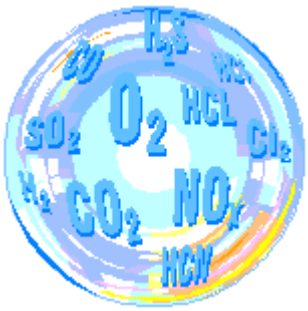


GA-12*plus* service programme

Manual

v.2.12

madur®

E L E C T R O N I C S

INTRODUCTION..... 3

INSTALLATION OF THE PROGRAMME..... 3

REQUIRED HARDWARE..... 3

SOFTWARE..... 3

STARTING UP THE PROGRAMME..... 3

PROGRAMME WINDOW..... 4

MENU BAR..... 4

QUICK ACCESS MENU BAR..... 4

STATUS BAR..... 5

MENU FUNCTIONS..... 5

FILE 5

Restart transmission.....5

Programme settings..... 6

User Information.....6

Quit..... 7

Service mode.....7

REMOTE CONTROL..... 8

RESULTS..... 9

ANALYSER SETTINGS..... 10

Main settings 10

Charts.....16

Printouts.....18

Results screen.....20

Language..... 21

Calibration.....22

Gas calibration.....24

Flow calibration..... 25

Gas sensors..... 26

Flash memory..... 27

FUELS..... 27

CUSTOMERS..... 31

REPORTS..... 33

HELP..... 37

ABOUT... 37

Introduction

The *GA12*[plus] programme is used for operating the flue gas analysers designed and produced by madur. It operates with the following devices:

- GA-12
- GA-12plus
- maPress
- maPress II
- S1200
- S1400

The software allows the user to make changes to the settings which are inaccessible from the device interface, performing calibration, transferring the measurement results to the PC and printing the measurement reports.

Installation of the programme

Required hardware

- PC with the Windows 98 (or any of the later versions) operating system installed
- A free serial port
- the madur analyser with the communication cable

Software

- the GA12 installation software package

Double clicking on the Setup_GA12.exe programme icon will start the installation process.

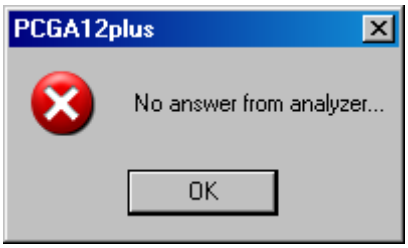
Starting up the programme

Before starting the programme up it is necessary to make sure that the analyser is switched on and connected to the computer with the RS-232 cable. The programme can be started with the help of the icon placed in the *Start* menu.

After the programme has been started on the following information will automatically be sent from the device.

- the analyser type
- the serial number of the analyser
- the software version

The programme will suggest that the analyser clock is set if its readings are different from the readings of the computer clock. If the following note is displayed:



and the analyser is switched on and connected to the serial port of the computer the port settings should be checked (see point 5.1.2)

Some of the programme options are inaccessible in the regular working mode. To access the analyser main settings and its calibration settings it is necessary to start the programme in the service mode. (see point 4.1.5).

Programme window

Menu bar

The *Menu* bar enables the user to access all the programme functions and settings. The *Menu* options are further described in chapter number 4.

Quick access menu bar

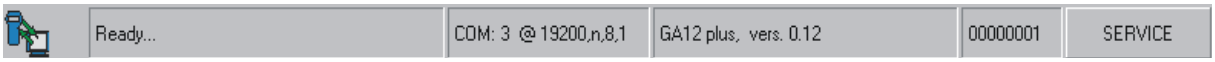
The *Quick access menu* bar makes it possible for the user to access directly the following menu functions:

- Restart transmission
- Port
- User data
- Remote control

- Results
- Main settings
- Charts
- Analyser printouts defining
- Results screen
- Fuels DataBase
- Customers DataBase
- Reports DataBase

The description of the above functions can be found in the chapter number 5.

Status bar

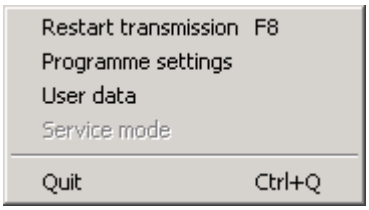


The status bar is situated at the bottom of the programme window. It contains the following information:

- the icon illustrating the connection status
- a description of the analyser status
- information on the current communication parameters
- information on the analyser's type and the software version
- the analyser serial number
- a description of the current working mode (service mode – SERVICE; or the regular working mode - not signalised)

Menu functions

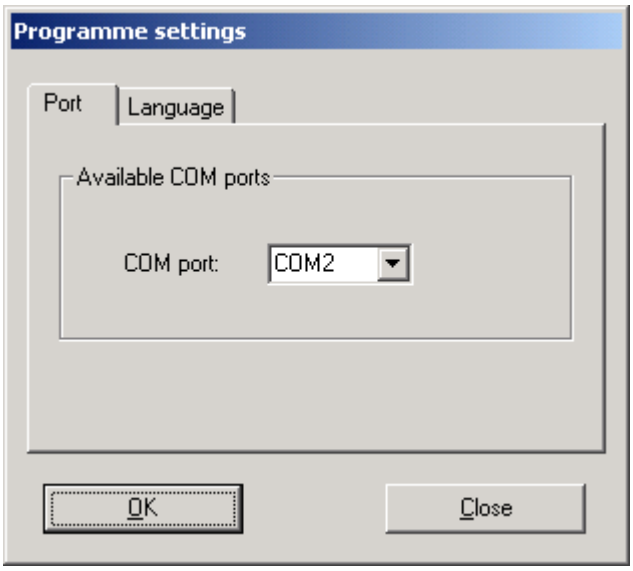
File



Restart transmission

Restarts the data transmission. Discontinues the current connection and establishes a new one.

Programme settings

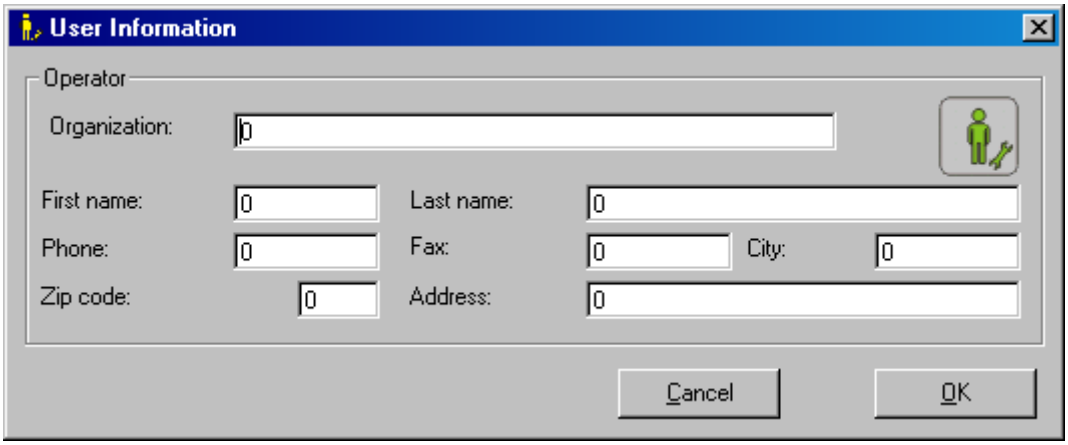


The window contains two boxes. The *Port* box allows the user to choose the serial port to which the analyser is connected. Should the setting be improper the connection will not be established.

The *Language* box enables the user to change the programme language version.

User Information

The following window will be displayed:



With the help of the above window the user can fill in the programme operator's data.

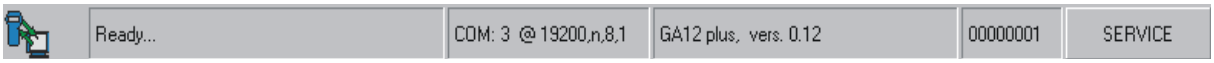
Quit

Closes the programme window.

Service mode

To turn to the service mode it is necessary to enter the password. After the *Service mode* option has been chosen the following window will appear:

The fact that the programme is working in the service mode is signalised on the right-hand side of the status bar.



Working in the service mode makes it possible for the user to access the analyser main settings and perform the calibration process.

Remote control

The following window will be displayed:

The window's appearance may differ from the one shown in the picture as it depends on the design of the analyser connected to the PC.

The window enables the user to access the device interface and all its functions indirectly. Single click on the display with the right button of the mouse calls the following menu up.

The above menu can be used for changing the display colour (however, changing the programme setting will have no effect on the colour of the physical display).

It is possible to save the current content of the display as a *.bmp file with use of the

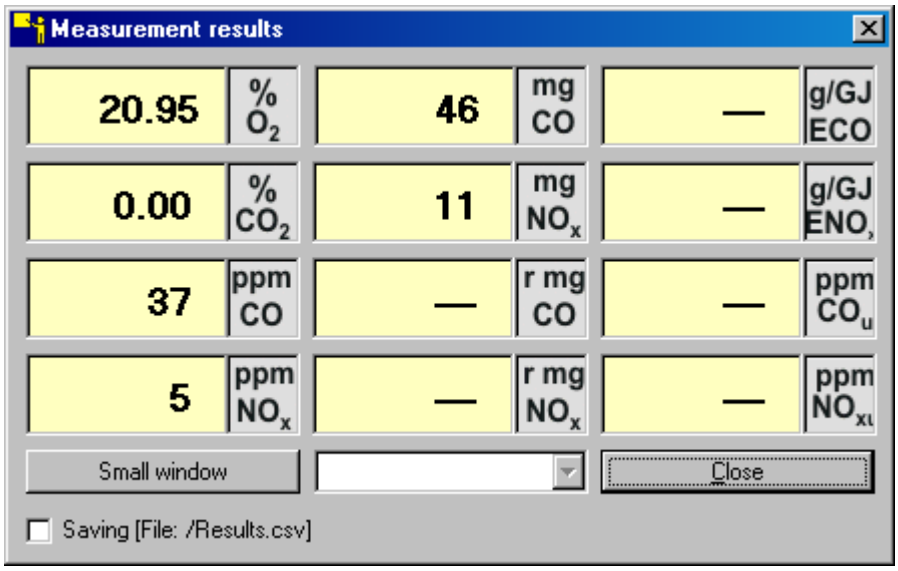
key. The file is saved in the programme directory and its name is generated automatically.

The

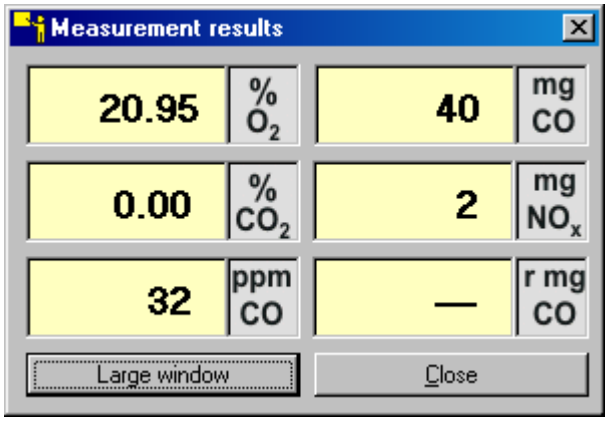
button closes the window.

Results

Choosing this option calls the following window up:

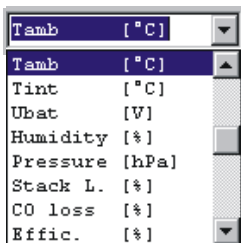


The window makes it possible for the user to observe the current measurement results. The connection with the analyser is essential for displaying the above window. Pressing the Small window key will change the size of the window (the number of the presented results will decrease).



Similarly pressing the Large window key returns to the previous window size.

