

Rhinotest System

RHINOTEST

Service Manual

How to use the program RHINOTEST 1000



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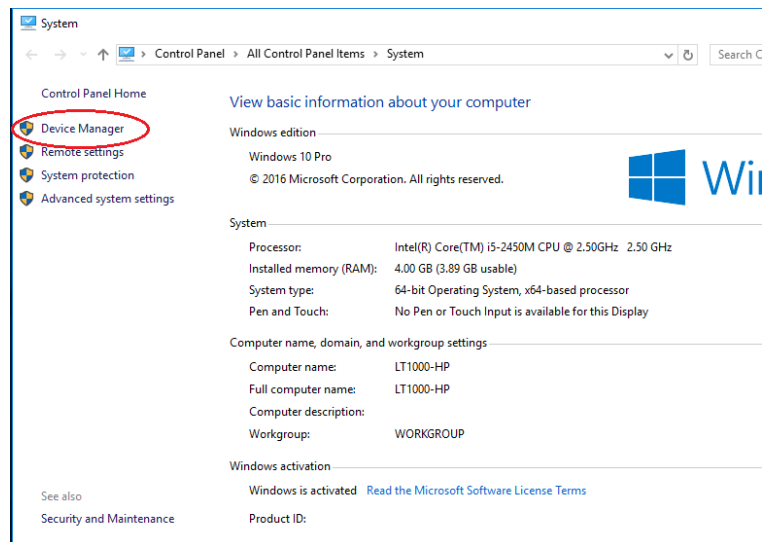
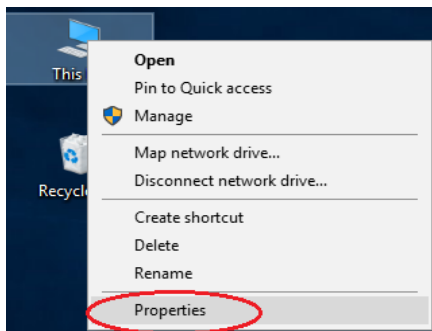
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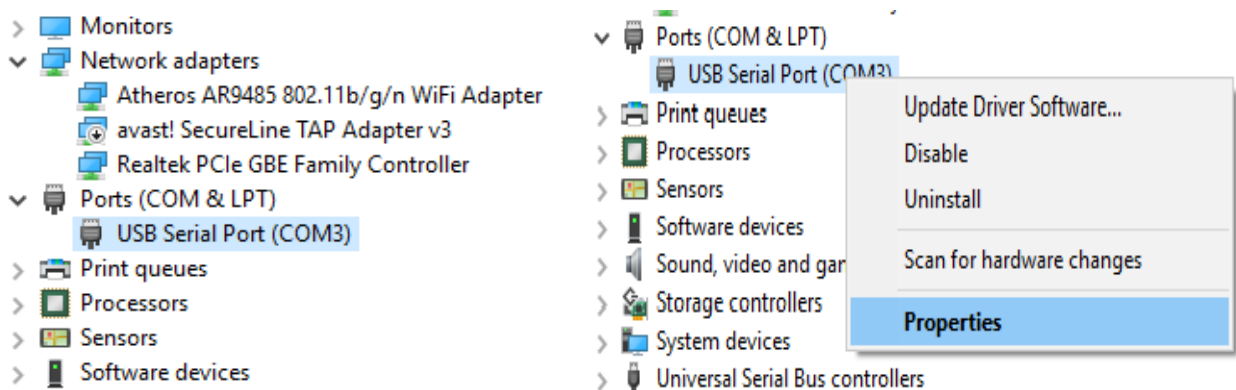
1. Rhinotest Startup

1.1. Software installation

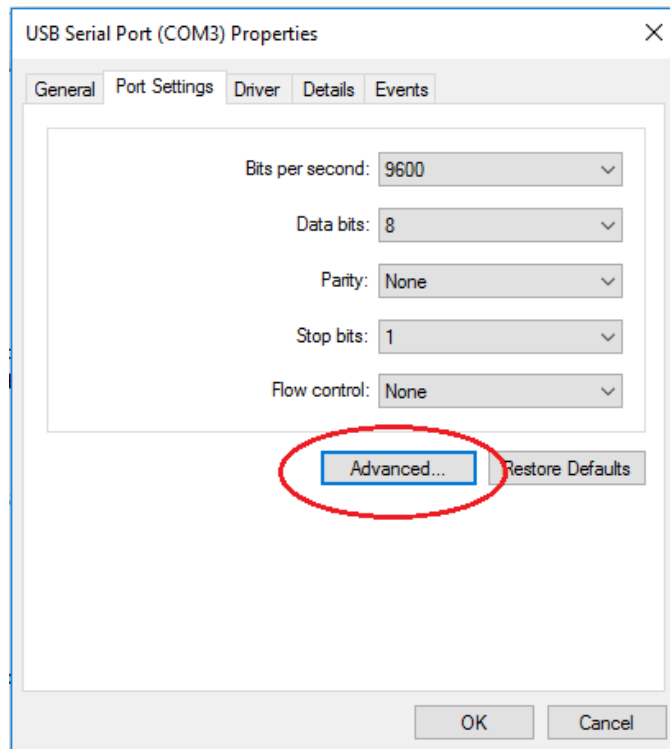
1. Put the Rhinotest CD into the CD/DVD drive of Your Computer.
2. Find „Rhinotest\USB Drivers” folder.
3. Execute „CDM vxxx WHQL Certified.exe” file and follow the instructions on the screen.
4. Plug Rhinotest 1000 device to a free USB port, then plug a power supply cable and turn on the device with a switch situated at the back cover.
5. Find „My Computer” icon on your desktop (or „Computer” for Win10 systems) and right click on it. You will see a Menu as pict. below. Choose „Properties” tab and press „Device Manager”.



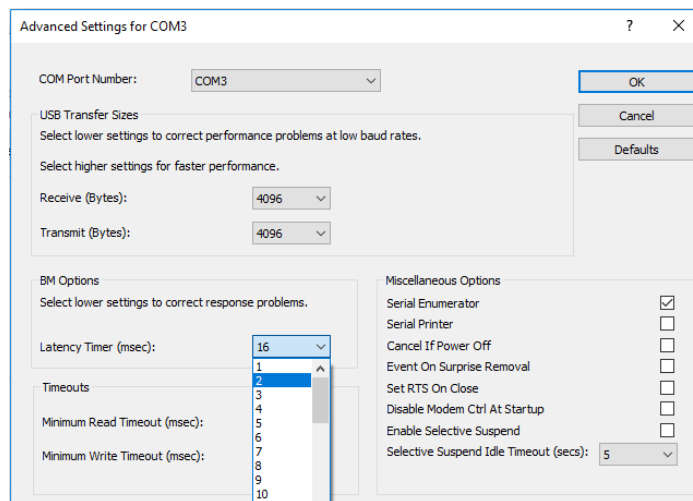
6. Enlarge the branch „Port COM&LPT” and find „USB Serial Port (COM x)” device. Remember the COM port number.



7. Right-click on selected device and select „Properties”. Switch to tab “Port settings” and press „Advanced”.



8. Set the parameter „Delay time” to 2 ms.



9. Apply changes with „OK”.

10. Find „Rhinotest” folder on your CD and execute „setup.exe” file. Follow the instructions on the screen.



11. After installing „Rhinotest” software, find a registry file on your CD called „kalibracja – xxxxxxxx.reg” and actualize the system registry, with double-click on this file and accepting the questions. **CAUTION: During the action scribed in point 11, Rhinotest Software MUST be closed!**

12. Run the “Rhinotest program”. Find “Tools” menu and choose “Select Connection”. Set the proper number according to paragraph 6 and confirm with OK. You may use “Detection” button for reminding the number.

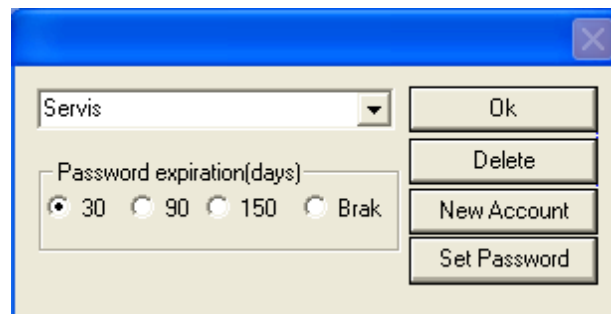
1.2. Login

Rhinotest 1000 application supports administrative work with spirometry test stations for system administrator can use. Logon procedure allows personalization in application access and storing information's about logged users in Mes apps if required. Rhinotest1000 can also be set in autologon mode where logging to application is skipped. Login mode is set by default and can be change by Mes service staff **only!** System administrator or it's users shod not attempt to change the login mode at any circumstances and always contact Mes support if such change is required.

