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MESS  MATIC®

**SYM SERIES HORIZONTAL
BALANCING MACHINE**

**INSTRUCTION & MAINTANENCE
MANUAL**



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SECTION 1 INTRODUCTION

1.1 General introduction and usage fields

SYM Series Horizontal Balancing Machine is an industrial balancing machine which is designed for sensitive balancing operation of shafts and other rotors. The machine is not suitable for other purpose of usage. Balancing operation is performed when the spinning axis of the shafts are paralel to the ground. The motor spin movement (Accelarating, constant speed, braking) is performed by inverter. The machine is computerized, Windows operated, and user friendly.

The machine measures the imbalance value by measuring the vibrations of spinning rotor with the help of the sensors located on the main body of the machine. The machine is capable of measuring static and dynamic imbalance values. The angular position of this measured imbalance is measured by encoder which is connected to the mechanic of the machine.



**Before starting using ht emachine, please read the instructions manual carefully in order to prevent the possible wrong usage of the machine.
In case of any further needs, please keep this instructions manual always near to the machine**

1.2 Packacing and carriage

According to customers' request, the machines are packaged for delivery in the factory in two ways,

1. On pallet
2. Without package

In two ways, the machine is stretched.



Carriage of the machine should be performed by fork-lift. The machine should never be lifted from the balance adaptor.



Please control the main body of the machine as you open the first cover if there is any broken part of not. If there is, please immediately contact with the seller or manufacturer.



1.3 Technical Features Table

| | |
|------------------|-----------------|
| Motor Power (Kw) | |
| Balance RPM | 300-3000 |
| Measurement Type | STATIC, DYNAMIC |



The operating of the machine should be performed by authorized and experienced operator. Do not change anything on the control panel of the machine. In case of any problem with the machine, contact with the after sales department or the manufacturer.

SECTION 2 INSTALLATION AND COMMISSIONING

2.1 Customers' duty for installation

For installation, prefer a comfortable, safe, smooth surface, and far from any vibrating machines position. Please connect the machine to the ground with the bolts that given with the machine. In case of not connecting the machine to the ground, the requested balancing measurement datas will not be measured. The required working condition are as follows:

- Humidity : %30 - %95
- Temperature : -20 °C + 55 °C

2.2 Electrical Connection



If there is any voltage loss in your system, you should use regulator before connecting your machine to the electricity. There should be earth connection in your system.



Any change or work on the electricity system, should be performed by authorized personel.



SECTION 3 INSTRUCTIONS

3.1 Starting the machine

After installing the machine and connected to the electricity, first turn on the shalter on the control panel. Then, if your computer doesn't starts automatically, push the button on the computer.



During balancing operation, please keep away your hands and body as much as possible from the spinning parts of the machine. Neckless, accessories, large clothes are dangerous for the operator. During operation, please do not wear these accessories

3.2 Screen Information

After turning on the machine, you will see username and password enterance menu. (Figure-1) Username is (MESSMATIC) and password is (1), press enter.

The image shows a Windows-style dialog box titled "User Rights". It has two text input fields: "User Name" which contains the text "MESSMATIC", and "Password" which is currently empty. Below the input fields, there are three buttons: "Shutdown" with a red stop sign icon, "OK" with a green checkmark icon, and "Cancel" with a red X icon.

Figure-1

After a while, you will see the main screen (Figure-2).



