

GA-12^{*plus*} service programme

Manual

v.2.12



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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:

PCGA12	plus	×
8	No answer from analyzer	·
	ОК	

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 $\underline{4}$.

Quick access menu bar



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

- <u>Restart transmission</u>
- <u>Port</u>
- <u>User data</u>
- <u>Remote control</u>

- <u>Results</u>
- Main settings
- <u>Charts</u>
- Analyser printouts defining
- <u>Results screen</u>
- Fuels DataBase
- <u>Customers DataBase</u>
- <u>Reports DataBase</u>

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

Status bar

Ready	COM: 3 @ 19200,n,8,1	GA12 plus, vers. 0.12	00000001	SERVICE
-------	----------------------	-----------------------	----------	---------

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

Quit	Ctrl+Q
Service mode	
User data	
Programme settings	
Restart transmission	F8

Restart transmission

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

Programme settings

Pro	grar	nme settings				
F	Port	Language				
	ר ^א ≀	vailable COM po	ints			
		COM port:	COM2	•		
		<u>0</u> K			<u>C</u> lose	

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.

P	rogramme settings
	Port Language
	Available language
	Select language: English

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

User Information

The following window will be displayed:

🐌 User Informat	ion			×
Operator				
Organization:	þ			Î Î
First name:	0	Last name:	0	
Phone:	0	Fax:	O City:	0
Zip code:	0	Address:	0	
			<u>C</u> ancel	<u>0</u> K

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:

<table-of-contents> Enter Password</table-of-contents>	×
	ОК

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

Ready COM: 3 @ 19200,n,8,1	GA12 plus, vers. 0.12	00000001	SERVICE
----------------------------	-----------------------	----------	---------

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

manual

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.

Foreground color Background color

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

Capture <u>d</u>isplay

key. The file is saved

in the programme directory and its name is generated automatically.

The

Close

button closes the window.

Results

Heasurement r	esults			×
20.95	% 02	46	mg CO	g/GJ ECO
0.00	% CO ₂	11	mg NO _x	g/GJ ENO,
37	ppm CO	—	r mg CO	— ppm CO _u
5	ppm NO _x		r mg NO _x	- ppm NO _{x1}
Small windov	V		~	
🔲 Saving [File: /Re	esults.csv]			

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 <u>Small window</u> key will change the size of the window (the number of the presented results will decrease).



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:

Tamb	["C]	•
Tamb	["C]	
Tint	["C]	
Ubat	[V]	
Humidity	[%]	
Pressure	[hPa]	
Stack L.	[%]	
CO loss	[%]	
Effic.	[%]	•

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

/T1	
The	

<u>C</u>lose

button closes the window.

Analyser settings



Main settings

The window similar to the window shown below will appear.

🖌 Analyzer main settings		X
ppm to mg factor C0 1,250 mg/ppm S02 2,860 mg/ppm N0 1,340 mg/ppm H2S 1,520 mg/ppm N02 2,056 mg/ppm CL2 3,220 mg/ppm Default	Results: 2 Saved report: 3 Fast printer	Calibration None Auto (55H) O <u>O</u> K (AAH) I Lock CO/NOx/Press calibration
Averaging & Resolution 02 8 sec. HiRes Pflow 2 sec. C0 8 sec. HiRes Tint 2 sec. N0 8 sec. HiRes Tamb 2 sec. With a sec. HiRes T c 2 sec. Press 8 sec. HiRes T gas 2 sec. Ubat 2 sec. RH% HiRes	Bit settings ✓ "Ambient CO" test Differential pressure sensor US date 25% 02 range ✓ CO/NOx zeroing with 02 calibr. ✓ 02 zeroing with CO calibration ÖNORM ✓ Use 02ref from fuel data	Numeric settings Serial No 00000001 Report # 0 Contrast 3 Backlight (03) 0 Backlight (060s) 0 N0 in N0x [%] 95,0 C0 sensor limit 2000,0 Language version Spanish
C0 sensor range Pump settings © 2000ppm [0.1/1ppm] © 20000ppm [1ppm] © 39000ppm [10ppm] © 3,800% [0.001%]	old	Send <u>t</u> o analyzer