In Login mode after user click's Rhinotest1000 icon following form displays:

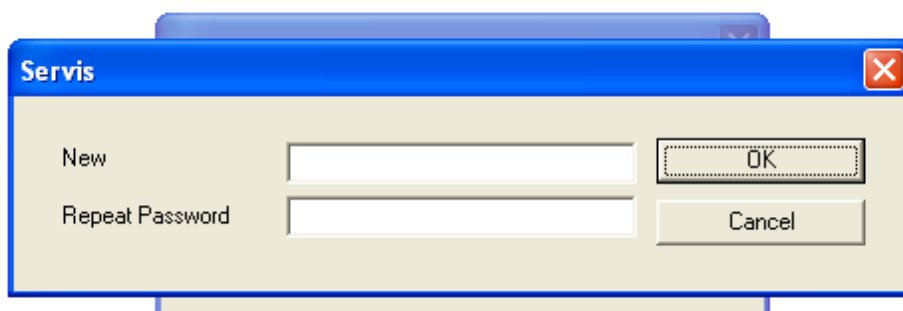


Use comb box to choose user or enter user name using keyboard. Enter password and click “Login” or “Manage” If you chose “Login” program will run and user will be auto-logged in every Mes application until instance of logged program exists. Pressing “Manage” will lead to following screen:



Manage panel allows to create new account, or delete/modify currently logged. There is no super user or admin account. Instead every logged user can create new account or modify account he owns. To create new account type user name, password expiration time and press “New”. Program will create account with chosen name with default “123” password. To delete current account press delete.

To set new password press “Set password” button. During logon if the password become expired user will also be asked to choose new password with following screen:



2. Patient's data

By patient's data we mean a set of information necessary for patient's identification. Without this information no test can take place. Patient's data can be entered in four ways:

1. New patient's data (⇒ Chapt. 2.1).
2. Selecting patient form data base (⇒ Chapt. 2.2).
3. Selecting a file with earlier test results. Command *Patient from file*(menu *File*).
4. Opening and closing the file with earlier patient's test results (⇒ Chapt. 8).

After entering patient's data all test will be done for this patient. In order to test another patient, their data must be entered.

1.3. New data

New patient's data are entered through the dialogue box *Patient's data* (fig.1) which is accessible after the command *New patient* (menu *File*). The box has a set of fields where information compatible with the label which is near each field should be typed.

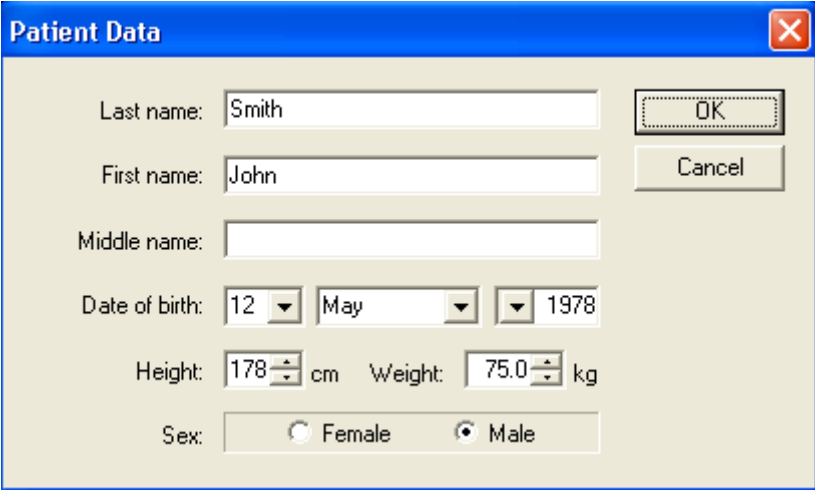


Fig. 1 Dialogue box *Patient data*

1.4. Selecting from data base

The patient can be selected from the data base through the command *Select patient* (menu *Data base*). For information on selecting the patient form the data base see *Data base manual*.

1.5. Modyfication

Patient's data can be modified through the dialogue box *Patient's data* (⇒Fig.1) which opens after the command *Edit patient's data* (menu *File*). Data modification is possible only after its earlier entering (⇒ Chapt. 2)but before any tests have been started. Only patient's *Height and Weight* can be modified.

1.6. Data review

Patient's data review, i.e. the review of its daily contents is done through the dialogue box *Patient's data* (⇒Fig. 1) which opens after the command *Edit patient's data* (menu *File*). The data of the same patient coming from different tests can differ only in *Height and/or Weight*.

2. Test description procedure

Next chapters are devoted to descriptions of tests which can be done using *RhinoTest* application. Each of them contains sub-chapters common for all tests and sub-chapters specific for each test. Common sub-chapters are:

1. Test parameters

The sub-chapter presents the set of all parameters which are determined during the test, i.e. their names, units and a short description.

2. Test options

The sub-chapter contains a description of settings (options) which influence the way the tests are done. These settings are modified through the dialogue box *Test options* (menu *Tools*). The box has several folds, each of which represents one test and bears the name compatible with the test name. Moreover, the box has two buttons *OK* and *Cancel*. The first button is used to accept, the second one – to cancel the modifications.

3. Test procedure

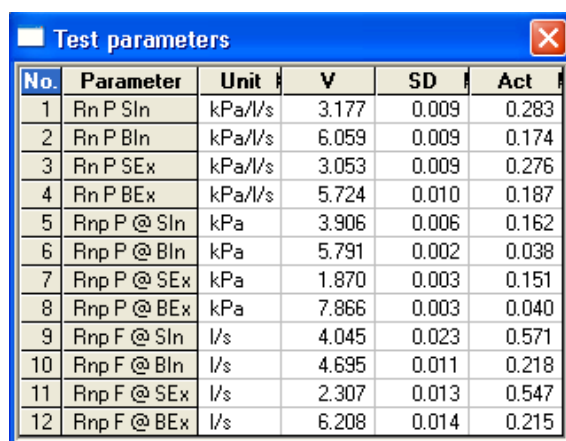
The sub-chapter contains the procedure of the test.

4. Test result

The sub-chapter shows a sample result of the test. Each result contains, among others, a set-up of test parameters shown as a table (⇒ Chapt. 3.1). Flow and volume axes have identifiers IN and EX which show the flow direction.

2.1. Table with test results

Table (⇒Fig. 2) is a part of the test result containing all its parameters.



No.	Parameter	Unit	V	SD	Act
1	Rn P SIn	kPa/l/s	3.177	0.009	0.283
2	Rn P BIn	kPa/l/s	6.059	0.009	0.174
3	Rn P SEx	kPa/l/s	3.053	0.009	0.276
4	Rn P BEx	kPa/l/s	5.724	0.010	0.187
5	Rnp P @ SIn	kPa	3.906	0.006	0.162
6	Rnp P @ BIn	kPa	5.791	0.002	0.038
7	Rnp P @ SEx	kPa	1.870	0.003	0.151
8	Rnp P @ BEx	kPa	7.866	0.003	0.040
9	Rnp F @ SIn	l/s	4.045	0.023	0.571
10	Rnp F @ BIn	l/s	4.695	0.011	0.218
11	Rnp F @ SEx	l/s	2.307	0.013	0.547
12	Rnp F @ BEx	l/s	6.208	0.014	0.215

Fig. 2. Table with result.


The table has the following columns:

No.	Name	Description	Remarks
1	No.	Parameter number	
2	Parameter	Parameter name	
3	Unit	Parameter unit	
4	X	Mean value	Calculated of all done and recorded breaths
5	V	Variation coefficient	As standard value related to mean value
6	SD	Standard deviation	Standard deviation of all curves parameters
7	Act	Actual parameter value	Value obtained as measurement result

Notice:

In tests where several sets of parameters can be the result, the table has an additional column in each set. Each of these columns has the comparison of actual values from each set with the actual values that have been indicated as basic values through the command *Next comparison* (table system menu (Chapt. 3.1.1)). The heads of the columns are $+A_i/A_j\%$ or $A_i/A_j\%$ where i is the set index and j – is the index of the set which is the basic one. The name depends on the selected way of comparison (relative or absolute).

2.1.1. Table configuration

Table is configured through the commands in its system menu. The menu is accessible after clicking the icon on the left of the title bar .

The menu has the following commands:

No.	Name	Description
1	Compare relatively Compare absolutely	Changes the way of comparing actual value to the basic one into relative or absolute
2	No.	Shows or hides a column ⇔ Fig. 2
3	Mean value	
4	Variation coefficient	
5	Standard deviation	
6	Actual	
7	Comparing actual	
8	Next comparison	Changes the column index to which actual values of each parameter sets are compared
9	Configure parameters	Chapt. 3.1.2
10	<i>Standard system commands</i>	Standard <i>Windows</i> commands, e.g. Move, Close, etc.

NOTICE: The set configuration is common for all tests. “Test comparison” for which a separate configuration exists, is an exception.

2.1.2. Parameter configuration

Parameter configuration, i.e. the selection of parameters which are to be placed in the table and the selection of their sequence is done through the dialogue box *Configure parameters* (⇔Fig. 3) which opens after the command of the same name as the one in the table system menu ((⇔ Chapt. 3.1.1).

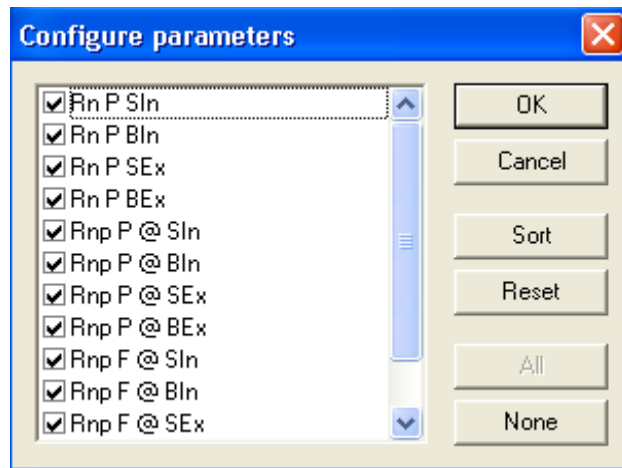


Fig. 3. Dialog box *Configure parameters*.

