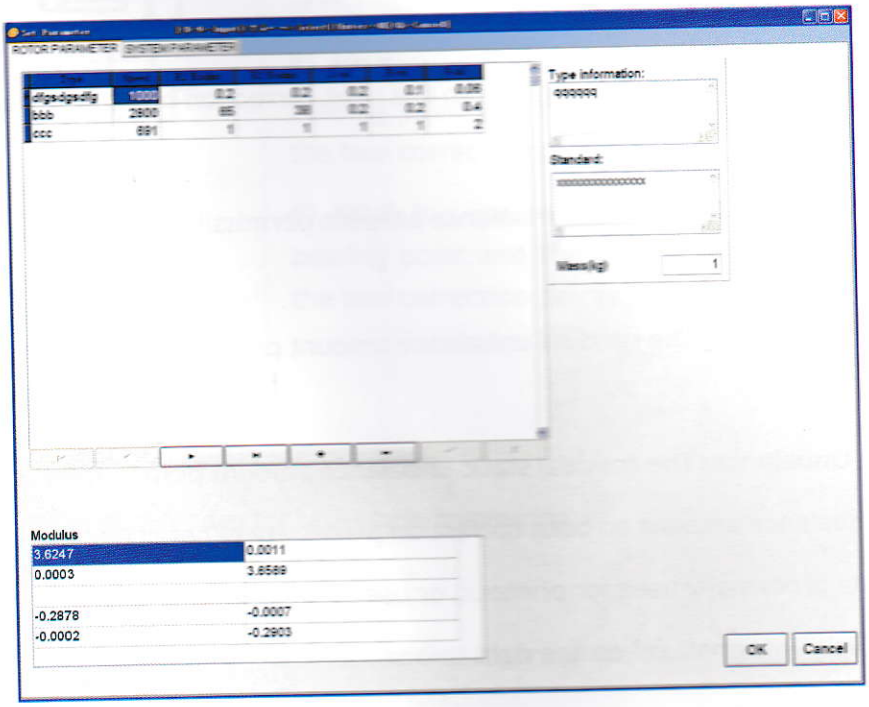
"Mass" : Input the rotor mass and it displays in the report.

"**Standard** ": The standard used for judging the unbalance amount. Button "G" and "U" are used to calculate the permissible unbalance.

Example 1 :
Input 6.3 for the "Standard" when the rotor requires a Balance Accuracy Grade G6.3. Type into the rotor mass in Kg, confirm the Rev and radius, and click "G" to gain the permissible left, right and static unbalance for the form.

Example 2 :
Input 200 for the "Standard" when the rotor requires an unbalance of 200gmm. Confirm the Rev and click "U" to gain the permissible left, right and static unbalance for the form.
Press Key "Enter" when data input is finished. The row of data which the cursor stays at are treat as the parameters for measuring. Press Key "Q" to cancel the current modification and return to measuring interface.
Note : Only after pressing Key " Enter " can the modification be saved.
Note: The unit for the permissible left, right and static unbalance amount has to be consistent with the setting of Parameter 13#.

3.2.2 Mathematical Mode (Influence coefficient method)

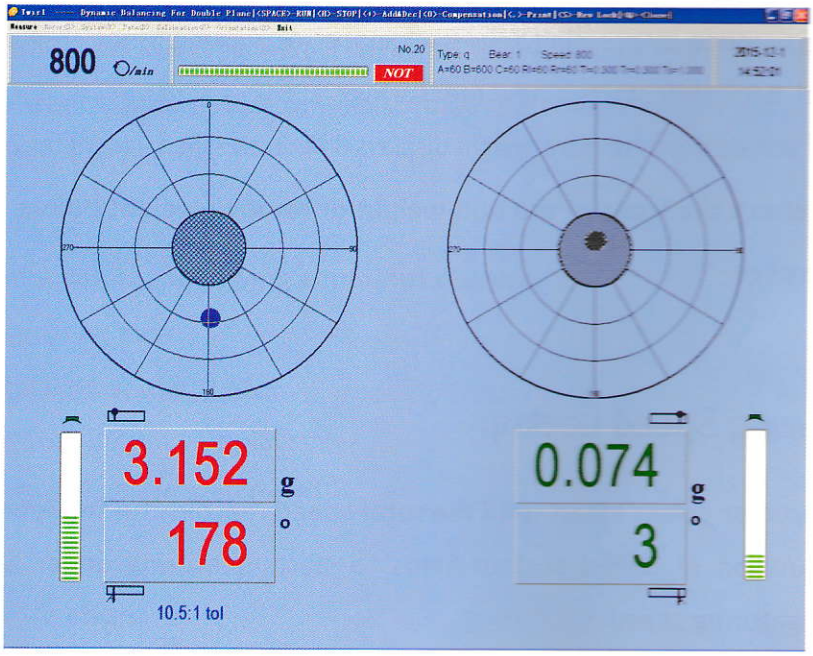


1.Type : Type name. DIY defined. For example: rotor model number etc..
2. Speed: Measuring speed stands for the actual rotation speed of the rotor. Only when the rotation speed reaches the set Rev can the system start measuring. (Unit: rev/min)
Note : the parameter is neither used to adjust the motor rev nor equal to rotor's real working speed.
3. Left permissible Unbalance: The residual unbalance amount permissible on the left plane. (Unit: g)
4. Right permissible Unbalance: The residual unbalance amount permissible on the right plane. (Unit: g)
5.Static permissible Unbalance: The residual static unbalance amount permissible(Unit: g). The sum of permissible unbalance amount on both correction planes are generally input here.
" Type Information": Input the rotor data here and they display in the report.
"Standard ": The standard used for judging the unbalance amount. It displays in the report.
"Mass" : Input the rotor mass and it displays in the report.

3.3 Measuring Operation

3.3.1 Rotor Dynamic Unbalance Measuring

Press Key " SPACE" or click Menu [measuring] under major interface to start measuring. The process bar shows.



Place the rotor on the bearings, set the rotor parameters and start to run the rotor.

Adjust the photoelectric head(for belt-drive and self-drive balancing only) until the speed meter signal column changes, showing the speed and signal.

Process bar starts to show the process once the speed reaches the set Rev. The Unbalance amount displays when the process is half-done.

When the process is 100% done, it displays "GOOD" for approval or "NOT" for disapproval of the unbalance, indicated in green or red as well. At this time, the digit displayed remains unchanged, suggesting the completion of measuring.

Stop running the rotor and correct the unbalance in displayed amount and angle. Do mind the unit used.

Start running the rotor to measure again after one-time correction. After some times of auto-measuring and manual correction, the rotor can be balanced.

Note: 1. Press Key "SPACE" to repeat the measuring when the speed remains at the set Rev.

2. An interval of 5 seconds for the next measuring occurs when the parameter 10# is set as 5(above zero). If the parameter 12# is set as 100, it measures constantly until Key "Q" is pressed or Menu [Measure]/[Stop] is clicked.

3.Press Key "H" or menu [Measure]/[Stop] to quite the measuring state.

3.3.2 Add-weight or Remove-weight

Add a weight of measured-unbalance-amount to the displayed angle to balance the rotor under the add-weight mode. Instead, remove a weight under the remove-weight mode.

For example, when it displays 12.5g, 36° and  please add a weight of 12.5g to the position of angle 36° to balance the rotor.

Shift the correction mode by pressing Key "BackSpace" or clicking Menu [Measure]/[Add-weight]/[Remove-weight]. Each shift starts a new measuring.

Note: The icons of add-weight or remove-weight displays differently when Parameter 24# is set as 1.

※ **Caution: Do check the icons of the add-weight or remove-weight before the correction, so as not to ruin the rotor!**

3.3.3 Measuring Speed Lockup

The measuring process doesn't start until the rotor speed reaches the set Rev and displays in red as well. But the function of Speed Lockup helps to start measuring under a sub-speed, without modifying the measuring speed.

Guide: Stabilize the speed at a certain Rev under the measuring state, press Key "S" or Menu [Measure]/[Lockup Speed] to lock the speed. It starts measuring when the speed display turns blue. The locked speed is treated as the measuring speed if it keeps measuring. The locked speed can be canceled only when Key "H" is pressed to stop measuring and it becomes invalid for the next measuring.

3.4 Calibration

Calibration is required for a new machine after installation, so as to scale the proportional coefficient of the senor signal and actual physics value. The debugging staff will perform the calibration after installation. However, the end-users may need to do it as well if the measuring accuracy appears low.

Calibration means to add a known weight(Test mass) to the rotor and input the amount and angle of the test-mass into the measuring instrument so that the computer can gain the proportional factor automatically after calculation.

Calibration is required when the following situations occur:

1.)Inaccurate measuring data.

2.)Sensors are replaced or adjusted.

3.)The measuring instrument is replaced.

4.)Work field for the machine is changed.

Preparation before Calibration.

1.)Prepare the rotor. It had better be a test rotor(The less unbalance it has, the better it is).

