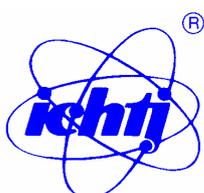


AIRBORNE DUST MONITOR AMIZ – 2007

COMPUTER PROGRAM OPERATION MANUAL



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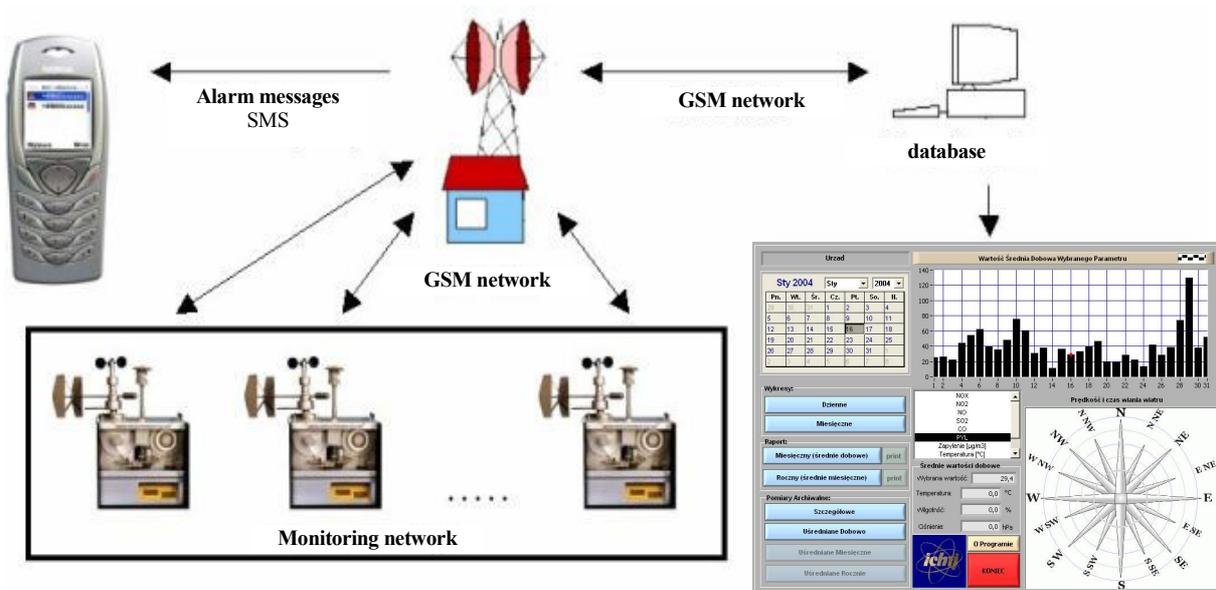
1. INTRODUCTION

Dust monitor AMIZ-2007 is designed for automatic measurement of airborne dust concentration in ambient air. The dust monitor can operate as an independent individual monitor of dust, or as one of series monitors connected in monitoring network, using GSM mobile phone system. Principle of operation of the monitor is based on determination of dust deposited on air filter from known volume of air sample. Mass of deposited dust is determined by attenuation of beta radiation from PM-147 beta source. Additionally ambient air pressure, relative humidity and temperature are measured.

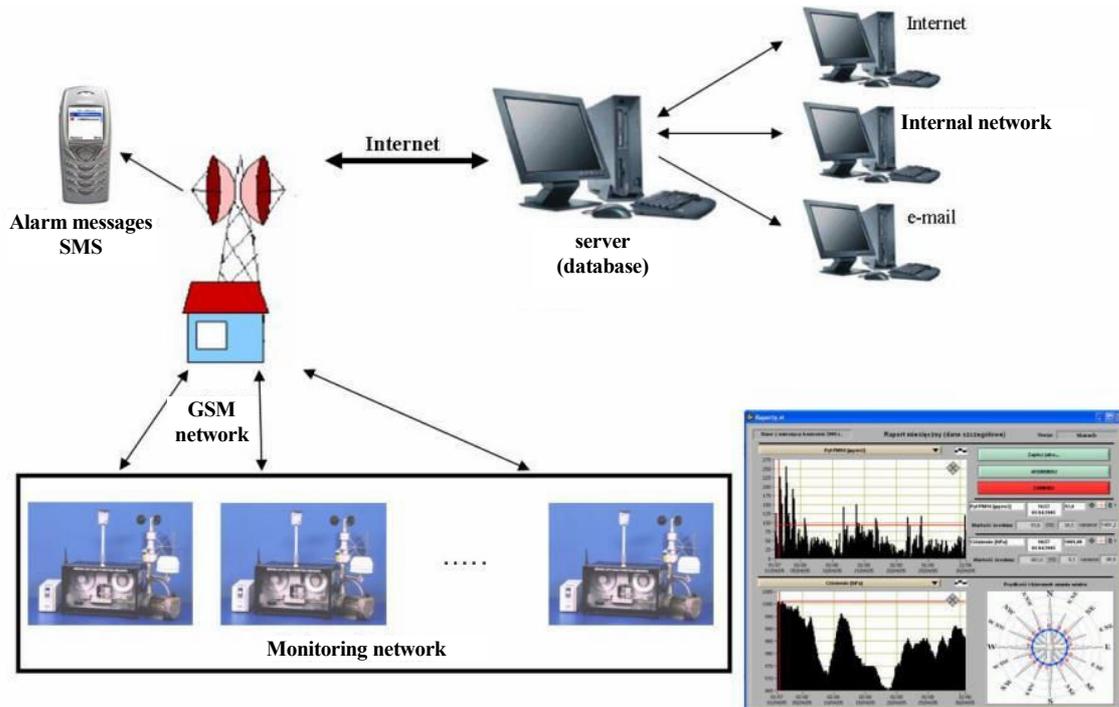
Monitoring network operates under control of computer program that is installed in the computer at the environmental control center. Data transmission and communication with the dust monitor (measuring station) is carried out in two monitoring network configuration:

- GSM communication network
- Internet communication network

Functional diagrams of both types of network are shown below.



Functional diagram of GSM communication network for dust concentration monitor AMIZ-2007G



Functional diagram of internet communication network for dust concentration monitor AMIZ-2007I

The same dust monitor AMIZ-2007 is used in both configuration (GSM or internet), but the computer programs are different. The AMIZ-2007 dust monitor can even be used without wireless communication with an external computer. In such a case a laptop can be used for readout of measuring results from the monitor, serial port or a printer.

In chapters 2 ... 8 description is given of the program AMIZ-2007G for GSM communication between the central computer and dust monitors (measuring stations). In chapter 9 the description of program AMIZ-2007I is given for internet communication between the central computer and the measuring stations. The information how to install the programs and other common features of both the programs is also given in chapters 2 ... 8.

2. INSTALLATION AND REMOVAL OF COMPUTER PROGRAM

2.1. Program installation

To install the computer program, put in the CD attached to the monitor into CD drive, and select the installation program by clicking the "setup.exe" file

- 1) After the installation program is initiated, a dialog window is displayed allowing for selection of a directory in which the program is to be installed (Fig. 1 key Change – the default directory is "C:\Amiz_2007")
To start installation click the button "Finish". To interrupt the installation click the button "Cancel" – the program is not installed

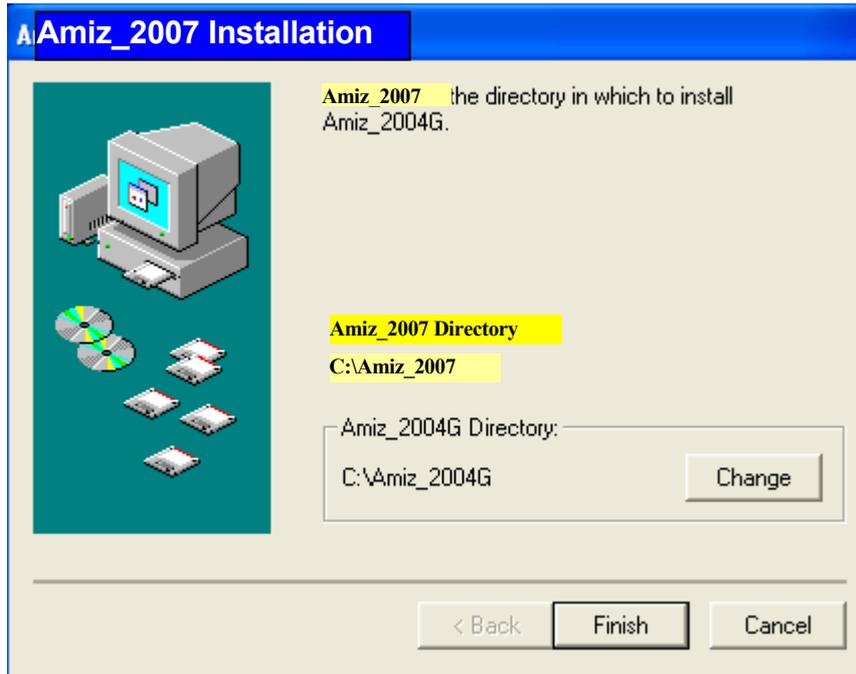


Fig. 1. Dialog box for selection of the directory in which the program is to be installed

- 2) After the program is installed the user is asked if the environment (LabVIEW Run-Time Engine) should be installed in which the application will operate. In case the application is installed for the first time, the (LabVIEW Run-Time Engine) environment should be installed (see Fig. 2), if not installed, the program AMIZ_2007 will not work. To install this program, the button “Next” should be clicked in each appearing window, and in the last window the button “Finish” should be clicked.



Fig. 2. Dialog box starting installation of operation environment for AMIZ-2007

If the environment is already installed (e.g. during an earlier installation of the program), installation of the environment can be skipped - click the button “Cancel” when dialog box shown in Fig. 3 is displayed. The environment can eventually be refreshed by clicking the

button “Modify” or “Repair” then the button “Next”. Selection of “Remove” button deletes the program from from the disk (initiation of the program is impossible). The modification procedure (reinstallation) of LabVIEW Run-Time Engine runs exactly in the same manner as its first installation. After installation the program is ready for use.