Main Screen

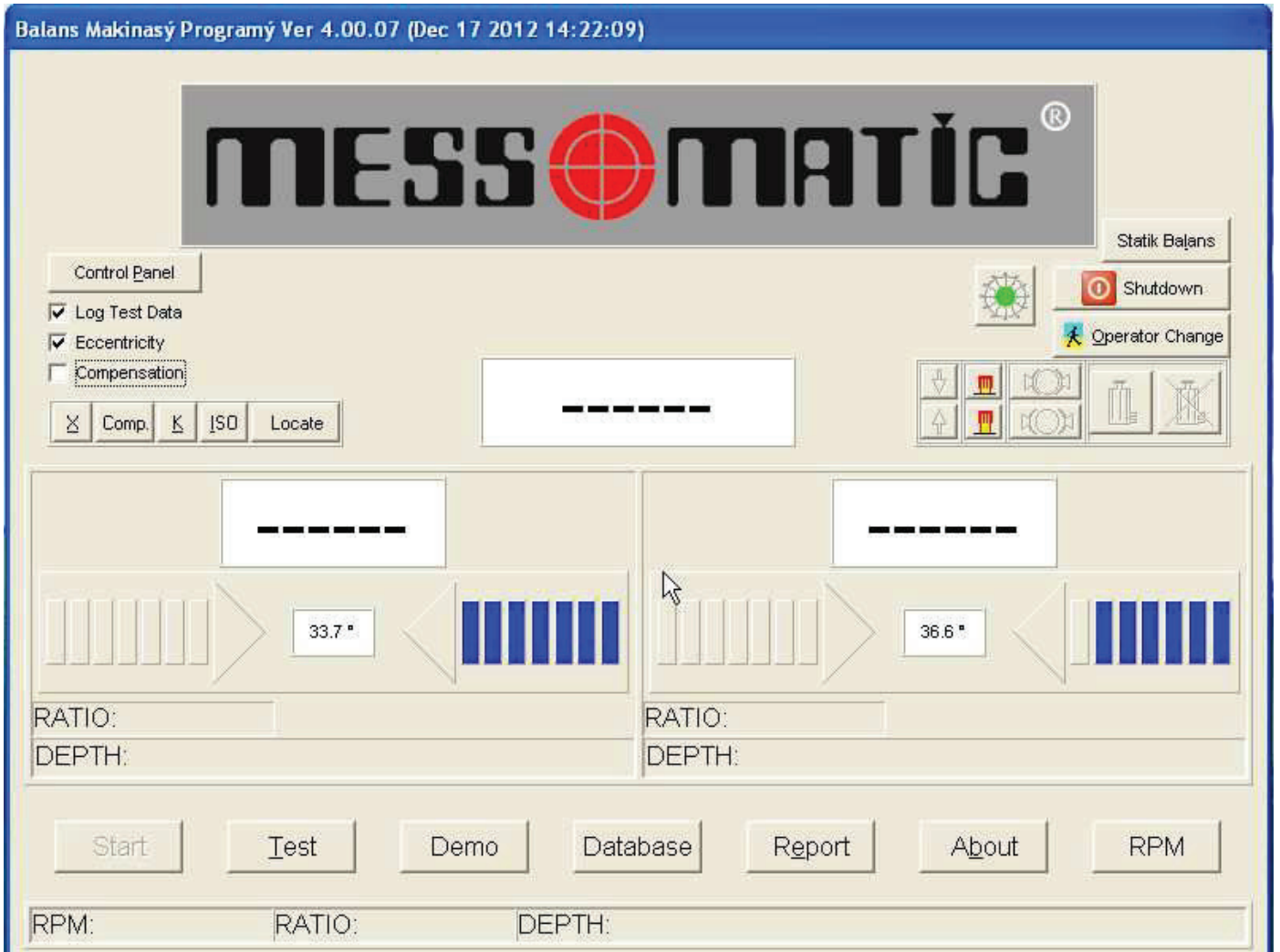


Figure-2

Main screen buttons and functions:

- **DISPLAY BOX** : Shows the imbalance values in grams. The box in the middle shows the static imbalance value. The boxes on two sides show the dynamic imbalance values.
- **LEFT RIGHT ARROW KEYS** : Shows you which direction that you should turn the rotor to find the imbalance point. You should turn the rotor in the direction of arrow until you see OK on the screen.

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- NO, PART NAME : In this section, the information is displayed belonging to the part which is chosen in data menu.
- START : Starts the machine.
- DEMO : Show the demo page of the company
- DATA : For data enterance and special functionions.
- REPORT : Print out the firdt imbalance values and imbalance values after balancing operation. (Printer is not a standart accessory, is offered as an option.)
- INFORMATION : Displays the information of the manufacturer.
- RPM : Displays the RPM level
- RATIO : Displays the ratio of the measurement.
- DEPTH : Displays the maximum depth of drilling or milling during balancing operation.
- HOLE NUMBER (FOR DRILLING): Display the maximum hole number during balancing operation.
- ANGLE (FOR MILLING) : Is the milling angle for milling operation of both sides of the imbalance point during balancing operation.
- SAVE : Saves the imbalance values to the harddrive, from the report menu you can reach these datas.
- ECCENTRICITY : Automatically eliminates the errorrs because of eccentricity. During balancing operation, this option must be enabled.
- COMPENSATION : Electronically admits the imbalance of the adaptor as "Zero"
- X : Exit to Windows.
- COMPENSATION : Starts the machine, to electronically making the imnbalance of the adaptor zero. Use this option after calibration to test if the machine is measuring correctly or not.

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- **K** : Operates the eccentricity operation.
- **ISO** : Enables you to calculate the residual imbalance of the rotor according to the 1940 ISO standards.
- **POSITION** : After imbalance measurement, the rotor automatically positions. (In GLOBAL DATA_GENERAL menu, “position after balancing” option should be chosen.) This option is not working in every type of industrial balancing machine.
- **M1** : For report print out, after the measurement of first imbalance value, press this button to save the data. If not, in the print out, the first imbalance value is not indicated.
- **M2** : For report print out, after the measurement of last imbalance value, you should press this button.
- **SHUT DOWN** : Shuts down the computer.
- **OPERATOR CHANGE** : When you click this button, you will see the menu Figure-1. Every operator will enter their own username and password before starting operating. During shift changes and not working times on the machine, the operator clicks this button to prevent non authorized usage of the machine.

3.3 Polar Graphic Screen:

As requested, the unbalance values can be displayed on polar graphic screen. The unbalance value will be indicated by red point. The green area is displaying the values inside the tolerance. If the unbalance value is not inside the tolerance, the machine will display the unbalance results with red background in order to take operators' attention.