2.)Prepare the mass for correction and weigh it.

3)Determine the correction point and angle before calibration.

4.)Input the rotor data in advance.

Note:

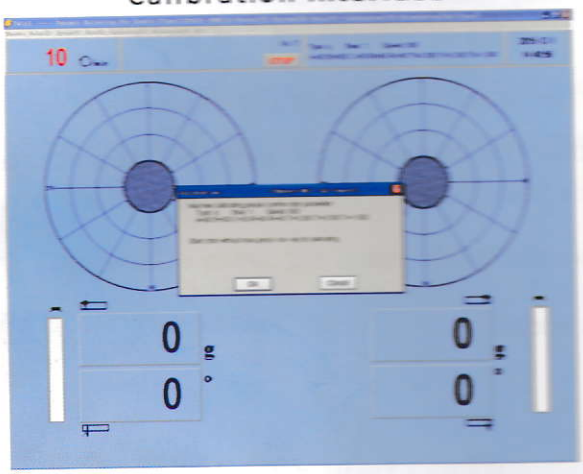
1.) The calibration can be canceled at any time by pressing Key "Q". Meanwhile, it returns to the measuring interface with no data saved.

2.) The vector diagram displayed remains invalid during the calibration.

3.4.1 Two-plane Calibration

1. Press "H" "C" under measuring interface or Menu [Calibration] to enter calibration interface. The dialogue box appears then.

Calibration interface



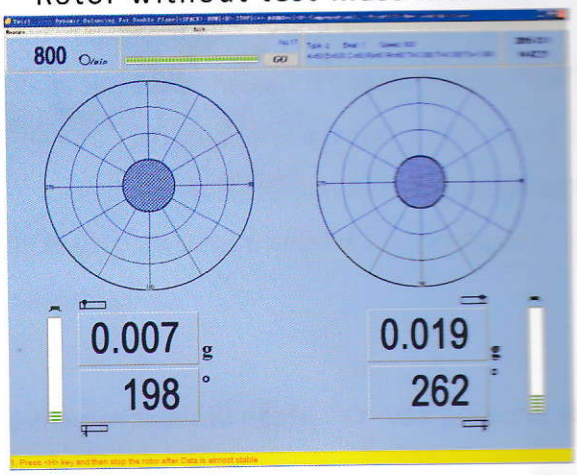
Note:

Please confirm whether the rotor data match the test-rotor.

2. After the confirmation, press Key/Button "Enter" to start to calibrate.

3. Start the rotor to run without the test mass, and press Key "Space " to start measuring.

Rotor without test-mass interface

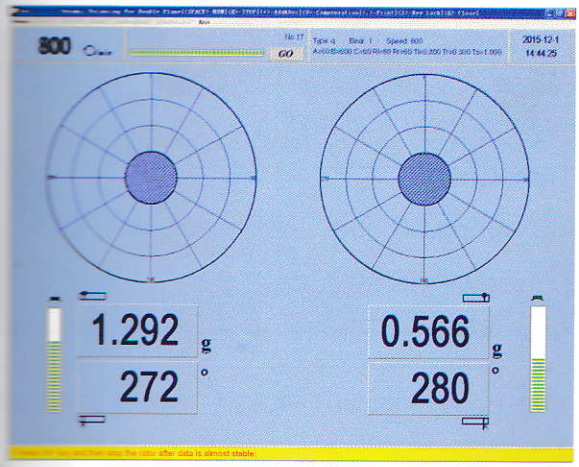


Note :

Rotor without test-mass means no test-mass is added to the rotor.

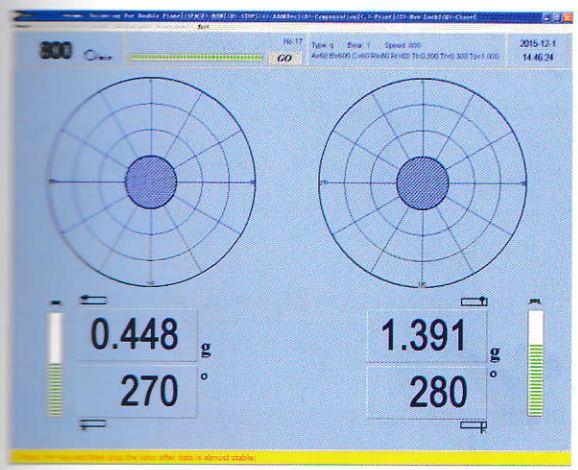
4.When the process bar reaches full and the data displays with slight difference, please press Key "H" to stop measuring and the rotor.

5. Add the test-mass to the assigned angle on the left correction plane. Start the rotor again and press Key "Space" to start measuring.

Interface of add-weight on the left	Note:
	1.)Add test-mass to the left plane. 2.)Add the mass to Angle 0° .User may need to add the mass to other angles when Angle 0° is unavailable. However, please do add the mass in accordance with the input angle to avoid discrepancy.

6.When the process bar reaches full and the data display with slight difference, please press Key "H" to stop measuring and the rotor.

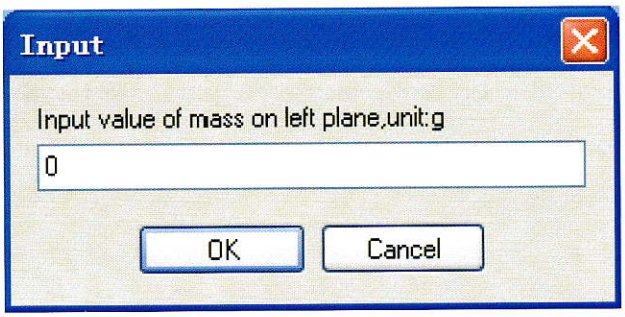
7. Remove the test-mass from the left correction plane and add it to the right correction plane at the assigned angle. Start the rotor again and press Key "Space" to start measuring.

Interface of add test-mass on right	Note:
	1.)Remove the test-mass from the left correction plane and add it to the right correction plane at the assigned angle. 2.)Add the mass to Angle 0°.User may need to add the mass to other angles when Angle 0°is unavailable. However, please do add the mass in accordance with the input angle to avoid discrepancy.

8. When the process bar reaches full and the data display with slight difference, please press Key "H" to stop measuring and the rotor. Remove the test-mass.

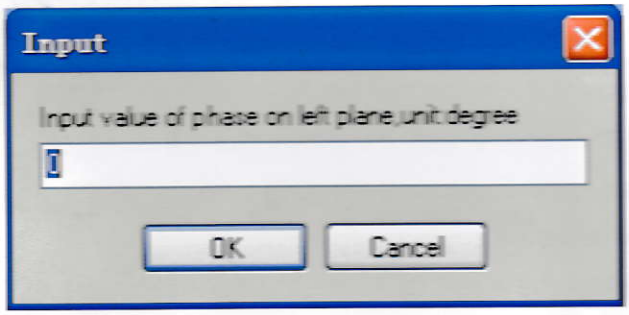
9. Press Key " Enter " and input the calibration data as following:

(1) Left value : the weight of the test-mass added to the left correction plane in unit gram.

Interface of the test-mass weight added to the left correction plane. 	Note: 1.)Input the weight of test-mass added to the left correction plane. 2.) Unit: Gram. For Example, type into "50" if the test-mass weighs 50 grams.

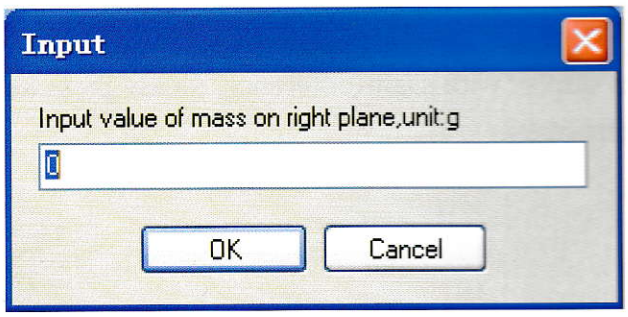
Press Key "Enter" or click Button "OK" to go on with data input.

(2.) Left phase : The angle of the test-mass added to the left correction plane in unit degree (°).

Interface of the test-mass angle added to the left correction plane. 	Note: 1.)Input the test-mass angle added to the left correction plane. 2.) Unit: Degree(°) For Example: Type into "30°" if the test-mass is added to Angle 30°. It requires no input when the angle is 0°.

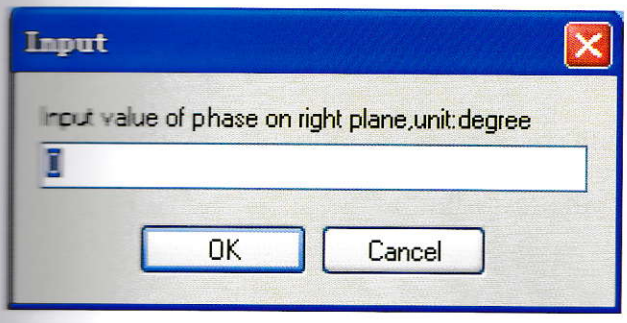
Press Key "Enter" or click Button "OK" to go on with data input.