The box has the following elements:

1. **Parameter list:**

The list contains parameters necessary for the test. Fig. 3 shows parameters used in Posterior test.

2. **OK button:**

Serves for accepting the actual parameter selection.

3. **Cancel button:**

Serves for cancelling all modifications done since the dialogue box has been opened.

4. **Sort button:**

Sorts the contents of the *Parameter list* alphabetically.

5. **Reset button:**

Resets the initial parameter configuration, i.e. the one done by the manufacturer

6. **All button:**

Highlights all elements of the *Parameter list*.

7. **None button:**

Unmarks all elements of the *Parameter list*.

The parameter is marked and unmarked by click on a square which is on its left hand side on the list. The parameter position can be modified by dragging its name onto the required position. Dragging is done as follows: place the mouse cursor on the parameter the position of which you want to change, press the left mouse button, keep it pressed and move the cursor up or down. When you reach the required position, let the button go free.

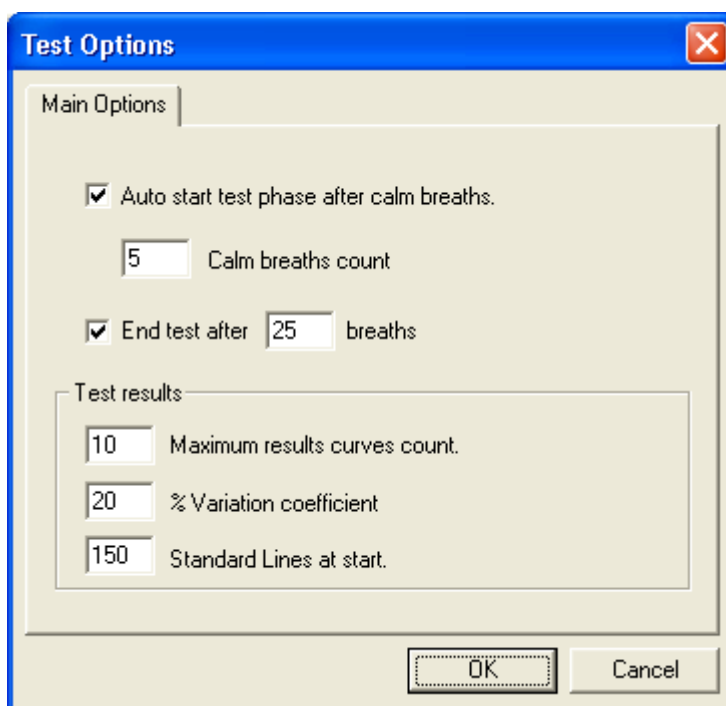
3. Posterior

3.1. Test parameters

Parameter name:	Unit:	Description:
Rn P SIn	kPa/l/s	inspiration nasal resistance by standard
Rn P BIn	kPa/l/s	inspiration nasal resistance by Broms'
Rn P SEx	kPa/l/s	expiration nasal resistance by standard
Rn P BEx	kPa/l/s	expiration nasal resistance by Broms'
Rnp P @ SIn	kPa	pressure when measuring the parametr <i>Rn P SIn</i>
Rnp P @ BIn	kPa	pressure when measuring the parametr <i>Rn P BIn</i>
Rnp P @ SEx	kPa	pressure when measuring the parametr <i>Rn P SEx</i>
Rnp P @ BEx	kPa	pressure when measuring the parametr <i>Rn P BEx</i>
Rnp F @ SIn	l/s	flow when measuring the parametr <i>Rn P SIn</i>
Rnp F @ BIn	l/s	flow when measuring the parametr <i>Rn P BIn</i>
Rnp F @ SEx	l/s	flow when measuring the parametr <i>Rn P SEx</i>
Rnp F @ BEx	l/s	flow when measuring the parametr <i>Rn P BEx</i>

3.2. Test options

Test options are accessible on the fold *General* (\Rightarrow Rys. 4) of the dialogue box *Test options* (\Rightarrow Chapt. 3, item 2).



Rys. 4. Dialogue box Test options – Anterior / Posterior.

The box contains the following elements:

1. Field *Switch automatically to test phase after quiet breaths*:

When we click on this option we have the possibility to give the number of quiet breaths after which the program will pass on to the proper test phase itself (curves are registered).

a) Number of quiet breaths

We state how many breaths there need to be during preparing to the proper phase. The range of possible values: 3 – 5.

2. Field *Finish test after doing [n] maneuvers*:

When we click on this option the program finishes the test itself after the specified number of maneuvers (breaths) and passes on to the test results review mode. If this option is not clicked on, we must finish the test ourselves by using the **Stop** button (green square).

3. Field *Maximum number of result curves*:

This is the number of curves which will be displayed on the result screen. The number is also the minimum number of maneuvers which have to be done in order to finish the test properly.

4. Field *[n]% Variation criterion*:

This and the next fields are used to determine the initial settings for the result filtration. On the base of this parameter, the original test result is set. The result can be changed by the repeated test analysis.

5. Field *Start Standard Zone*:


Like *Variation criterion* it is used to determine with which parameters the result should be generated.


3.2.1. Quiet breath phase during the test


The quiet breath phase is used to check whether the patient's breath is quiet and smooth. Breaths are evaluated in terms of stability on the base of the smoothness criterion (Chapt. 11.3) taking into consideration the options *Number* and *Non-smoothness* of the field *Quiet breaths*. Only when the patient's breath fulfills this criterion, it will be possible to pass on to the next test phase. This transition cannot disturb breath smoothness. If the smoothness is disturbed then it may be necessary to repeat the whole quiet breath phase.

During the whole quiet breath phase there is a message *Breathe quietly and smoothly* on the prompt bar. When the smoothness criterion is fulfilled, the prompt changes to another one which matches the activity the patient is supposed to do during the test. It does not mean, however, that the patient has to do the activity immediately. On the contrary, they can breath smoothly and the activities can be done after a while.

3.3. Test procedure

1. Select *Posterior* (menu *Test*).
2. Check test options (⇒see 4.2).
3. Start the test by selecting *Start test* (menu *Tools*).
4. Do the test following the phases:
 - a) **Quiet breaths.** (⇒Chapt. 4.2.1). When the breaths are smooth, the message *Posterior* will appear on the prompt bar. In case the field *Automatically switch on to after quiet breath phase* is not highlighted, the program will wait for the operator's decision. The button  will become active. Clicking on it will mean switching on to curve registration.
 - b) **Quiet breaths which are the result of the test.** During this test phase the patient breathes as before, quietly and smoothly so that the breaths are natural, not forced and close to each other. In the bottom right corner of the screen there is a counter which counts maneuvers (one inspiration and one expiration make one maneuver).
 - c) **Test finish.** When the set (in test options) minimum number of breaths is done it is the signal to finish the test. The test will finish automatically if the option 'Finish test after [n] breaths' has been

clicked on in test options. If not, then the button *Finish test*  will highlight itself and this will enable to finish the test and switch on to results review mode automatically.

- d) **Test continuation.** After finishing the test, while being in results review mode we may return to test mode and continue the test with the same patient. If we see that the results are not repeatable enough and we need more breaths then we return to test mode by clicking on the *Resume test*  button. The test can be resumed as many times as necessary.

3.4. Test results

The test result is a set of curves which fulfill the statistic criteria: *variation criterion* – which is preset in test options or, after the test, during **Repeated test analysis** (⇒ 3.4.1). The test is fully stored in memory. Each curve that has been generated during the test is saved to file and is a part of the result. Result criteria reduce the number of shown curves to those whose parameters fit into the preset variation criterion range. When there are more than 10 curves fulfilling the criteria, only 10 curves which are the closest to the mean value of the whole test are shown as the test result.

The graphic representation of the result has three graphs: flow in pressure function (known as Posterior graph), flow in time function and a table with test parameters (⇒ 3.1).

3.4.1. Repeated test analysis (F5)

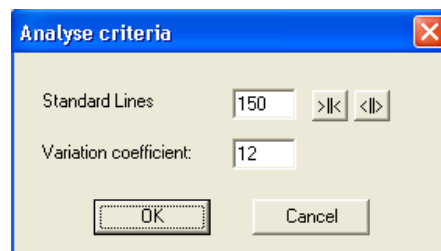


Fig. 5. Dialogue box *Test analysis criteria*

Repeated test analysis is used to generate the result once again. We can change two parameters: Standard Lines (Standard Zone) and variation criterion. Standard Lines are modified in jumps every 25 Pa within the range from 25 Pa to 300 Pa. Variation criterion varies with the jump every 1. The initial value of both parameters is preset in test options (⇒ Chapt. 4.2).