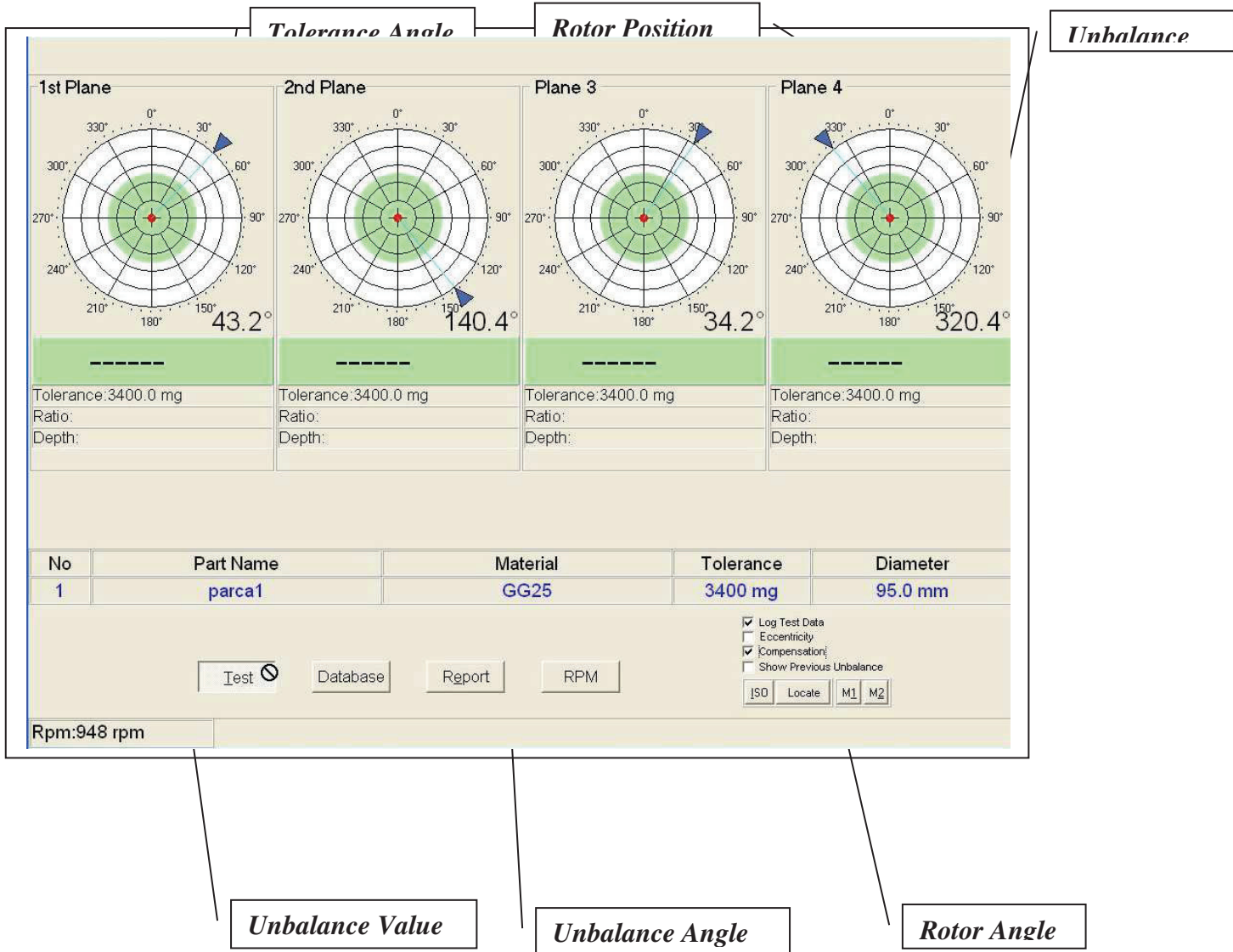


Figure-3



3.4 Database

Before balancing, you should enter the DATABASE menu to enter the necessary information about the rotor. When you enter the DATABASE menu, you will see the screen on Figure-4.

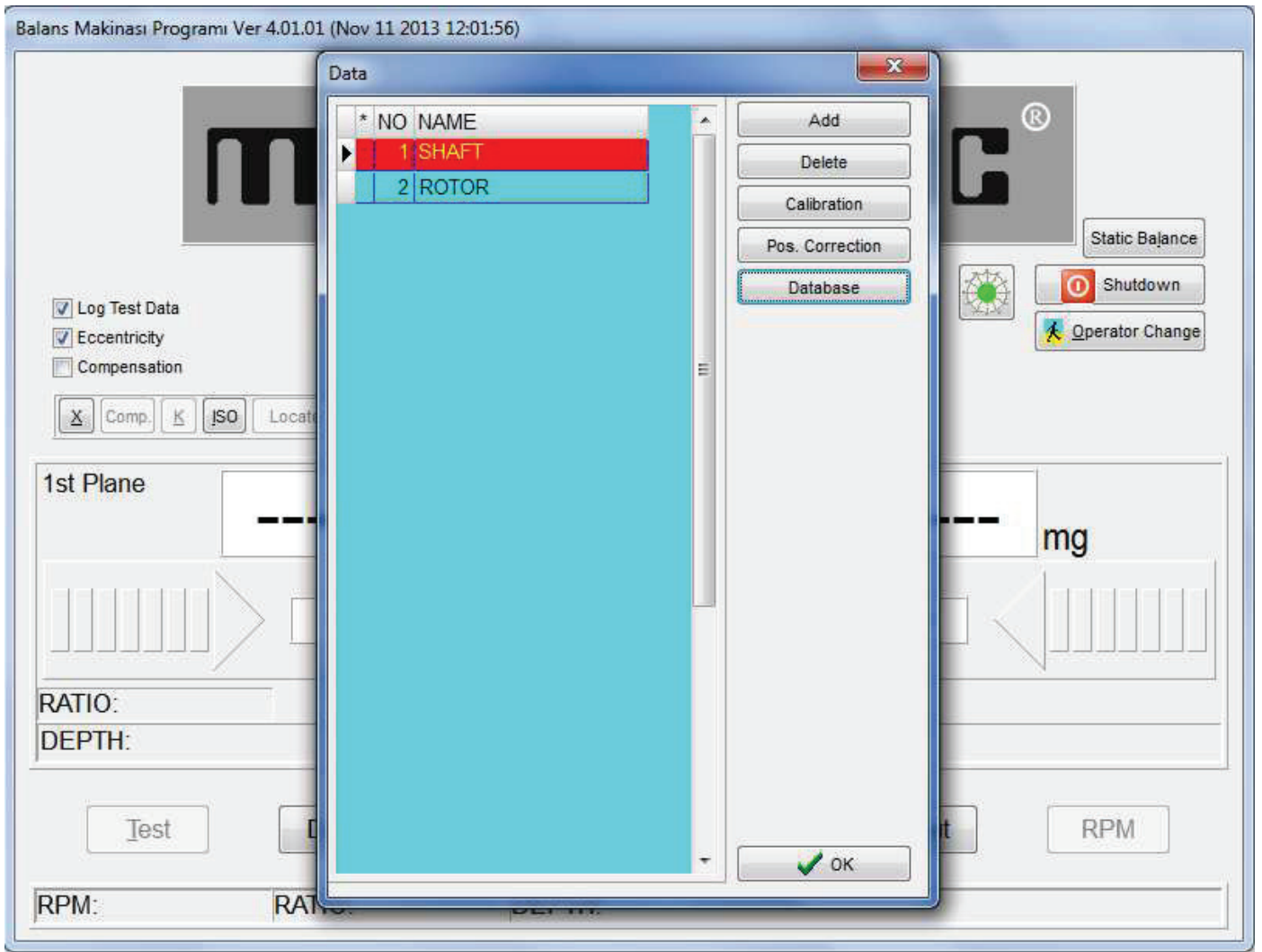


Figure-4

By clicking on the rotor line you can choose the existing rotor.