(3) Right value : The weight of the test-mass added to the right correction plane in unit gram.

Interface of the test-mass weight added to the right correction plane. 	Note: 1.)Input the test-mass weight added to the right correction plane. 2.) Unit: Gram. For Example, type into "50" if the mass weighs 50 grams.

Press Key "Enter" or click Button "OK" to go on with data input.

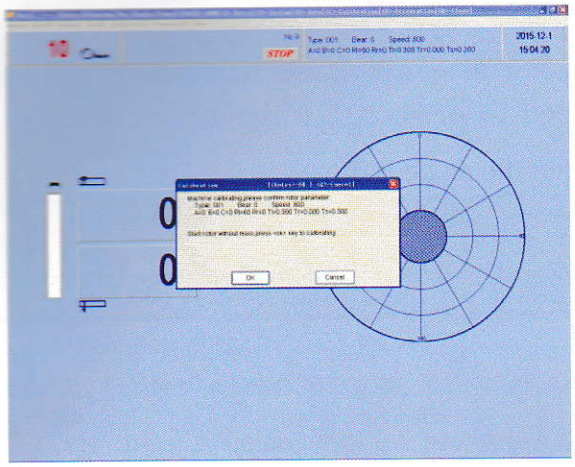
(4.) Right phase : The angle of the test-mass added to the right correction plane in unit degree (°).

Interface of the test-mass angle added to the right correction plane. 	Note: 1.)Input the test-mass angle added to the right plane. 2.)Unit: Degree(°) For Example: type into "30" if the mass is added to Angle 30°. It requires no input when the angle is 0°.

Press Key "Enter" to save the calibration data and exit.

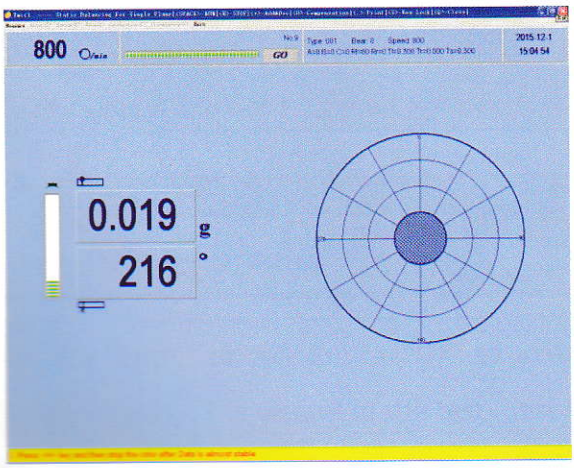
3.4.2 One-plane Calibration

1. Press "H" "C" under measuring interface or Menu [Calibration] to enter calibration interface. The dialogue box appears then.

Calibration Interface	Note:
	Please confirm whether the rotor data match the test-rotor.

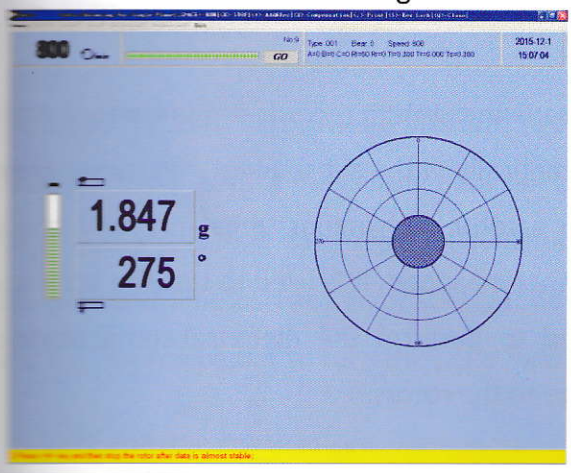
2. After the confirmation, press Key/Button "Enter" to start to calibrate.

3. Start the rotor to run without test-mass, and press Key "Space " to start measuring.

Rotor without test-mass interface	Note:
	Rotor without mass means no test-mass is added to the rotor.

4. Press Key "H" to stop measuring and the rotor when the process bar reaches full and the data display with slight difference.

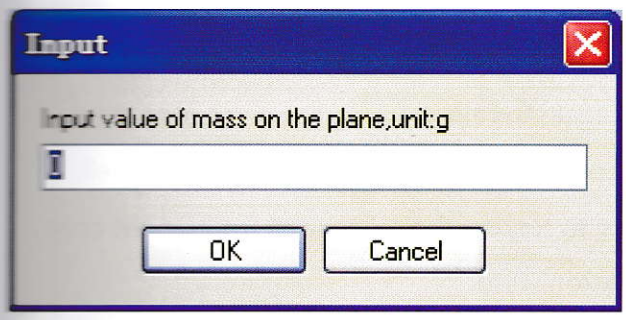
5. Add the test-mass to the assigned angle on the correction plane. Start the rotor again and press Key "Space" to start measuring.

Interface of add-weight	Note:
	1.)Add test-mass to the correction plane. 2.)Add the mass to Angle 0°. User may need to add the test-mass to other angles when Angle 0°is unavailable. However, please do add the mass in accordance with the input angle to avoid discrepancy.

6. Press Key "H" to stop measuring and the rotor when the process bar reaches full and the data display with slight difference. Remove the test-mass.

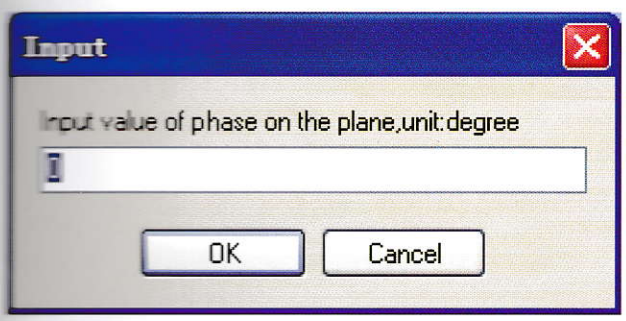
7. Press Key " Enter " and input the calibration data as following:

(1) Test-mass weight: The test-mass weight added to the left correction-plane in unit gram.

Interface of test-mass weight added	Note:
	1.)Input the test-mass weight added to the correction plane. 2.) Unit: Gram. For Example, type into "50" if the mass weighs 50 grams.

Press Key "Enter" or click Button "OK" to go on with data input.

(2) Phase : The angle of the test-mass added to the left correction plane in unit degree (°).

Interface of the test-mass angle added to the left correction plane.	Note:
	1.)Input the test-mass angle added to the correction plane. 2.)Unit: Degree(°) For Example: type into "30" if the mass is added to Angle 30°. It requires no input when the angle is 0°.

Press Key "Enter" or click Button "OK" to go on with data input.

Press Key "Enter" to save the calibration data and exit.

3.5 Compensation

Electrical compensation, or once of compensation, means the system records the unbalance after a measuring and deduct the recorded unbalance automatically in the subsequent measuring. Here is an example of its application: Add a test-mass to a rotor with minor unbalance and check whether the machine can accurately detect the unbalance as added. It is used to test the accuracy of the measuring instrument. So it is recommended to perform the electrical-compensation operation to avoid possible measuring fault and damage to the rotors.

Electrical compensation is often used when it is difficult to reduce the unbalance to as little as possible. The electrical compensation means to treat an unbalanced rotor as balanced. The system records the measured unbalance into Parameters 81#-84# under the non-compensation measuring state. However, under the "Compensation" state, instead of recording the real-unbalance measured, the unbalance displayed has been deducted by the recorded unbalance so as to remove the "gross unbalance".