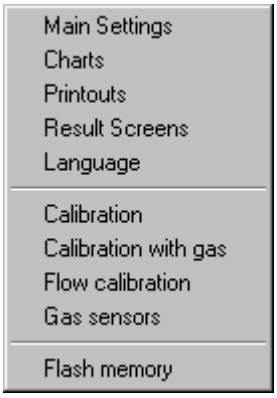
The user can choose the window which is to be defined by a single click on it with either the left or the right mouse button while in the large *Measurement results* window. This will activate the following list:



With the use of the above list the choice of the measurement results which are to be displayed can be carried out.

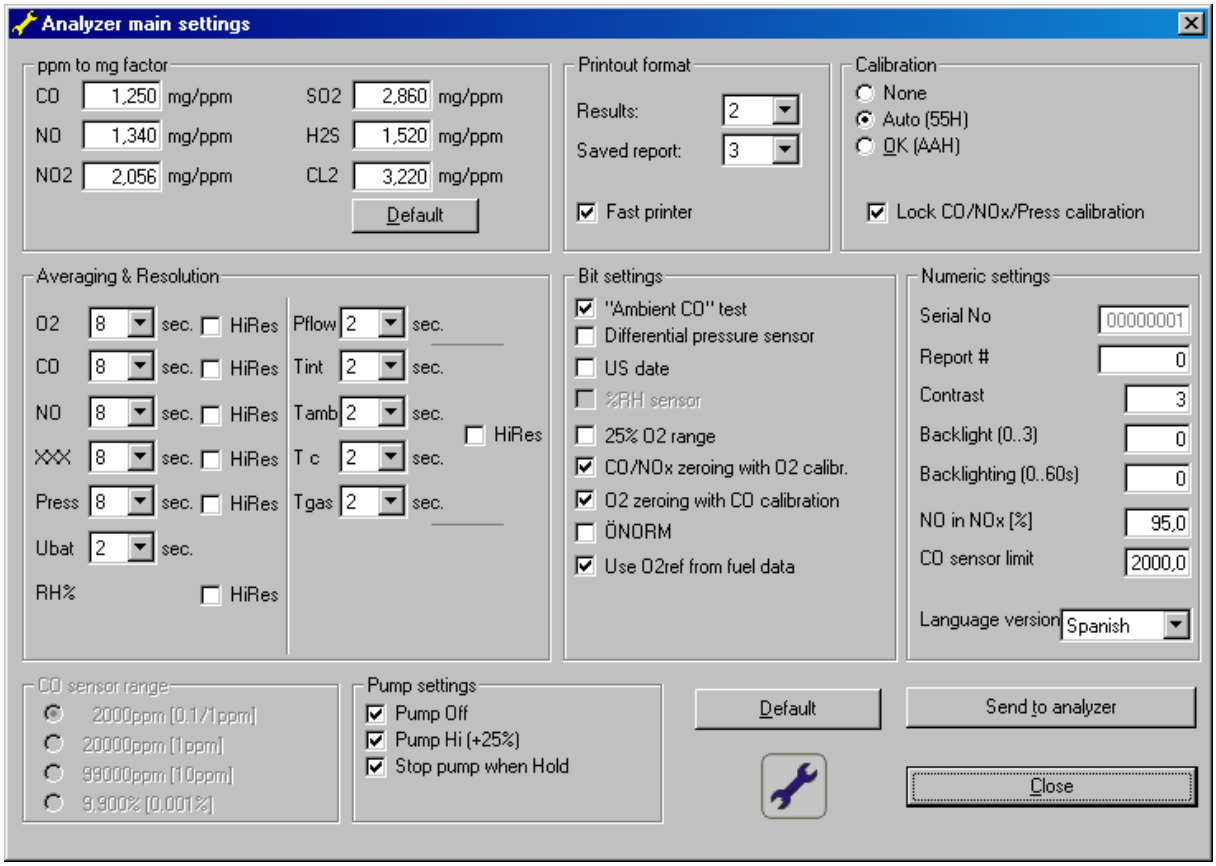
The Close button closes the window.

Analyser settings

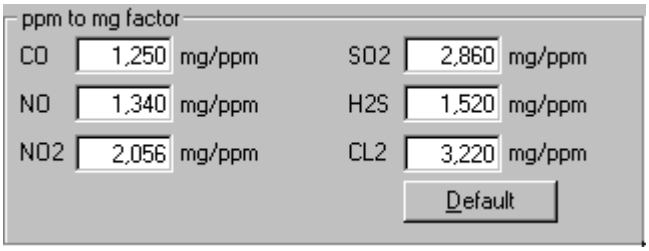


Main settings

The window similar to the window shown below will appear.



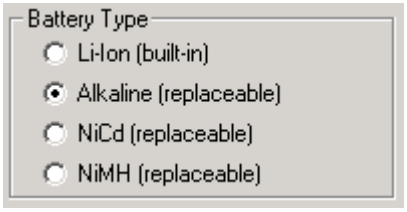
Description of each of the elements that may appear in the window:



The ppm to mg factor table

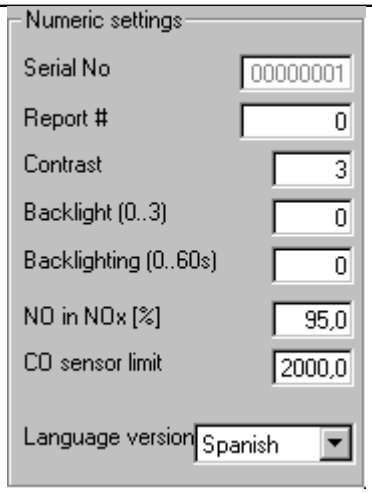
Enables the user to define the factor used for converting ppm into mg.

Pressing the Default button sets the default value of the factor.



Battery Type table

Enables the user to define the kind of the battery that powers the analyser.

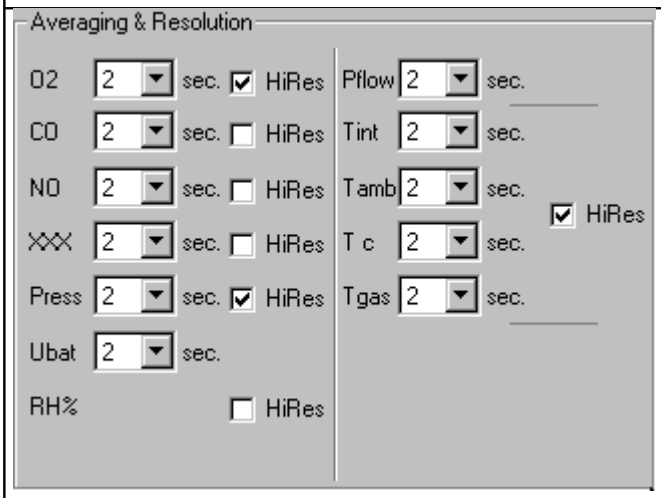


The *Numeric settings* table

- *Serial No* - the serial number of the device.
- *Report #* - the initial readings of the reports counter.
- *Contrast* - the display contrast (16 display contrast levels are available – 0 ...15; 0 – the minimum contrast level).
- *Backlight (0..3)* - the backlight of the display (4 backlight level are available – 0 ...3; 0 – the minimum backlight brightness).
- *Backlighting (0..60s)* - the value refers to the length of the backlighting period after any of the analyser keys have been pressed; 0 – the backlight will be constantly turned on.
- *NO in NOx (%)* - the coefficient used for calculating the level of NO_x from the measured NO.
- *CO sensor limit* - the upper limit of the CO measurement range, the analyser

will give a warning when exceeding the limit value. The permissible values range from 100 up to 2000ppm.

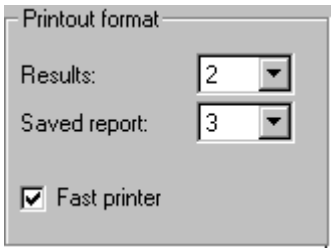
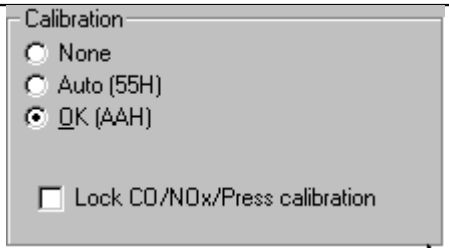
Language version – with the help of this list the user is able to choose the default language version of the device software. In case of an accidental language change (when having problems with finding the proper setting in the analyser menu) it is possible to restore the default language by keeping the left function key pressed when starting the analyser.

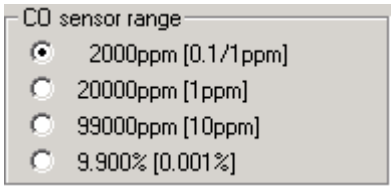
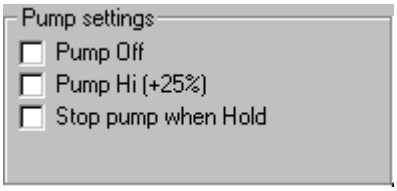
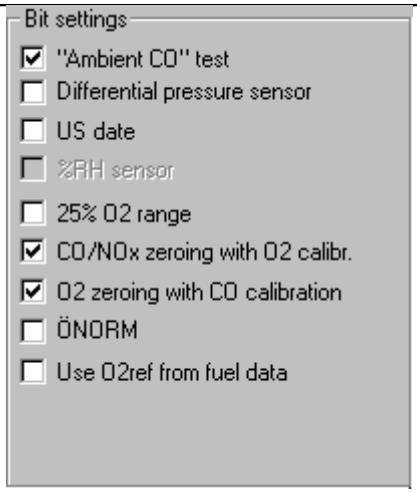


The *Averaging & Resolution* table

The table enables the user to set the averaging times of the measured values. Marking the *HiRes* option will increase the resolution of the measurement.

The resolution values for different measurement channels are: the temperature (either 0.1°C or 1°C), NOx (either 0.1 ppm or 1 ppm), CO (either 0.1 ppm or 1 ppm), O2/CO2 (either 0.01 % or 0.1 %), the pressure (either 0.1 mm/0.001 inch/0.1 Pa or 1 mm/0.01 inch/1 Pa) and humidity (either 0.1 % or 1 %). For all of the temperature sensors the ambient, interior, gas and condansation temperature values (*Tint, T amb, T c,*

	Tgas) are set jointly. Tc – the temperature for compensating the cold end of the thermocouple.
	The table makes it possible for the user to choose the printout format of the results and the reports. The choice can be made out of 8 printout formats (four of them set and four to be defined by the user). When the *Fast printer* field is marked the printer uses the Martel printer commands, otherwise the HP commands are used (this will lead to a decrease in the printing speed). **Attention:** The Martel printer works correctly no matter what kind of command is used. The HP printer will not work properly when the *Fast printer* field is marked.
	The *Calibration* table The choice of the following settings is to be made only by service staff. It is advisable not to change them. *None* erases all the calibration settings from the analyser. When the analyser is next switched on it restores the default settings. When the *Auto* option is chosen the analyser uses the default settings. When the *OK* field is marked the device uses the calibration parameters set by the producer or the service staff. Marking the *Lock CO/NOx/Press calibration* field makes it impossible for the user

	to perform the gas and the pressure calibration process directly from the analyser.
	This box enables the user to define the measurement range of the CO sensor (the values depend on the kind of the device the programme operates) When the table is inactive the settings can be done via the *Gas sensors* window.
	The *Pump settings* table. The fields in the box have the following functions: – *Pump Off* - switches the pump off until the analyser is next turned on – *Pump Hi (+25%)* - increases the pumps capacity by 25% – *Stop pump when Hold* - stops the pump when the device works in the *Hold* mode
	The *Bit settings* table – When the "*Ambient CO" test* field is marked the option of measuring the content of the CO in ambient air is available. The measurement range is 500ppm. – The *Differential pressure sensor* field should be marked if the device is equipped with the differential pressure sensor (GA-12plus or Sensonic 1400). – When the *US date* field is marked the date will be given in the mm/dd/yy format, otherwise the dd/mm/yy format will be used.