The buttons on the right side of the Data menu is as follows.



-
- NO : The number of the rotor
 - PART NAME : Rotor name. Editable.
 - ADD : Adds a new line for the new rotor type
 - DELETE : Deletes the selected rotor.
 - POS CORRECTION : You can use this button for manually changing the angle of the unbalance point.
 - CALIBRATION : You can make calibration with this button for the selected rotor type.

3.5 Introducing a New Rotor.

- Click on the “ADD” button to add a new line for your new type of rotor.
- Click on the new created line, and the rotor name will be blue colour. You can change the name of the rotor.
- Click “OK” to enter the parameter menu of this rotor. You will see the following figure 5.



[2] ROTOR

Rotor Dimensions

diameter [mm] : 256.00

diameter1 [mm] : 256.00

diameter2 [mm] : 256.00

diameter3 [mm] : 256.00

diameter4 [mm] : 256.00

Unit

mg

g

g.mm

g.cm

Plane Measurements

a [mm] : 200.00 g2 [mm] : 100.00

g1 [mm] : 100.00 g3 [mm] : 100.00

Tolerance

maximum unbalance [g] : 3.40 43.52 g.cm

maximum unbalance1 [g] : 3.40 43.52 g.cm

maximum unbalance2 [g] : 3.40 43.52 g.cm

maximum unbalance3 [g] : 3.40 43.52 g.cm

maximum unbalance4 [g] : 3.40 43.52 g.cm

Balance Method

Addition Method

Compensation

Eccen. Phase : 72.0

Calibration

DynamicBalance

Show Static

nPlaneNumber : 4

calibration_a [mm] : 200.00

calibration_g1 [mm] : 100.00

calibration_g2 [mm] : 100.00

calibration_g3 [mm] : 100.00

Report

SerialNo : 0

Customer :

Measuring

waiting Time [ms] : 10000

ISO

Read Parameters OK Cancel

Figure-5

- On the right side under the “Calibration” section, you should enter the plane numbers according to your shafts.
- Select the unbalance unit that will be displayed as unbalance result. (gram, miligram, g.mm g.cm.)
- Enter the rotor dimensions in millimeters for each planes.
- Enter your tolerance of the selected rotor manually for each planes.
- With the ISO features, you can automatically enter the tolerances. Click ISO, the following screen will appear, figure 6



Balance Grade

Rotor Type

| | | | | |
|---|-----|-----|----|----|
| 1 | 2.5 | 6.3 | 16 | 40 |
|---|-----|-----|----|----|

Automobile wheels, rims, complete wheels rotating mils.
Elastically mounted, fast four stroke, diesel or fuel, six or more cylinder motors.
Complete cranck mil for automobile, truck, train motors.

Grade G:

Rotor Mass m: kg RPM n: rpm

Rotor Radius r: mm

max unbalance p =

Figure-6

- Select the grading type of your rotor according ISO 1940. Enter the weight of your rotor. Enter the real running RPM of your rotor. Enter the radius of your rotor. Click max. unbalance, the ISO tolerance will be calculated automatically. If you click "USE" button, this calculated tolerance will be saved automatically as the tolerance of this rotor. If you click "CLOSE" button, you will exit without saving the tolerance values.
- Balance Method: If you enable "Addition Method", during balancing operation, you should add the requested unbalance weight to the requested angle.
- Waiting time is the time of the rotor reaching the adjusted rpm level, unbalance measurement time, and stopping time. You do not need to change this milisecond value unless there is an error during start up of the rotor.
- After, entering these parameters, click "OK" and exit from this parameter menu to the new menu.
- Enter the "DATABASE" menu, and click calibration! Figure 7.

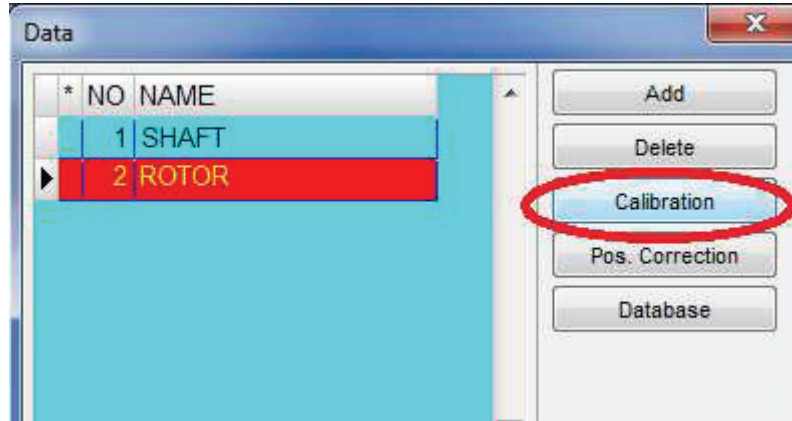


Figure-7

SECTION 4 CALIBRATION

You should definitely perform calibration operation before starting the balancing procedure of a shaft.

4.1 Calibration Steps

- Mount the shaft to the balancing machine.
- Click on the shaft name (which is mounted)
- Click "CALIBRATION" The calibration screen will appear. Figure 8

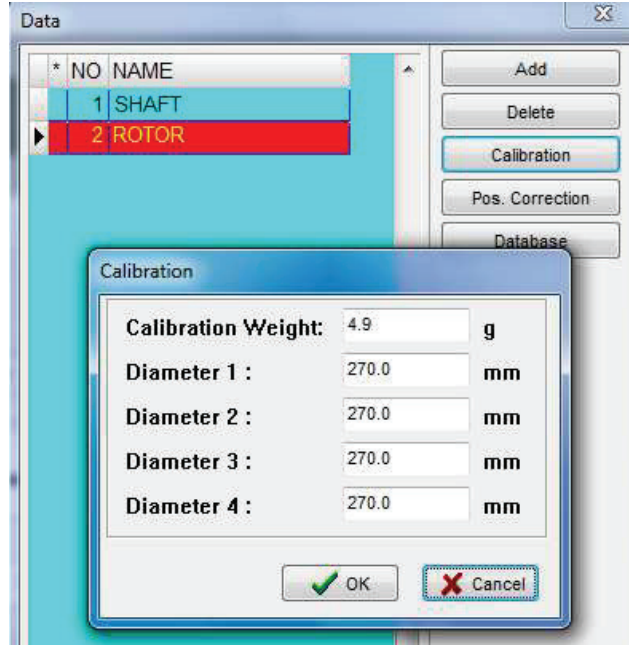


Figure-8

- Enter the calibration weight that you are going to use for calibration and enter the calibration diameters for each plane. (Remember that the calibration diameters should be exactly same with the balancing diameters.)
- Click “OK” and a dialog box will appear. Figure 9