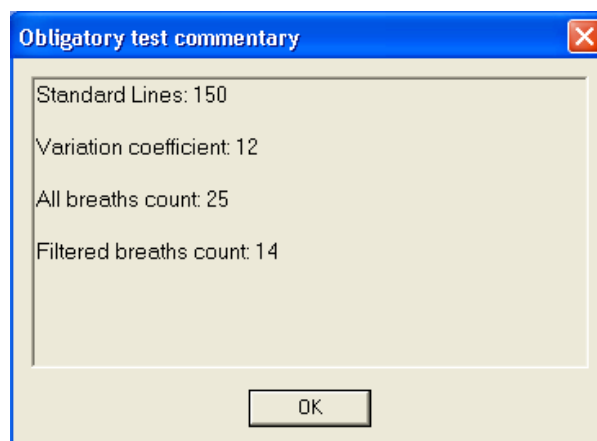


Fig. 6. Dialogue box *Obligatory test commentary*

After the repeated analysis has been done the report informing about the following is generated:

- Standard Zone for calculated parameters
- How many breaths are in the whole test
- How many breaths have fulfilled the variation criterion

The report is also found on the test printout.

3.4.2. Posterior test graphic representation

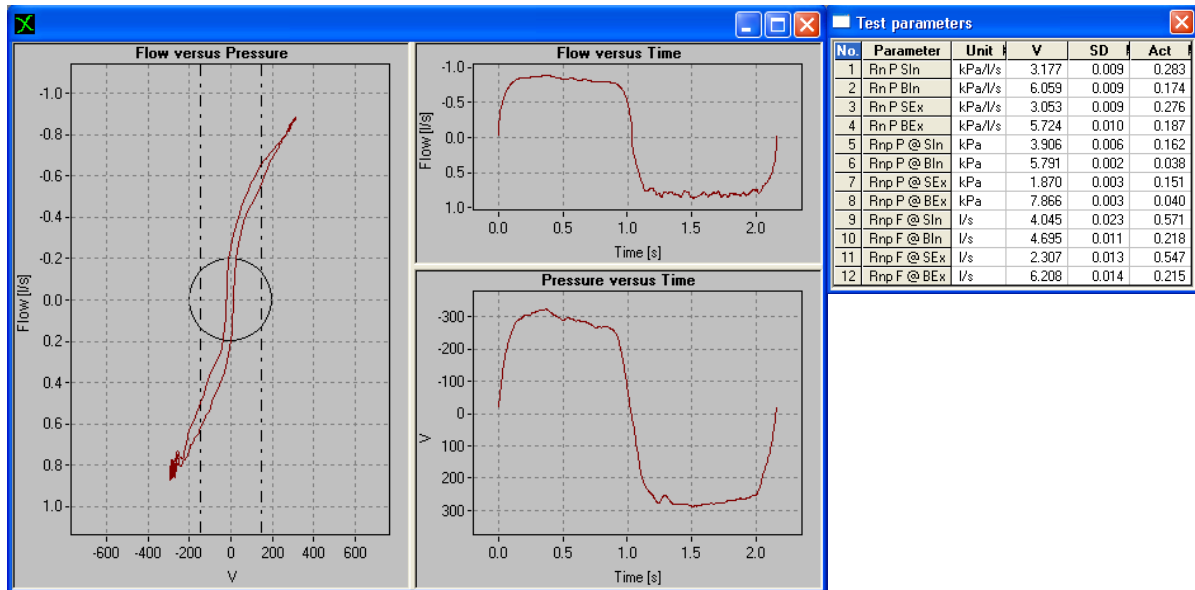


Fig. 7. Posterior test result.

4. Anterior

4.1. Test parameters




Parameter name:	Unit:	Description:
Rn RSIn	kPa/l/s	inspiration right nasal resistance by standard
Rn RBIn	kPa/l/s	inspiration right nasal resistance by Broms'
Rn RSEx	kPa/l/s	expiration right nasal resistance by standard
Rn RBEx	kPa/l/s	expiration right nasal resistance by Broms'
Rn LSIn	kPa/l/s	inspiration left nasal resistance by standard
Rn LBIn	kPa/l/s	inspiration left nasal resistance by Broms'
Rn LSEx	kPa/l/s	expiration left nasal resistance by standard
Rn LBEx	kPa/l/s	expiration left nasal resistance by Broms'
Rn SIn	kPa/l/s	inspiration total nasal resistance by standard
Rn BIn	kPa/l/s	inspiration total nasal resistance by Broms'
Rn SEx	kPa/l/s	expiration total nasal resistance by standard
Rn BEx	kPa/l/s	expiration total nasal resistance by Broms'
P@ RSIn	kPa	pressure when measuring the parametr <i>Rn RSIn</i>
P@ RBIn	kPa	pressure when measuring the parametr <i>Rn RBIn</i>
P@ RSEx	kPa	pressure when measuring the parametr <i>Rn RSEx</i>
P@ RBEx	kPa	pressure when measuring the parametr <i>Rn RBEx</i>
P@ LSIn	kPa	pressure when measuring the parametr <i>Rn LSIn</i>
P@ LBIn	kPa	pressure when measuring the parametr <i>Rn LBIn</i>
P@ LSEx	kPa	pressure when measuring the parametr <i>Rn LSEx</i>
P@ LBEx	kPa	pressure when measuring the parametr <i>Rn LBEx</i>
F@ RSIn	l/s	flow when measuring the parametr <i>Rn RSIn</i>
F@ RBIn	l/s	flow when measuring the parametr <i>Rn RBIn</i>
F@ RSEx	l/s	flow when measuring the parametr <i>Rn RSEx</i>
F@ RBEx	l/s	flow when measuring the parametr <i>Rn RBEx</i>
F@ LSIn	l/s	flow when measuring the parametr <i>Rn LSIn</i>
F@ LBIn	l/s	flow when measuring the parametr <i>Rn LBIn</i>
F@ LSEx	l/s	flow when measuring the parametr <i>Rn LSEx</i>
F@ LBEx	l/s	flow when measuring the parametr <i>Rn LBEx</i>

4.2. Test options

Test options are accessible on the fold *General* (⇒ 4.2) as common settings for *Posterior* and *Anterior* tests.

4.3. Test procedures

5. Select *Anterior* (menu *Test*)
6. Check test options (⇒ 4.2)
7. Start the test by clicking *Start test* (menu *Tools*)
8. Proceed with the test doing the following phases:
 - a) **Quiet breaths** (⇒ Chapt. 4.2.1). when breaths are smooth, the message *Anterior* will appear on the prompt bar. It means that the maneuvers are being recorded. If the field *Automatically switch on to after quiet breath phase* is not highlighted then the program will wait for the

- operator's decision to start the proper test. The button  will become active. Clicking on it will mean switching on to curve registration.
- Right Anterior.** During this test phase the patient breathes as before, quietly and smoothly so that the breaths are natural, not forced and close to each other. In this phase the olives are assigned as follows: the flow from the right nasal opening and the pressure from the left one. In the bottom right corner of the screen there is a counter which counts maneuvers (one inspiration and one expiration make one maneuver).
 - Left Anterior.** This is a second test phase when we change the assignment of the olives so that the flow is taken from the left nasal opening and the pressure from the right one.
 - Test finish.** When the set (in test options) minimum number of breaths is done it is the signal to finish the test. The test will finish automatically if the option 'Finish test after [n] breaths' has been clicked on in test options. If not, then the button *Finish test*  will highlight itself and this will enable to finish the test and switch on to results review mode automatically.
 - Test continuation.** After finishing the test, while being in results review mode we may return to test mode and continue the test with the same patient. If we see that the results are not repeatable enough and we need more breaths then we return to test mode by clicking on the *Resume test*  button. The test can be resumed as many times as necessary.

4.4. Test result

The test result is a set of curves which fulfill the statistic criteria: *variation criterion* – which is preset in test options or, after the test, during **Repeated test analysis** (⇒ 3.4.1). The test is fully stored in memory. Each curve that has been generated during the test is saved to file and is a part of the result. Result criteria reduce the number of shown curves to those whose parameters fit into the preset variation criterion range. When there are more than 10 curves fulfilling the criteria, only 10 curves which are the closest to the mean value of the whole test are shown as the test result.

The graphic representation of the result has three graphs: flow in pressure function (known as Posterior graph), flow in time function and a table with test parameters (⇒ 3.1).

4.4.1. Repeated test analysis (F5)

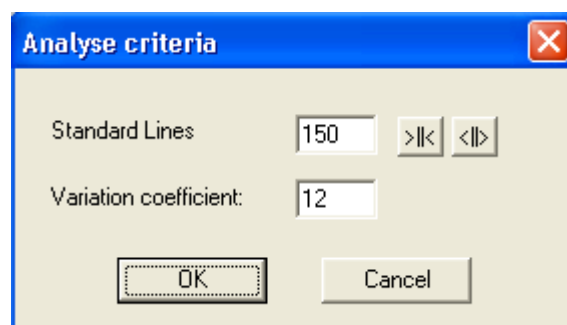


Fig. 8. Dialogue box *Test analysis criteria*

Repeated test analysis is used to generate the result once again. We can change two parameters: Standard Lines (Standard Zone) and variation criterion. Standard Lines are modified in jumps every 25 Pa within the range from 25 Pa to 300 Pa. Variation criterion varies with the jump every 1. The initial value of both parameters is preset in test options (⇒ 4.2).