- The *%RH sensor* field is active when the exterior probe with the RH sensor is connected to the device.
- When the *25% O2 range* field is marked the O2 measurement range is widened to a 0…25% range. The default range is 0…20.95%.
- When the *CO/NOx zeroing with O2 calibr.* field is marked the CO, SO_2 and NO_x sensors will be zeroed each time the user performs the calibration of the O2 sensor for 20.95%
- When the *O2 zeroing with CO calibration* field is marked the O2 sensor will be automatically zeroed each time the CO sensor is calibrated.

When the *ÖNORM* field is marked the set of fuels defined in ÖNORM is used, there is no possibility to change the reference oxygen value in the instrument, the value is taken from the fuel parameters. Using the Austrian set of fuels will automatically switch the mode of the manual reference oxygen O_{2ref} choice off (value always taken from the fuel parameters). The fuel names will always be in German.

The Austrian fuels:

0- Erdgas
1- Flüssiggas
2- Heizöl HEL
3- Heizöl EL
4- Holz
5- Kohle

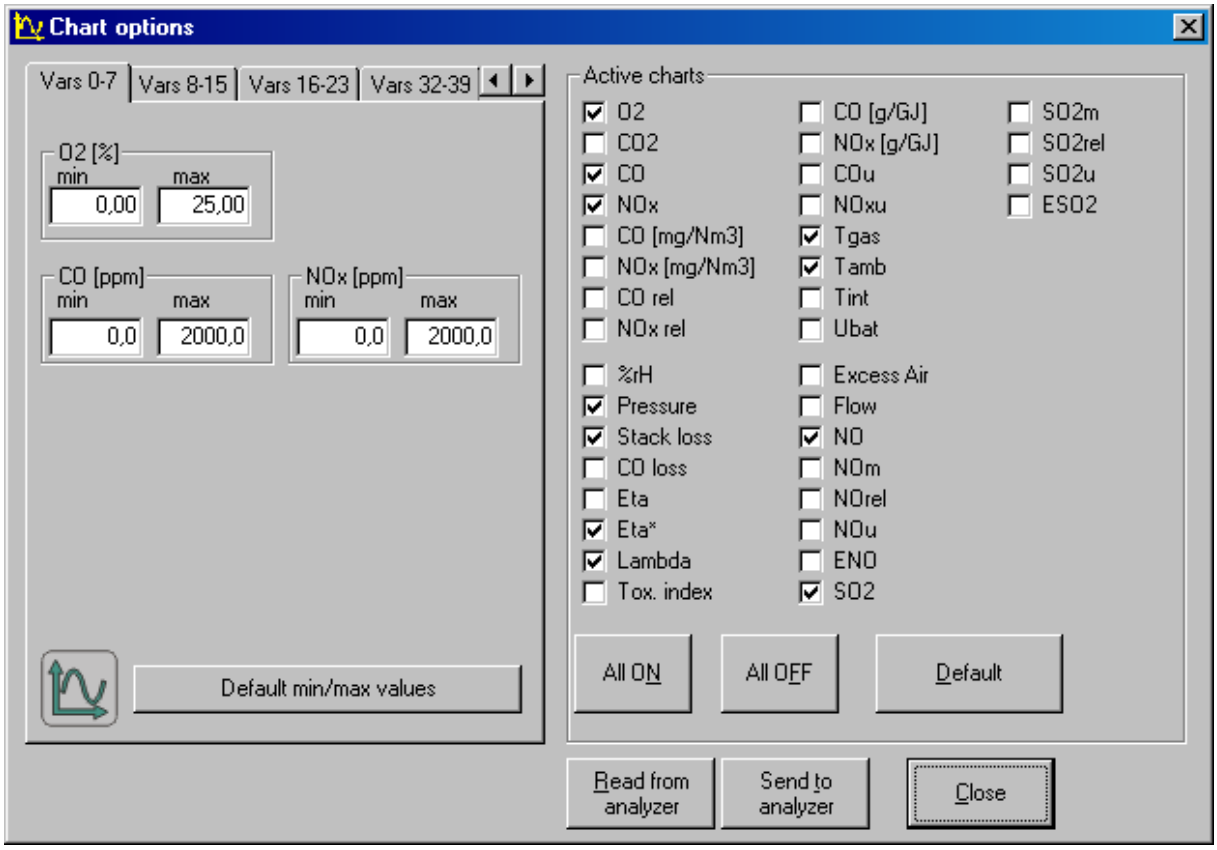
- When the *Use O2ref from fuel data* field is marked the O2ref value will be imported from the fuels database and it will be impossible to edit it directly

	in the device. If the field stays unmarked the O2ref value can be set in a range of 0…13%.

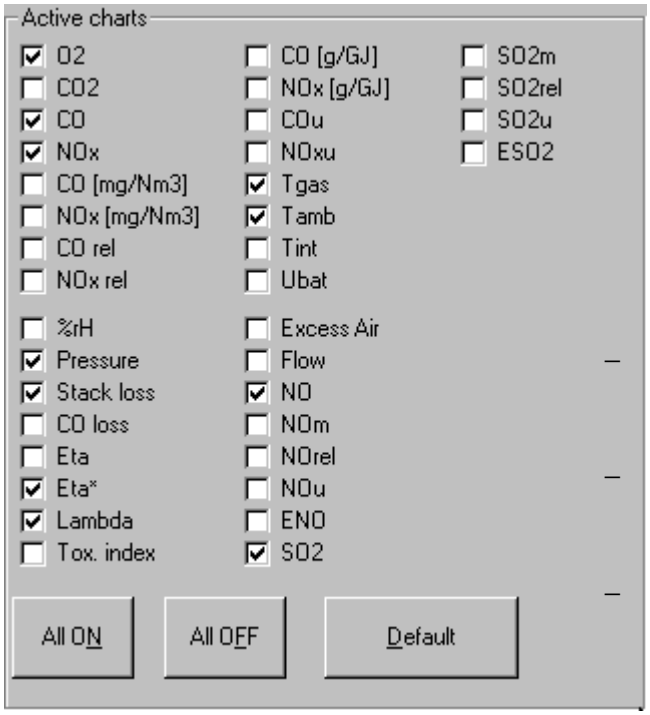
Pressing the Default key returns to the default settings.

If the programme is working in the service mode the Send to analyzer key is active. After the key has been pressed a confirmation message will appear. After confirmation the sending process proceeds and the following window will be displayed.

Charts



The window makes it possible for the user to change the settings of the charts presented on the analyser's display.

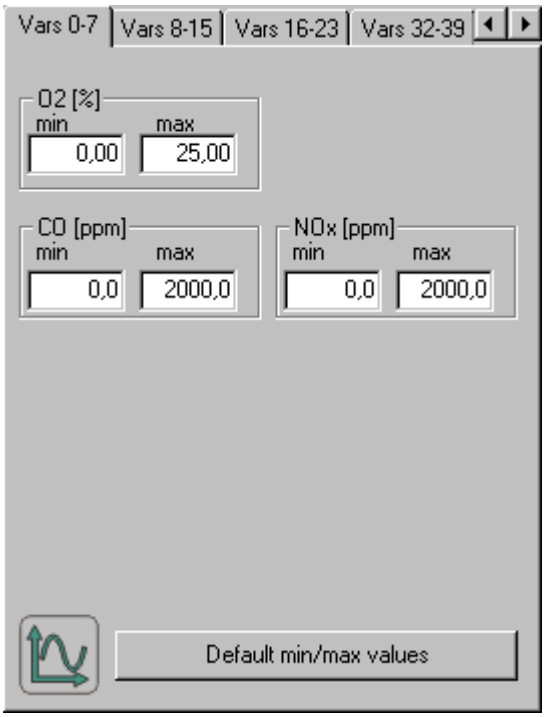


The table enables the user to define which measurement results will be presented on the charts. The keys below have the following functions:

All ON marks all the fields

All OFF unmarks all the fields

Default returns to the default settings

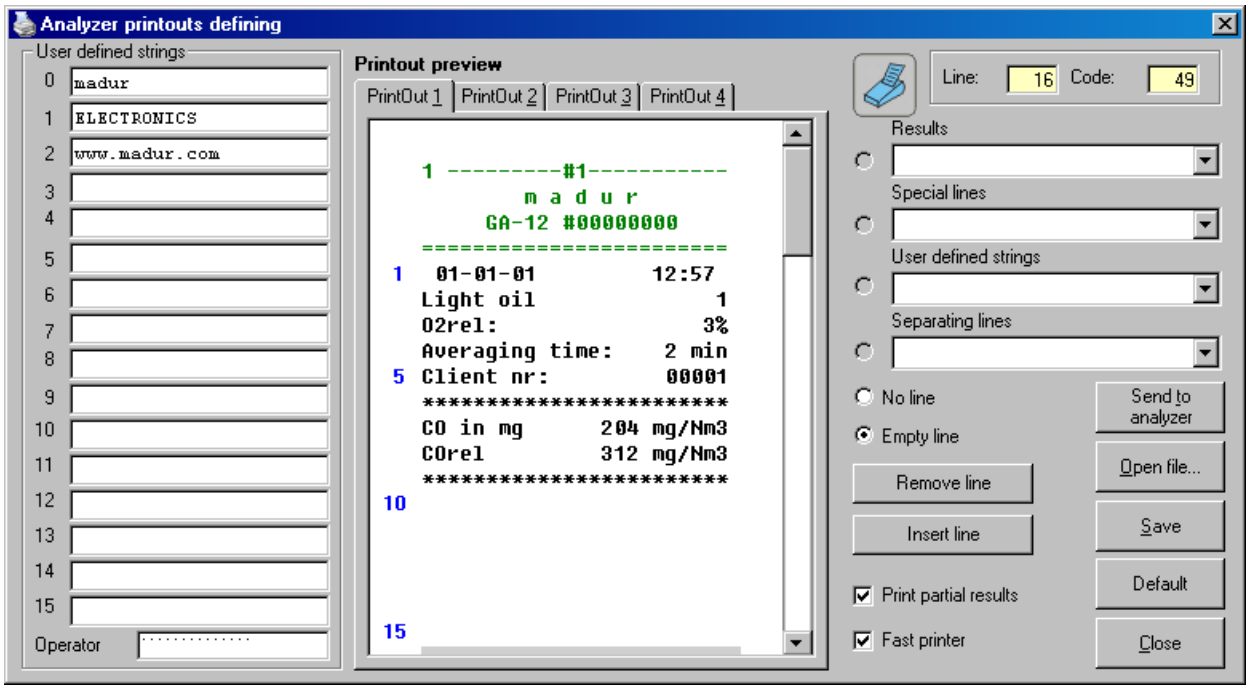


The field makes it possible for the user to define the minimum and maximum values of each of the chart's axes.

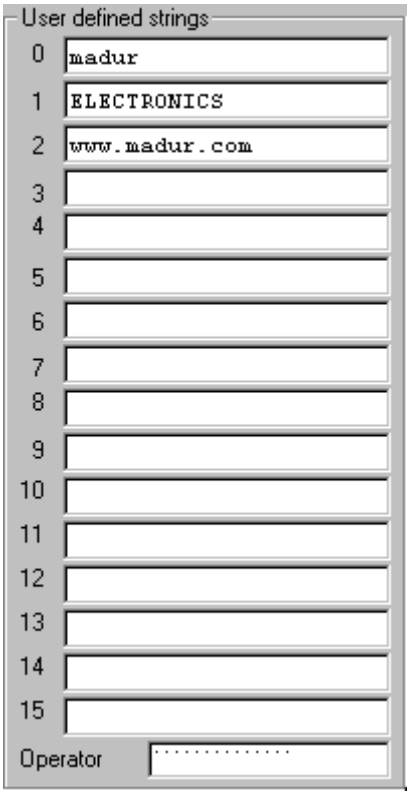
The Default min/max values key sets the default values.

The Read from analyzer and Send to analyzer buttons enable the user to read the settings from the analyser and to save the current settings in the analyser memory with the help of the programme.