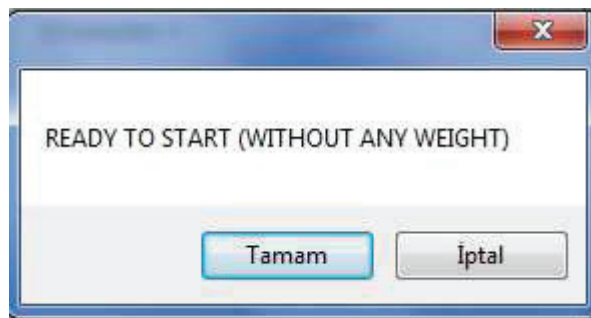


Figure-9

- **(Important! Do not apply the calibration weight at this moment!)** Click OK. The machine starts rotating and after a while stops and you will see the message “To the 1. Plane, apply ... calibration weight machine will work” in the dialog box. (Figure-10)



Figure-10

- Now, apply the calibration weight to the entered calibration diameter on the 1. Plane and position the weight to 12 o'clock position (where you want to see the heavy part after calibration) and click OK. The machine will start again. After a while the machine stops and you will see the message "To the 2. Plane, apply ... calibration weight machine will work" in the dialog box. (Figure-11)

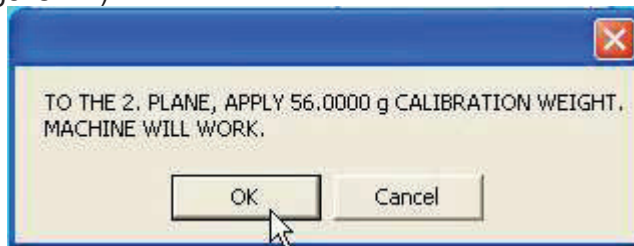


Figure-11

- Now, apply the calibration weight to the entered calibration diameter on the 2. Plane and position the weight to 12 o'clock position (the same position that you positioned for the 1. plane) and click OK. The machine will start again.
 - Repeat the same step for plane 3 and 4
- After the last rotation of plane 4 with the calibration weight, you will see the message "Factory gram calibration is successful" in the dialog box. (Figure-15).



Figure -12

Press OK to save the whole operation done. If the values that you have entered are not valid, the computer will warn you.



4.2 Compensation

Testing the Calibration

After finishing the calibration procedure, disconnect the calibration weights from the shaft. Exit from the “DATA” menu. Click “COMPENSATION” button to make the unbalance of the rotor “0” electronically. The rotor will start rotation, after it stops, click on “TEST” button. After test, you will see an unbalance value very close to “0” gr. on each planes. Then connect the calibration weight to any of the planes and click “TEST” button. After the result of this test, you should see exact calibration weight on the screen and the position should be correct on the connected plane. If the values are not correct, you should repeat the calibration from the beginning.

The calibration should be repeated in the conditions listed below.

- After the installation of the machine
- When the machine imbalance measurement are not correct.
- When the adaptor is changed
- When the computer is changed
- When the electronic TMS card is replaced
- When the RPM of the machine is changed
- When the sensor is changed
- When the machine is moved to any other place.

SECTION 5 BALANCING

5.1 Turning on the machine and preparation

- Turn on the main button on the right side of the machine.
- If the computer doesn't start automatically, turn on the computer
- Enter your username and password



When the system starts, check if the right rotor is selected or not. The rotor data can be seen at the bottom side of the screen. If the selected rotor type is not correct (same with the rotor connected to the machine) enter DATA menu, and click on the right rotor, Click “OK” and check the rotor parameters, click “OK” and exit to the main balancing menu.

5.2 Balancing Operation

In order to balance, after centering the rotor, press START. The machine will display the unbalance value on the screen. In non servo controlled machines, position the rotor to see the unbalance position. According the balancing type selected, on the screen you will see balancing data, the unbalance values for each plane, an the unbalance angles, exact positions. When you manually turn the shaft, you will see the positions changing live. In the correct angle, the polar display will be yellow, the 12 O'clock position of the shaft is the unbalance point. Regarding you balance method, from the databse if additional method is enabled, you should add the requested unbalance gram to this point. If “Additional method” is not enabled, this is the point that you should make drilling operation as the unbalance weight.

After balancing operation, you can press START again to check if the rotor is inside the tolerance or not.

Dismount the balanced rotor from the balancing machine.

5.3 Rotor Type Differentiation

- Fix the new adaptor which is suitable for the new balancing rotor. Tighten the adaptor with a max 2 % run-out. Remember, if the run-out is greater 2 %, the balancing operation will not be correct.
- Connect the rotor to the balancing machine’s first and last pedestal flanges.
- If the shaft is 2 pieces or 3 pieces, use the middle pedestals, and mount the shaft to the middle pedestals from connection points. Always be sure that all the mounting screws of the shaft are tightened well.
- Tighten the screws of the all pedestals to the bench, the pedestals should be fixed very well to the bench.
- Check the sequence of the pedestal cables on the left side of the control unit. If you agree using all the pedestals, the pedestals should be connected in the right sequence. Pedestal 1 should be connected to “Plane 1” socket, the pedestal 2 should be connected to “Plane 2” socket, the pedestal 3 should be connected to “Plane 3” socket, the pedestal 4 should be connected to “Plane 4” socket,



- If you are using only 2 pedestals, mount the cables of these pedestals in sequence with Plane 1 and Plane 2. The other sockets will be empty. If you are using only 3 pedestals, mount the cables in sequence with Plane 1, Plane 2, Plane 3, the last socket will be empty.
- After getting ready, select the right shaft type from the Data menu.
- If this is a different shaft from the previous balancing operation, make calibration.
- If this is exactly the same shaft with the previous balancing operation, you do not need to make calibration unless you change the RPM level. You can directly click TEST to see the unbalance of the shaft.
- After calibration, perform compensation
- Balance a rotor and check.