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

	The ppm to mg factor table
ppm to mg factor	
CO 1,250 mg/ppm SO2 2,860 mg/ppm	Enables the user to define the
NO 1,340 mg/ppm H2S 1,520 mg/ppm	factor used for converting ppm into
N02 2,056 mg/ppm CL2 3,220 mg/ppm	mg.
Default	Pressing the Default button
	sets the default value of the factor.
C Li-lon (built-in)	Battery Type table
Alkaline (replaceable)	Enables the user to define the
O NiCd (replaceable)	kind of the battery that powers the
NiMH (replaceable)	analyser.
- Numeric settings	The Numeric settings table
Serial No 00000001	- Serial No - the serial number of the
Report # 0 Contrast 3	device.
Backlight (03)	- <i>Report</i> # - the initial readings of the
Backlighting (060s)	reports counter.
NO in NOx [%] 95,0	
CO sensor limit 2000,0	display contrast levels are available –
	$0 \dots 15; 0$ – the minimum contrast
Language version Spanish	level).
-	Backlight (03) - the backlight of the
	display (4 backlight level are available
	-03; 0 – the minimum backlight
	brightness).
-	- Backlighting (060s) - 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
Averaging & Resolution	analyser. The Averaging & Resolution table
02 2 💌 sec. 🔽 HiRes Pflow 2 💌 sec.	
CO 2 💌 sec. 🗖 HiRes Tint 2 💌 sec.	The table enables the user to set the averaging times of the measured
CO 2 v sec. HiRes Tint 2 sec. NO 2 v sec. HiRes Tamb 2 sec.	The table enables the user to set
CO 2 sec. HiRes Tint 2 sec. NO 2 sec. HiRes Tamb 2 sec. XXX 2 sec. HiRes T c 2 sec.	The table enables the user to set the averaging times of the measured
CO 2 v sec. HiRes Tint 2 sec. NO 2 v sec. HiRes Tamb 2 sec. VXX 2 v sec. HiRes T c 2 sec. Press 2 v sec. HiRes T gas 2 sec.	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> option will
CO 2 sec. HiRes Tint 2 sec. NO 2 sec. HiRes Tamb 2 sec. XXX 2 sec. HiRes T c 2 sec.	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> option will increase the resolution of the
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> option will increase the resolution of the measurement. The resolution values for different measurement channels are: the
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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),
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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 0.1 mm/0.001 inch/0.1 Pa or 1 mm/0.01 inch/1 Pa) and humidity
CO 2 ▼ sec. ► HiRes Tint 2 ▼ sec. NO 2 ▼ sec. ► HiRes Tamb 2 ▼ sec. XXX 2 ▼ sec. ► HiRes T c 2 ▼ sec. Press 2 ▼ sec. Filters T gas 2 ▼ sec. Ubat 2 ▼ sec. Image: HiRes T mage: HiRes T mage: HiRes	The table enables the user to set the averaging times of the measured values. Marking the <i>HiRes</i> 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 0.1 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

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 Printout format *Fast printer* field is marked the printer • Results: 2 uses the Martel printer commands, 3 • Saved report: otherwise the HP commands are used 🔽 Fast printer (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. Calibration The Calibration table O None O Auto (55H). The choice of the following OK (AAH) settings is to be made only by service Lock CO/NOx/Press calibration 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

 CO sensor range ② 2000ppm [0.1/1ppm] ③ 20000ppm [1ppm] ③ 99000ppm [10ppm] ③ 9.900% [0.001%] 	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 <i>Gas</i> <i>sensors</i> window.
Pump settings ☐ Pump Off ☐ Pump Hi (+25%) ☐ Stop pump when Hold	 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
 Bit settings ✓ "Ambient CO" test Differential pressure sensor US date ②RH sensor 25% 02 range ✓ CO/N0x zeroing with 02 calibr. ✓ 02 zeroing with CO calibration ÖNORM Use 02ref from fuel data 	 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, SO₂ 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

ld	field	the	If	device.	the	in
an b	e car	value	2ref	ed the O	marke	unr
			3%.	ge of 01	a rang	in a