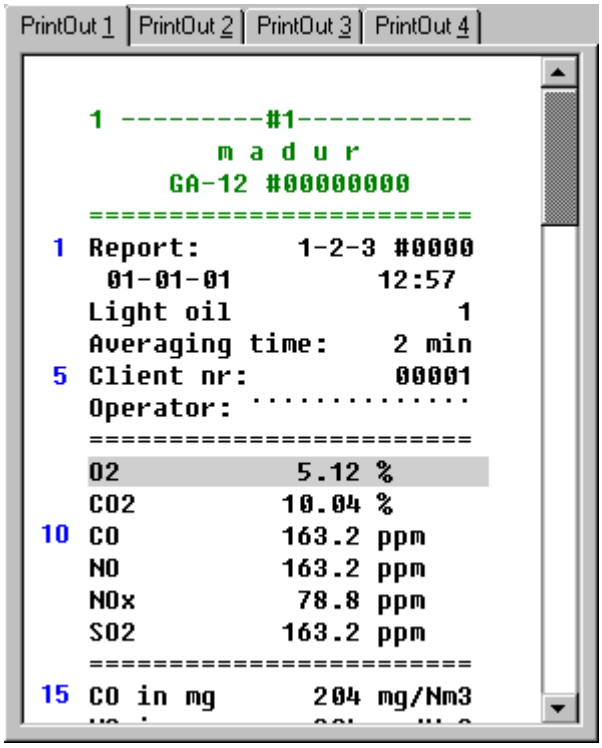
Printouts



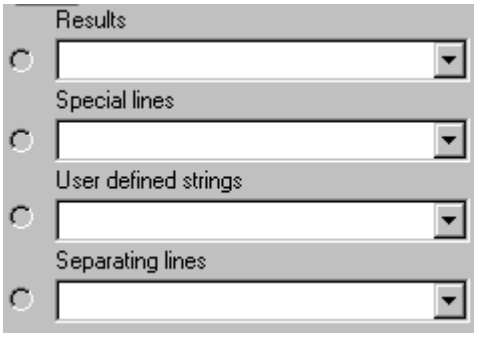
The *Analyser printouts defining* window includes the following fields:

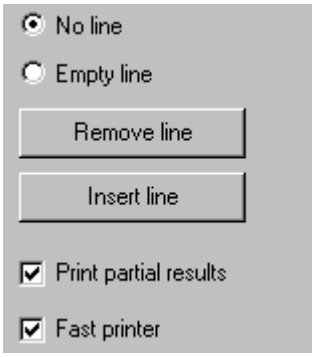


16 user's comments (numbered 0-15) stored in the analyser's memory. Each of the strings can take up to 20 characters.



The *Printout preview* window is used for editing the printout format. The green-coloured headlines cannot be edited. The line numbers are displayed in blue. The currently edited line is highlighted.



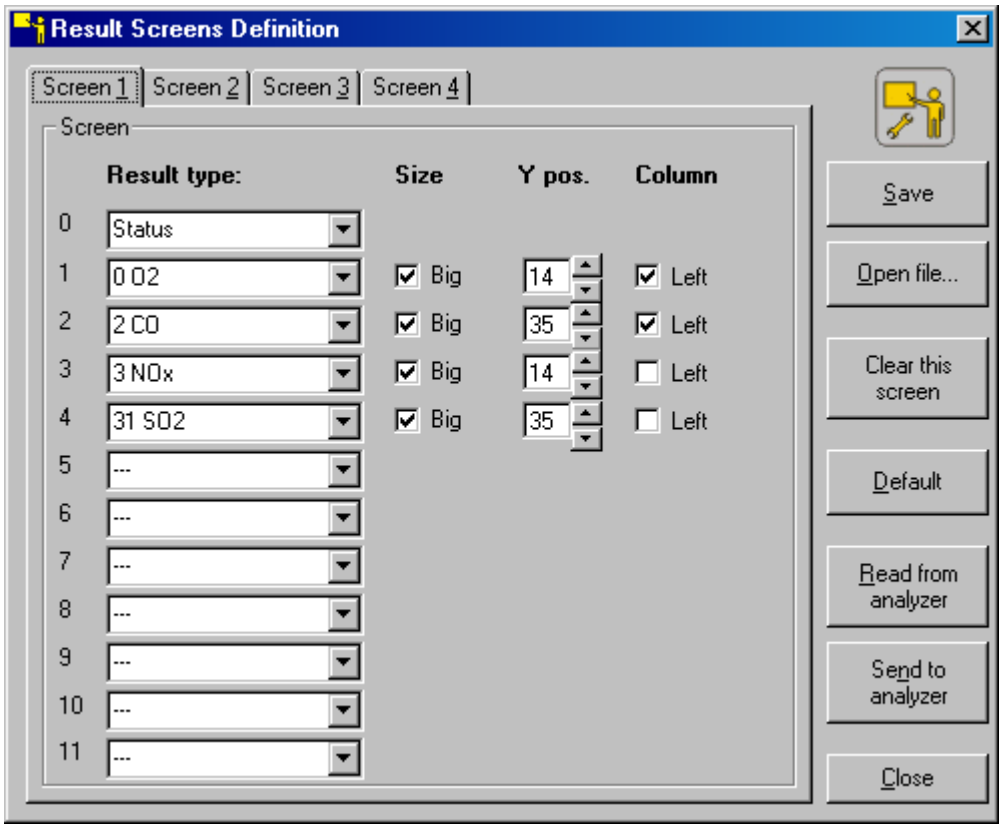


With use of these fields the user is capable of choosing the currently edited line content. The Remove line key removes the highlighted line. The Insert line key adds a new line and situates it right above the currently highlighted line. When the Print partial results field is marked the partial results of triple measurements are also printed.

The Send to analyzer key sends the printout format settings to the analyser memory. The printout settings can be also stored in a file.

The Open file... key opens the file containing the printout settings. The Save key saves the settings and the user defined strings in the file. The Default key returns to the default settings.

Results screen

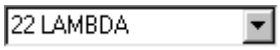


In the analyser four screens presenting the measurement results are available. Each of the screens can be made up of up to 12 results presented in two columns. The bottom line of the analyser's display is used for displaying the menu whereas the first line can be used for displaying the status bar. Each of the results can be presented:

- as big or small (the height of either 16 or 8 pixels)
- in the left or the right column
- at different height – depending on the Y position (0..63)

The analyser display has a resolution of 128 x 64 pixels. The Y position can change from 0 to 63. (0 - the top line of the pixels; 63 - the bottom one). To define the results screens content the user should choose up to 12 results, decide on their size (big/small), their situation – the column (left/right) and the Y position (0..63). If any of the results is not to be displayed, it should be set as "*Empty*" **(---)**.

The *Screen* table contains the following elements:



The choice of the value which is to be displayed can be made with the help of the list shown on the left-hand side. If the choice of the *(---)* symbol is made the result will not be displayed. If the *status* is chosen the status bar will be displayed. In such a

case the parameters: *Column, Size,* and *Y pos.* are unnecessary. The status bar is always displayed in the top line and it takes up both the columns.

If the field is marked the displayed result will be 16 pixels high, otherwise it will measure 8 pixels. The setting does not affect the status bar.

Y pos. – the position on the Y axis (0..63). 0 – the top line; 63 – the bottom line

When the field is marked the result will be presented in the left column.

Saves the settings in the file

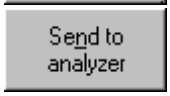
Loads the settings from the file

Sets all the results to be displayed on this screen as *(---)* empty.

Attention: If the choice of *(---)* is made on all of the particular screen lists the screen will not be displayed.

Sets the default results screens configuration.

Loads the settings from the analyser.



Sends the settings to the analyser.

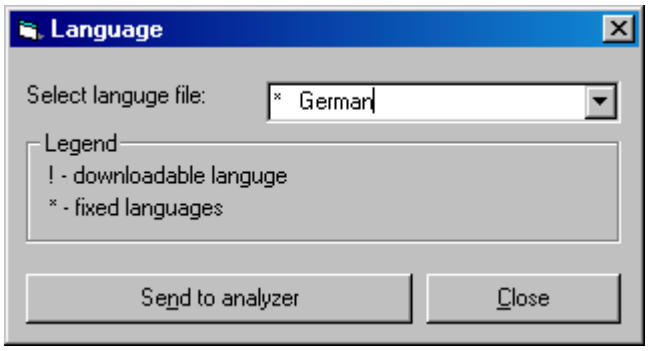
Language

Attention: The option is available only when working with GA12^{plus} or maPress II analyser.

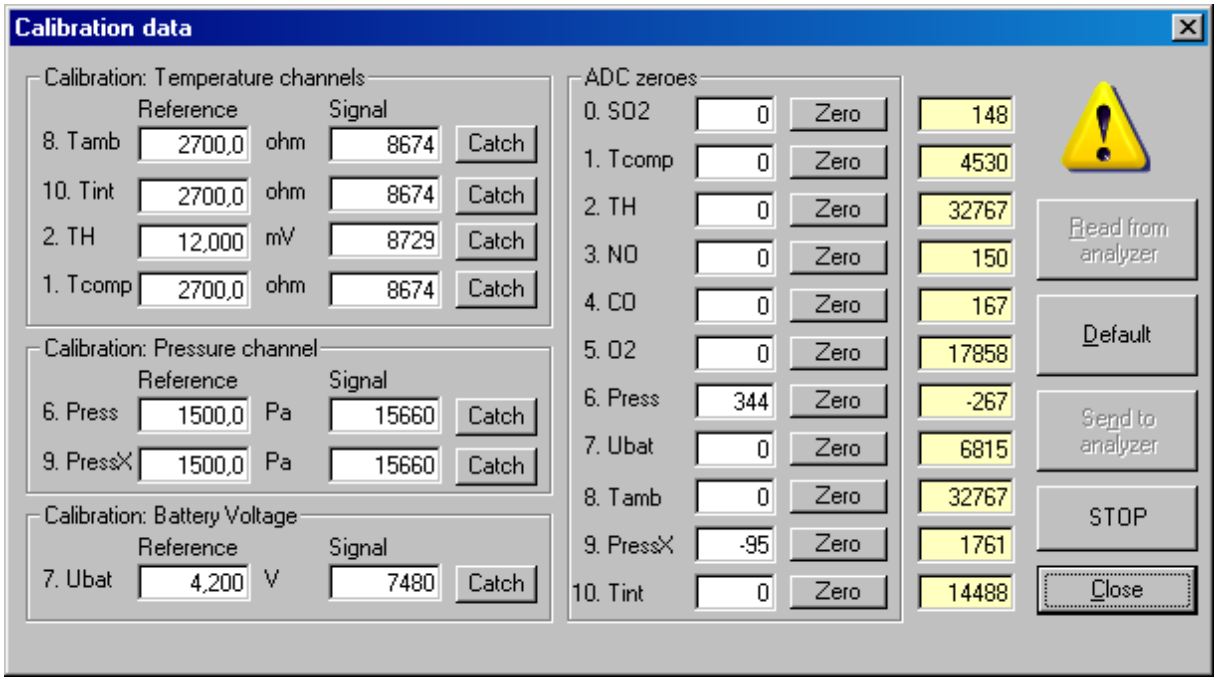
The choice of the device's software language version can be made with the help of the *Language* window. The instrument is pre-programmed with 6 languages marked on the list with *. There is also a possibility of downloading an additional language version chosen from the *Select language file* list with the help of the 

key – the selected version will be marked with *!*. If the user decides to change the additional language version when it is chosen in the device the currently used by the device language version will be changed.

In case of an accidental language change (when having problems with finding the proper setting in the analyser's menu) it is possible to restore the default language by keeping the left function key pressed when starting the analyser (the default language version can be set in the *Analyser main settings* window).