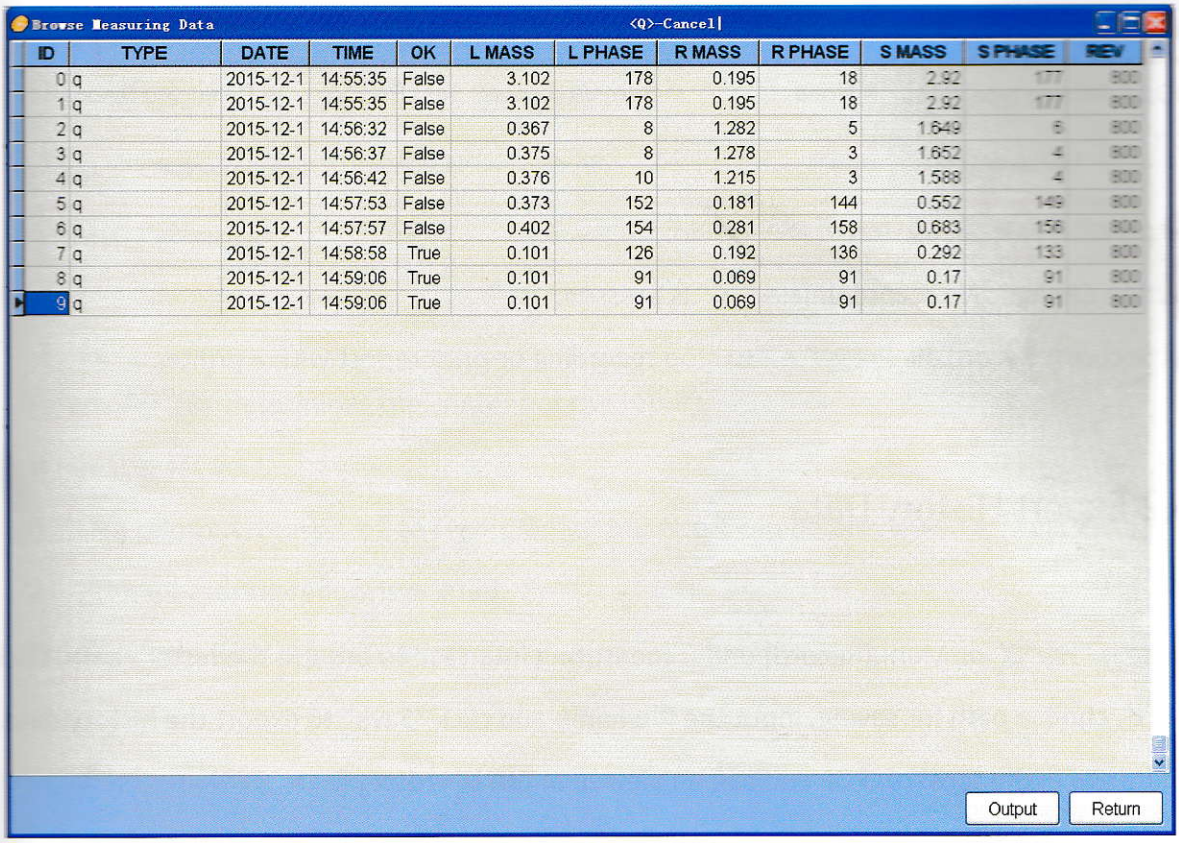
Press Key "0" after measuring to start the electrical-compensation measuring, indicated with a flashing "Compensate" in the screen. Press Key "0" again to return to regular measuring state, otherwise the subsequent measuring will be executed under electrical compensation as well.

※ **Caution: Electrical compensation is applied to testing the measuring instrument only. Correction is prohibited under electrical-compensation state.**

3.6 Browse Measuring Data

Press Key "H" and "D" or Menu [Record] to enter "Browse Measuring Data".

Totally 10000 pieces of measuring data can be saved in the form. Each piece of data include the rotor type, measuring date, residual dynamic/static unbalance, measuring speed and judgment of the qualification etc.. The cursor stays at the last measuring data by default, so please press " ↑ " and " ↓ " or rolling bar to turn the page forward or backward, or press Key or Button "Q" to return.

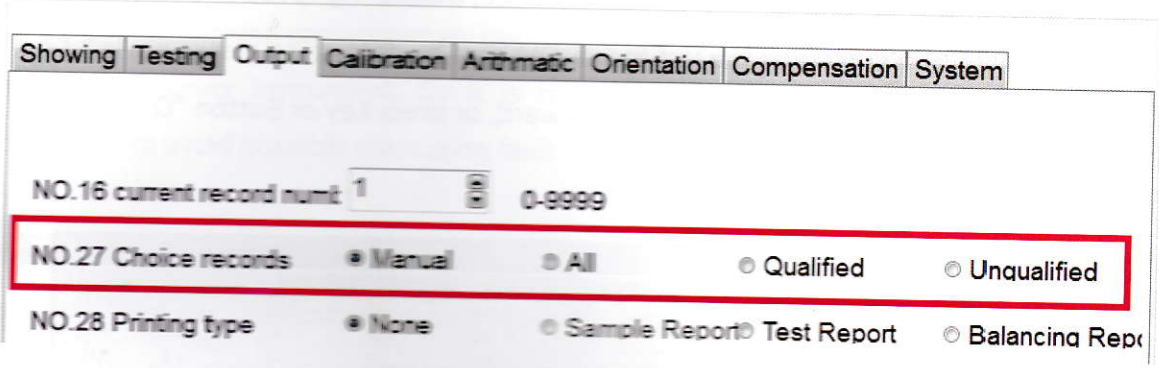


ID	TYPE	DATE	TIME	OK	L MASS	L PHASE	R MASS	R PHASE	S MASS	S PHASE	REV
0	q	2015-12-1	14:55:35	False	3.102	178	0.195	18	2.92	177	800
1	q	2015-12-1	14:55:35	False	3.102	178	0.195	18	2.92	177	800
2	q	2015-12-1	14:56:32	False	0.367	8	1.282	5	1.649	6	800
3	q	2015-12-1	14:56:37	False	0.375	8	1.278	3	1.652	4	800
4	q	2015-12-1	14:56:42	False	0.376	10	1.215	3	1.588	4	800
5	q	2015-12-1	14:57:53	False	0.373	152	0.181	144	0.552	149	800
6	q	2015-12-1	14:57:57	False	0.402	154	0.281	158	0.683	156	800
7	q	2015-12-1	14:58:58	True	0.101	126	0.192	136	0.292	133	800
8	q	2015-12-1	14:59:06	True	0.101	91	0.069	91	0.17	91	800
9	q	2015-12-1	14:59:06	True	0.101	91	0.069	91	0.17	91	800

3.6.1 Save Record

Parameters 27# is used to set the auto-filter of measuring records.

Class



If the parameter is set as:

0-"Button Choice": No record unless " • " is pressed.

1-"All Record": Record all. Press " • " to stop recording or print report with a printer.

3.6.2 Export History Data

Press Keys "H" "D" or Menu[Record] under measuring interface to browse the history data. Click "Export", choose path for saving, input the file name and click "Save" to export the history data. The data are in the form of .PDF and can be viewed in the Microsoft Excel.

Press "Q" or click "Quit" to return to the major screen.

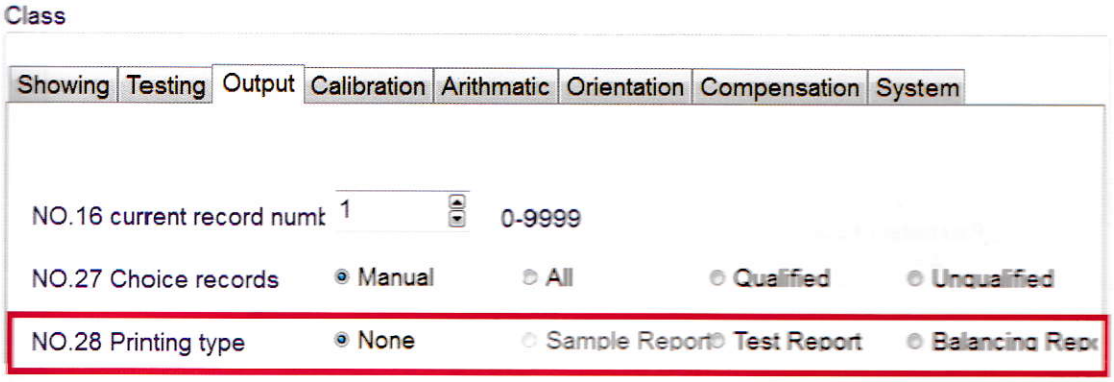
Notice: Data cannot be modified under the data browse interface.

3.7 Printout

The balance report is printed in A4 paper, with the rotor parameters, correction-plane information, balance standard, measuring data, vector diagram and balance result included.

Connect the cable, load the A4 copy paper and switch on to set the printer ready.

Then, set the system parameters:



Parameter 28# determines the content of the report.

When it is set as:

0 No printout. Press " • " to record only. The report can be previewed as well.

2 The measuring report is printed.

3 The balancing report is printed.

Additional information can be put into the report, including the rotor mass, rotor type, balance standard and machine type. Input the machine type at the "System Parameter" page. Add an extra file printmemo.txt into the program so that users can add information in no more than four lines. The user-added information can be printed and displayed in central in the report.

It is forbidden to terminate the measuring state. Or, the initial unbalance loses.

3.7.1 Measuring Report

Measuring report is used to report the measured unbalance information. Set Parameter 28# as 2 "Measuring Report" to gain a measuring report. During a measuring, press Key " • " or Menu [Measure]/[Print] to go to printout. Then Press Key "Enter" in the dialogue box to start the printout. Press " • " to print copies of the same report. No other operations can be executed when printing.