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

🔁 Chart options	×
Vars 0-7 Vars 8-15 Vars 16-23 Vars 32-39 ▲ 02 [%] max 0,00 25,00 C0 [ppm] max N0x [ppm] min max 0,0 2000,0 0,0 2000,0 0,0 2000,0	Active charts ✓ 02 CO [g/GJ] S02m C02 N0x [g/GJ] S02rel ✓ C0 COu S02u ✓ N0x N0xu ES02 CO [mg/Nm3] ✓ Tgas N0x [mg/Nm3] ✓ Tamb CO rel Tint N0x rel Ubat ¾rH Excess Air ✓ Pressure Flow ✓ Stack loss ✓ N0 CO loss N0m Eta NOrel ✓ Eta* NOu ✓ Lambda ENO Tox. index ✓ S02
Default min/max values	All O <u>N</u> All O <u>F</u> F <u>D</u> efault
	Read from Send to Close

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

Active charts	
▼ 02 □ C0 [g/GJ] □ S02m □ C02 □ N0x [g/GJ] □ S02rel ▼ C0 □ C0u □ S02u ▼ N0x □ N0xu □ ES02 □ C0 [mg/Nm3] ▼ Tgas □ N0x [mg/Nm3] ▼ Tamb □ C0 rel □ Tint □ N0x rel □ Ubat	The table enables the user to define which measurement results will be presented on the charts. The keys below have the following functions:
%rH Excess Air Pressure Flow Stack loss NO CO loss NOm Eta NOrel Eta* NOu Eta* ENO Tox. index S02	 All ON marks all the fields All OEF unmarks all the fields
Tox. index I ON All O <u>F</u> F Default	- Default returns to the default settings
Vars 0-7 Vars 8-15 Vars 16-23 Vars 32-39 ▲ 02 [%] max 0.00 25.00 CO [ppm] max 0.0 2000.0 min max 0.0 2000.0	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.
Default min/max values	
The Bead from and Send to but	tons 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 Remove line line content. The kev highlighted line. removes the 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 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

Res	ult Screens Definition				×
	en <u>1</u> Screen <u>2</u> Screen <u>3</u> een	Screen <u>4</u>			
	Result type:	Size	Y pos.	Column	Save
0	Status 💌				
1	0 02	🔽 Big	14 +	🔽 Left	<u>O</u> pen file
2	2 CO 💌	🔽 Big	35 +	🔽 Left	
3	3 NOx 💌	🔽 Big	14 -	🗖 Left	Clear this screen
4	31 SO2 💌	🔽 Big	35	🗖 Left	
5	🔻				Default
6	🔻				
7	🔻				Read from
8	🔻				analyzer
9	🔻				Send to
10	🔻				analyzer
11	··· ·				<u>C</u> lose

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 $128 \ge 64$ 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:

22 LAMBDA

-

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 <u>Send to analyzer</u> 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.

Default Read from analyzer Send to analyzer

🔽 Left

🔽 Big



<u>O</u>pen file...

Clear this screen 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).

🖷, Language		×]
Select languge file:	* German	•	
Legend ! - downloadable lang * - fixed languages	uge		
Se <u>n</u> d to ana	alyzer	<u>C</u> lose	