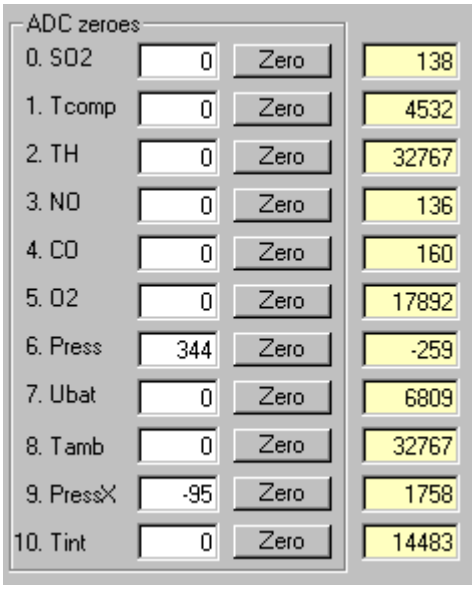


Calibration

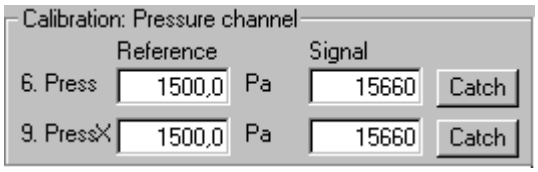


The calibration settings are designed only for the qualified service staff. Madur does not recommend making any changes to these settings.

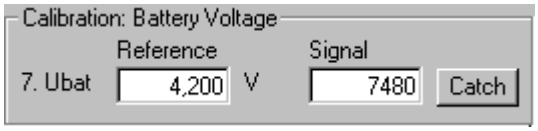
The calibration process should be preceded by the zeroing process of all the channels which means shortening the temperature sensors inputs and disconnecting the gas sensors, and the hoses from the pressure intlets.



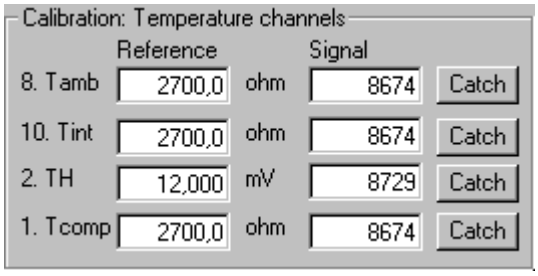
In the yellow boxes the current values of the output signals from the A/C converter are given. With use of the *Zero* key the user can set the current value as the value referring to the zero signal. In the position number 7 – *Ubat* Pressing the *Zero* button enters the 0 value.



To calibrate the pressure channels the user should apply the pressure of the familiar to the user value (measured with another device) to the pressure measurement inlet enter the measured value in the *Reference* field and define the appropriate signal level with use of the *Catch* button.



To calibrate the battery voltage the user should measure it with the help of the external voltmeter, enter the measured value in the *Reference* field and define the appropriate signal level with use of the *Catch* button.



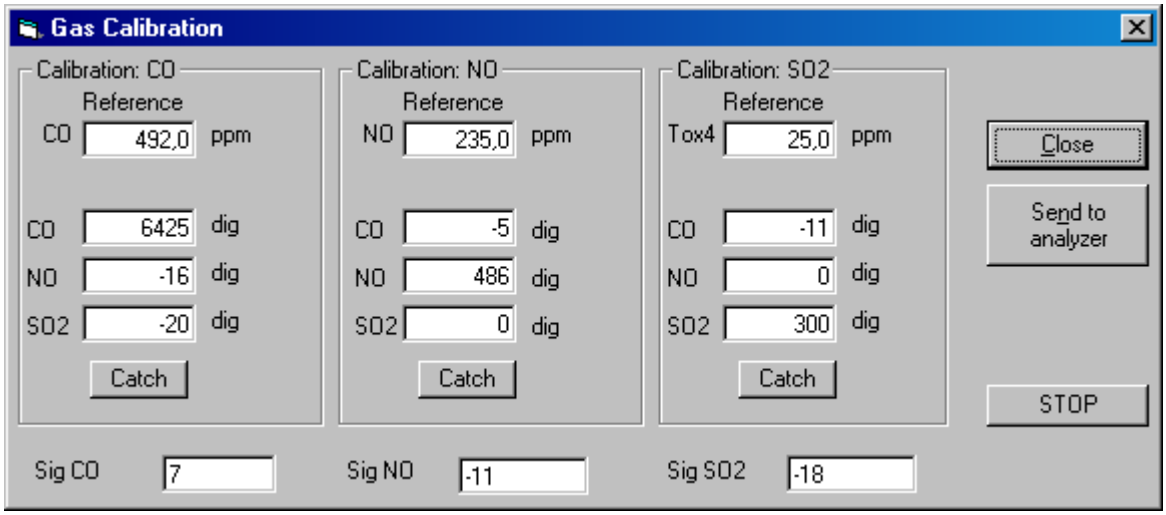
The temperature sensor inlet should be connected to the resistor of a particular resistance (500 ohm – 2 kohm); if the calibration process concerns the gas temperature sensor the resistor should be replaced with the source of the model voltage (approximately 10 mV); later with use of the *Catch* button the user is able to assign the current value of the converter signal to the *Signal* field.

Pressing the STOP button discontinues the measurement process. Pressing the Show results button resumes the measurement.

The calibration data can be send to analyser only in the service mode with use of the Send to analyzer button. There is a possibility of displaying the calibration data currently saved in the analyser's memory in the programme's window. This can be done with the help of the Read from analyzer key.

The Default key returns to the default settings.

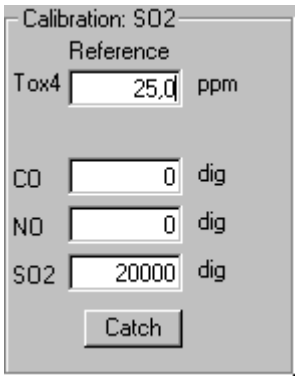
Gas calibration



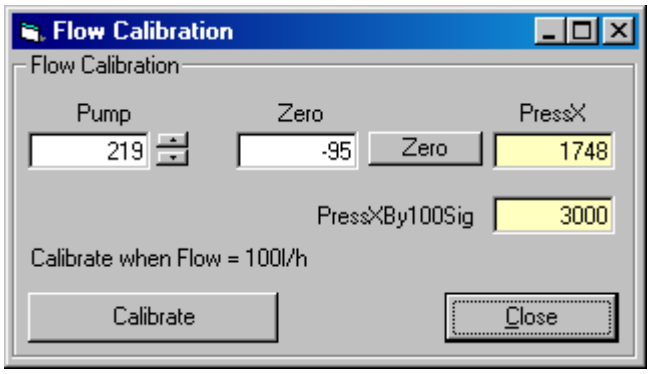
To perform the gas calibration the user should:

- apply the model gas containing the single measured component in the inert gas (for example: CO in N_2)
- enter the gas concentration value in the appropriate *Reference* field
- wait until the readings stabilize (at least 2 minutes)
- press the appropriate *Catch* button
- repeat the procedure for other gases

Attention: If the analyser is not equipped with a particular sensor the values presented below should be entered in the appropriate table (the example below concerns the lack of the SO_2 sensor):



Flow calibration

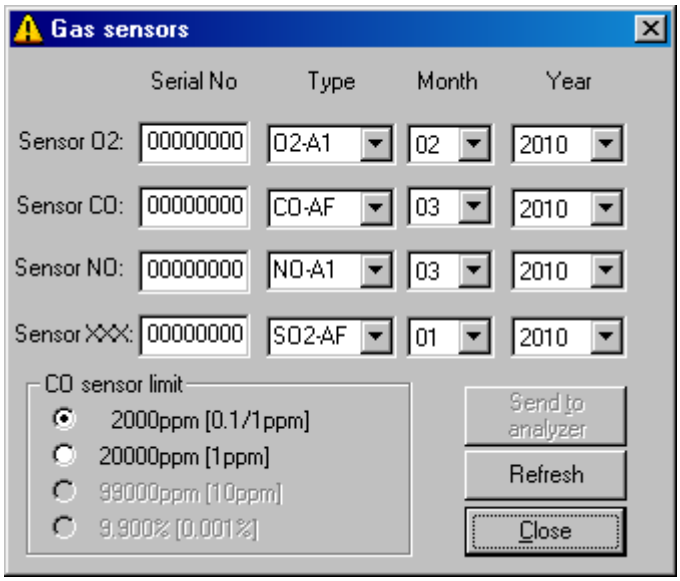


If the flow calibration is to be performed the pump should be switched off and the sensor should be zeroed with the help of the *Zero* button. The flow meter should be connected to the gas channel.

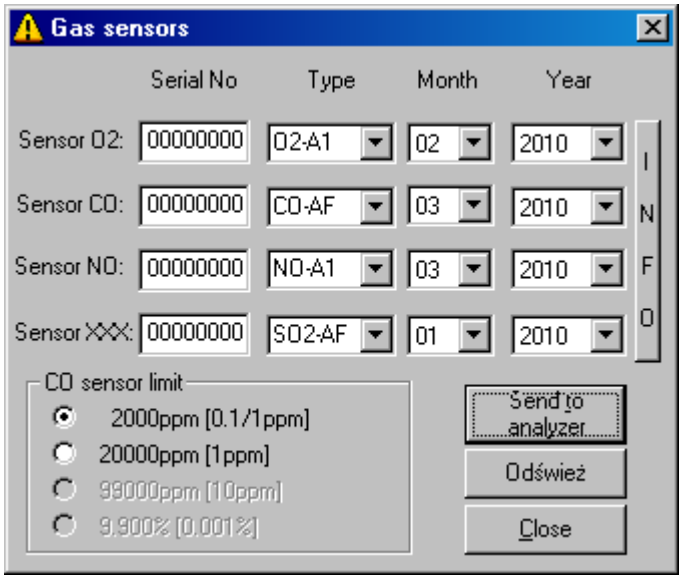
Attention: The user should make sure that dead volume of more than 0,5l between the flow meter and the device is provided.

The pump's capacity can be set with the help of the roller. Its value can be set when the flow is 100l/h. This can be done with use of the *Calibrate* button.

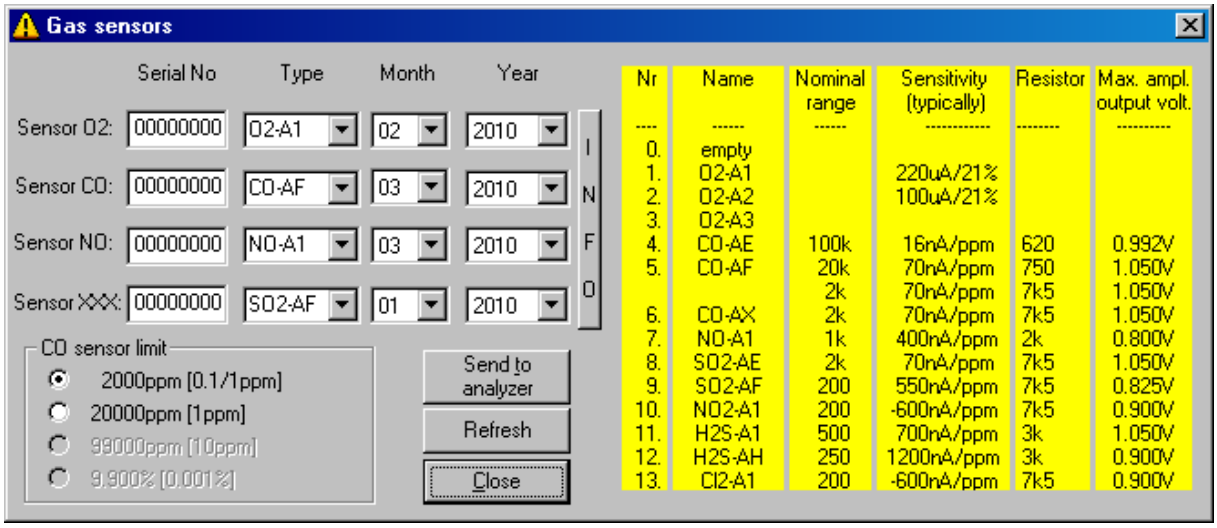
Gas sensors



In the above window the serial numbers and the installation dates of each of the sensors are displayed. The user is not able to make any changes to these settings. They are filled in during the production process of the analyser. If the programme is working in the service mode the window looks as follows:



Pressing the *INFO* button displays the following window with some additional information:



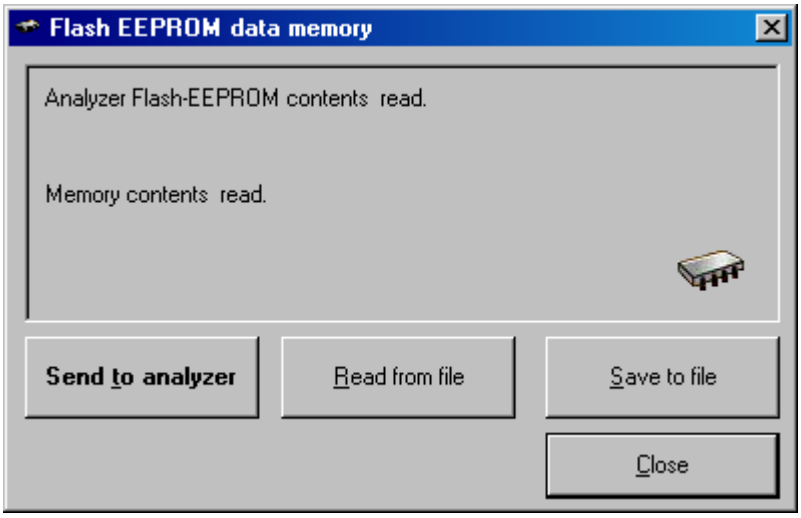
This window enables the user to make changes to the installation dates of the sensors.