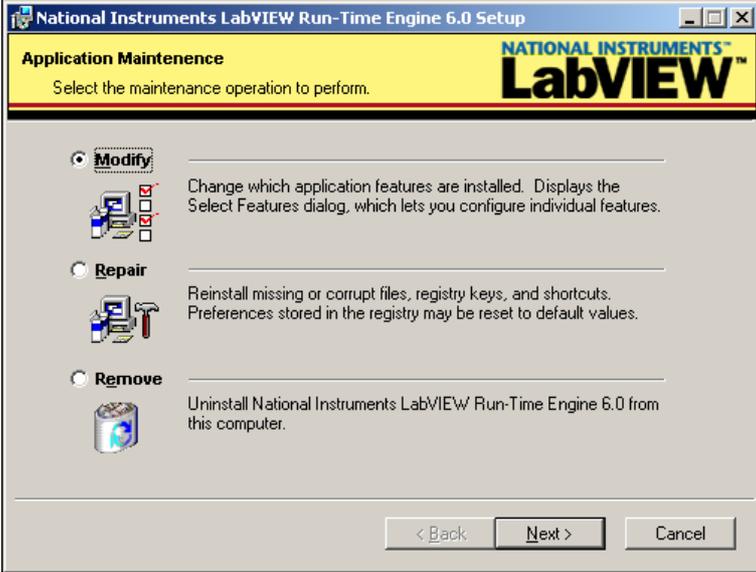


Fig. 3. Skipping the installation of LabVIEW Run-Time Engine environment

2.2 Program removal

To remove the program from computer disk, select in the Start Menu of the computer:: Start→ Settings→Control panel →Add/remove programs a dialog box shown in Fig. 4 is displayed;

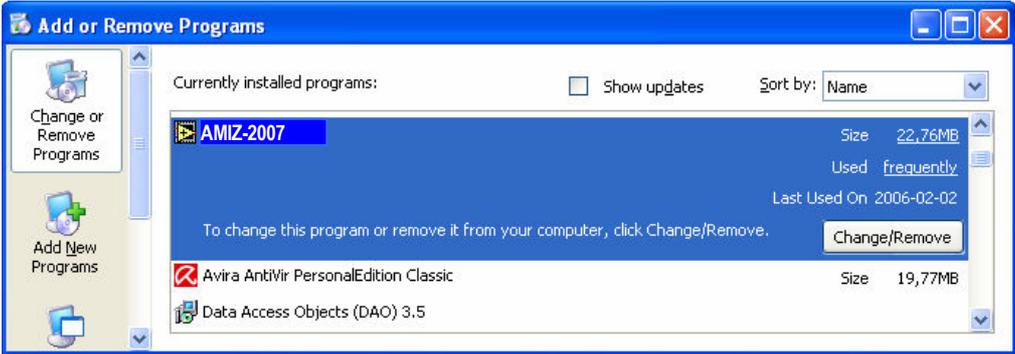


Fig. 4. . Dialog box view of ”add/remove application in Windows 2000.

Mark in the dialog box the application “Cd_2” and click the button that will appear at the right of the program name. In the same manner the NI LabVIEW Run-Time Engine 6.0 should be removed.

3. FIRST START OF THE PROGRAM

Before start of the program, modem should be connected to a free serial port of the computer. To start the program, select from the Start menu of the computer successively: Start →

Programs→ Amiz-2007. Dialog box shown in Fig. 5 is displayed. In case of the first start of the program the user is informed that here is no configuration file, and a serial port error exists. Ignore this message. Configuration file will be created later.

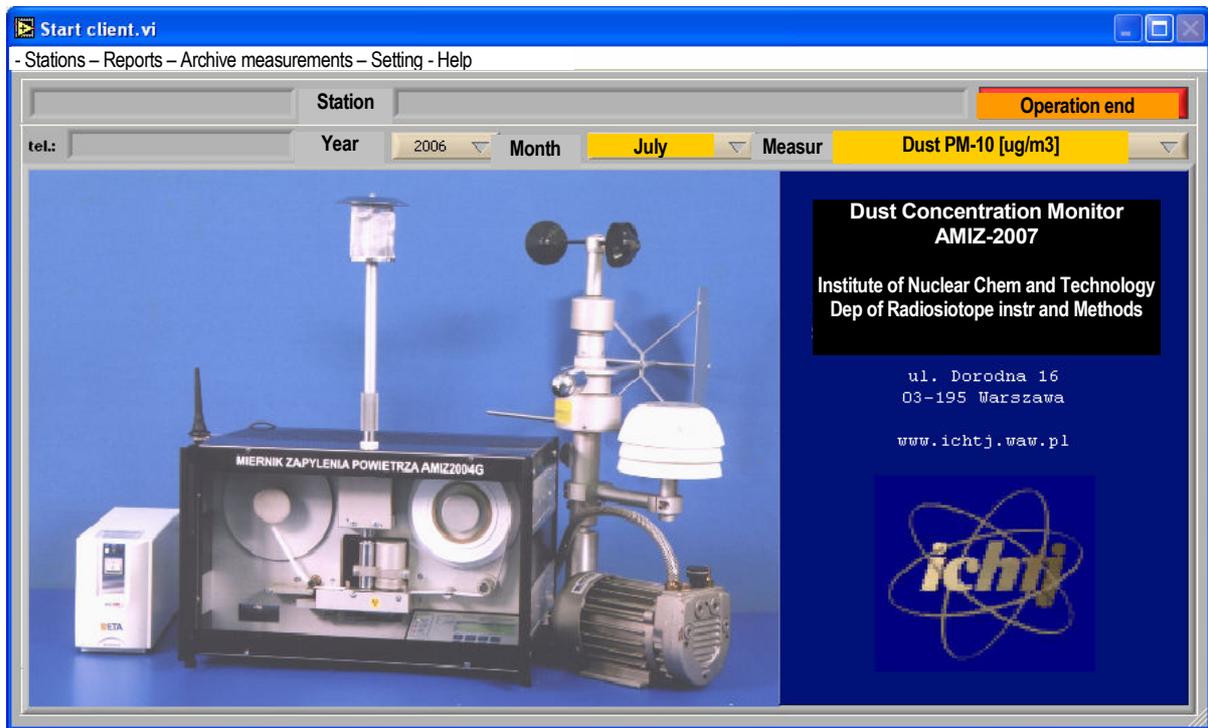


Fig. 5. Main window of the program

3.1. Serial port setting

To set parameters of the serial port (modem is connected to the serial port) select from the main menu, Fig. 5, “Setting”, see Fig. 6.

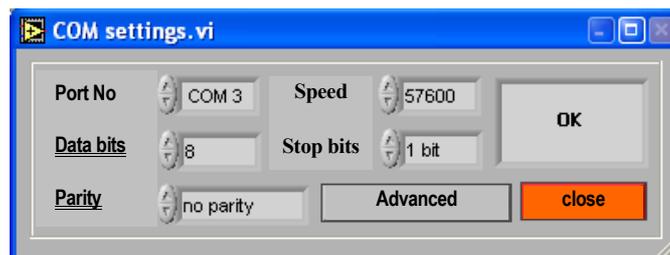


Fig. 6. Dialog box for setting serial port

Number of serial port to which modem is connected should be selected in this window. The remaining parameters should be set as below:

Speed	57600
Data bits	8
Stop Bits	1
Parity	No parity

After setting the parameters a button “OK.” appears, as indicated in Fig 6.

3.2. Add new station

To add a new station to the list of stations operating in the network, click in the main menu, Fig. 5, the button “Station” and then “Add station”. A new dialog box is displayed allowing for adding a new station, see Fig. 7 (example)

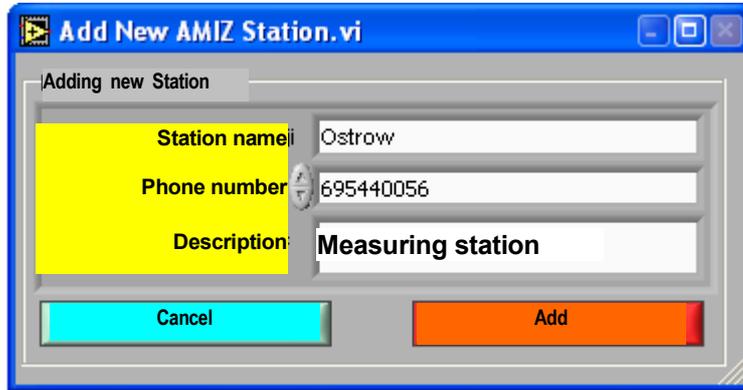


Fig. 7. Dialog box for adding new station

Number of the new station, number of phone modem, that is installed in AMIZ-2007 monitor, and short description of the station should be introduced with the dialog box. This operation should be repeated for all the stations operating in the dust monitoring network.

Attention. After the procedures of adding the stations are finished, exit from the program and then call the program again

4. Program setting

To set program parameters, click in the main menu, Fig. 5, the button “Settings”. Dialog box is displayed with accessible setting functions. From that menu changes and settings can be made of serial port, modem, and of operation directory of the program. The telephone book (list) located in modem can be controlled, SMS can be reviewed and sent .

4.1. Serial port settings

To set parameters of the serial port select from the main menu, Fig. 5, “Setting” then “Serial port” . A dialog box is displayed allowing for configuration of serial port, see Fig. 8.

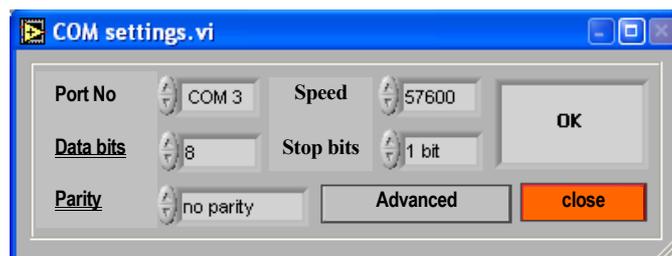


Fig. 8. Dialog box for setting serial port

Number of serial port to which modem is connected should be selected in this window. The remaining parameters should be set as below:

Speed	57600
Data bits	8
Stop Bits	1
Parity	No parity

After setting the parameters a button “OK.” appears, as indicated in Fig 8.

4.2 Setting of modem

Starting from main menu, Fig. 5, choose successive options: Settings→ modem settings → insert PIN No. Dialog box shown in Fig. 9 is displayed allowing to enter PIN number of SIM card located in the modem

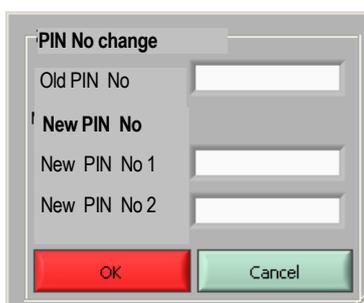


Fig. 9 Dialog box

4.3. Default operation directory of the program

Starting from main menu, Fig. 5, click successively Settings→ directory path. Dialog box is displayed allowing to enter the access path to the directory. It is the default directory in which are stored reports generated in WWW



Fig.10. Dialog box for changing the access path of the default directory

4.4. SMS messages

To be able to read out the alarm messages sent from the air dust concentration monitors AMIZ-2007 click the following buttons starting from the main menu, Fig. 5: Settings→ SMS messages. A dialog box is displayed, see Fig. 11

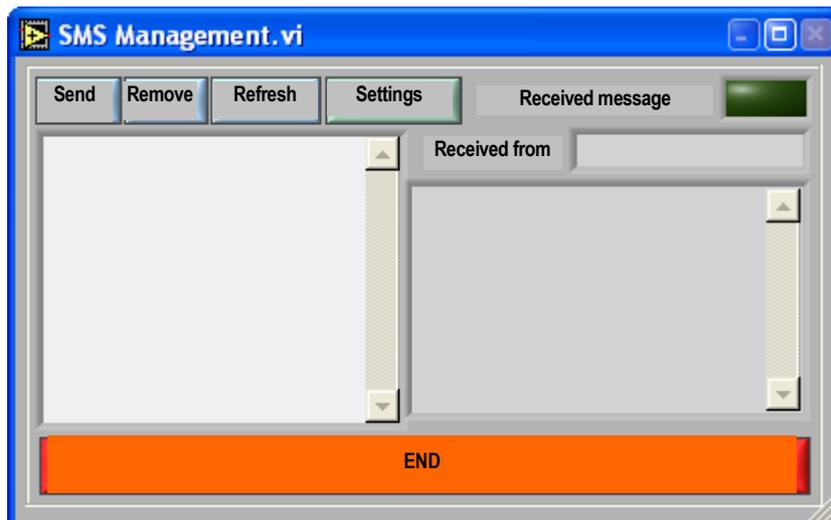


Fig. 11. Dialog box for read out SMS messages

The user has the following possibilities:

- 1) To review of received alarm messages and SMS messages
- 2) To send SMS messages to any phone number – the option: “send” serves this purpose. Dialog box will then appear asking for the phone number and contents of the message to be sent
- 3) To remove the received messages – option “Remove”
- 4) To change service phone number
- 5) To refresh read out messages – to check if in the mean time no new alarm messages arrived

4.5. Telephone book

The user has the possibility to use telephone book located at SIM card in the modem. To add or to change the phone numbers in the phone book select, starting from the main menu, Fig. 5, the following options: Settings→ Phone book. A dialog box is displayed showed in Fig. 12.