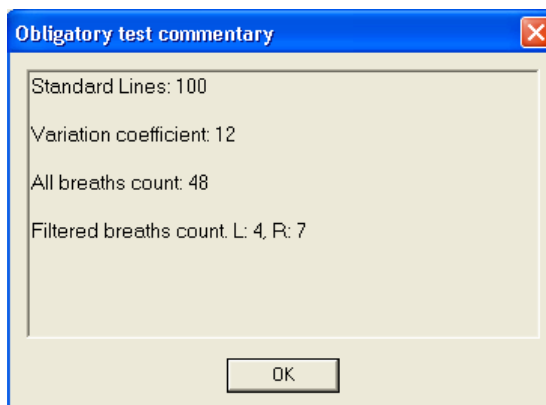


Fig. 9. Dialogue box *Test analysis criteria*

After the repeated analysis has been done the report informing about the following is generated:

- Standard Zone for calculated parameters
- How many breaths are in the whole test
- How many breaths have fulfilled the variation criterion

The report is also found on the test printout.

4.4.2. Anterior test graphic representation

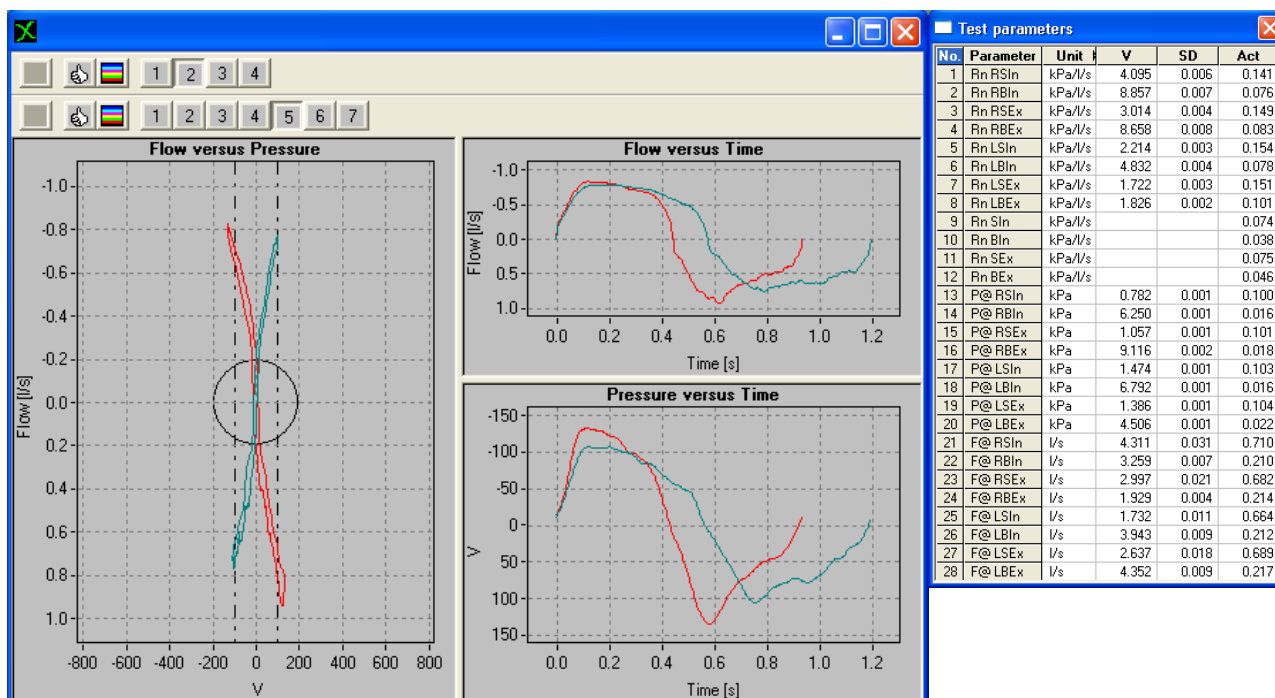


Fig. 10. Anterior test result.

5. Subordinate tests

Tests that are subordinate in relation to another test known as the main test, is the test which is done after it. Usually, the patient has received a medicine, the provoking agent or another substance. The main test is also called the *pre-* test, while the subordinate test – the *post* test. The main test can have many subordinate tests whereas the subordinate test can have only one main test. Each test that has no subordinate test is, by nature, the main test. The subordinate test can be done in relation to the test which is not itself subordinate in relation to another test.

How to do the subordinate test:

1. Open the test which is going to be the main one.
2. Select *Do subordinate test* (menu *Tools*).

6. Saving test results

6.1. Saving to data base

Saving the test result into the data base is done through *Save* (menu *Data base*). For tests in which the result is one curve and one parameter set, this curve and this set are saved. For tests in which the result can be many sets of curves and parameters, the actually active curve with the corresponding parameter set are saved. For tests in which it is possible to activate many curves at the same time, the first activated curve with the corresponding parameter set are saved. If in the flow-volume test, the envelope is activated, then it is saved in the data base together with the corresponding parameter set.

6.2. Saving to file

Saving the test result to file is done through *Save* and *Save as* (menu *File*). Each test is saved in a separate file. Each patient has their catalogue on the disk as '*C:\MES\Test results\Surname and Name Second Name, Date of Birth*'. In this catalogue there will be other catalogues whose names will correspond to the names of tests the patient has been given. As a standard, test results will be placed in these catalogues and the default name of each file will be the date and time of the test. It is advised to save the files under their default names since it will enable automatic recognition of the files during reviewing and comparing of the tests. Naturally, the test result can be saved under any name indicated by the user in any catalogue.

7. Test results review

RhinoTest application enables the review of tests which were earlier saved on the disk (⇒ Chapt. 5). The test can be opened through *Open* (menu *File*).

7.1. Patient's tests list

It is possible to load the list of all the tests for one currently selected patient (⇒ Chapt. 2). Only these tests which have been saved under standard names (⇒ Chapt. 6) are attached to the list. After loading, the tests can be reviewed using the *Test Manager* toolbar (⇒ Chapt. 13.3).

Loading test list can be done as follows:

1. Enter patient's data whose tests you want to load (⇒ Chapt. 2).
2. Select *Load tests* (menu *File*). Then, a list of tests belonging to the patient will be loaded and the list *Test type* in *Test Manager* will be pulled out (⇒ Fig. 11).

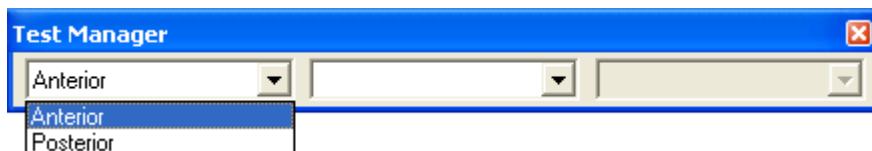


Fig. 11. *Test manager* with the pull-out list *Test type*

3. Select the item for the test you want to review on the list *Test type*. Then, the list *Main test date* (⇒ Fig. 12) will be pulled out. For main and subordinate tests see chapter 6.

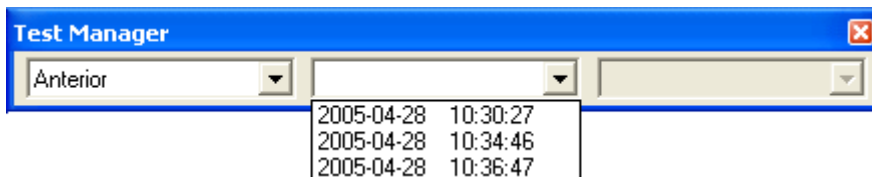


Fig. 12. *Test manager* with the pulled out list *Main test date*

4. On the list *Main test date* select the item with the date of the test you want to open. Then, the selected test will be loaded and shown on the screen.
5. To open another selected test, click on its date on *Test date* list. To change the test type, select its name on *Test type* list.
6. If the test opened in item 4 has its subordinate tests, after its opening the list *Subordinate test date* will be pulled out (⇒ Fig. 13).

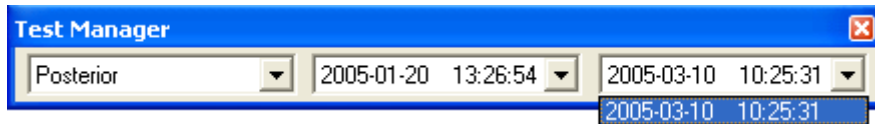


Fig. 13. Test manager with the pulled out list Subordinate test date

In order to review a subordinate test, select its date on the list *Subordinate test date*. To return to the main test, again select its date on the list *Main test date*.

7.2. Patient search

The program enables to search for a patient whose test is already in the catalogue *Mes/Test results*. Either select *Patient search* or click on the toolbar the button showing binoculars. The box as in Fig. 14 will appear.