Calibration

Calibration data		×
Calibration: Temperature channels	ADC zeroes	
Reference Signal 8. Tamb 2700.0 ohm 8674 Catch	0. SO2 0 Zero 148	3 🔨
	1. Tcomp 0 Zero 4530	
10. Tint 2700,0 ohm 8674 Catch	2. TH 0 Zero 3276	Read from
2. TH 12,000 mV 8729 Catch	3. NO 0 Zero 150	
1. Tcomp 2700,0 ohm 8674 Catch	4. C0 0 Zero 167	
Calibration: Pressure channel	5. 02 0 Zero 17858	<u>D</u> efault
Reference Signal 6. Press 1500,0 Pa 15660 Catch	6. Press 344 Zero -267	
	7. Ubat 0 Zero 6815	Se <u>n</u> d to analyzer
	8. Tamb 0 Zero 32767	7
Calibration: Battery Voltage Reference Signal	9. PressX 95 Zero 176	STOP
7. Ubat 4,200 V 7480 Catch	10. Tint 0 Zero 14488	

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.

manual

ADC zeroe	s		
0. SO2		Zero	138
1. Tcomp	0	Zero	4532
2. TH	0	Zero	32767
3. NO	0	Zero	136
4. CO	0	Zero	160
5. 02		Zero	17892
6. Press	344	Zero	-259
7. Ubat	0	Zero	6809
8. Tamb	0	Zero	32767
9. PressX	-95	Zero	1758
10. Tint	0	Zero	14483

Calibration: Pressure channel					
Reference Signal					
6. Press	1500,0	Pa	15660	Catch	
9. PressX	1500,0	Pa	15660	Catch	

- Calibration: Battery Voltage									
	Reference	Signal							
7. Ubat	4,200 V	7480	Catch						

Calibration: Temperature channels										
	Reference	Signal								
8. Tamb	2700,0	ohm	8674	Catch						
10. Tint	2700,0	ohm	8674	Catch						
2. TH	12,000	mV	8729	Catch						
1. Tcomp	2700,0	ohm	8674	Catch						

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.

Pressir	ng the	STOP	button	discontinues	the	measurement	process.
Pressing the	Show results	button	resumes	the measurem	lent.		

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 \underline{D} efault key returns to the default settings.

Gas calibration

🐂 Gas Calibration			×
Calibration: CO Reference CO 492,0 ppm	Calibration: NO Reference NO 235,0 ppm	Calibration: SO2 Reference Tox4 25,0 ppm	<u>[</u> lose
CO 6425 dig NO -16 dig SO2 -20 dig	CO -5 dig NO 486 dig SO2 0 dig	CO11 dig NO0 dig SO2300 dig	Se <u>n</u> d to analyzer
Catch	Catch	Catch	STOP
Sig CO 7	Sig NO -11	Sig SO2 -18	

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 N₂)
- 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):

	ration: SO2- Reference	
Tox4	25,0	ppm
CO		dig
NO		dig
S02	20000	dig
	Catch	

Flow calibration

🐃 Flow Calibration		_ D ×
- Flow Calibration		
· ····		PressX
219 🗧	-95 Zero	1748
	PressXBy100Sig	3000
Calibrate when Flow = 1001/	'n	
Calibrate		lose

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 0,51 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 1001/h. This can be done with use of the *Calibrate* button.

Gas sensors

<u> A</u> Gas sensors	:					×
Seri	ial No	Туре	М	onth	Yea	ər
Sensor 02: 000	00000	2-A1	- 02	2 💌	2010	•
Sensor CO: 000	00000 C	0-AF	- 03	} 💌	2010	•
Sensor NO: 000	00000 N	0-A1	• 03	} 🔻	2010	•
Sensor XXX: 000	00000 s	02-AF	• [01	-	2010	•
🗧 🗆 CO sensor limit					Condito	_
 2000ppi 	m (0.1/1pp	m]			Send to analyze	
C 2000pp	m [1ppm]				Refresh	
C 99000pp	m [10ppm]			_	nerresh	·
C 9,900% (0.001%]			(<u>C</u> lose	

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:

<u> </u> Gas	sensors				×
	Serial No	Туре	Month	Year	
Sensor O	2: 00000000	02-A1 💌	02 💌	2010 💌] [
Sensor C	0: 00000000	CO-AF 💌	03 💌	2010 💌] N
Sensor N	0: 00000000	NO-A1 💌	03 💌	2010 💌] F
Sensor X	∞: 00000000	SO2-AF 💌	01 💌	2010 💌] [
⊢CO se	nsor limit ———				
•	2000ppm [0.1/1	lppm]		Senđ <u>t</u> o analyzer	
	20000ppm (1ppn	n]			
0	39000ppm (10pp	m]	_	Odśwież	
0	9.900% [0.001%]			<u>C</u> lose	

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

<u> A</u> Gas se	nsors									×
	Serial No	Туре	Month	Year	Nr	Name	Nominal range	Sensitivity (typically)	Resistor	Max, ampl. output volt.
Sensor 02:	00000000	02-A1 💌	02 💌	2010 💌 📊	 0.	empty		(opically) 		
Sensor CO:	00000000	CO-AF 💌	03 💌	2010 💌 N	1. 2.	02-A1 02-A2		220uA/21% 100uA/21%		
Sensor NO:	00000000	NO-A1 💌	03 💌	2010 💌 F	3. 4.	02-A3 CO-AE	100k	16nA/ppm	620	0.992V
Sensor XXX	: 00000000	SO2-AF 💌	01 💌	2010 🔽 0	5. 6.	CO-AF CO-AX	20k 2k 2k	70nA/ppm 70nA/ppm 70nA/ppm	750 7k5 7k5	1.050V 1.050V 1.050V
CO sense	or limit			Send to	7. 8.	NO-A1 SO2-AE	1k 2k	400nA/ppm 70nA/ppm	2k 7k5	0.800V 1.050V
-)00ppm (0.17)00ppm (1ppn			analyzer	9. 10.	S02-AF N02-A1	200 200	550nA/ppm -600nA/ppm	7k5 7k5	0.825V 0.900V
	100ppm (10pp	-		Refresh	11. 12.	H2S-A1 H2S-AH	500 250	700nA/ppm 1200nA/ppm	3k 3k	1.050V 0.900V
O 9.9	00% (0.001%)	1		<u>C</u> lose	13.	CI2-A1	200	-600nA/ppm	7k5	0.900V

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.

4	* Flash EEPROM data memory	x
	Analyzer Flash-EEPROM contents read.	
	Memory contents read.	
		THE
	Send <u>to</u> analyzer <u>R</u> ead from file	<u>S</u> ave to file
		<u>C</u> lose

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.

			Fuel No	Name	CO2max	HV	A1	В	Alpha	02ref	Vss	Vair	Eta bonus	Gaseo
Fuel#	8				%	MJ/m3 MJ/kg				%	m3	m3	%	
Name Fuel3			0	Light oil	15,4	42,7	0,5	0,07	52	3	10,53	11,2	0	0
CO2max	11,7	%	1	Natural gas	11,7	35,9	0,37	0,09	32	3	8,56	9,54	0	
HV	35,9	MJ/kg	2	Town gas	13,1	16,1	0,35	0,11	32	3	3,61	3,9		
			3	Coke-oven gas	10,2	17,4	0,29	0,11	32	3	3,86	4,28	0	
A1 coeff.	0,37		4	Liquid gas	14	93,2	0,42	0,08	32	3	22,3	24,36	0	
B coeff.	0,09		5	Bio-diesel	15,7	41,8		0,05	52	3	10,44	11,15		
	3200		6	Fuel1	12	0		0	0	3	8	8	0	
Alpha	J 3200		7	Fuel2 Fuel3	15			0 0,09	0 3200	3	8 10	8	0	
02ref	3	%	9	Fuel3	11,7	35,9		0,09	3200	3	8	9	0	
Vss	10	m3	11	Fuel4	15	0		0	0	3	8	8	0	
Vair	, 9	m3	191	Fuel6	6540,3	6540,7	6,5535	490,19	65407	2	487,67	651,47	25,5	
Fuel ETA bonus	3	m3 %	255	Empty	12			0	52	3	10	10		
User fuels from analyzer Fuel #6 255 En Fuel #7 7 Fu Fuel #8 255 En	ipty el2 ipty	Change Change Change Change												
Fuel #9 255 En		nalyzer												