Flash memory

This option is designed only for the use of service staff. It enables the user to save the analyser's Flash memory contents in a file. The default name of the file save in the programme's main directory is:

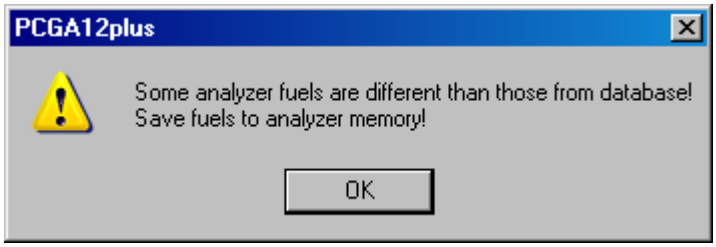
*the_analyser_serial_number*_FlashEE.bin

It is possible to send the file's content to the analyser when working in the service mode. If not, the *Send to analyzer* option is disabled.

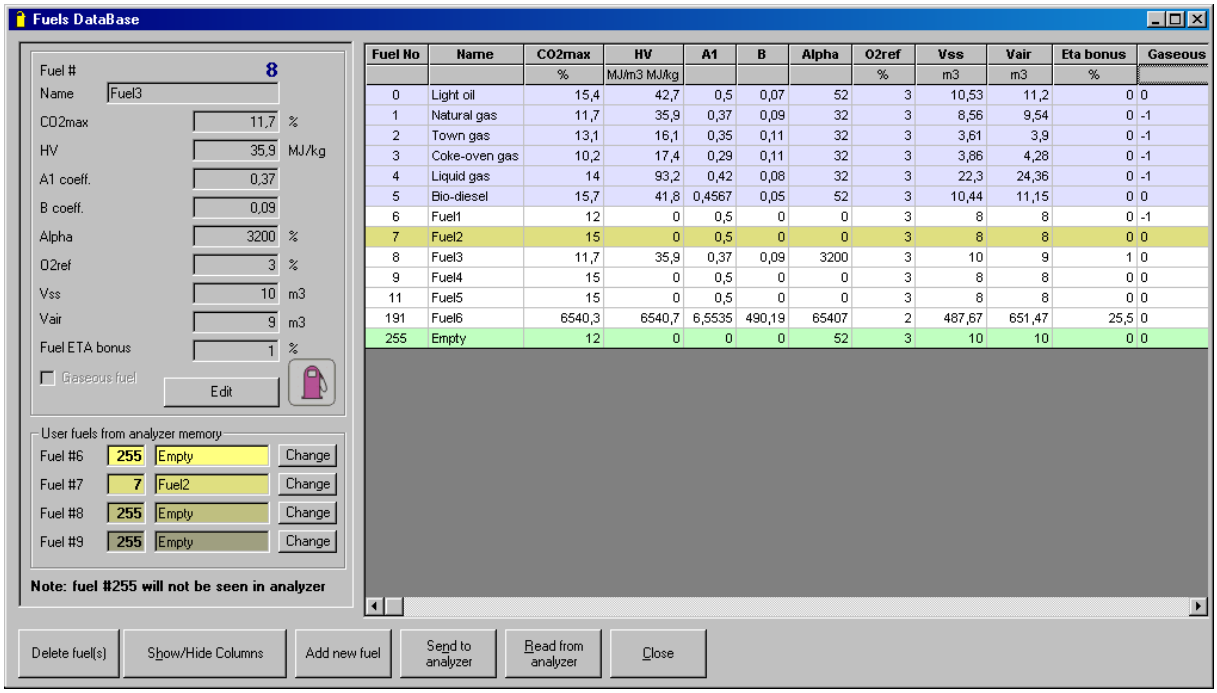


Fuels

The opening of the *Fuels DataBase* might be preceded by the appearance of the following note:



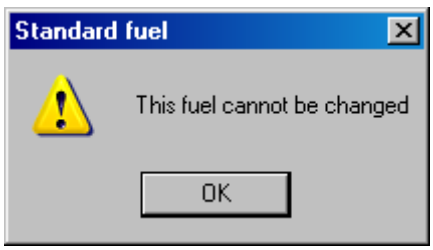
After confirmation the *Fuels Database* will be displayed.



The *Fuels DataBase* can hold up to 256 positions. Each fuel has its individual number Fuel #. The fuel number cannot be edited. The standard fuels are numbered 0-5. These are:

- 0 Light oil
- 1 Natural gas
- 2 Town gas
- 3 Coke-oven gas
- 4 Liquid gas
- 5 Bio-diesel

The fuel number 255 is the so-called “empty fuel” - it will not be seen in the analyser . The parameters of the standard fuels cannot be edited:

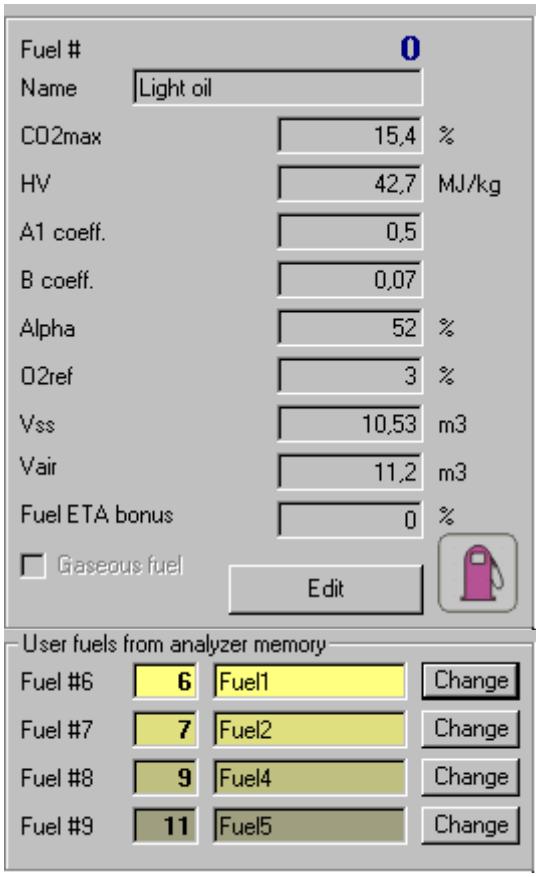


All the other fuels (numbered 6-254) can be defined by the client. The analyser has six programmed standard fuels and the memory holding up to 4 additional fuels defined by the user. The *Fuels DataBase* window makes it possible for the user to define the new fuels and send their parameters to the analyser when needed.

The *Fuels DataBase* window elements:

Fuel No	Name	CO2max	HV	A	B	Alpha	O2ref	Vss	Vair	Eta bonus
0	Light oil	15,4	42,7	0,5	0,07	52	3	10,53	11,2	0
1	Natural gas	11,7	35,9	0,37	0,09	32	3	8,56	9,54	0
2	Town gas	13,1	16,1	0,35	0,11	32	3	3,61	3,9	0
3	Coke-oven gas	10,2	17,4	0,29	0,11	32	3	3,86	4,28	0
4	Liquid gas	14	93,2	0,42	0,08	32	3	22,3	24,36	0
5	Bio-diesel	15,7	41,8	0,4567	0,05	52	3	10,44	11,15	0
6	Fuel1	12	0	0,5	0	0	3	8	8	0
7	Fuel2	15	0	0,5	0	0	3	8	8	0
8	Fuel3	11,7	35,9	0,37	0,09	3200	3	10	9	1
9	Fuel4	15	0	0,5	0	0	3	8	8	0
11	Fuel5	15	0	0,5	0	0	3	8	8	0
191	Fuel6	6540,3	6540,7	6,5535	490,19	65407	2	487,67	651,47	25,5
255	Empty	12	0	0	0	52	3	10	10	0

The above table contains the fuels parameters.



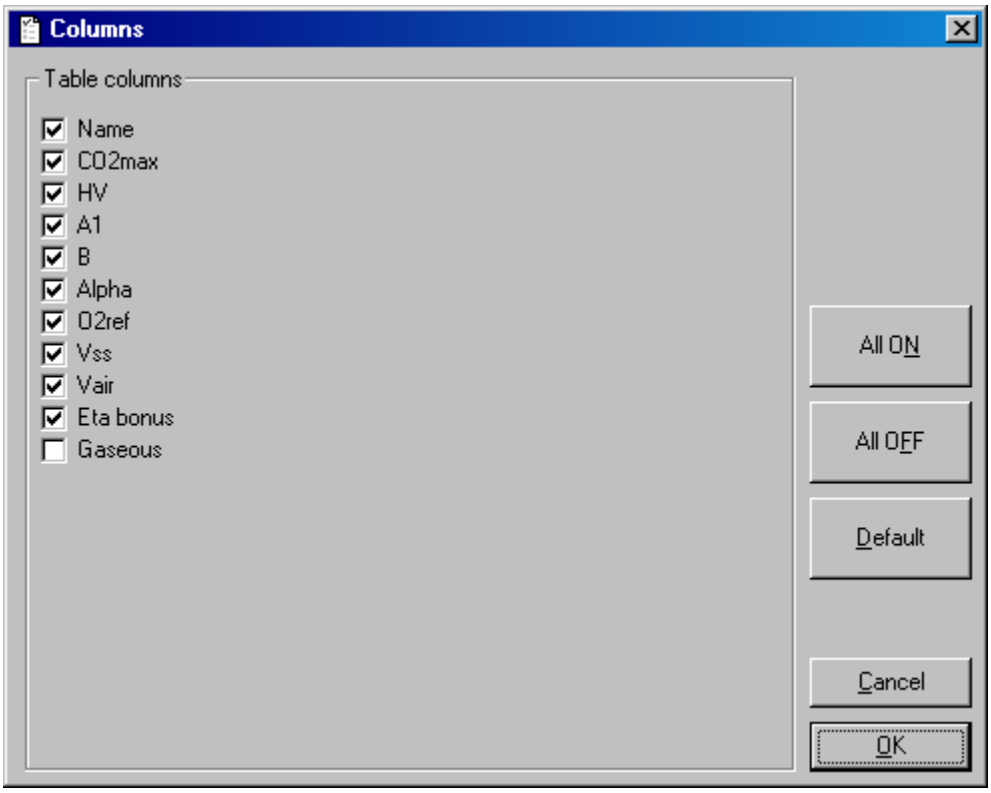
The table with the chosen fuel parameters.