The user has the following possibilities:

- 1) To select the phone book
- 2) To import a book from a file (in cvs format) – option “Import”
- 3) To write selected phone book to a file – option “Export”
- 4) To actualize a selected phone book after changes were introduced

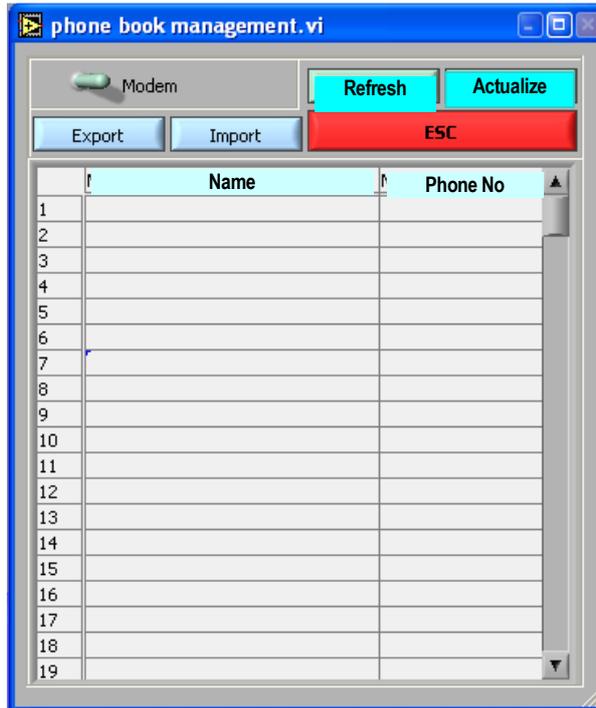


Fig. 12. Dialog box of phone book

5. CONNECTION WITH MEASURING STATION

5.1. Data read out from AMIZ-2007

To get data from selected measuring station select starting from the main menu Fig. 5, the following options: Stations → Station name → Get data. The user is then asked if he wants to be connected with the selected station. After it is confirmed, computer program starts connection with the selected monitor AMIZ. After connection with the monitor is made, the user is informed how many data are stored in the memory of the monitor, and he is also asked if the data should be taken. When the data collecting is finished, they are presented in form of a diagram in the window of main menu

5.2. Read out and replacement of operation parameters of AMIZ-2007

After the options are selected, starting from main menu, Fig. 5,: Stations → Station name → Monitor parameters a dialog box is displayed shown in Fig. 13

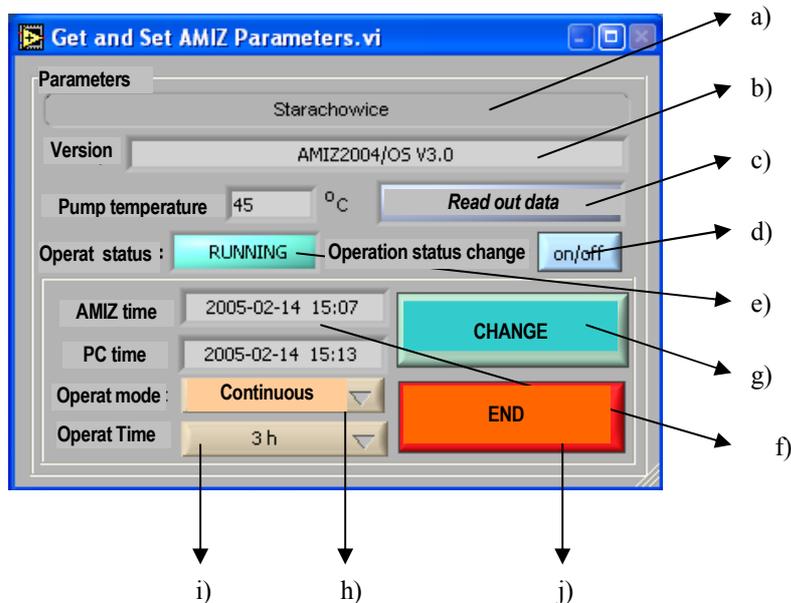


Fig. 13. Dialog box for readout and setting of monitor parameters AMIZ-2007

- a) station name from which the parameters are read out
- b) Version number of AMIZ monitor that is connected
- c) Communication window – actual commands are presented that are carried out (e.g. reading data, data read out, data read out error)
- d) Remote switching on / off of AMIZ
- e) Message on status of AMIZ operation (on / off)
- f) Actual time of AMIZ and of computer. The times are synchronized
- g) Button for change (setting) operation parameters. The parameters can be changed only when operation of the monitor is stopped.
- h) Change (setting) of mode of operation of the monitor – possible modes: continuous, automatic, single mode.
- i) Change (setting) measuring cycle period – from 30 min to 24 h.
- j) End of changes (settings).

The user can also make the following changes in the window:

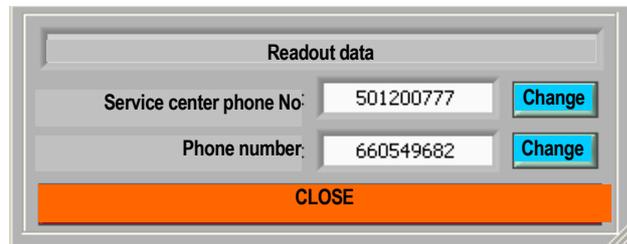
- 1) To change (set) mode of operation of the monitor – continuous, automatic, single mode of operation
- 2) To change (set) measuring period from 30 min to 24 h
- 3) To switch remotely on / off the monitor
- 4) To read out pump temperature and version number of the monitor

Attention. To make changes (settings) of the monitor, it has to be stopped, and after the changes are introduced, the monitor should be put in operation again.

Attention. In case of any problems with exit from the windows, the program should be closed by pressing the combinations of keys: Ctrl+Alt+Delete., and then the program should be open again.

5.3. Change of SMS settings

To change SMS settings select, starting from the main menu Fig. 5, the following options: Stations → Station name→ SMS. Dialog box is displayed, Fig 14, allowing to enter mobile phone number, to which alarm SMS messages should be sent, e.g. in case the band of air filter is broken.



Readout data	
Service center phone No:	501200777 <input type="button" value="Change"/>
Phone number:	660549682 <input type="button" value="Change"/>
<input type="button" value="CLOSE"/>	

Fig. 14. Dialog box for SMS setting

In the area “Service center phone number” mobile phone number of the service of mobile phone network (depending on the network in which SIM card is bought), through which SMS messages are transmitted.. In the area “Phone number” the phone number or of modem of the person for proper operation of the monitor.

After the phone numbers are entered the user is then informed if the phone numbers were correctly, or incorrectly entered.

6. DATABASE OF MEASURING RESULTS

To review measuring results that are accessible from a selected monitor select, starting from the main menu, Fig. 5, the following options: Stations → Station name → Select station. In the main window of the main menu a diagram is displayed with the measuring results during current month, Fig. 15.

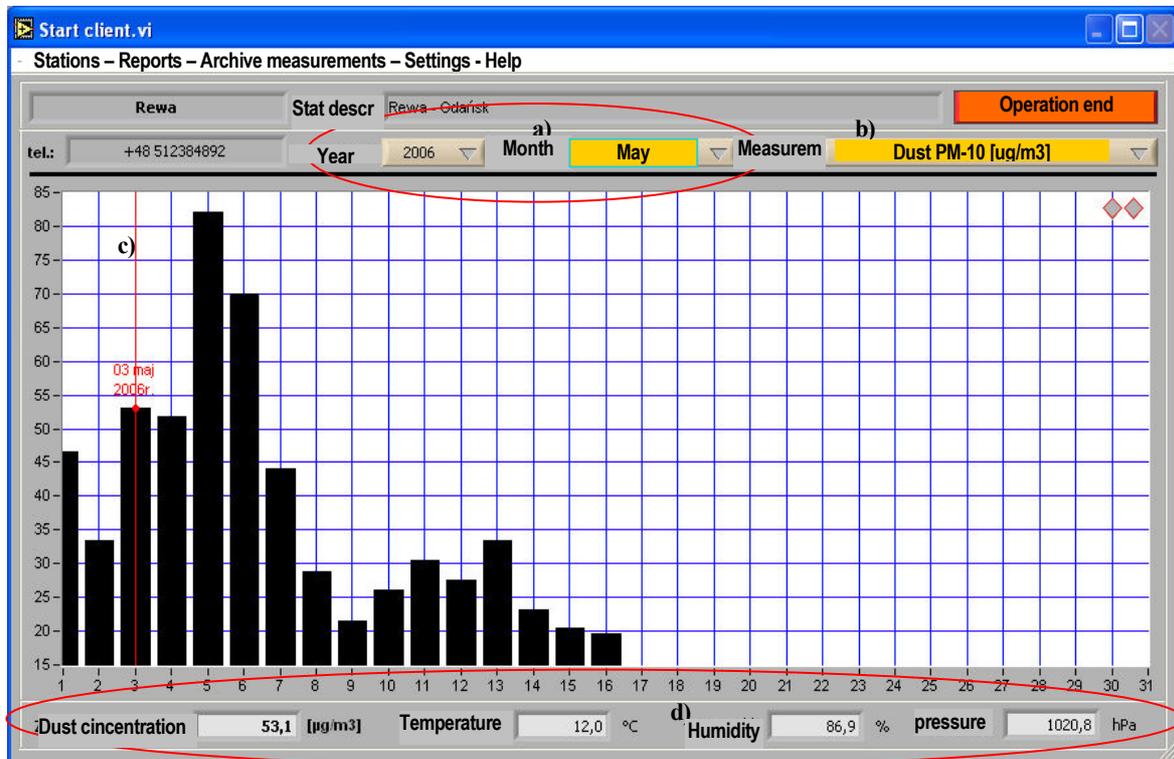


Fig. 15. Main window of the program.