Report Of Dynamic Balancing Test

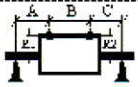
No. 0029

Type: q
Weight: 500 kg

75-5

Parameter Of Balancing Plane

A= 60.00 mm B= 600.0 mm C= 60.00 mm



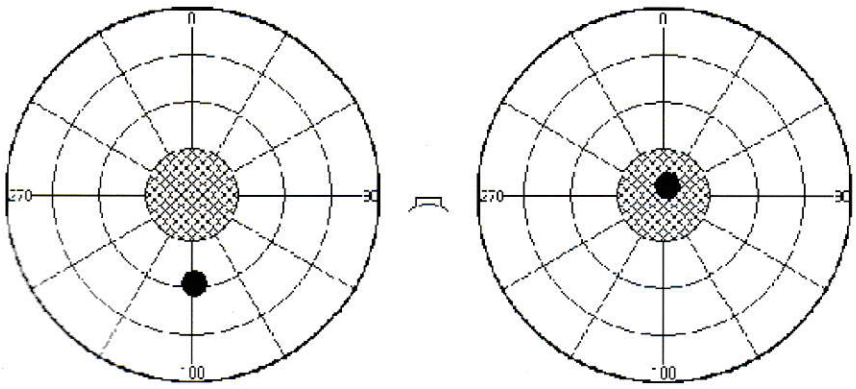
R1= 60.00 mm R2= 60.00 mm

Qualificatory Criterion

Permissible Unbalance Amount Of Left Plane = 0.300 g
Permissible Unbalance Amount Of Right Plane= 0.300 g
Static Permissible Unbalance Amount = 1.000 g

Testing Data

	Rev (r/min)	LeftMass (g)	LeftPhase (deg)	RightMass (g)	RightPhase (deg)	StaticMass (g)	StaticPhase (deg)
Measuring data	800	3.173	178	0.061	22	3.117	177



Result

Unqualified

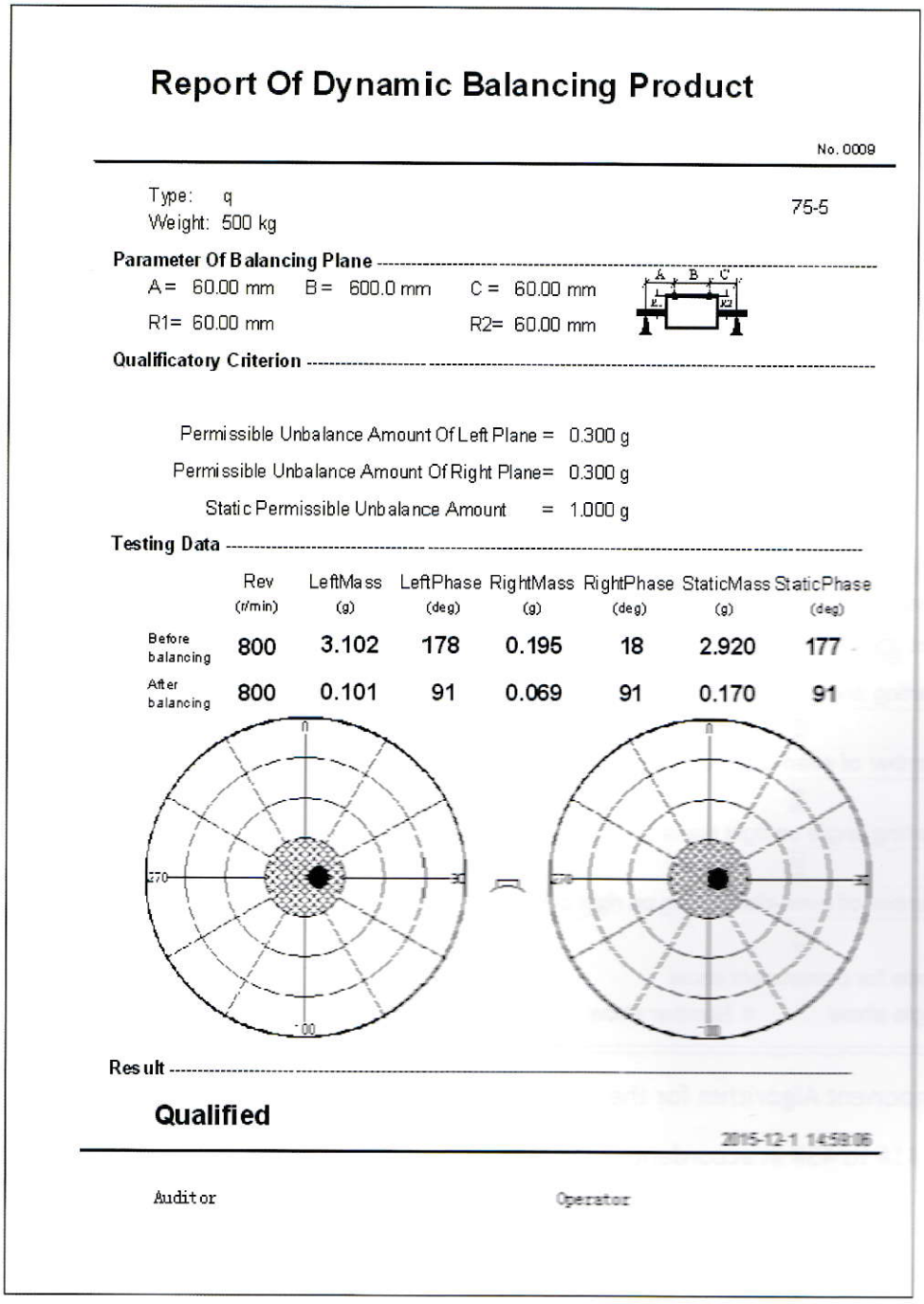
2015-12-1 14:53:53

Auditor Operator

3.7.2 Balancing Report

The balancing report records two groups of measuring data, namely the pre-correction and post-correction information of the rotor.

Set Parameter 28# as 3 to gain a balancing report. Press Key " • " or Menu Measure]/[Print] after the first measuring and a dialogue box appears indicating the initial unbalance information. Press Key or Button "Enter" to record the initial unbalance. Then keep the measuring state(no pressing Key "H") and correct the unbalance. After the last time of correction, press Key " • " or Menu [Measure]/[Print] to print. Press Key or Button "Enter" in the dialogue box to start the printout.



Report Of Dynamic Balancing Product

No. 0009

Type: q
Weight: 500 kg

75-5

Parameter Of Balancing Plane

A= 60.00 mm B= 600.0 mm C= 60.00 mm

R1= 60.00 mm R2= 60.00 mm

Qualificatory Criterion

Permissible Unbalance Amount Of Left Plane = 0.300 g

Permissible Unbalance Amount Of Right Plane= 0.300 g

Static Permissible Unbalance Amount = 1.000 g

Testing Data

	Rev (r/min)	LeftMass (g)	LeftPhase (deg)	RightMass (g)	RightPhase (deg)	StaticMass (g)	StaticPhase (deg)
Before balancing	800	3.102	178	0.195	18	2.920	177
After balancing	800	0.101	91	0.069	91	0.170	91

Result

Qualified

2015-12-1 14:59:06

Auditor Operator

3.8 Use Algorithm

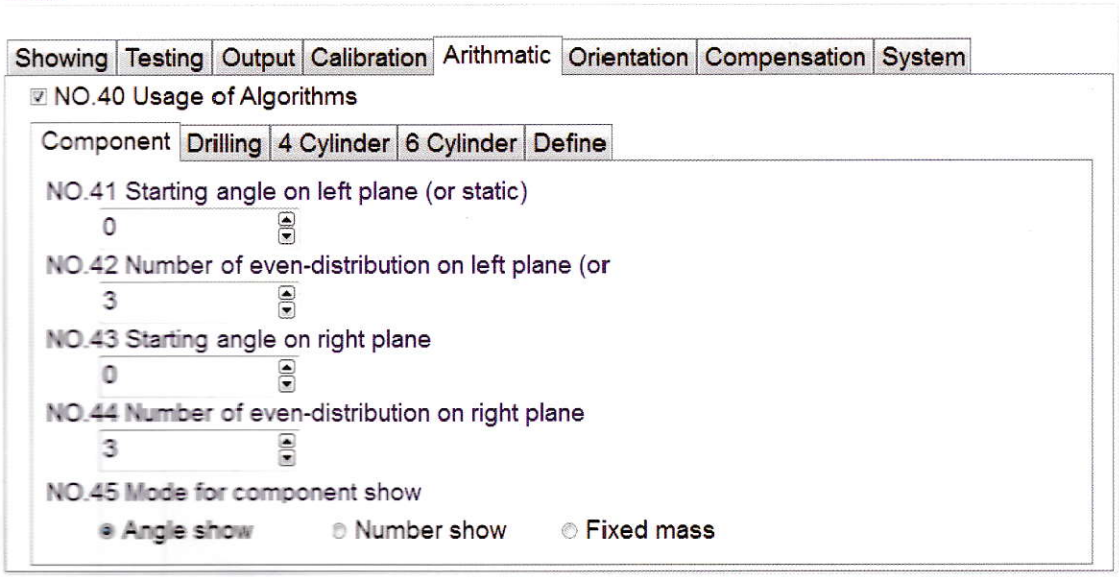
The measuring instrument tells the user how to add or remove weight at a certain angle. However, the measured unbalance have to be turned into the correction amount or angle. As is known, fan blades can be balanced only on the blades, electric tools only in length and crankshaft only in a 90-degree-plane. So the measuring instrument offers some most-used technological algorithms to display the unbalance and serve the correction method for reference.