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	В	Alpha	02ref	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
	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	S <u>h</u> ow/Hide Columns	key displays the following window:
-----	----------------------------	------------------------------------

Columns		×
 ✓ Name ✓ CO2max ✓ HV ✓ A1 Ø B ✓ Alpha ✓ O2ref ✓ Vss ✓ Vair ✓ Eta bonus ✓ Gaseous 	All O <u>N</u> All O <u>F</u> F Default	
	<u>C</u> ancel	

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

	Identifier	Organization	First name	Last name	Phone	Fax	Zip code	City	Addres
Ŷs	- Idorikinor	organization	The Halle	Edot Hallio	1110110		p 0000	0.0	1100101
	1	Hollywood 1	John	Travolta	1111111	1111111	11111	LA	Sunset
stomer 1	2	Hollywood 2	Clint	Eastwood	2222222	2222222	22222	LA	Main
	3	Hollywood 3	Sean	Connery	3333333	3333333	33333	Dublin	Catholic
Irganization:									
ollywood 1									
lame:									
ame.									
ohn									
ravolta									
ravolta									
Adress:									
Adress:									
\dress: 1111									
\dress: 1111									
ravolta Adress: 1111 A unset Blyd									
Adress: 1111 A unset Blvd									
Adress: 1111 A									

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

key displays the following window:



The window allows the user to choose the data which is to be displayed in

the table. The



key resets the default table columns configuration.

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

🔒 Customer data	x
Customer data	Image: Concelement of the customer data have been filled in and the Image: Concelement of the Customer will be added to the Customers DataBase. Image: Print (Martel)
Boiler Boiler type Temp. [kW Fuel Fuel flow [m3/1 Temp. [*C]	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
eport 📃	176	2	single	2006-09-02	11:53:00	GA12p	00000000
opon	190	6	single	2006-06-06	13:07:00	GA12p	
Created on: 2006-01-26	191	7	single	2006-06-06	13:18:00	GA12p	
10:45:00	192	8	single	2006-06-06	13:50:00	GA12p	
Analyzer: 00000000	177	16	single	2006-01-26	10:44:00	GA12	00000000
Avr Time: 10 sec	188	17	triple averaged	2006-01-26	10:45:00	GA12	00000000
AVE TIME: TU SEC	181	18	single	2006-01-26	11:52:00	GA12	0000000
	182	19	single	2006-01-26	12:34:00	GA12	00000000
	183	20	single	2006-04-21	12:13:00	GA12	00000000
ustomer	184	20	single	2006-04-21	12:17:00	GA12	00000000
	189	20	triple averaged	2006-05-16	09:28:00	GA12	00000000
3	175	147	triple averaged	2006-06-19	15:22:00	maPress II	
Hollywood 3	174	148	single	2006-06-19	15:22:00	maPress II	
Sean							
Connery							
Boiler: Bigger							
JU7							
ataBase							
otal records: 13							

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.

🗎 Report - full da	ata		×
Created on Analyzer:	2006-06-06 13:18:00	Avr Time 2 sec. 02ref: 3 % Fuel 7	Report 7
Gas concentration 02 C02 C0 C0u N0 N0u	% % 2,0 ppm ppm 236,9 ppm ppm	Relative concentrations COrel mg/Nm NOrel mg/Nm NOxrel mg/Nm SO2rel mg/Nm Combustion parameters mg/Nm	13 Comment 13 13
NOx NOxu CO in mg NOx in mg NOm in mg SO2 SO2u SO2u SO2m	249,4 ppm ppm 3 mg/Nm3 513 mg/Nm3 317 mg/Nm3 52,3 ppm ppm 150 mg/Nm3	Tgas °CTamb °CStack loss %Efficiency %Loss by i. c %ETA1 %Excess airSoot level %	Pressure Press -0,041 hPa Draft hPa Flow 0,0 m/s
Customer info Organization:: Boiler type:	Hollywood 1 Big	1 More	Print [Dose]

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.