- selection of date of the data to be displayed
- selection of measured quantities (dust, temperature, pressure, relative humidity)
- diagram of mean day values of measured quantity (dust, temperature, pressure, relative humidity)
- mean day value of dust concentration, temperature, pressure, and relative humidity for selected day

6.1. Reports

It is possible to make four types of reports. The reports prepared by the program are:

- daily reports,
- monthly reports – daily mean (average) values are reported
- monthly detailed reports
- yearly reports - mean (average) monthly values are reported

To review the measuring results for a determined station, first it has to be selected. It is done by selecting, starting from the main menu, Fig. 5 the following options: Stations→ Station name→ Select station → Reports→ Daily→ Show. A window is displayed, see Fig 16 (example)

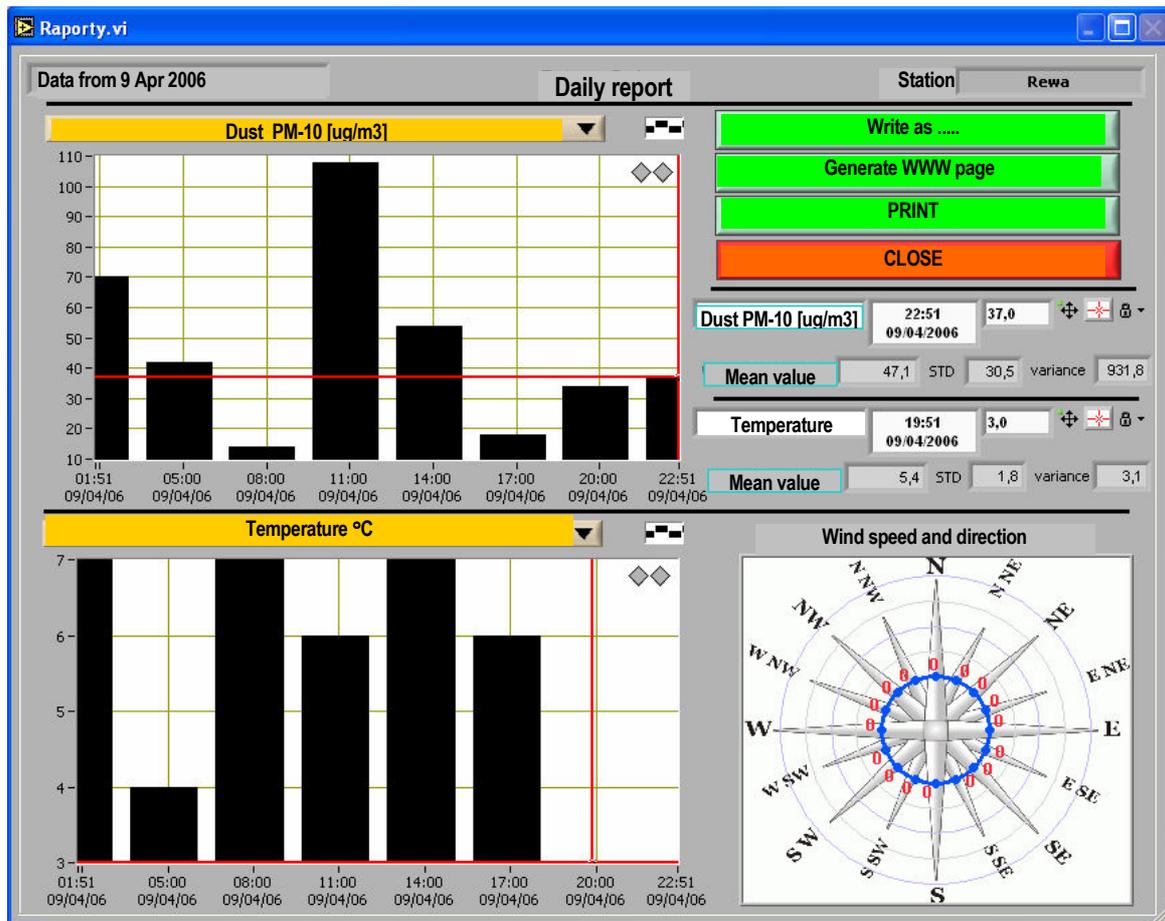


Fig. 16. Example daily report of dust concentration, temperature and wind. Zero indications for wind speed means that no wind sensors are attached to the monitor.

Clicking in the upper diagram the button “Dust PM-10 [ug/m3]” a submenu is displayed allowing to select other measured data to be displayed in the upper diagram (temperature, pressure, humidity). Similarly clicking the button “Temperature °C” in lower diagram a submenu is displayed allowing to select other measured data to be displayed in the lower diagram (temperature, pressure, humidity).

Moving the red cursor across the diagram, exact date and value of the measured quantity can be read out. These data are presented above the wind diagram. Selection of measurements can also be made with gray arrows located in upper right corner

The presented data can be written down to excel file in a table of digits, and can be printed

A Monthly detailed report is made by selecting, starting from the main menu Fig. 5, the following options: Stations→ Station name→ Select station → Reports→ Monthly detailed→ Show. A window with the diagram is displayed, see Fig 17 (example)

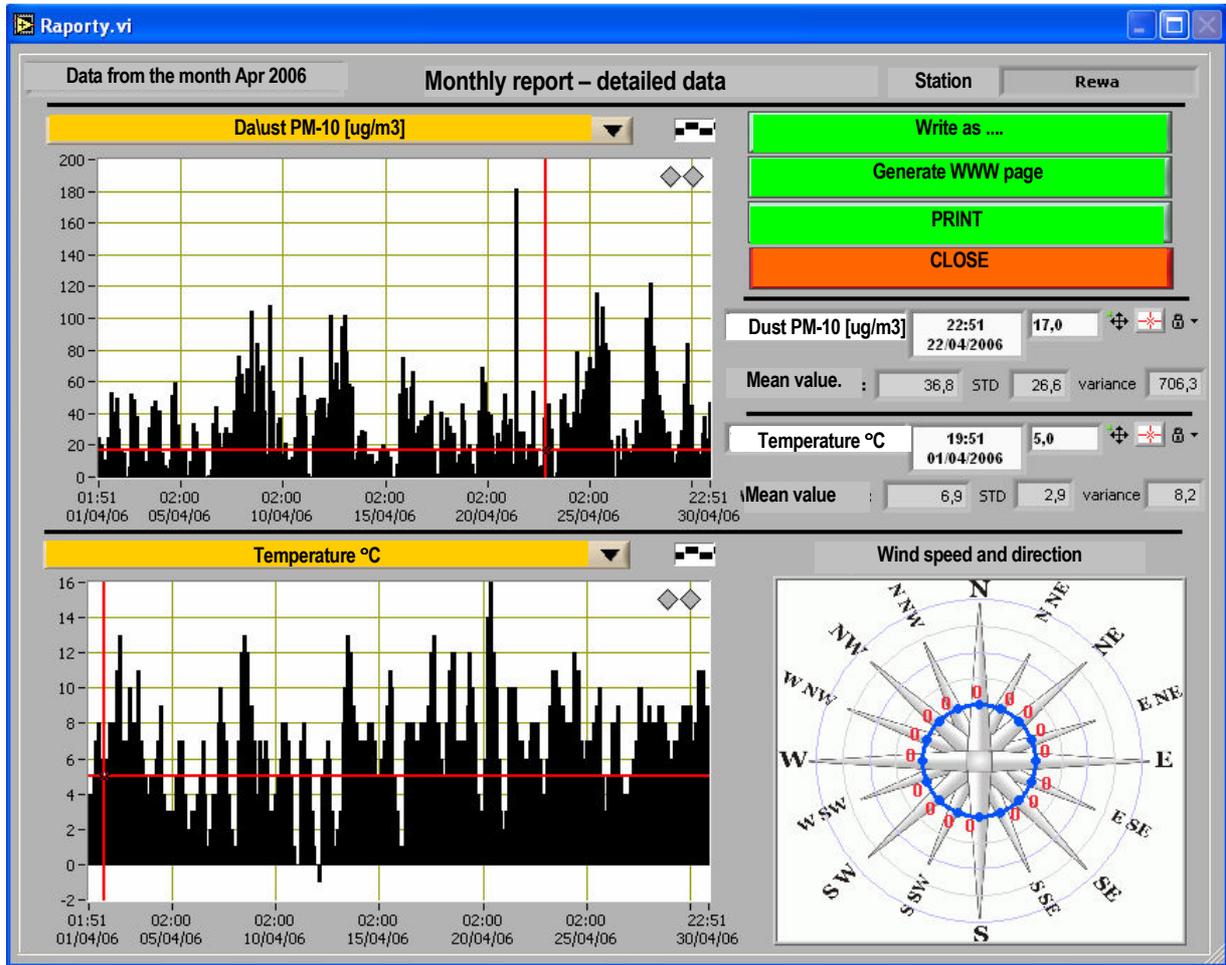


Fig. 17. Example of monthly detailed report of dust concentration, temperature and wind. Zero indications for wind speed means that no wind sensors are attached to the monitor.

Clicking in the upper diagram the button “Dust PM-10 [ug/m3]” a submenu is displayed allowing to select other measured data to be displayed in the upper diagram (temperature, pressure, humidity). Similarly clicking the button “Temperature °C” in lower diagram a submenu is displayed allowing to select other measured data to be displayed in the lower diagram (temperature, pressure, humidity).

.A Monthly report (of day mean values) is made by selecting, starting from the main menu Fig. 5, the following options: Stations→ Station name→ Select station → Reports→ Monthly → day mran →Show. A window with the diagram is displayed, see Fig 18 (example)

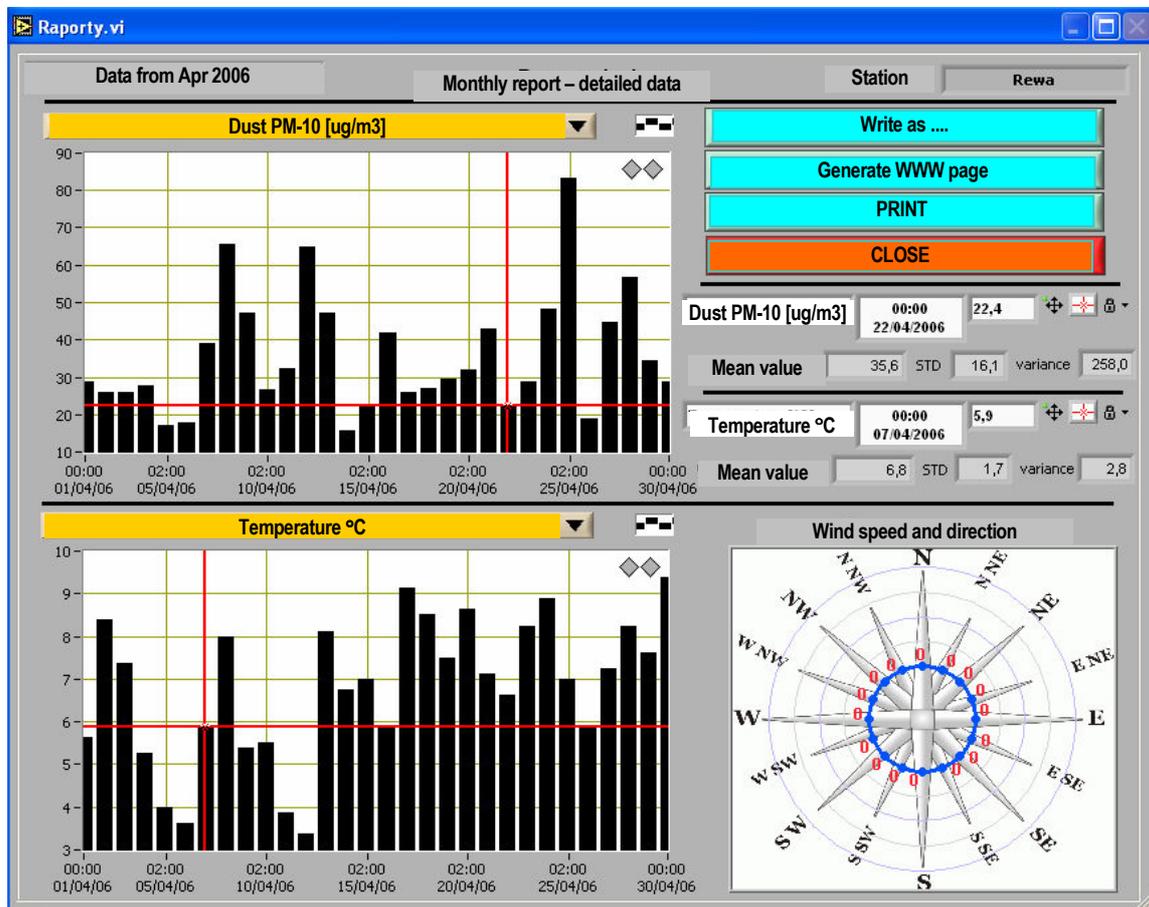


Fig. 18. Example of monthly report (of day mean values) of dust concentration, temperature and wind. Zero indications for wind speed means that no wind sensors are attached to the monitor.