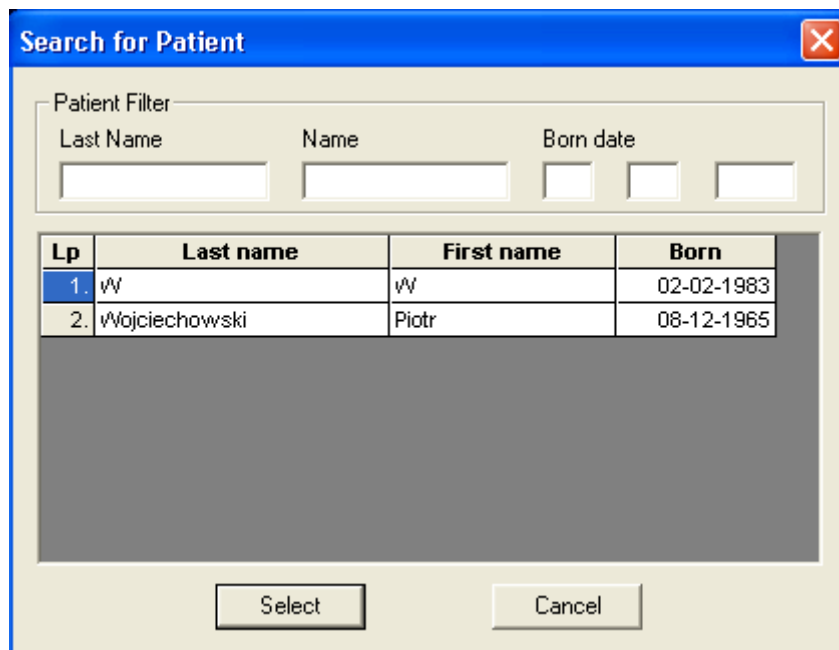


Fig. 14. Patient search.

Patients can be searched by name, surname and date of birth. By typing relevant criteria in the adequate field, the list of patients will change accordingly to the conditions. After selecting the patient we can use Test manager (⇒ Chapt. 8.1).

8. Test comparison

To compare the tests select *Compare* (menu *File*). It is done by calculating changes of the parameters of one test type (\Rightarrow Chapt. 3, item 1). Graphic presentation of these changes is also possible. Tests of the same type belonging to the same patient can be compared. The main test can be compared to other main ones or its subordinate tests. The subordinate test can be compared to its main one and/or other subordinate tests in relation to its main test. For main and subordinate tests see Chapter 6.

Test comparisons can be saved and printed like test results (\Rightarrow Chapt. 7 and 10).

How to compare tests:

1. Open one of the compared tests (\Rightarrow Chapt. 9). If we compare the main test to other main ones, then we open this test. If we compare the main test with its subordinates, then we open one of the subordinate tests.
2. Select *Compare* (menu *File*). The dialogue box *Compare tests* (\Rightarrow Fig. 15) appears on the screen. On the list *Test date* an item with the test date that was open in item 1 will be highlighted.
3. Highlight other test dates on the list and click *OK*. The, the test comparison will appear.
4. To add or delete tests form the comparison select *Compare tests* using the command *Compare* (menu *File*).

8.1. Selecting tests for comparison

Tests for comparison are selected using the dialogue box *Compare tests* using the command *Compare* (menu *File*).

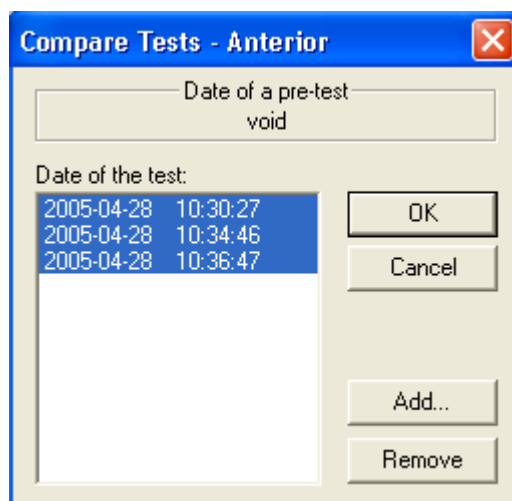


Fig. 15. Dialogue box *Compare tests*

The box includes the following elements:

1. Title bar:

Contains the inscription *Compare tests* and the type of the compared tests.

2. Field *Main test date*:

When we compare the main tests with its subordinate ones, the field shows the main test date. When we compare the main test with other main ones, this field is empty.

3. List Test date:

Shows test dates which were found automatically or added using *Add*.

4. OK button:

Accepts the selection of the test, closes the box and does the comparison.

5. Cancel button:

Cancels all modifications in the dialogue box and closes it.

6. Add button:

Adds tests to the list *Test date*. Only tests of the same type for the same patient can be added. Moreover, if we compare the main test with other main ones, we can add only main tests. But if we compare the main tests with its subordinates, we can add only tests that are subordinate in relation to the main one.

7. Delete button:

Deletes all tests highlighted on the list *Test date*.

NOTICE: The selection of parameters of the test which will appear in the comparison is done in the same way as the selection while saving to the data base (⇒ Chapt. 7.1).

8.2. Comparison result

The figure below shows an exemplary test comparison result (here: two Posterior tests). The result shows a graph comparing changes of selected parameters and a table presenting actual parameter values of the compared tests. It is also possible to include those table columns which contain the comparison of actual values (⇒ Chapt. 3.1.1).

When comparing Posterior and Anterior tests, the result shows also the graph of the flow in pressure function with the curves representing the compared tests.

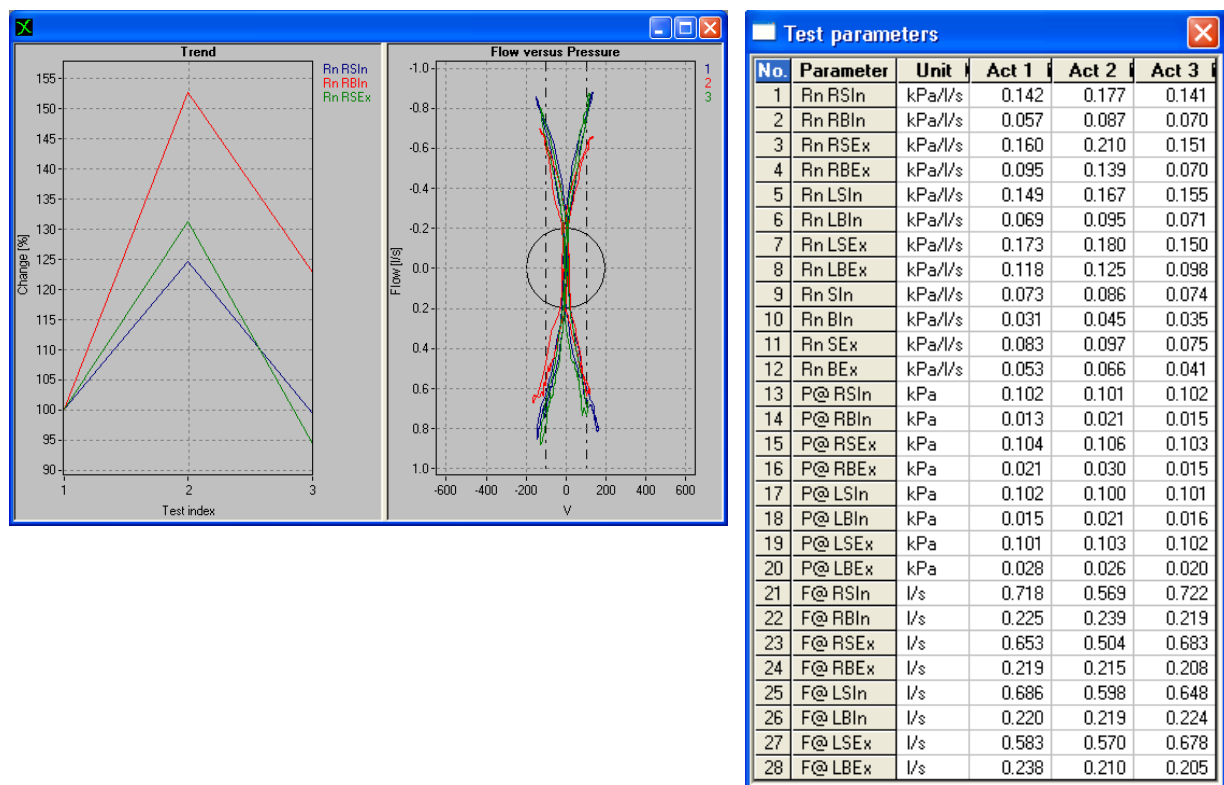


Fig. 16. An example of test comparison result

8.3. Selecting trend parameters

Trend parameters, i.e. these parameters whose change will be shown on the graph is done by clicking *Select parameters* in the graph **context menu**. The context menu can be accessed by clicking the right mouse button on the graph. Trend parameters are selected in the same way as table parameter (⇒ Chapt. 0).

9. Test result printout

The test result can be printed after the command *Print* (menu *File*). The print can be set using the commands *Print settings* and *Print configuration* (⇒ Fig. 17). The print preview (the way the print looks on the screen) can be seen after *View print*. These commands are to be found in menu *File*.