Note:The technological algorithm displayed below is for reference only. It is not related to the machine accuracy.

3.8.1 Component Algorithm

Some rotors can be balanced only at some certain angles, for example a fan blade can be corrected only at the blades. So it is recommended to choose the Component Algorithm when the correction positions are even-distributed in circle. The measuring instrument serves the algorithm for the operator's reference.

Class



Choose Component Algorithm for the "Arithmetic" while setting the parameters. Set the Parameters 41# to 45# in accordance with the rotor.

41 Starting Angle on Left Plane

[Note] The intersection angle of zero degree(0°) and the first correction blade on the left correction plane.

[Set Range] 0-120°

42 Number of even-distribution on left plane

[Note] The even-distributed number of the correction positions in the circular direction on the left correction plane.

[Set Range] 3-360

43 Starting Angle on Right Plane

[Note] The intersection angle of zero degree(0°) and the first correction blade on the right correction plane.

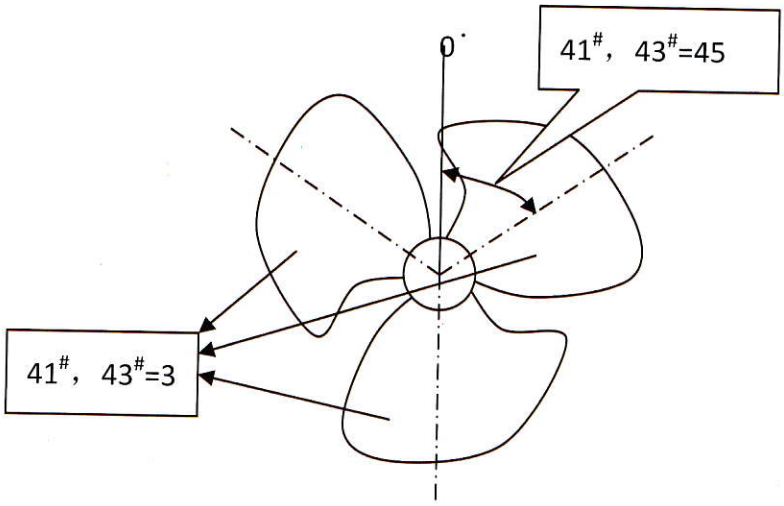
[Set Range] 0-120°

44 Number of even-distribution on right plane

[Note] The even-distributed number of the correction positions in the circular direction on the right correction plane.

[Set Range] 3-360

[Note] Set the diagram below for the explanation of Parameters 41#-44#.



45 Component Display Mode

[Note] It is used to determine the display mode after calculation in component algorithm. There are two modes available. The first mode is to split the unbalance angle with related Parameters 41#-44# while Parameter 45# is set as 0 or 1. The other mode is to split the unbalance amount with related Parameters 46#-47# while Parameter 45# is set as 2.

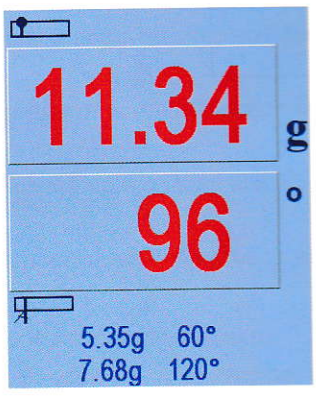
[Set Range] 0,1,2

[Set Value] 0: Display the angle.

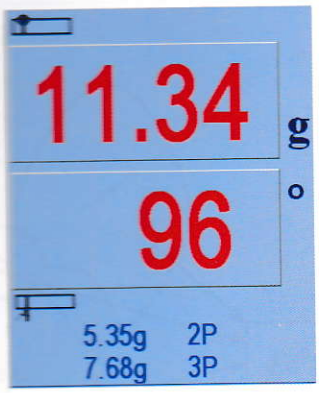
1: Display the serial number. The fan blades are numbered starting from the first correction point. It then displays the serial number of the blade which needs correction.

2: Split-weight.

Press Key "Enter" to return after setting. The component displays when it displays the measuring data. The measuring result displays in angle when Parameter 45# is set as 0 while the result displays in the serial number of the blade. See the following for reference.



Display in Angle



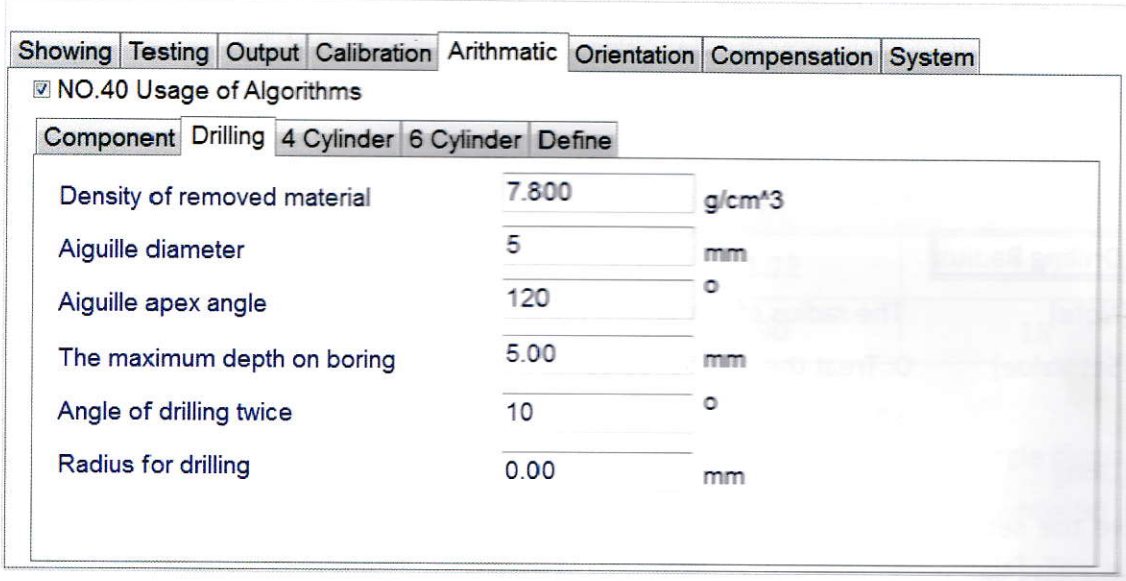
Display in Serial Number

For example, the left picture above indicates to correct an unbalance of 5.35 gram at Angle 60° and 7.68 gram at Angle 120° . The right picture above indicates to correct an unbalance of 5.35 gram on the second blade and 7.68 gram on the third blade. The component display can be canceled by setting Parameter 40# as 0.

3.8.2 Drilling Algorithm

Drilling algorithm means to display the measured unbalance and drilling solution simultaneously. Enter the parameter settings to set and choose the drilling algorithm. Then set Parameters 50# to 55# in according with the drilling condition.

Class



50 Density of Removed Material

[Note] The density of the material to be removed from the rotor.

[Set Range] >0

[Unit] g/cm^3

51 Aiguille Diameter

[Note] The diameter of the drilling bit when doing the correction.

[Set Range] >0

[Unit] mm

52 Aiguille Apex Angle

[Note] The apex-angle degree drilling bit.

[Set Range] 1-180

[Unit] Degree

53 The Maximum Depth on boring

[Note] The maximum permissible depth for radial drilling.

[Set Range] Less than the radius of drilling bore.

[Unit] mm

54 Included Angle of twice drilling

[Note] The included angle of twice drilling.

[Set Range] 0-30

[Unit] Degree

55 Drilling Radius

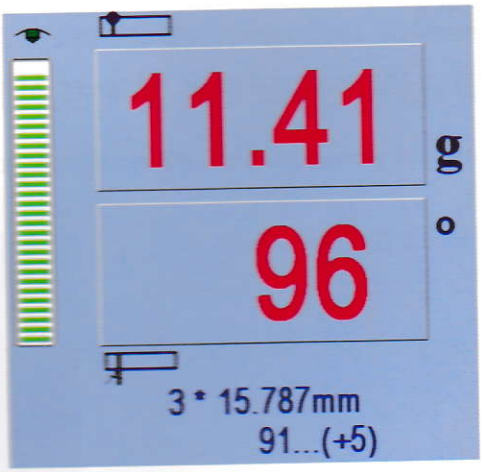
[Note] The radius of the drilled bores.

[Set Value] 0: Treat the rotor's radius R1 and R2 as the bore's radius.

>0: Set the radius manually.