The presented data in the reports can be written down to Excel file for yearly reports and as WWW page for monthly reports.

Moving the red cursor across the .diagram, exact date and value of the measured quantity can be read out. These data are presented above the wind diagram. Selection of measurements can also be made with gray arrows located in upper right corner

To store the data in a form of WWW page, click the button “Generate WWW page” then threshold values for the presented data should be determined. The diagram is attached to the report if in the column “Generate ?” the word “yes” is written down. In the other case the diagram is not created. After the threshold values are determined, click the button “OK.” to generate the WWW page, or button “Cancel” to interrupt creation of the page, see Fig. 19. The diagram created are placed in www directory together with external data directory

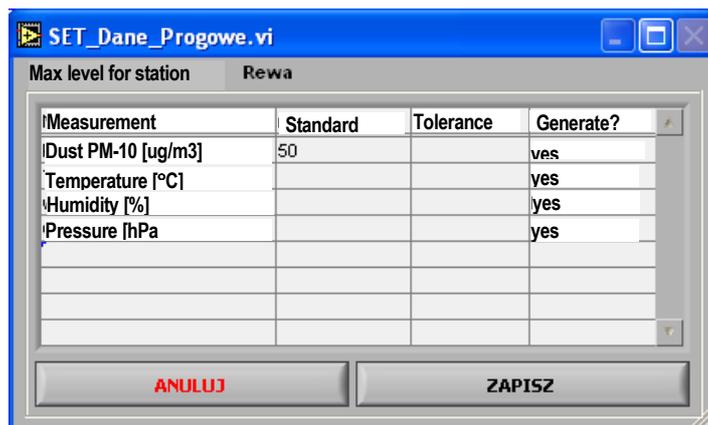


Fig. 19. Threshold data

To create yearly report select, starting from the main manu, Fig. 5 the following options: : Stations → Station name → Select station → Reports → Yearly → Show. The yearly report is displayed, see Fig. 20.

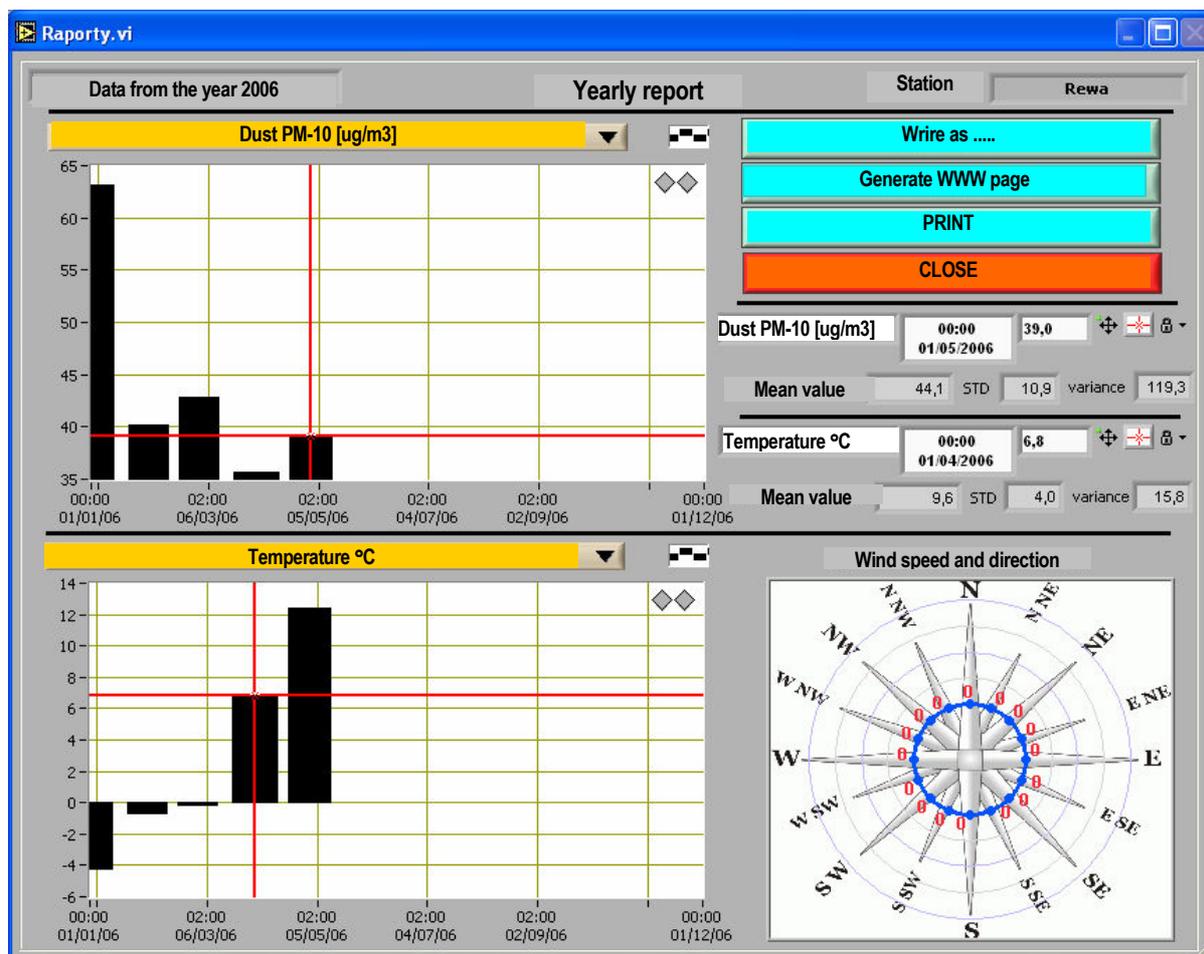


Fig. 20. Example of yearly report (month mean values) of dust concentration, temperature and wind. Zero indications for wind speed means that no wind sensors are attached to the monitor.

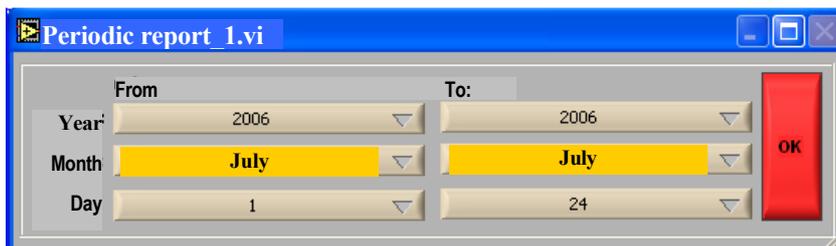
Clicking the button “CLOSE” review of data presented in daily and monthly reports is finished

6.2. Archive measurements

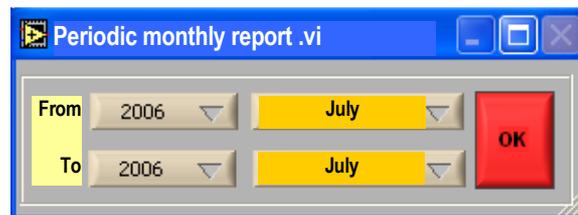
This option enables to review archive measurement database that were carried out in the past in different measuring periods. The following data are accessible:

- Detailed diagrams – permitting to review detailed measuring results from any period
- Mean daily diagrams - showing daily mean data from a selected period
- Mean monthly diagrams – showing monthly mean data from a selected period
- Mean yearly diagrams - showing mean yerly data from a selected period

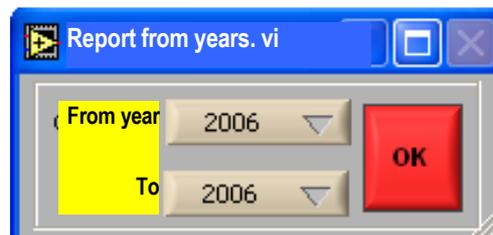
In case of the first two types of diagrams the period of presentation is selected from the dialog box, shown below



In case of monthly average data, the presentation period (year and month) is selected from the dialog box showed below



For the last manner of data presentation only years are selected, as shown below



The data presented in the diagrams can be written down to an Excel file. Print out of he data is impossible.

*Example diagrams presenting some archive measurements are given in the nest pages.