5.4 Shut Down

- 4.6.1 Never shut down the machine directly from the shalter, first shut down the Windows.
- 4.6.2 To shut down the Windows click on “Shut Down” button
- 4.6.3 Then, shut down the main shalter.

SECTION 6 SETUP MENU

6.1 Setup Menu functions

In order to enter the setup menu, follow the further steps;

- In the main screen, enter “DATABASE” menu.
- Click “DATABASE” Password is required, enter your password. In the factory settings, username is “MESSMATIC” and password is 1
- The following screen will be displayed. (Figure 13)

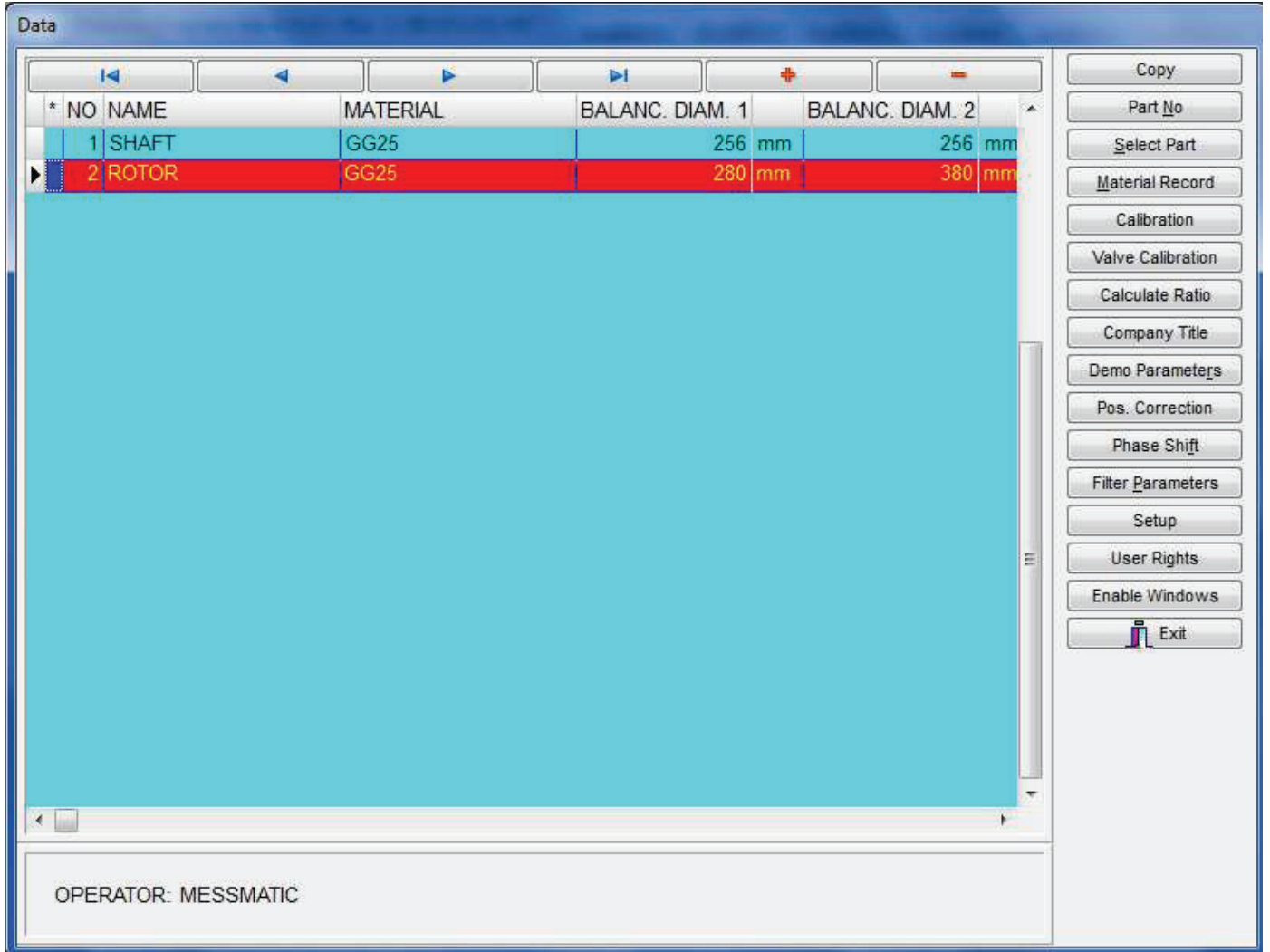


Figure - 13

In Figure 13, you will see the name of the rotors that are created by yourself, and on the right side, there are other functions. In this page, you can change the parameters of the balancing machine.

This area should be used by Authorised Chief or Admin.

Reklam Parametreleri

- **POSITION CHANGING**

POSITION CHANGING is used to change the imbalance angle position of the rotor. When there is no balance weight on the adaptor, compensation should be done. Then apply the calibration



weight and perform TEST. After the machine stops, you should position the calibration weight to an angle that you want to see the imbalance point during operation. Enter DATA menu, press [Alt + D] od click on POSITION CHANGE button, you will see a dialog box indicating that you have given a new imbalance position. Below, there is OK and CANCEL button, if you would like to cancel the operation press CANCEL, you will see a dialog box telling you that you have cancelled the process, for saving and exit, press OK.