The Edit button enables the user to edit the parameter values.

The numbers and the names of the fuels saved in the analyser's memory. Each of the fuels is highlighted with different colour. Accordingly, the lines containing the data of the particular fuel in the fuels parameters table is of the same colour. Pressing the Change key will

replace the appropriate fuel with the one currently indicated in the fuels parameters table.

The Show/Hide Columns key displays the following window:

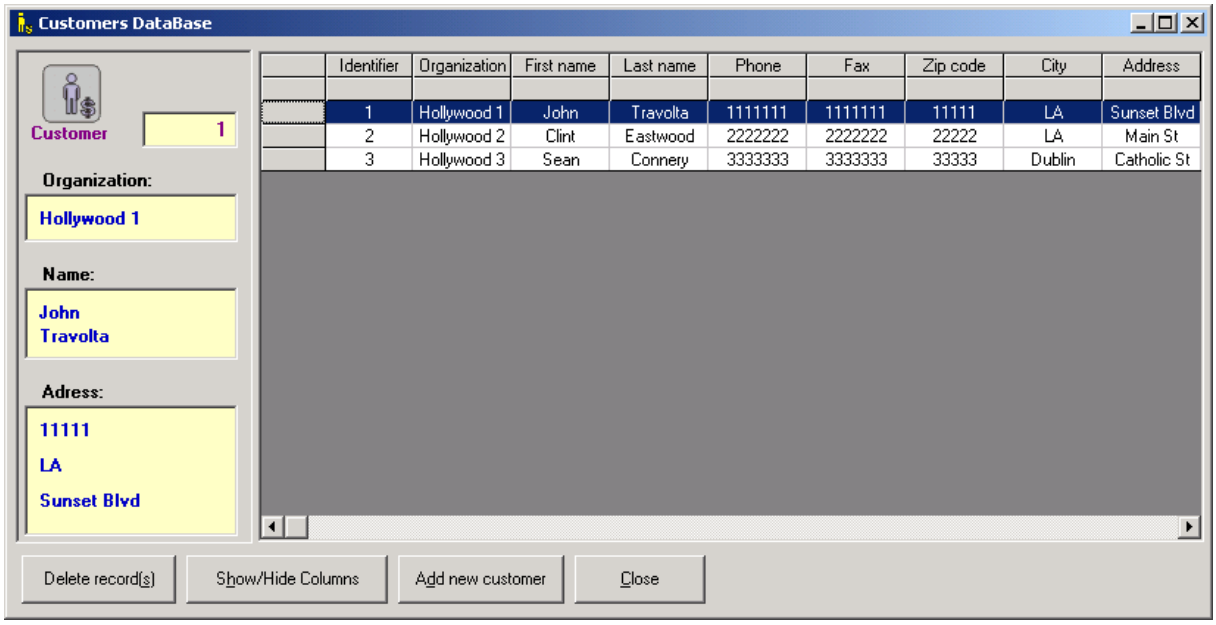


The window enables the user to choose the fuel parameters which are to be displayed in the table.

Pressing the Send to analyzer key sends the chosen fuel parameters to the analyser's memory.

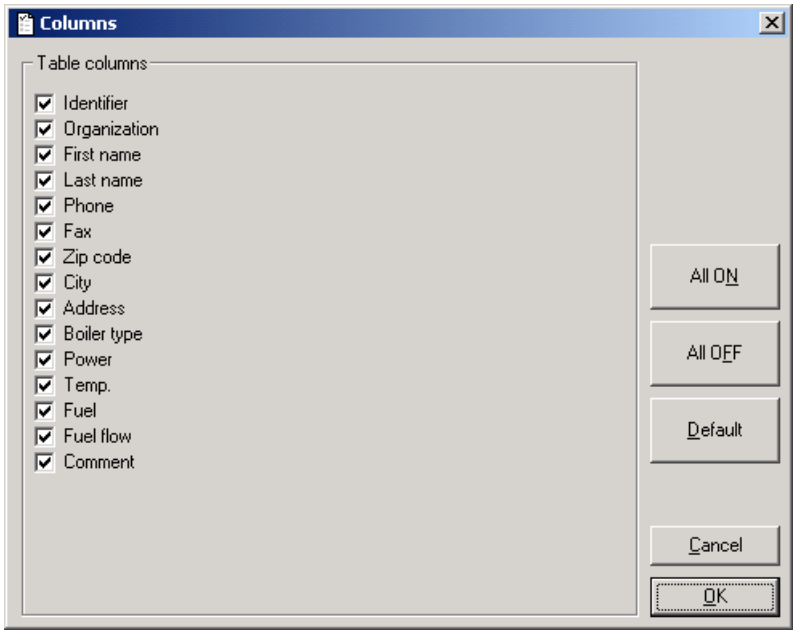
The Read from analyzer key imports the user's fuel parameters from the analyser.

Customers



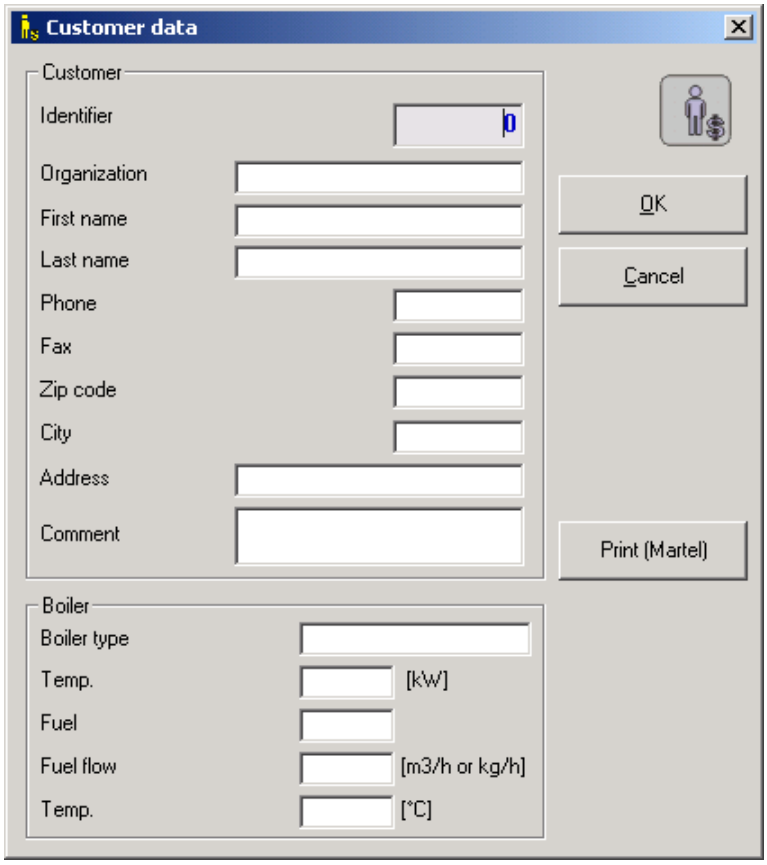
With the help of the above window it is possible to edit the *Customers DataBase*. The table on the right-hand side of the window contains all the customers data. Indicating the particular line of the table displays the customers data in the field on the left-hand side of the *Customers DataBase* window.

Pressing the Delete record(s) key deletes the indicated records. Pressing the Show/Hide Columns key displays the following window:



The window allows the user to choose the data which is to be displayed in the table. The Default key resets the default table columns configuration.

Pressing the Add new customer key opens the window presented below:



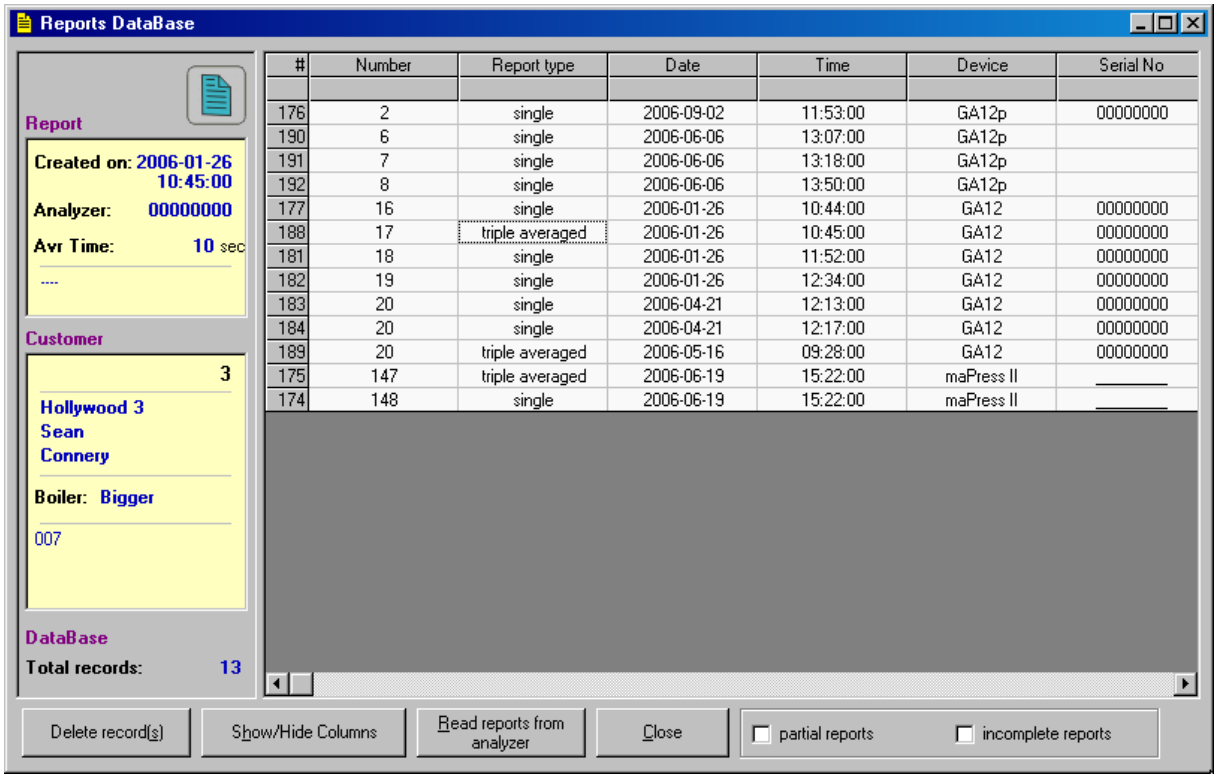
When the customer data have been filled in and the OK key has been pressed the customer will be added to the *Customers DataBase*.

Attention: If the customer owns more than one boiler it is necessary to create separate records for each of the boilers.

Double clicking on the table's line enables the user to edit the customer data. Editing the customer data is performed with the help of the same window which is used when adding a new customer.

Attention: Each of the customers has an individual number – the identifier. The identifier is generated automatically when a new customer is created. The identifying number should be used when compiling a report in the analyser.