Fig. 21. Archive measurements → detailed measurements

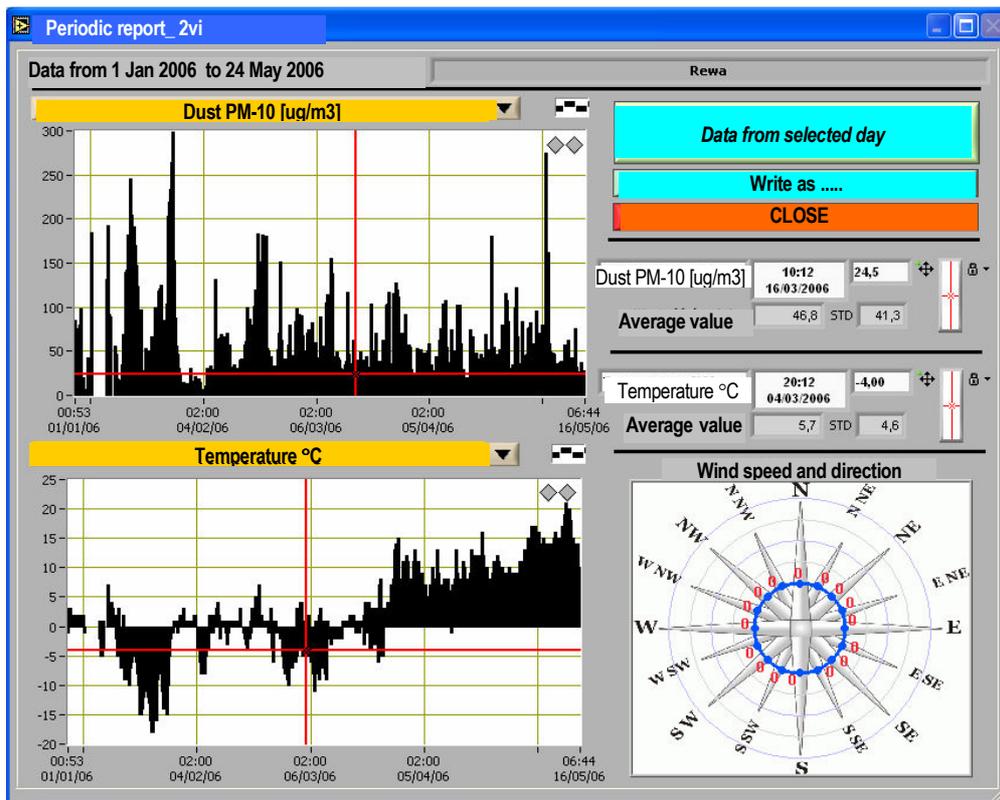


Fig. 22. Archive measurements → Daily average

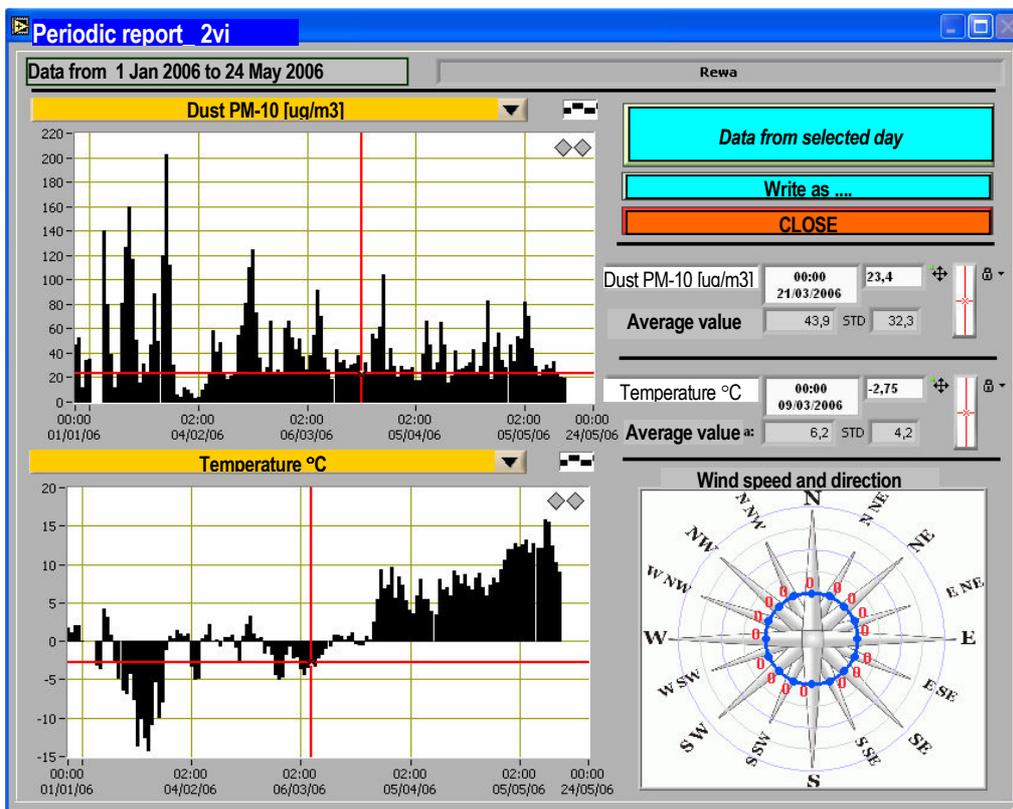


Fig. 23. Archive measurements → monthly average

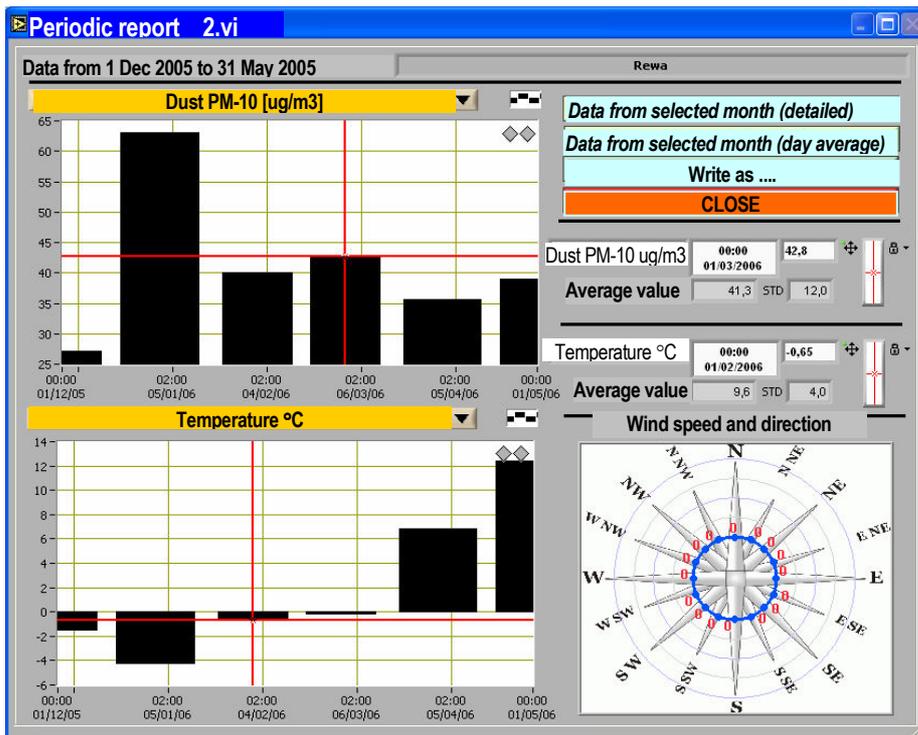
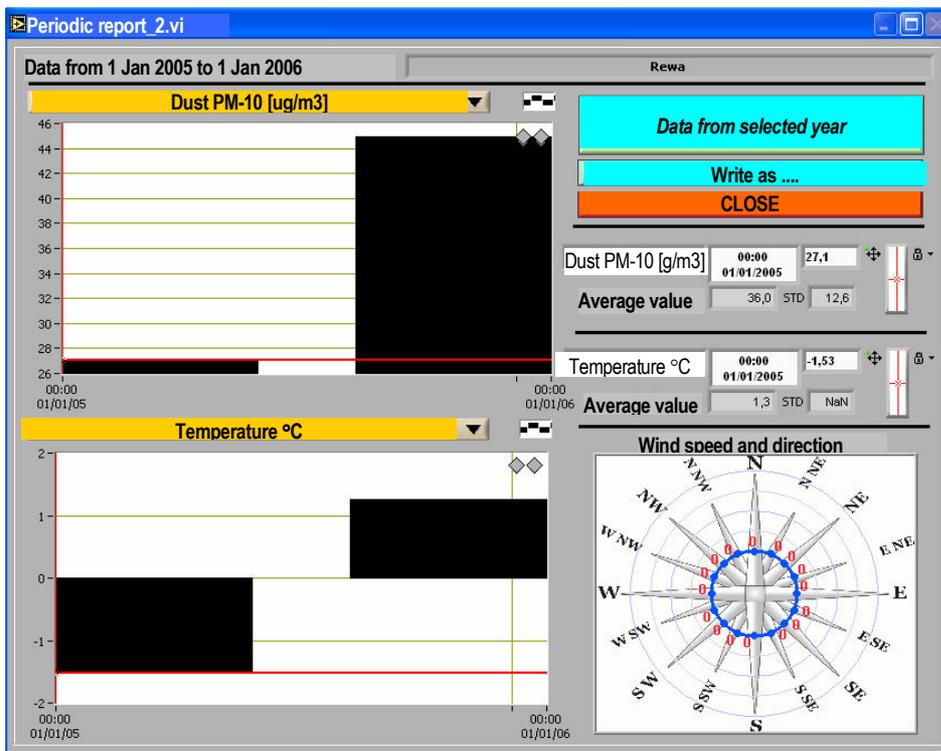


Fig. 24. Archive measurements → yearly average



7. Menu structure

Stations

Station No 1
Select station

Get data
Operation parameters of the monitor
Setting SMS alarms
Change monitor options

Remove station

Add station

Reports

Daily
Show
Print
Monthly detailed
Show
Print
Monthly – daily average
Show
Print
Yearly – monthly average
Show
Print
Geberate WWW report

Archive measurements

Detailed measurements
Daily average
Monthly average
Yearly average

Settings

SMS messages
Telephone book

Access path
Serial port
Modem setting
Enter PIN Number
Change PIN Number

Help

About

PROGRAM CERTIFICATE

Central (acquisition) computer

Modem telephone number
SIM card number
PIN number
PUK number

Measuring station No. 1

Station name
Station address
Telephone number
SIM card number
PIN number
PUK number

Measuring station No. 2

Station name
Station address
Telephone number
SIM card number
PIN number
PUK number

Measuring station No. 3

Station name
Station address
Telephone number
SIM card number
PIN number
PUK number

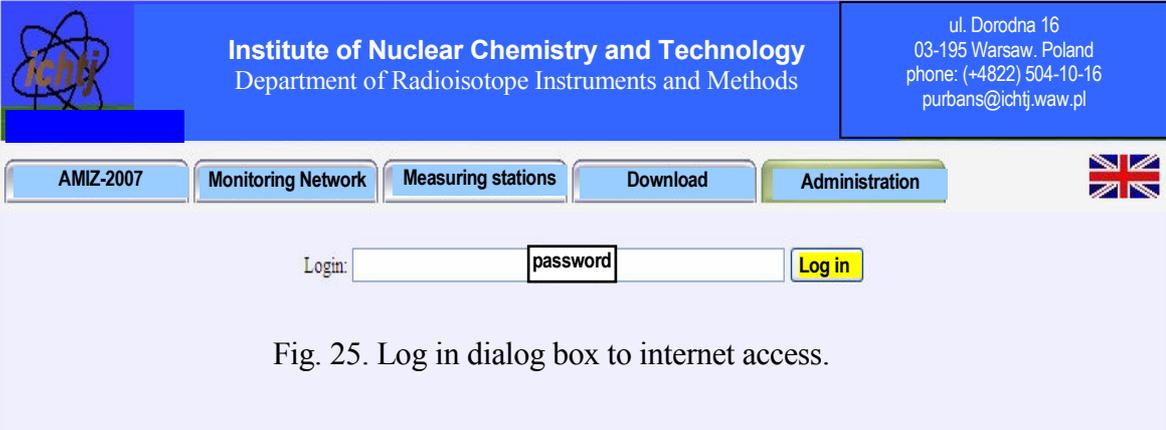
.....
.....

9. INTERNET COMMUNICATION WITH DUST MONITOR

9.1. Log in to the service

The service presenting measuring data from air dust monitors AMIZ-2007 is located under the address: <http://www.ichtj.waw.pl/amiz/>. Basic information is given there relating to the dust concentration monitoring network, and results of measurements (daily average). More detailed information is accessible after log in to the service.

To log in to the service, when the www page is displayed, click the button “Administration” and then enter your log in and the password, see Fig. 25.



The screenshot shows the website header for the Institute of Nuclear Chemistry and Technology. The header is blue and contains the logo on the left, the institute's name and department in the center, and contact information on the right. Below the header is a navigation menu with buttons for 'AMIZ-2007', 'Monitoring Network', 'Measuring stations', 'Download', and 'Administration'. A small UK flag is visible on the right side of the menu. Below the menu is a login form with a 'Login:' label, a text input field containing the word 'password', and a yellow 'Log in' button.

Fig. 25. Log in dialog box to internet access.