- **USER IDENTIFICATION**

In user identification, every operator will have a personal username and password. There are authorization levels in usernames and passwords. Admin, Chief, operator. The highest level is Admin. The middle level is Chief, the lowest level is Operator. (Figure – 18)

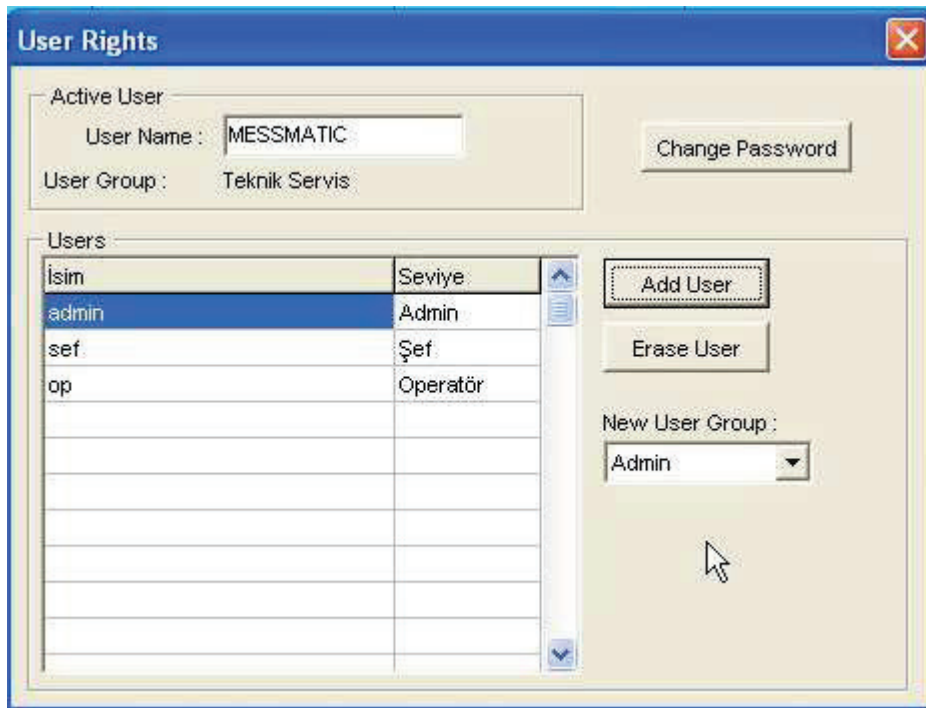


Figure - 14

- **ENABLE WINDOWS**

Allows you to Access Windows features during the program is running.

- **EXIT**

This feature enables you to exit from DATA menu to the main screen.



6.2 Global Data

To reach the detail information about the rotor parameters, balancing machine setup, double click on the rotor. In the reached GLOBAL DATA menu (Figure – 15) with the sub menus you can reach every data about the rotor.

The screenshot shows the 'Global Data' window with the following sections and parameters:

- Setup** (selected):
 - Serial com: timeout [ms] : 10000
 - Split Weight: split_weight, reference point : 0.00
 - Display: inverted arrows, posConst1 : 53.84, posConst2 : 53.84, posConst3 : 53.84, posConst4 : 53.84
 - Report: SerialNo : 0, Operator : MESSMATIC
 - Spray: marking enabled, marking time [ms] : 300, marking tolerance [%] : 1.00, marking_printer_enabled
- Compensation**:
 - X0 : (0.00) 0.0
 - Y0 : (0.00) 0.0
 - W0 : (0.00) 0.0
 - Z0 : (0.00) 0.0
 - XKopru : (0.00) 0.0
 - YKopru : (0.00) 0.0
 - WKopru : (0.00) 0.0
 - ZKopru : (0.00) 0.0
 - Eccen. Phase : 72.0
 - auto-eccentr.elim.
- Balancing Method**:
 - free
 - drill from the top
 - milling from the top
 - drill from the side
 - milling from the side
 - milling using calibration
- Unit**:
 - mg
 - g
 - g.mm
 - g.cm
- Positioning Type**:
 - Static
 - 1. Plane
 - 2. Plane
 - max(1,2) Plane
- test_freq**: 0
- mark of the piece within tolerance
- marking_depth [mm] : +
- position after balancing
- do not position if in tolerance
- position to balancing start point
- disable servo after positioning
- unlock rotor after the test
- unlock rotor after the test if ok

Buttons: Read Parameters, OK, Cancel

Figure - 15



GENERAL

Compensation : (X0) Electronic compensation value. If you make this value “0” the compensation will be resetted.

Xeccentricity : Electronic eccentricity compensation value. If you make this value “0” the it will be resetted.

Eccentricity Angle : This angle is going to be used during eccentricity operation. As you maket his angle smaller, the result is going to be much more reliable.

Position after balancing : When this option is selected after imbalance measurement, the machine automatically positions the rotor. This feature is not present in every machine.

Balancing Method : The method for balancing is choosen in this section. When free balance is choosen, the machine does not do positioning.

Unit : The unit of the unbalance value.

Crystal : This section is designed for authorized personel of the manufacturer company, the customer shouldn' t change anything in this area. Only, the customer can change the waiting time. For the heavy rotors, this waiting time should be increased, for the light rotors, it hould be decreased.

SETUP

In the setup menu, (Figure – 16) you can change the language of the machine.