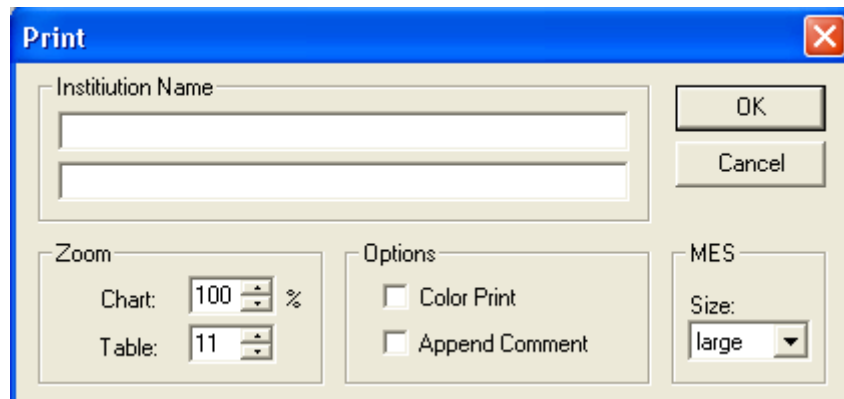


Fig. 17. Dialogue box *Print configuration*

The box contains the following elements:

1. **Field *Institution name*:**

Contains two Edit lines where you write the name of the NHS unit doing the tests. The name appears in the printout heading.

2. **Field *Zoom*:**

a) **Edit line *Graph*:**

Makes giving the zoom co-efficient of the printed graph possible. The coefficient is expressed in per cents.

b) **Edit line *Table*:**

Makes giving the zoom coefficient of the table possible. The coefficient is a multiplier.

3. **Field *Options*:**

a) **Option *Color Print*:**

Selecting this option means a color printout. Naturally, only when the system has a color printer.

b) **Option *Attach comment*:**

Selecting this option means attaching a commentary to the printout. The commentary is edited in *Comment editor* (menu *Tools*).

4. **Field *MES***

a) **Selection list *Size*:**

Makes the setting the size of the bitmap MES, which appears in the page heading, possible.

5. ***OK* button:**

Accepts all changes done.

6. ***Cancel* button:**

Cancels all changes done.

10. Flow measurement calibration

Rhinomanometer calibration is done using the dialogue box *Volume calibration* (\Rightarrow Fig. 18) which is accessed after selecting *Calibrate rhinomanometer* (menu *Tools*). Calibration consists of several maneuvers with the calibration pump of several liter volume. As a result, two calibration coefficients are obtained: *EX* – for expirations and *IN* – for inspirations. They are calculated as the quotient of the assumed pump volume and the actual pump volume which has been read by the measuring system.

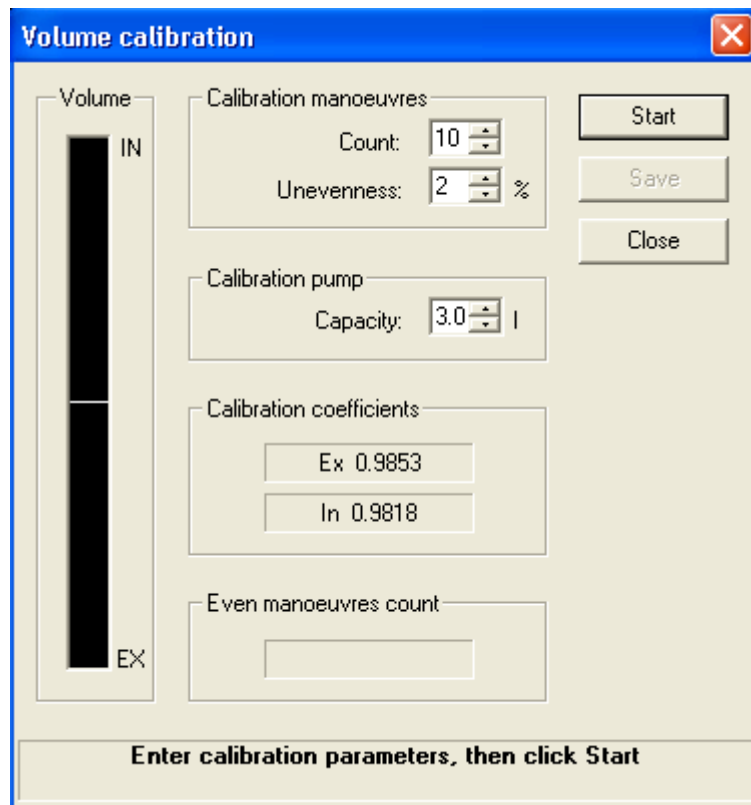


Fig. 18. Dialogue box *Volume calibration*

The box has the following elements:

1. Field *Calibration maneuvers*:

a) Edit line *Number* :

In this line, the number of successive maneuvers which will be done with the calibration pump during calibration, keeping the assumed *Non-uniformity*, should be given (\Rightarrow Chapt. 11.3).

b) Edit line *Non-uniformity*:

In this line, the maximum deviation of individual maneuvers from their standard in order to regard them as correct, should be given.

2. Field *Calibration pump*:

a) Edit line *Volume*:

In this line the volume of the pump which is going to do calibration should be given.

3. Field *Calibration coefficients*:

a) Field *EX*:

Contains the calibration coefficient for expirations.

b) Field *IN*:

Contains the calibration coefficient for inspirations.

4. Field *Number of uniform maneuvers*:

During calibration this field shows the number of maneuvers done so far which fulfill the uniformity criterion (\Rightarrow Chapt. 11.3) and have been assumed as correct.

5. Prompt field:

This field shows prompts instructions for the person doing calibration.

6. Field *Volume*:

This field shows the volume in the form of a column diagram.

7. *Start* button:

Begins calibration.

8. *Stop* button:

Stops calibration.

9. *Save* button:

Saves calibration results. Accessible only after calibration has been finished.

10. *Close* button:

Closes the dialogue box. If, after the calibration, the box is closed without clicking *Save*, then the calibration result is lost.

10.1. Preparation for calibration

Check the connection of the pneumotachograph head made with flexible cables. During calibration, the should be fastened directly to the calibration pump outlet.

10.2. Calibration procedure

1. Open dialogue box *Volume calibration* by selecting *Calibrate rhinomanometer* (menu *Tools*).
2. Fill in fields *Calibration maneuvers* and *Calibration pump* and click *Start*.
3. Move the calibration pump quietly and smoothly. Calibration is finished automatically when the number of required maneuvers fulfilling uniformity criterion have been reached (\Rightarrow Chapt. 11.3).
4. Click *Save* to save calibration results.

10.3. Uniformity criterion of successive breaths

There are two parameters used in the uniformity criterion:

1. N - number of successive breaths
2. Δ - acceptable non-uniformity

N of successive breaths is regarded as uniform if the deviation of no inspiration from the mean calculated of all inspirations and the deviation of no expiration from the mean calculated of all expiration do not exceed the acceptable non-uniformity Δ .

Example: $N = 5$ successive inspirations: 1.0, 0.8, 1.1, 1.2, 0.9 [1]. The mean = 1.0

- a) For $\Delta = 10\%$, i.e. 0.1 the criterion is not fulfilled because the deviation of the second and fourth inspiration from the mean is 0.2 and exceeds 10%.
- b) For $\Delta = 20\%$, i.e. 0.2 the criterion is fulfilled because the deviation of no inspiration exceeds 20%.

11. Menu commands

11.1. Menu *File*:

<i>New patient</i>	⇒ Chapt. 2.1
<i>Edit patient data</i>	⇒ Chapt. 1.5
<i>Patient from file</i>	Selects patient from the file
<i>Search patient</i>	⇒ Chapt. 8.2
<i>Open</i>	⇒ Chapt. 8
<i>Close</i>	Closes active document
<i>Save</i>	⇒ Chapt. 5
<i>Save as</i>	Sends test result using e-mail. Can be done when there is an e-mail program
<i>Load tests</i>	⇒ Chapt. 8
<i>Compare</i>	⇒ Chapt. 9
<i>Send e-mail</i>	Send results by e-mail
<i>Print</i>	⇒ Chapt. 10
<i>Print preview</i>	⇒ Chapt. 10
<i>Print settings</i>	⇒ Chapt. 10
<i>Print configure</i>	⇒ Chapt. 10
<i>[Recently opened files]</i>	List of recently opened files
<i>Quit</i>	Finishes work with application

11.2. Menu *Data base*:

<i>Select patient</i>	⇒ Chapt. 2.2
<i>Save</i>	⇒ Chapt. 7.1
<i>Save and Open</i>	⇒ Chapt. 7.1 (saves and opens the data base)
<i>Load tests</i>	Not possible in this program version

11.3. Menu *View*:

<i>Tool bars</i>	Shows or hides the toolbar indicated in the menu
<i>Status line</i>	Shows or hides status line (⇒Chapt. 13.6).
<i>Box background</i>	Changes the color of the box background into the one indicated in the menu
<i>Tabela</i>	Shows or hides the table with test parameters (⇒Chapt. 3.1).