	SINGLE	
1	2	3
	Triple	
1	 Triple	3

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:

 Printout co 		Comment	Style Grid line	s	Colour
				` -	
00% 🔽 🗹 Analyz	er 🔽 Fuel	Operator	Frame		Report contents
Measurement Re	eport #7			Date	: 2006-07-28
CUSTOMER:					
Organization	Hollywood 1				
First name	John				
Last name	Travolta				
Phone/Fax	111111171111111				
Zip code/ Address	11111, LA, Sunset Blvd				
BOILER:					
Boiler type	Big	Fuel	1		
Power	100	Fuel flow	11,5		
Temp.	90				
ANALYZER:					
Туре	GA12p	Operator	9999999999	i999	
Serial number					
REPORT:		FUEL:			
Report type	Single	Name		Apha	0
Averaging Time	2	CO2max	15	02ref	3
02ref	3	HV	0	Vss	8
Date/Time	2006-06-06 / 13:18:00	A	0,5	Vair	8
Report number	7	B	D	ETAbonus	D
Name	Symbol		Value		Unit
Oxygen	02				[%]
Carbon Dioxide	C02				[%]
Carbon Monoxide	CO		2,0		[ppm]
Carbon Monoxide in mg	COmg		3		[mg/Nm3]
Carbon Monoxide rel.	COrel				[mg/Nm3]
Undiluted carbon monoxide	COu				[ppm]
CO in air	CO in Air				[ppm]

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

- Printout contents-		
Customer	🔽 Results	🔽 Comment
🔽 Analyzer	🔽 Fuel	🔽 Operator

Choosing between the colour and the black-and-white printout versions can be carried out with the help of the <u>Colour</u> 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.

Style	
Frame	

Pressing the	Report contents key opens the Date	abase columns window.
S. Database ashires		
🚔 Database columns		
– Table columns		
V Number	🔽 Sensor Name	
Report type	✓ S02	
🔽 Date	SO2 mg	
🔽 Time	S02 rel	
Device	🔽 SO2 u	
🔽 Serial No	🔽 Tgas	
🔽 Operator	🔽 Tamb	
Customer	Press	All O <u>N</u>
Comment	Flow	
🔽 Fuel	🔽 EA	11055
🔽 Avr Time	TI TI	All O <u>F</u> F
☑ 02	🔽 SL	
🔽 CO2	🔽 SCO	
CO 🔽	🔽 ETA	<u>D</u> efault
🔽 COmg	🔽 ETA1	<u></u>
COrel	🔽 Lambda	
🔽 COu	RH ≫	
🔽 CO in Air	🔽 Draft	<u>C</u> lose
NO NO	🔽 LastSoot	
NOmg	V T1	<u>o</u> k
NOrel	▼ T2	
NOu NOu	PressAbs	
NOx NOx	PressLo	
NOxmg	PressHi	
NOxrel	LastPressLo	
NOxu	LastPressHi	
Show/Hide C		
Customer parameter	MaPress II	
	ETA Group Remains	
ppm mg/Nm3	% °C Remains	

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 O <u>N</u>	key marks all the active fields		
_	the	All O <u>F</u> F	key leaves all the fields unmarked		
_	the	<u>D</u> efault	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.

- Show/Hide C										
Customer	parameter		MaPress II							
CO	NO		ETA Group	Remains						
ppm	mg/Nm3	%	<u>°C</u>	Remains						

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:

60%	•
20%	
40%	
60%	
80%	
100%	
Fit Width	
Fit Height	

Help

Opens the *Help* window.

About...

Opens the window with the information on the application:

	🔗 About			×		
	ELECTRONICS Please visit our WEB site: www.madur.com					
	PCGA12 - Software for madur analyzers					
		Version 3.08.0	00			
	Operates with: GA-12, GA-12plus, S1200, maPress					
	System Info					
Pressing the	System Info	key starts the	Information o	n the	Microsoft .	system

programme.