[Unit] mm

Save the settings and return to measure. Under the remove-weight mode, it displays the measuring data and the drilling solution simultaneously. Please refer to the picture below.



In the picture, the "3*15.787mm" means it requires to drill three bores in depth of 15.787mm each. The 91...(+5) means the first bore lies at Angle 91° , the second at Angle 96° and the third at 101° (with a difference of 5°). The last line(drill position) doesn't display when the calculation uses one bore for correction. The displayed angle represents the drilling position at this time. Meanwhile, the drilling solution doesn't show up when the rotor is measured with tolerable unbalance.

Note: The correction mode has to be remove-weight mode to display the drilling solution.

3.8.3 Four-cylinder Crankshaft Algorithm

A four-cylinder crankshaft has four planes. Correction can be done only at 0 degree to 90 degree on the left and right planes while at 180 degree to 270 degree on the other two planes. Considering that, the correction is usually executed on the left and right planes. So please set Parameters ABC in accordance with the two planes. The other two planes are considered as one middle-plane due to their close distance. So correction can be performed on either of the two planes if necessary. Set Parameter 40# for crankshaft algorithm. Save the settings and return to the measuring to show the crankshaft parameters as below:

Four-cylinder Crankshaft	L	M	R
phase	1.21	1.22	1.82
value	2	90	18

It means no correction is required if no measured value displays for a plane. The angle displays in 0 degree to 90 degree. But for the middle-plane, 0 degree stands for 180 degree while 90 degree stands for 270 degree(with an angle difference of 180 degree to the system angle). The way the angle displays is designed for users' convenience.

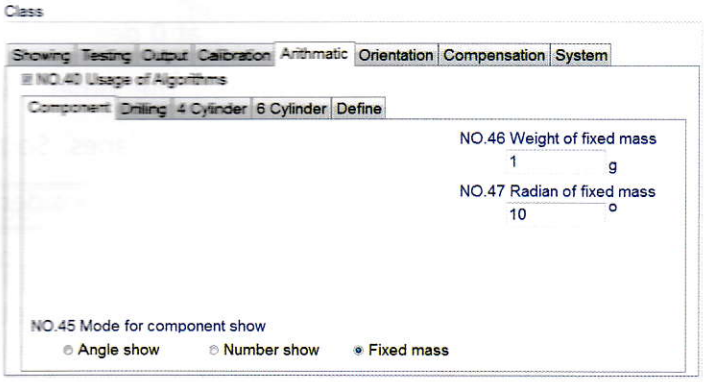
3.8.4 Six-cylinder Crankshaft Algorithm

A six-cylinder crankshaft has six planes, manually numbered as 1 to 6 from the left to the right with a one correction position available for each. The correction position lie at 0 degree for Planes 1 and 6, 120 degree for Planes 2 and 5, and 240 degree for Planes 3 and 4. Plane 2 is treated as the left correction plane while Plane 5 as right correction plane. So please set Parameters ABC accordingly. Set Parameter 40# as to realize six-cylinder crankshaft algorithm. Save the settings and return to the measuring to show the unbalance information as below:

Six-cylinder Crankshaft	P1	P2	P3	P4	P5	P6
phase	0	120	240	240	120	0
value	1.66	0.23	0.656	0.726		1.97

P1-P6 represents Plane 1 to 6. The unbalance angle and amount are both displayed. If no unbalance information displays for a plane, it means the plane requires no correction.

3.8.5Add Fixed-mass



It is a special correction mode by adding weight. Two masses of certain weight are added to different angles to balance the rotor. To gain the mode, please choose "component algorithm" and "fixed mass" in the parameter setting. Set Parameters 46#, 47# in accordance with the rotor.

46 Effective Mass of Fixed-mass

[Note] The added-weight has a definite mass, so the angle to add it needs to be displayed. This parameter stands for the effective weight from the correction point to the center of the added weight.

[Set Range] >0

[Unit] Gram

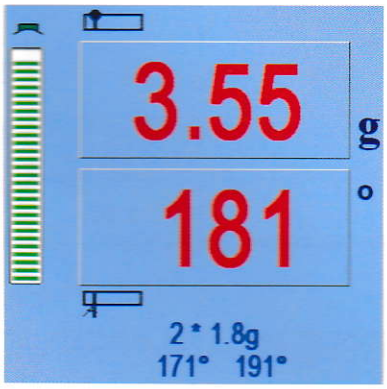
47 Radian of Fixed-mass

[Note] The radian of the two fixed-mass. It provides the minimum included angle degree for the two fixed-mass.

[Set]Range >0

[Unit] Degree(°)

Save the setting and return to the measuring state with remove-weight mode. It displays the measured unbalance and the calculation result of fix-mass algorithm simultaneously as below.



It indicates that the rotor requires two masses of 1.8 gram for each. One is to be added at Angle 171 degree and the other at Angle 191 degree.

3.9 Alarm

No signal input may occur due to sensor breakage or other reasons, so false balance may happen when users are not aware of the situation. The signal meter in the major interface reflects the signal intensity in green. Measuring mistakes may exist when the meter runs full. The signal may be weak or rotor may be balanced when the meter runs low. The meter runs low as well when no signal can be tested or collected. so please check the sensor and collection paths when the meter keeps reaching low.

It is not easy to be noticed when one of the two sensors is broken. To avoid the situation, Parameter 65#--Signal Proportional Ratio, is developed. The weaker signal meter flashes to remind the operator when the real signal proportional ration exceeds the set value. False alarm occurs if Parameter 65# is set as too small a value while no alarm goes off if it is set too large a value. So only a minor adjustment is recommended to be done by users.

4. Parameter Explanation

It can become a desirable measuring instrument by setting the parameters. This Chapter explains the definition and setting of parameters. Under measuring interface, press "H", "Y" or Menu[System] to enter the settings of parameters. On the left are the read-only parameters including the parameter number, parameter name, the value before modification. Modify the parameters in "Set System Parameter".

Press "→" to go to input box and set the value. Press " ↓ " or " ↑ "to go to the next or previous parameters. Modify other parameters the same way. Or go to the "Classification Setting" to set.

Other Operation:

a Press Keys "→" "←" to shift the parameter number and value.

b Press Keys " ↑ " " ↓ " to go to the previous or next parameter.

c Refer to the indication information for a correct setting of parameters.

d Press Key "Enter" or click Button "Enter" to save the setting and return to major interface.

There are 100 system parameters, some of which are read-only and some are modifiable. So please read the detailed introduction for the setting of modifiable system parameters from below.

1 2 3 4 5 8 9

1-9 represents the type name of parameters. Parameters with a type name of two-digit are valid while the one-digit ones are invalid.

4.1 Measuring Parameters

10 Measuring Interval

[Note] The actual speed remains at the set Rev when one-time measuring is done, so another new measuring will be performed after an interval of seconds. The parameter "Measuring Interval" is to set the time span of the interval.

[setting range] >=0

[setting value] 0: No remeasuring.

>0: the interval time between two measuring.

[unit] second(s)

11 Display Accuracy

[note] Set the decimal digits displayed。

[setting range] 0-4， 10-14

[setting value] The tens digits represent the phase while the units digits represent the value.

0:Integer display

1: Reserve One decimal digit

2:Reserve Two decimal digits

3:Reserve Three decimal digits

4:Auto-adjustment of decimal digits for best-display.

[Notice] It is able to display 5 significant digits (decimal point included). The system deletes the redundant decimal digits automatically when the number of it is above five.。

12 Refresh Frequency

[Note] The interval for screen refreshing.

[Set Range] 1-100

[Set Value] <100: The refresh interval

100: it keeps measuring until Key “Stop” is pressed.

[Unit] 0.1 Second

[Notice] The unit is 0.1 second. The smaller the unit is, the faster the measuring goes and the lower accuracy it gains, which is applicable to small-size high-speed-measuring machines. Vice versa.

13 Unbalance Display Mode

[Note] Display mode for the unbalance amount. To display the unbalance in gram, gmm, or to display the eccentricity in mm(g.mm/kg).

[Set Range] 0，1，2

[Set Value] 0: Unbalance Mass, Unit:g

1: Unbalance amount, Unit:gmm

2: Eccentricity, (Unit:μ, or g.mm/kg)

14 CW or CCW Measuring

[Note] Angle of rotor is opposite to the rotation direction. The rotor can be CW balanced or CCW balanced. The phase display is reversed under CCW rotation, so the system needs to know the rotation direction.

[Set Range] 0，1

[Set Value] 0:CW

1:CCW

[Note] A mark "Reverse" and a Reversed arrow will be displayed on the screen under CCW rotation.The consistency of the parameter setup and actual rotation direction is required to avoid mistakes for phase display.

15 Correction Mode

[Note] Marker Parameter, used to display the correction mode while measuring.

[Set Range] 0,1

[Set Value] 0:Add-weight

1:Remove-weight

[Note] The "Add/Remove" button changes simultaneously with the setting of the .parameter. Or it can be shifted by clicking Button “Add/Remove”.