11.4. Menu *Test*:

<i>Anterior</i>	Begins <i>Anterior</i> test
<i>Posterior</i>	Begins <i>Posterior</i> test
<i>Confirm maneuver</i>	Confirms start of the maneuver

<i>Break</i>	Stops or resumes test procedure
<i>Next phase</i>	Start next test phase
<i>Stop test</i>	Stops the test. If the minimum number of measurements have been done the test finished

11.5. Menu Tools:

<i>Start test</i>	Starts test procedure
<i>Do subordinate test</i>	⇒ Chapt. 6
<i>Test options</i>	⇒ Chapt. 3
<i>Atmospheric conditions</i>	Shows dialogue box for giving atmospheric conditions
<i>Comment editor</i>	Shows dialogue box for writing comments on the test
<i>Clear rhinomanometer</i>	Clears rhinomanometer
<i>Calibrate rhinomanometer</i>	⇒ Chapt. 11
<i>Select connection</i>	Shows dialogue box which makes giving the connection type of the computer to the rhinomanometer possible

11.6. Menu Window:

<i>Cascade</i>	Cascades boxes within the main application Window
<i>Tile H</i>	Tiles boxes horizontally so that they do not cover each other
<i>Tile V</i>	Tiles boxes vertically so that they do not cover each other
<i>Tile icons</i>	Tiles minimized boxes by the lower application edge

11.7. Menu Help:

<i>Index</i>	Starts <i>RhinoTest</i> help
<i>About the program</i>	Gives information about the program: version no, copyright, etc.

12. Toolbars






Toolbars mostly repeat menu commands. Thanks to their structure they enable a quicker access to commands. The user can place toolbars at any edge of the application main window as well as any place of that window.

12.1. Standard



Fig. 19. Toolbar – Standard

The toolbar has following buttons:

	menu <i>File</i> , command <i>New patient</i>	⇒ Chapt. 2.1
	menu <i>File</i> , command <i>Edit patient's data</i>	⇒ Chapt. 2.3 , 2.4
	menu <i>File</i> , command <i>Open</i>	Opens the file with test result
	menu <i>File</i> , command <i>Save</i>	⇒ Chapt. 5
	menu <i>File</i> , command <i>Print</i>	⇒ Chapt. 10
	menu <i>File</i> , command <i>Print preview</i>	⇒ Chapt. 10
	menu <i>Data base</i> , command <i>Select patient</i>	⇒ Chapt. 2.2
	menu <i>Data base</i> , command <i>Save</i>	⇒ Chapt. 7.1
	menu <i>Data base</i> , command <i>Load test</i>	Not possible in this program version
	menu <i>View</i> , command <i>Table</i>	Shows or hides the table with test parameters
	menu <i>Tools</i> , command <i>Start test</i>	⇒ Chapt. <i>Test procedure</i>
	menu <i>Tools</i> , command <i>Resume test</i>	
	menu <i>Tools</i> , command <i>Stop test</i>	⇒ Chapt. 11.4
	menu <i>Tools</i> , command <i>Quit test</i>	
	menu <i>Tools</i> , command <i>Confirm maneuver</i>	⇒ Chapt. 11.4
	menu <i>Tools</i> , command <i>Break</i>	⇒ Chapt. 11.4
	menu <i>Tools</i> , command <i>Next phase</i>	⇒ Chapt. 11.4
	Command <i>Move to zero</i>	Moves graph to the zero of the coordinate system
	menu <i>Tools</i> , polecenie <i>Clear rhinomanometer</i>	Clears rhinomanometer
	menu <i>Help</i> , polecenie <i>About the program</i>	Gives information about the program: version no, copyright, etc.
	menu <i>Help</i> , polecenie <i>Context help</i>	Not possible in this program version

12.2. Tests

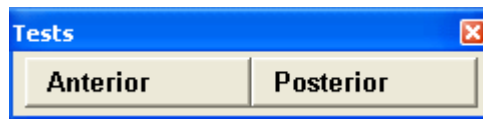


Fig. 20. Toolbar- Tests

The toolbar *Tests* has buttons repeating the commands of the menu *Test* which prepare the application for a given test procedure

12.3. Test manager

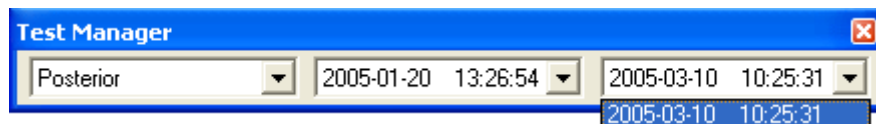


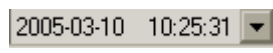


Fig. 21. Toolbar – Test manager

The toolbar has three fold-out lists:

-  *Test type* – the list has test types of the currently selected patient . ⇒ Chapt. 8
-  *Main test date* – the list has dates and times of main tests of the ⇒ Chapt. 8.6
type selected from the list *Test type*.
-  *Subordinate test date* – the list has dates and times of tests which ⇒ Chapt. 8.6
are subordinate to the one selected from the list *Main test date*.

12.4. Curve selection

The toolbar *Curve selection* is used in tests in which the result can have several curves. Commands in this toolbar are used to manipulate curves.

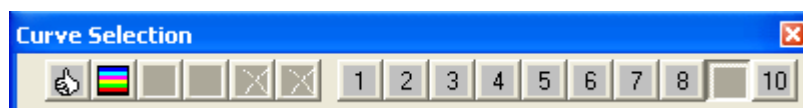









Fig. 22. Toolbar – Curve selection

The toolbar has following buttons:

	Command <i>Best</i>	Selects the best curve
	Command <i>Activate all</i>	Activates all curves
	Command <i>Disactivate all</i>	Disactivates all curves
	Command <i>Envelope</i>	Creates envelopes for activated curves
	Command <i>Delete deactivated</i>	Deletes deactivated curves
	Command <i>Change curve</i>	Changes the curve of a given color
	Command <i>Change curve</i>	Activates the curve of a given number, disactivating others

12.5. Prompt bar

The prompt bar is located by the bottom edge of the main application window, above the status line (⇒ Chapt. 13.6). Its location cannot be changed. During the test, the bar shows information about the activities the patient should presently do.

A counter of sample measurements is located on the right of the bar. It shows the number of the correctly done and accepted measurements of a given type. For example, the counter shows that spirometry is being done and two correct measurements have been done so far.

By the measurement counter, there is a field informing about the accessibility of the command *Confirm maneuver*. When *Enter* is seen in this field it means that this command is accessible and the start of the maneuver requires its confirmation. This maneuver can be confirmed either by selecting the command *Confirm maneuver* or pressing *Enter* key. For maneuvers which require their confirmation read chapters *Test procedure* about each test.

12.6. Status line

The status line is located by the bottom edge of the main application window. Its location cannot be changed, however the line can be hidden through the command *Status line* (menu *View*).

The status line shows explanations of menu commands and elements which are found on toolbars. In order to see the explanation, place the mouse cursor on the element.

During the test the status line shows also information about errors which do not require stopping the test. For example, if, in the flow-volume test the option *Min. expiration time* at 4 seconds and the patient's expiration lasts only 3 seconds, then, the measurement will be rejected and the status line will show the message 'expiration too short'.

On the right of the status line there are three fields informing about the keys *CapsLock*, *NumLock* and *ScrollLock*

13. Disinfection and Maintenance

13.1. Operational guidelines

14.1.1. Disinfection and sterilisation

WARNING!!!

Washing, disinfection and sterilisation of measuring accessories attached for the time of measurement can be done only after disconnecting them from the device. A mask must be disconnected from a rhinomanometer's coupler and a pneumotachographic head.

a/ After a test, place a head, reusable mask, reusable coupler for rhinomanometry mask, tips, nasal olive hard and soft in a container with albumin removing liquid used for washing surgical instruments for time recommended by a manufacturer of disinfection liquids. Then rinse headpiece and mask with distilled water and dry with stream of warm air or rinse with ethyl alcohol and leave until alcohol evaporates.

b/ Pneumotach headpieces must be clean, dry, and free of foreign bodies. After each test, clean a headpiece carefully, remove all foreign bodies and dirt with a soft brush.

Note. When you finish washing and sterilizing always check whether air ducts of the headpiece do not contain any liquid. Air ducts of the headpiece used for testing must be dry!!

Pneumotach headpieces may be sterilized with gas, steam, autoclaved in temperature not exceeding 121 °C (duration 15 min.), by ultrasound, by radiation, or sterilising fluids available on the market. or in liquids available on the market..

Every day you must check:

- whether air ducts are permeable
- condition of pneumotach headpieces

c/ Reusable mask, reusable coupler for rhinomanometry mask, tips, nasal olive hard may be sterilized with gas, steam, autoclaved in temperature not exceeding 121 °C(during 15 min)., by ultrasound, by radiation or sterilising in liquids available on the market.

d/ Nasal olive soft may be sterilized with gas or in liquids available on the market.

Sterilised accessories should be separated from accessories infected during the test. Sterile accessories should be stored in distinctly marked packings or containers eliminating danger of using not sterile accessories for tests.

14.1.2 Maintenance

Casing should be washed with a damp sponge or soft cloth. You may use soap or mild cleaning agents not containing organic solvents.

Note! Do not flood the unit with liquid.

14.2. Check out and calibration of rhinomanometer

The Rhinotest 1000 rhinomanometer does not require daily calibration. In exceptional cases, the “Calibration” function may be used to check measured values of volume, and correct them if necessary.



The user, when calibrating the device, accepts responsibility for calibration results and must be prepared for measurement errors, if the calibration is not precise enough. The manufacturer does not recommend that calibrations of the spirometer be completed outside the service network of the manufacturer.

The manufacturer recommends that calibration of the rhinomanometer be completed once a year by the manufacturer’s service. Each calibration of the rhinomanometer is confirmed by a calibration certificate.