Reports

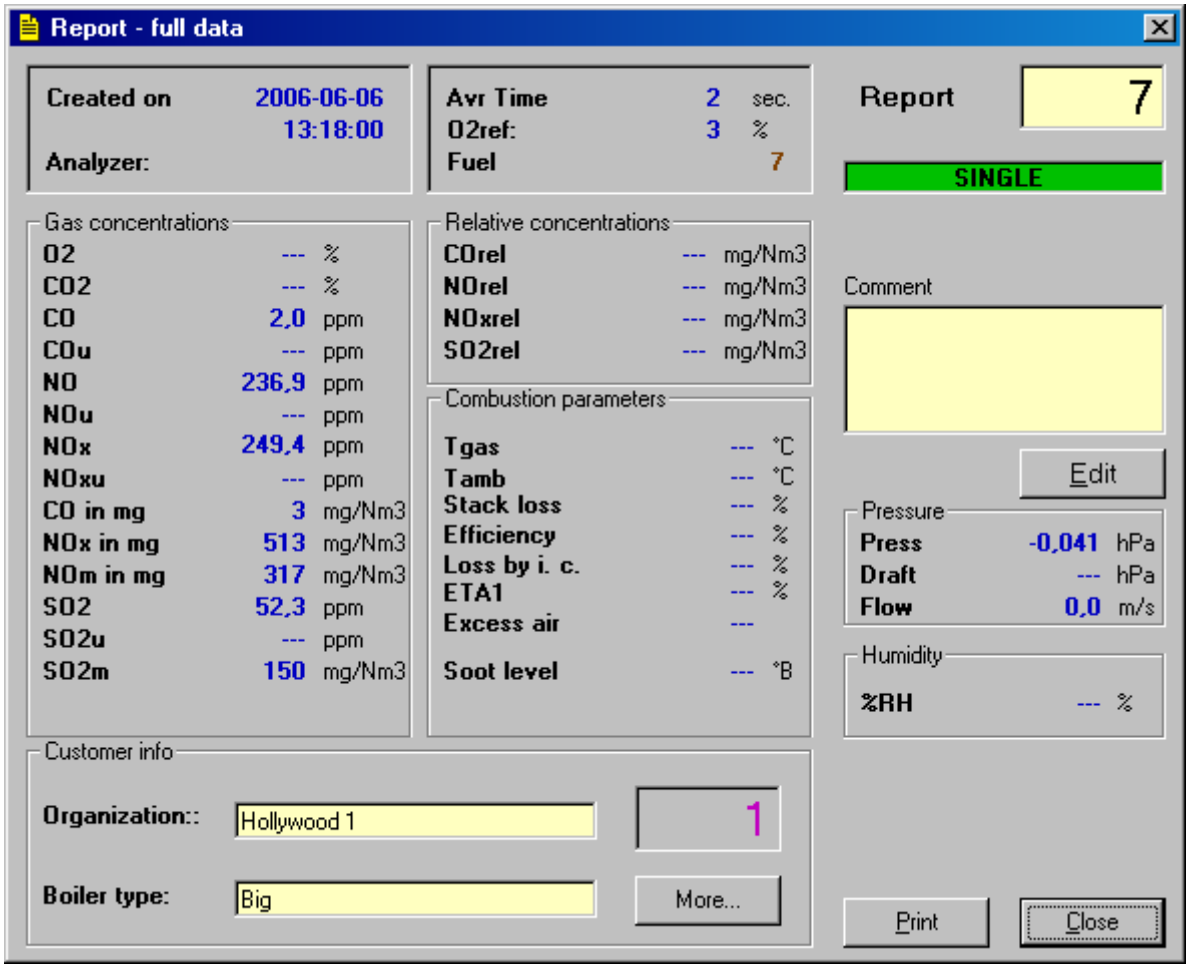


#	Number	Report type	Date	Time	Device	Serial No
176	2	single	2006-09-02	11:53:00	GA12p	00000000
190	6	single	2006-06-06	13:07:00	GA12p	
191	7	single	2006-06-06	13:18:00	GA12p	
192	8	single	2006-06-06	13:50:00	GA12p	
177	16	single	2006-01-26	10:44:00	GA12	00000000
188	17	triple averaged	2006-01-26	10:45:00	GA12	00000000
181	18	single	2006-01-26	11:52:00	GA12	00000000
182	19	single	2006-01-26	12:34:00	GA12	00000000
183	20	single	2006-04-21	12:13:00	GA12	00000000
184	20	single	2006-04-21	12:17:00	GA12	00000000
189	20	triple averaged	2006-05-16	09:28:00	GA12	00000000
175	147	triple averaged	2006-06-19	15:22:00	maPress II	_____
174	148	single	2006-06-19	15:22:00	maPress II	_____

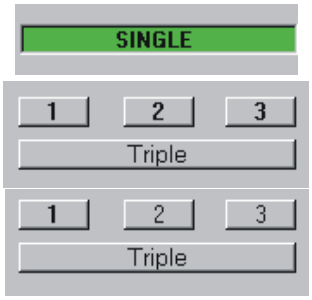
The *Reports DataBase* window.

There is the table of the saved reports on the right-hand side of the window. After the table's line has been marked, information about the measurement time, the analyser serial number, the measurement averaging time, the customer and the boiler type will be displayed in the left-hand column.

Double clicking on the table's line opens the following window:



The window contains all the measurement parameters and results. The field below the report number on the right hand side of the window informs the user of the report type.

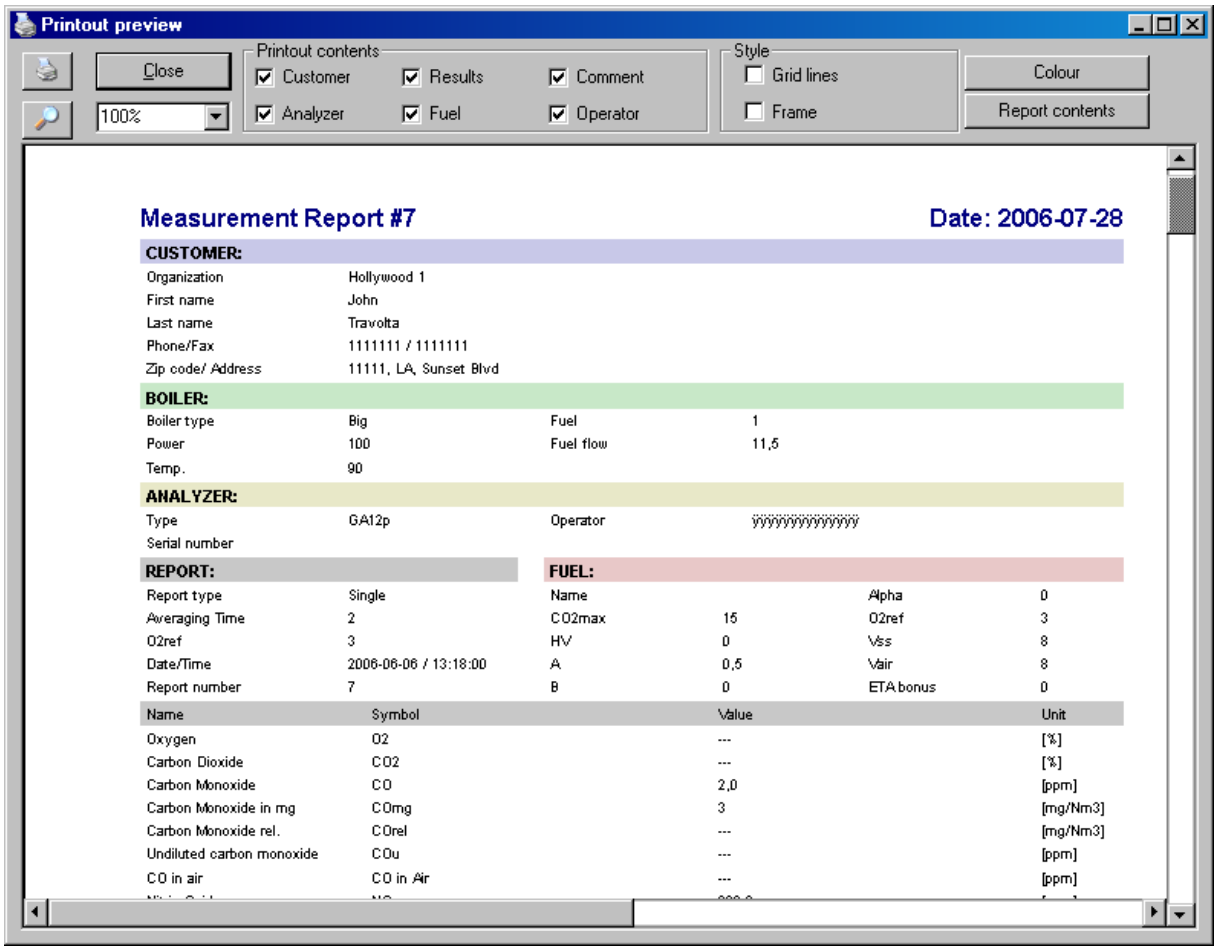


The single report

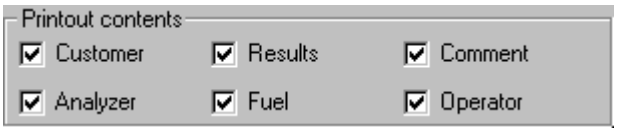
The averaged report

The first partial report of the triple report

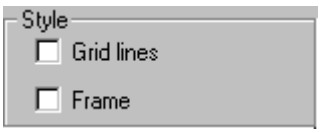
There is also a possibility of adding a comment to the report content and printing the report. Pressing the Print key opens the *Printout preview* window:



Marking and unmarking the fields at the top of the window, the user can decide on the printout content.



Choosing between the colour and the black-and-white printout versions can be carried out with the help of the Colour key. The *Style* table enables the user to decide on the printout appearance. Marking the appropriate field turns the grid lines and the frame on.



Pressing the Report contents key opens the *Database columns* window.

The user can decide on the contents of the report which are to be printed.

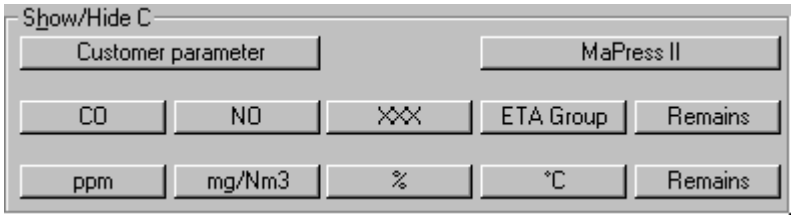
The keys on the right-hand side have the following functions:

– the All ON key marks all the active fields

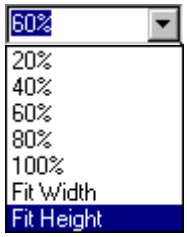
– the All OFF key leaves all the fields unmarked

– the Default key sets the default configuration of the results which are to be printed

In the Show/Hide C table the measurement results are grouped in a number of configurations. The table enables the user to set the desired configuration of the results in a quicker way.



Pressing the key starts printing of the report. Pressing the key switches to the next preview format. The choice of the preview format can also be done with use of the following list:

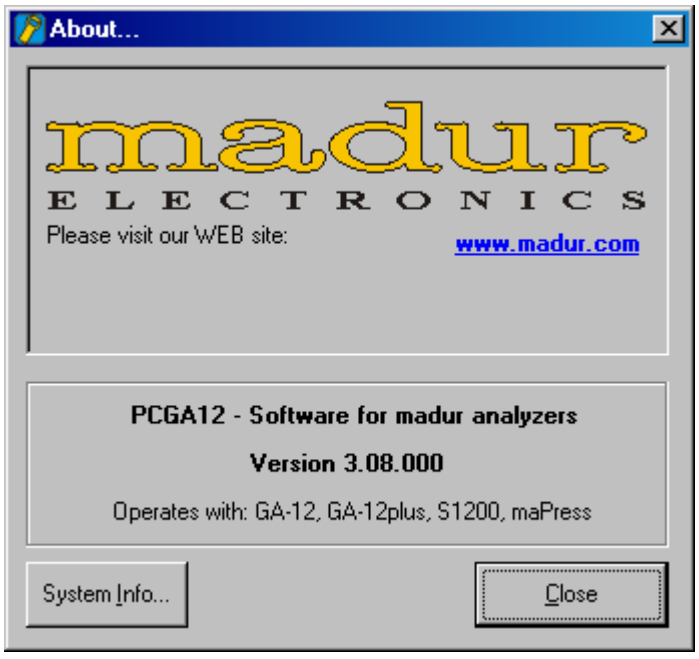


Help

Opens the *Help* window.

About...

Opens the window with the information on the application:



Pressing the System Info... key starts the *Information on the Microsoft system* programme.