[Related Para.] 24

16 Record No.

[Note] The record number for the last-time measuring data. It increases successively to 10000. The first piece of data is replaced with a newly-gained measuring data when it reaches 10000. So 10000 pieces of measuring data can be saved cyclically.

[Set Range] 1-9999

[Set Value] Read Only.

[Notice] Modification is possible if necessary. However, the measuring data newly-gained are saved starting from the modified one.

[Relative Parameter] 27

17 Calculation Mode

[Note] The setting of this parameter enables the measuring instrument to be applicable to either hard-bearing or soft-bearing balancing machines with real-time measuring signal display possible.

[Display Range] 0,1,2, Read Only

[Value Display] 0:Physics calculation,for hard-bearing balancing machine.

1: Mathematics calculation, for soft-bearing balancing machine.

2:No calculation, the real signal value is used.

[Notice] Factory set before delivery, and modification by end-users impossible.

18 Display Mode

[Note] To shift the display mode for measuring.

[Set Range] 0-2

[Set Value] 0: To display dynamic and static unbalance for two planes with three vector diagrams. The middle one is for the static unbalance.

1:Static unbalance for one plane with three vector diagrams. The middle one is for the static unbalance while the other two are for the couple unbalance.

2:Dynamic unbalance for two planes with two vector diagrams.

4.2 System Parameter

24 Consistency of correction position

[Note] The consistency of the correction mode for two planes. For example, set the parameter as 1 when correction is done by Adding weight on the left plane and Removing weight on the right plane.

[Set Range] 0,1

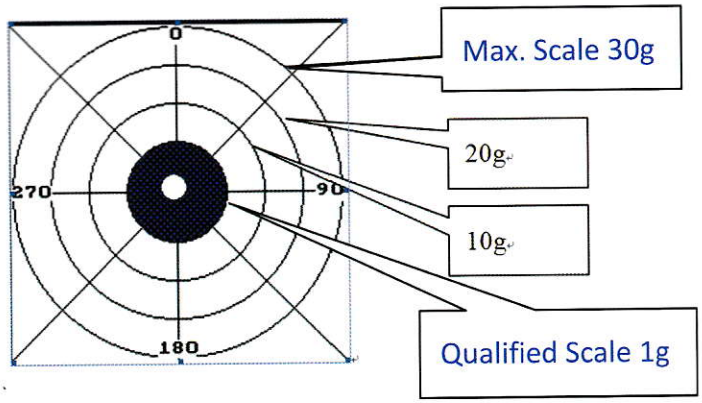
[Set Value] 0:Consistent.

1:Inconsistent.

[Notice] When the parameter is set as 1, the mark for add-weight or remove-weight shows differently. So please note it.

26 Proportional Ration of Vector Diagram

[Note] To define the scale, the rate of maximum scale and qualified scale of the vector diagram. For example, see the reference below when the qualification scale is 1 gram and the proportional ratio is 30.



[Set Range] 2-1000

27 Record Mode

[Note] Marker Parameter, to determine which kind of measuring data to be recorded to the database.

[Set Range] 0,1,2,3

[Set Value] 0: Manually select records. Choose desired data by clicking Key "Print".

1: Record all. Save all the measuring data into the database automatically.

2: Approved records. Save the approved measuring data into the database automatically.

3: Unapproved records. Save the unapproved measuring data into the database automatically.

28 Define Printout

[Note] Press Key "Print" after measuring to define the report form.

[Set Range] 0,1,2,3

[Set Value] 0: To record only, no printout.

1:Simple Report. To print via serial/parallel port with tiny printers(customized).

2:Diagram Report. To print via parallel/USB port with an ink-jet/laser printer.

3:Balance Report. To print the initial and residual unbalance with a universal printer .

29 Language Display

[Note] Display-language options for the software.

[Set Range] 0,1

[Set Value] 0:Chinese

1:English

4.3 Calibration Parameter

30 Calibration Method

[Note] Choice for calibration mode. It is set as "0" by default, namely one test-mass calibration mode.

[Set Range] 0,1

[Set Value] 0:One test-mass calibration.

1:Two test-mass calibration.

[Note] The operation varies for the different calibration modes. Please pay attention to the indications when performing the calibration.

31 Left Sensor's sensitivity

32 Left Phase's sensitivity

33 Right sensor's sensitivity

34 Right Phase's sensitivity

[Note] Parameters 31,32,33 and 34 are generated by the system after the calibration. The system gains the calibration coefficient automatically, so it can't be modified manually.

[Set Range] >=0

[Set Value] Auto gained after the calibration. Read only.

[Notice] The calibration coefficient can be modified by the user during the manual calibration process. But it is not recommended.

4.4 Use Algorithm

40 Use Algorithm

[Note] Some certain calculation methods may be used to solve actual technological problems while displaying the unbalance. The function can be customized.

[Set Range] 0-4, Integer Digit

[Set Value] 0: No algorithm.

1:Component Algorithm. Parameter 41#-45# have to be set.

2:Drilling Algorithm. Parameter 50#-55# have to be set.

3:Four-cylinder Crankshaft Algorithm.

4:Six-cylinder Crankshaft Algorithm.

5:Comparison Algorithm.

65 Signal Alarming Ratio

[Note] When the signal ratio exceeds the set range, the lower signal meter displayed flashes to alarm.

[Set value] >10

[Unit] %

67 Rev Ratio Range

[Note] The ratio of the Rev difference and the set Rev. The Rev difference refers to the difference of the actual Rev and set Rev.

[Set value] 1- 5 recommended

[unit] %

4.5 Compensation parameter

80 Compensation State

[Note] Mark Parameter, to indicate the electrical compensation. When a blinking " Compensation" appears above the process bar while measuring, it means electrical compensation is being used. The parameter is set as 1 at this time.

[Set Range] 0,1

[Set Value] 0: No Compensation

1:Electrical Compensation

81 Compensation coefficient FLX

82 Compensation coefficient FLY

83 Compensation coefficient FRX

84 Compensation coefficient FRY

[Note] To save the coefficient for electrical compensation.

[Set Range] None.

[Set Value] Read only.

[Note] It is updated with new measuring and used to calculate the compensation value.

85 Set Technological Compensation

[Note] Electrical compensation method

[Set value] 0 No compensation; 1 Add keys; 2 Remove clamps;

3 Clear Compensation value; 9990 test keys;

9991-9999 test clamps.

4.6 Rotor parameter

90 Bearing Mode

[Note] Choose a bearing mode according to the relative position of the bearing pedestals and correction positions.

[Set Range] 1-9

[Set Value] Read only

[Notice] It is valid only to modify the parameter under the item "BEAR" of Rotor parameter setting.

91 Measuring Speed

[Note] The system starts measuring only when the actual speed reaches the set value.

[Set Range] >100

[Set Value] Read only

[Notice] It is valid only to modify the parameter under the item "REV" of Rotor parameter setting.

92 Size A

93 Size B

94 Size C

95 Radius of left correction plane R1

96 Radius of right correction plane Rr

[Note] Measure the rotor to gain this parameter with reference to the bearing mode illustration.

[Set Range] >=0

[Set Value] Read only

[Unit] mm

[Notice] The modification of these parameters are valid only when it is done in Items A,B,C, Rl, and Rr under the screen of Rotor parameter setting.

97 Tl:Tolerable Unbalance on Left Plane

98 Tr:Tolerable Unbalance on Right Plane

99 Ts: Tolerable Static Unbalance

[Note] To set the tolerable unbalance on each correction plane.

[Set Range] >=0

[Set Value] Read Only

[Unit] Gram

[Notice] It is valid only to modify the parameter under the items "Tl" "Tr" and "Ts" rotor parameter setting.

5.Maintenance

5.1 Program installation and maintenance

1. Software operating environment

(1) Windows XP or Windows 7 OS

(2) Hard Disk Partition: More than Two divisions

2. Software Installation

Double click the "setup" in the installation file to start. Keep clicking "Next" following the indication until the installation completes.

3. Software Uninstall

Double click the "setup" in the installation file to start. Keep clicking "Next" following the indication until the installation completes.

4. Software maintenance

The software automatically backs up the rotor parameters, history data and calibration parameters etc. in Disk D. So please don't delete the data of Disk D easily. The software may need a re-installation due to the damage resulting from electricity break-off or sudden power-off. If so, please uninstall the software before re-install it. The software then gains the saved rotor parameters, history data and calibration parameters etc. from Disk D automatically.

5.2 System backup

Manual backup of the configuration data can be performed for later use. To back up the system, please click Menu "Quit", "Backup" and type into the fixed password "9090". It then indicates "System data is backed up". To restore the backup, please click Menu [Backup Lead-in] and type into the fixed password "9999". When it indicates "Quite the system", please click "OK" to finish the restoring and "System data lead-in is completed" appears. It requires re-starting the program to modify the system data, so please quit the system after restoring the backup.

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