After log in, window with internet main menu is displayed, allowing access to network functions (procedures), see Fig. 26, (example)

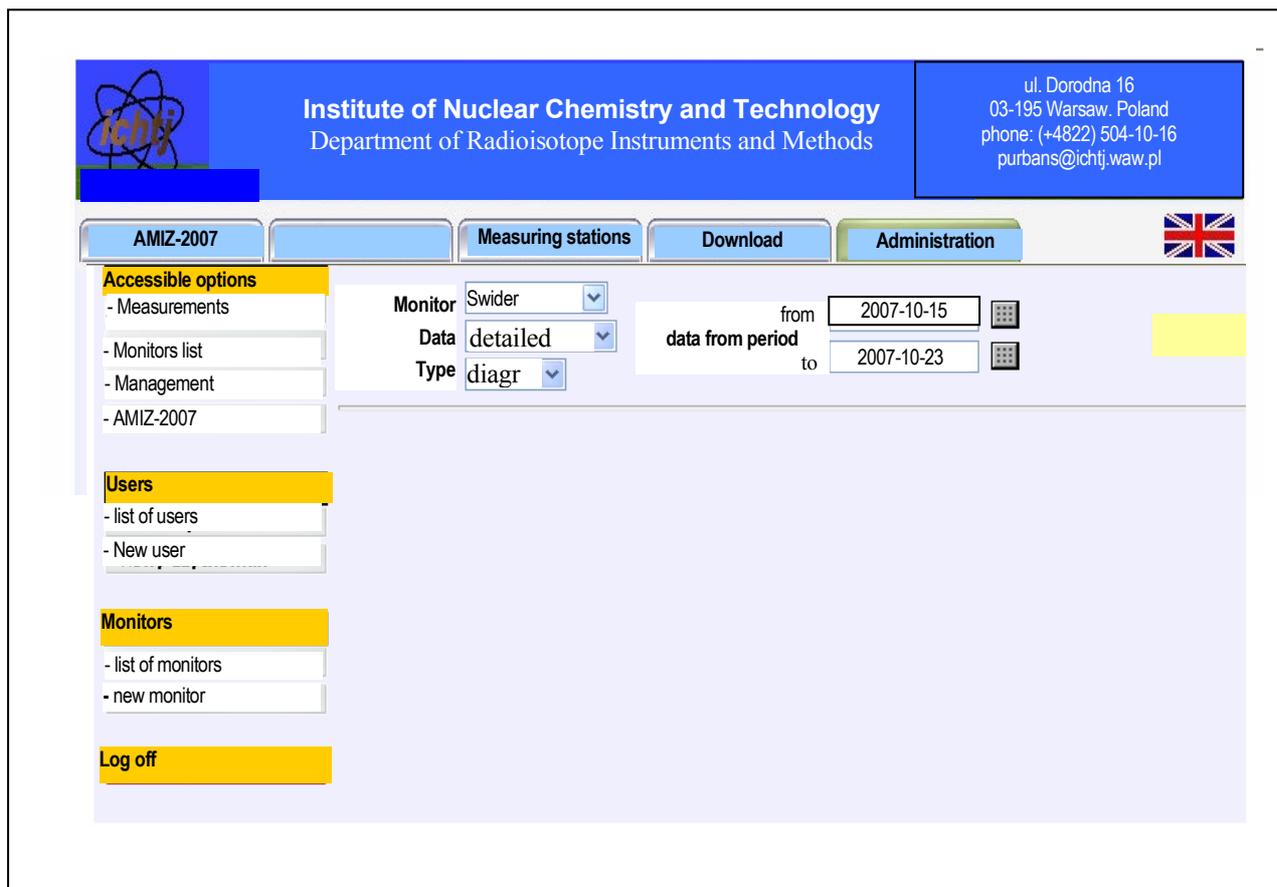


Fig.26. Internet main menu

9.2. Review of measuring results

To review the measuring results, click the button “Measurements”, when the window in Fig. 26 is displayed. The dust monitor from which the measuring data are to be displayed can be selected, and the type and form of presentation can also be selected.

The following data presentation is possible:

- Daily average data, or detailed data for the selected period of time – default period is 14 days
- Data presented if a form of table, or in a form of diagram (linear or bar diagram). In case data are presented in the form of table, they are grouped as shown in Fig. 27. For daily data, the number is given how many times the permissible dust concentration is exceeded. The permissible dust concentration is set from menu option “List of monitors”. All presented data can be written in text format into a word or Excel file. Example diagrams of results of measurements are shown in Fig. 28 – 31.

A)

Measurement time	Dust concentration	Temperature	Humidity	Pressure
(h)	($\mu\text{g}/\text{m}^3$)	($^{\circ}\text{C}$)	(%)	(hPa)
< 20	< 50	< 0	< 50	< 990
20 - 22	50 - 100	0	50 - 65	990 - 1010
> 22	> 100	> 0	> 65	> 1010

B)

Write in format

Date	Measurement time	Dust ($\mu\text{g}/\text{m}^3$)	Temperature ($^{\circ}\text{C}$)	Humidity (%)	Pressure (hPa)
2007-10-29 08:00	60 min.	17	10	99	1007
2007-10-29 07:00	60 min.	23	10	99	1007
2007-10-29 06:00	60 min.	0	10	99	1007
2007-10-29 05:00	60 min.	0	10	99	1007
2007-10-29 04:00	60 min.	0	10	99	1007
2007-10-29 03:00	60 min.	42	10	99	1008
2007-10-29 02:00	60 min.	59	10	99	1008
2007-10-29 01:00	60 min.	120	9	99	1008
2007-10-29 00:00	60 min.	167	9	99	1008
2007-10-28 23:00	60 min.	248	8	99	1009
2007-10-28 22:00	60 min.	190	8	99	1009
2007-10-28 21:00	60 min.	152	9	99	1009
2007-10-28 20:00	60 min.	112	9	99	1010
2007-10-28 19:00	60 min.	68	9	99	1009

C)

Write in format

Exceeded dust concentration: 1 (more than 50 $\mu\text{g}/\text{m}^3$)
 Exceeded dust concentration: 0 (more than 100m $\mu\text{g}/\text{m}^3$)

Date	Measuring time	Dust ($\mu\text{g}/\text{m}^3$)	Temperature ($^{\circ}\text{C}$)	Humidity (%)	Pressure (hPa)
2007-10-29 (9 p.)	9 h 0 min. (38%)	47.56	9.78	99.00	1007.44
2007-10-28 (24 p.)	24 h 0 min. (100%)	43.04	10.54	99.00	1011.50
2007-10-28 (24 p.)	24 h 0 min. (100%)	43.04	10.54	99.00	1011.50
2007-10-27 (24 p.)	24 h 0 min. (100%)	29.00	10.12	99.00	1013.08

Fig. 27. Presentation format of measuring data presented in tables

A) Data presentation depending on their value

B) Detailed data

C) Daily data

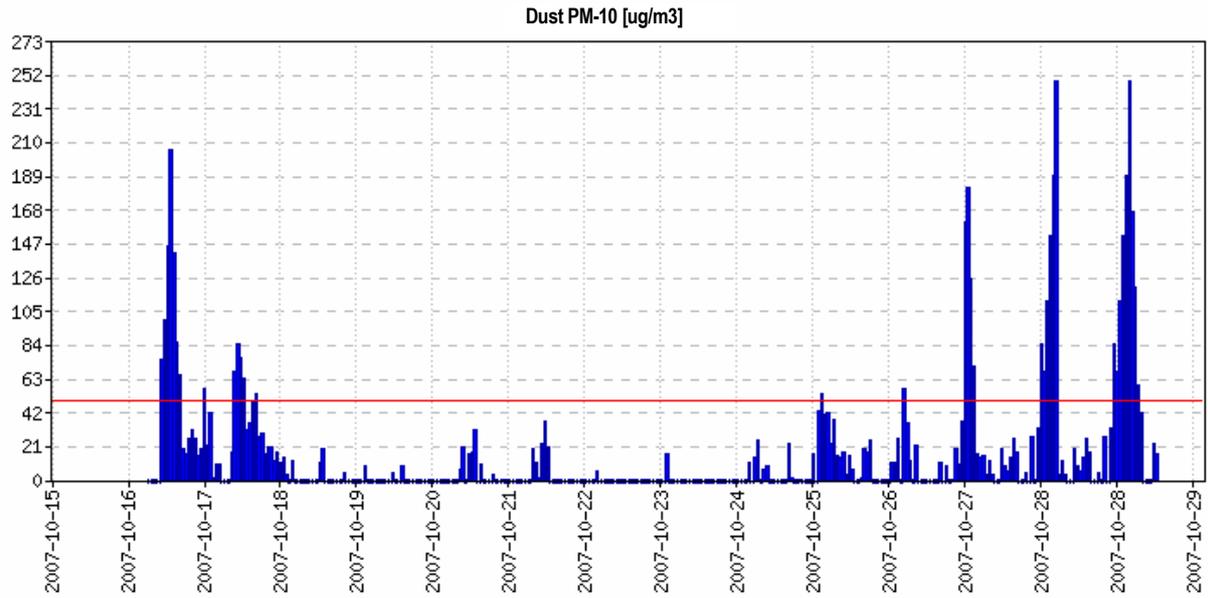


Fig. 28. Detailed bar diagram of dust concentration. The horizontal (red) line denotes permissible dust concentration

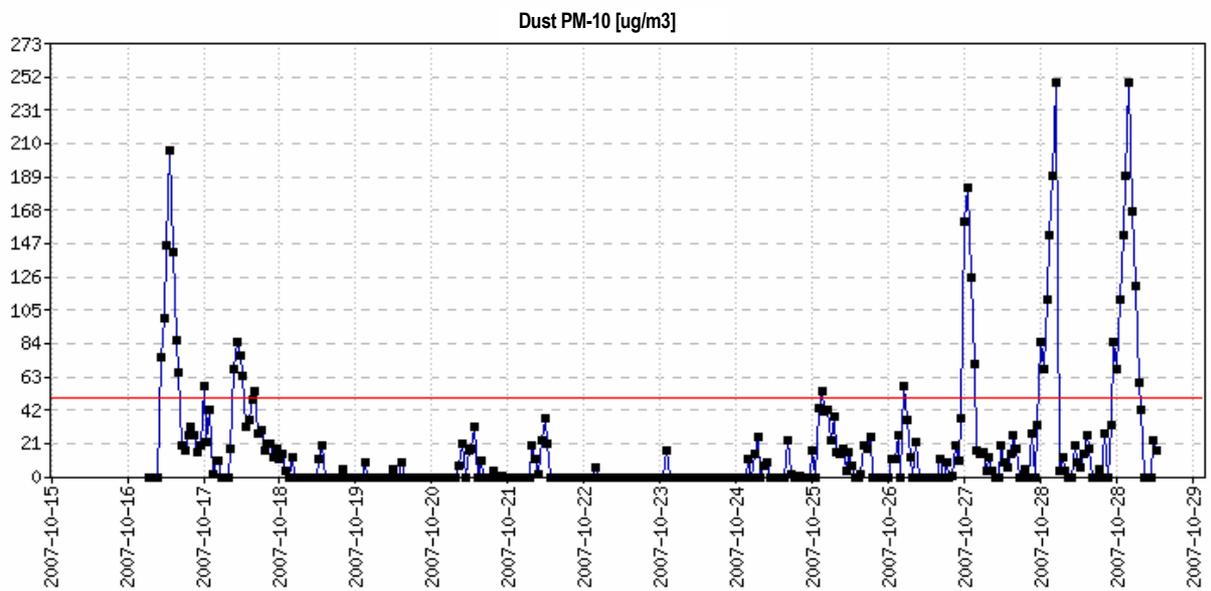


Fig. 29. Detailed linear diagram of dust concentration. The horizontal (red) line denotes permissible dust concentration