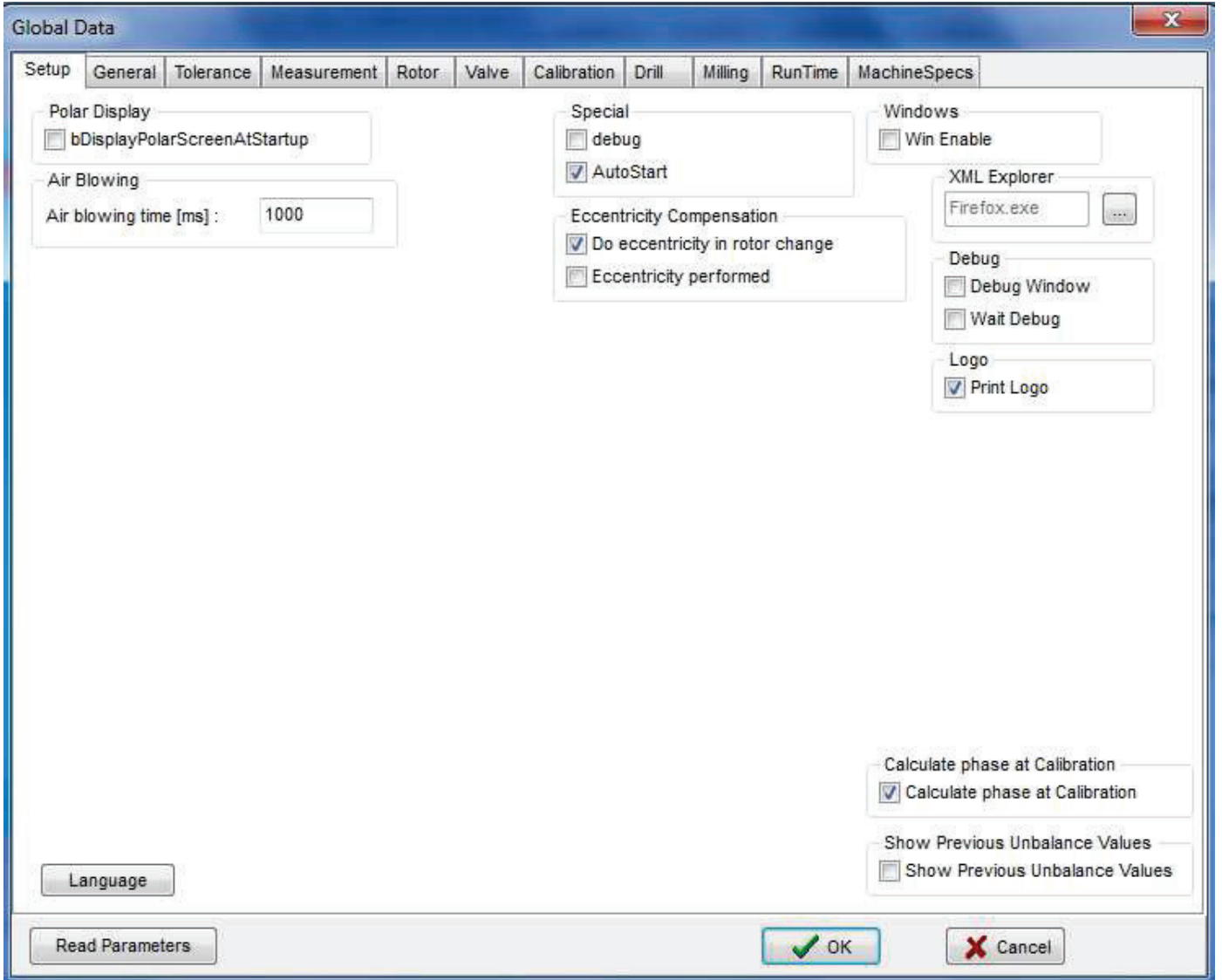


Figure - 16

TOLERANCE : In this section, you can change the tolerance values of the rotor for each plane.

MEASUREMENT : You can change the balancing machine unbalance measurement cycle number, measurement time interval, balance correction method.

ROTOR : You can enter the rotor diameters for each plane.

VALVE : If you are balancing wheels or rims, you can enter the parameters for valves



of the Wheels and rims.

CALIBRATION : You can permanently change the calibration diameters for each planes, calibration weight, change the plane number, enable/disable static balance, dynamic balance.

DRILL : If there is a drilling unit mounted on the balancing machine for balance correction operations, you can enter the drilling unit cone angle, diameter, drilling numbers permitted on the rotor, the balancing machine will also calculate the necessary drilling numbers and depths for balance correction according to the rotor's material.

MILLING : If there is a milling unit on the balancing machine for balance correction operations, you can enter the milling unit parameters like diameter, milling angle etc. the balancing machine will also calculate the necessary milling depth and angle for balance correction according to the rotor's material.

SECTION 7 MAINTANENCE INSTRUCTIONS AND WARRANTY INQUIRY

7.1 Maintenance Instructions



Before maintenance, repairing or cleaning operation disconnect the machine from the electricity.

Daily maintenance

Clean the dust on the machine
Check the runout of the adaptors, it should be max $\pm 2\%$
If present, clean the liner Lines of the milling or drilling unit, use VG68 oil.
Check if the air pressure is 6 bars.
Check the oil.
Check the calibration.

Weekly maintenance

Oil the adaptors with VG68 oil.
Check the screws of the machine fixing to the ground, tighten them.
Check the screws of the milling / drilling units, tighten them.
Clean the monitor.
Check the electricity connection, if proper or not, the cables should be tightened.

Monthly maintenance



Clean the electrical panel with pressure air
Clean the inside of the computer with pressure air.

7.2 Repairing Instructions

Crystal replacement

Disconnect the side pannels of the machine. You will see the crystal, disconnect it with M10 screws. Disconnect the crystal cable. Connect the new crystal. Tighten the crystal with 1 kg.m tork. Connect the new crystal' s cable. Close the side pannels.

Replacing the Encoder and Caplin

Disconnect the side pannels of the machine
Disconnect the encoders 3 screws which connects to the flansh
If you will replace the caplin, disconnect the caplin from the encoder and from the mechanic of the machine.

Disconnect the encoder

Disconnect the encoder cable

Connect the new caplin

Connect the new encoder to the flansh with 3 scres, and connect the caplin to the encoder

Coonect the cables of the encoder

Close the side pannels of the machine

Sensor Replacement

Disconnect the side pannels of the machine

Disconnect the sensor cable

Disconnect the metal holder of the sensor from the body with 2 screws

Disconnect the sensor card and replace it with the new one

Connect the metal holder of the sensor to the body with 2 screws.

Connect the sensor cable.