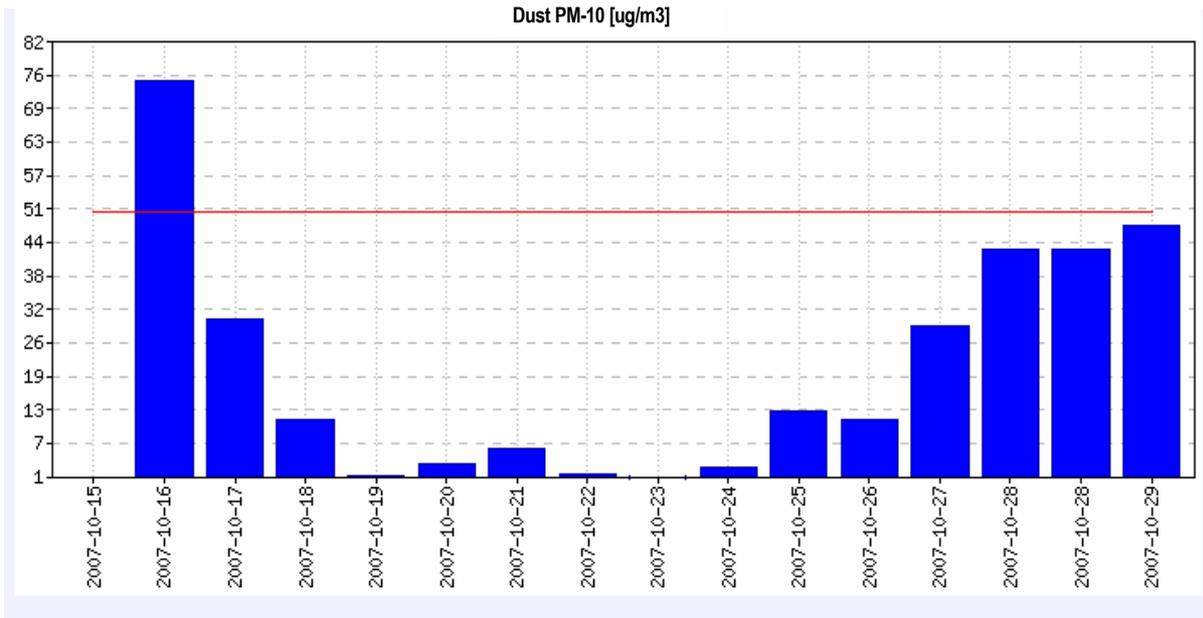


Fig. 30. Bar diagram of daily average dust concentration. The horizontal (red) line denotes permissible dust concentration

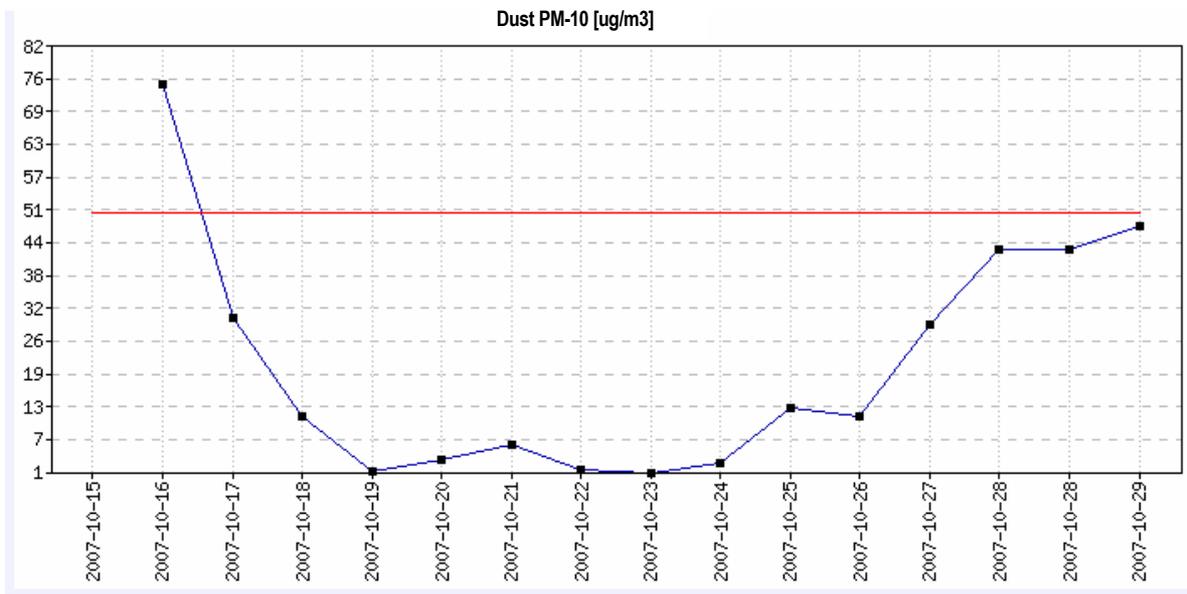


Fig. 31. Linear diagram of daily average dust concentration. The horizontal (red) line denotes permissible dust concentration

9.3. List of monitors

When menu shown in Fig. 26 is displayed and the button “Monitor list” is clicked a list of measuring stations (monitors) is displayed, see example below.

AMIZ ID Phone No	NAME	LOCALIZATION	VERSION	Last accessible	Change
513096498	Experim	Local test	no wind	2007-09-11 14:55	change
513096431	Otwock	Otwock near Warsaw	with wind	2007-10-31 12:44	change
512157859	Swider-	Swider / k Otwocka	no wind	2007-11-06 07:04	change

When the word “change” is clicked in the column “Change dialog box is displayed allowing for change of settings of selected monitor, see example below.

The dialog box contains the following fields and options:

- Monitor Name: Swider
- Monitor localization: Świder / k Otwocka
- Dust measured: PM-10
- Permissible level: 50
- Show on WWW page:
- Start date (dd.mm.yy): 00 00 00
- Stop date (dd.mm.yy): 00 00 00
- Dropdown menu: ostatnie 30 dni

Fig. 32 dialog box allowing changes of a monitor

The measured data presented in WWW page are presented from last 30 days – daily average. They are accessible for everybody without any restriction, by clicking button “Stations” when page <http://www.ichtj.waw.pl/amiz/> is displayed.

9.4. Managing the monitors

Program functions (options) for managing and control of the monitors operating in the dust concentration network are grouped here. To get to the options click the button “Management” when the menu shown in Fig. 26 is displayed. A list of the monitors together with some parameters is displayed. One of the monitors (stations), from the list, operating in the network is shown in Fig. 33

For each monitor the following information is given

- Operation status - informs if the station is in operation mode (carries out measurement) or is halted. If not in operation the cause of not operation is given
- Operation mode – what is the mode of carrying measurement (continuous, single, automatic) and what is the measuring period from 0.5 h to 24 h.
- Air pump temperature – what is the air pump temperature. If the temperature is too high the monitor operation is interrupted (halted)
- Kiosk temperature – temperature inside the kiosk

Kiosk humidity – relative humidity inside the kiosk

- Last accessible – date and time of last connection between the monitor and server
- Data refreshing – it is determined here how often the monitor should actualize its status
- SMS phone – number of mobile phone number to which alarm SMS are sent

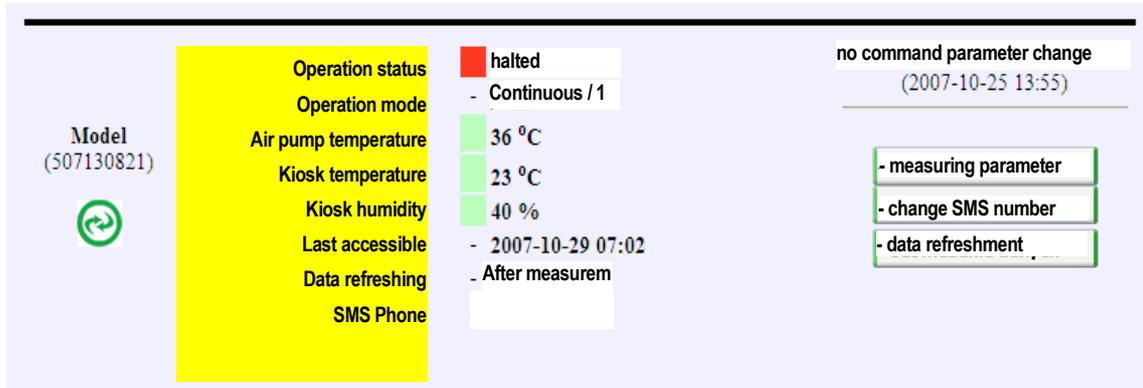
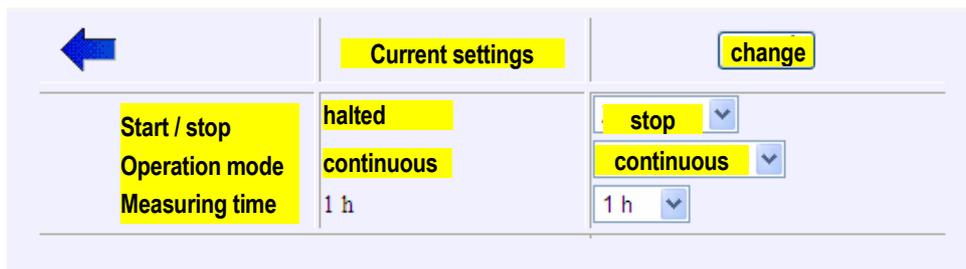
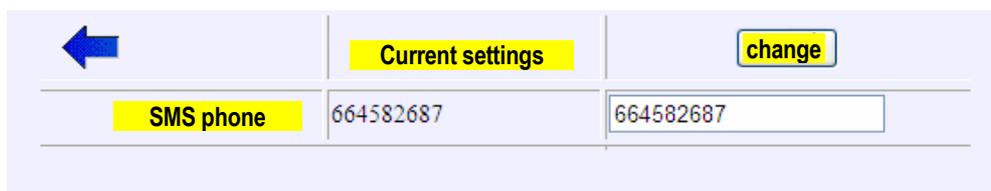


Fig. 33. Display of parameters of selected monitor

Clicking the button “measuring parameter” the dialog box is displayed allowing to change measuring parameters



Clicking the button “change SMS number” the dialog box is displayed allowing to change SMS phone number



Clicking the button :”data refreshment “ the dialog box is displayed allowing to change how often refreshing of data should take place.

The image shows a settings dialog box with a light blue background. At the top left is a blue arrow pointing left. In the top center is a yellow button labeled "Current settings". In the top right is a yellow button labeled "change". Below these are two yellow buttons: "WWW refreshing" on the left and "After measurement" on the right. To the right of the "After measurement" button is a dropdown menu. The dropdown menu is open, showing a list of options: "After measur" (partially visible), "After measurement", "Every 40 s", "Every 2 min", "Every 6 min", "Every 10 min", "Every 20 min", "Every 30 min", and "Every 1 h".