NGA 2000

Software Manual

CLD - Analyzer Module

Chemiluminescence - Measurement

(combined with NGA 2000 - Platform / MLT - Analyzer)

CLD Software Version 2.3

(Platform / MLT Software Version 3.1.X)

1. Edition 04/98

Catalog No.: 90 003 749

Process Analytic Division

ROSEMOUNT ANALYTICAL

FISHER-ROSEMOUNT Managing The Process Better

90003749(1) [NGA-e (CLD-Software 2.3 / MLT-Software 3.1.X)] 04/98

This Operation Manual includes information about the operation of the instrument.
Information about the additional indications and notes regarding maintenance, troubleshooting and repair are found in the accompanying Maintenance & Operation Manual.

Troubleshooting, component replacement and internal adjustments must be made by qualified service personnel only.

Fisher-Rosemount GmbH & Co does not take responsibility for any omissions or errors in this manual. Any liability for direct or indirect damages, which might occur in connection with the delivery or the use of this manual, is expressly excluded to the extend permitted by applicable law.

This instrument has left the works in good order according to safety regulations.
To maintain this operating condition, the user must strictly follow the instructions and consider the warnings in this manual or provided on the instrument.

1. Edition: 04/98

Read this operation manual carefully before attempting to operate the analyzer !
For expedient handling of reports of defects, please include the model and serial number which can be read on the instrument identity plate.

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Contents

1 Introduction

This software manual describes step by step how to operate successfully with the ½ 19" and 19" MLT analyzer module and analyzer of the NGA 2000 Series from **FISHER-ROSEMOUNT**.
Chapter two shows the structure of the software menus. Chapter three describes the display and the keyboard of the analyzer. Chapter four describes the basic controls with detailed illustrations. So you can easily compare the actual display of the analyzer module with the illustrations of the manual.
Chapter five describes the expert controls and chapter six describes the technical level configuration. The layout of both chapters is not as detailed as in chapter four. Normally, the way to a certain software menu is described with the software catchwords, you have to press to reach this menu. You will find the illustration of the corresponding LCD screen at the end of the catchword listing. After that you can read the meaning of the functions and variables of each expert or technical level menu.
Some contents of the expert controls are not important for every customer. It depends on the configuration of your NGA 2000 system, relative to the following components:

- Control Module **CM**
- Analyzer Module **AM**
- Input/Output Modules **I/O**'s (SIO, DIO)

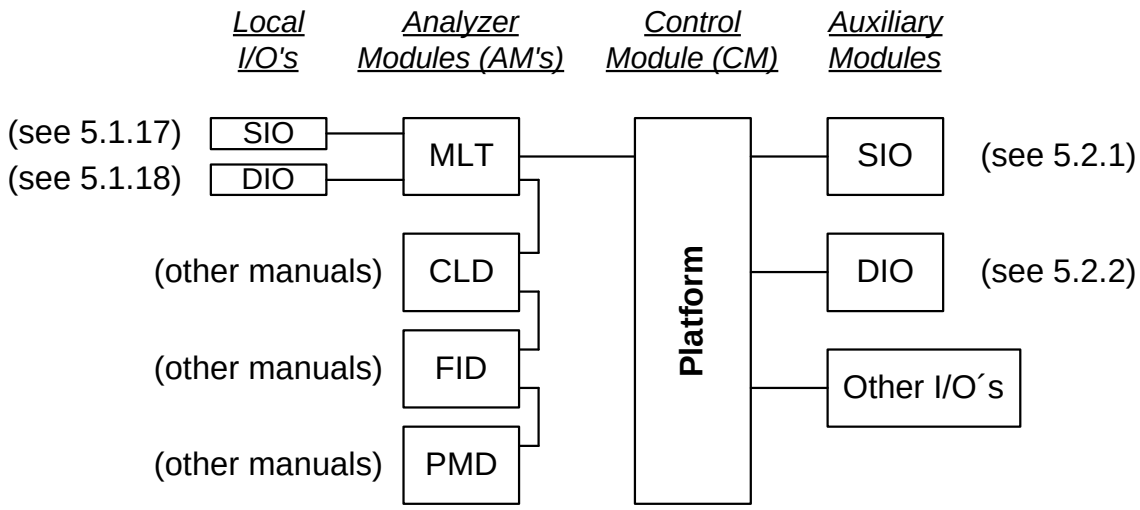
You can distinguish the following system units and SIO/DIO configurations:

System Unit	SIO/DIO-Configuration	Corresponding Chapter
CLD analyzer module (AM):[1] • without front panel i.e. without control unit • can be combined with a platform or an MLT analyzer	⇒ Local I/O's are not existing	* /
Platform (CM software): • Control unit with front panel • without measurement channels	⇒ 1 SIO and up to 4 DIO's can be installed in the platform ⇒ SIO and DIO can be configured for all channels combined with the platform	* chapter 5.2 p. 29 to 44
MLT analyzer (CM and MLT AM software): • Analyzer with front panel • CM and AM software in the same analyzer, i.e. all functions of the control unit and of the AM are united in the same implement	⇒ 1 SIO and 1 DIO can be installed in the MLT analyzer ⇒ SIO and DIO can be configured for all channels combined with the MLT analyzer	* chapter 5.2 p. 29 to 44

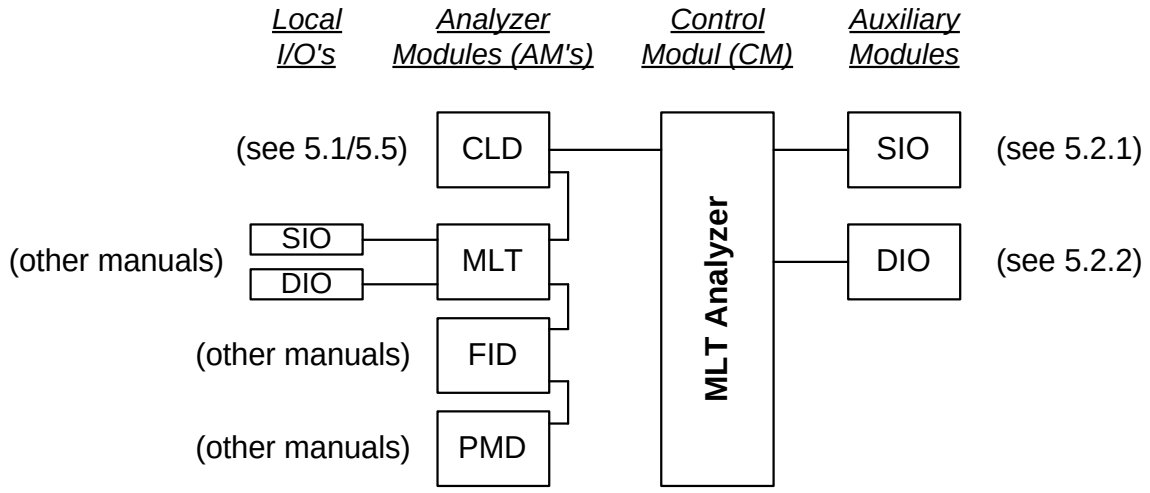
[1] The configuration of other analyzer modules like MLT modules is described in their own manuals !

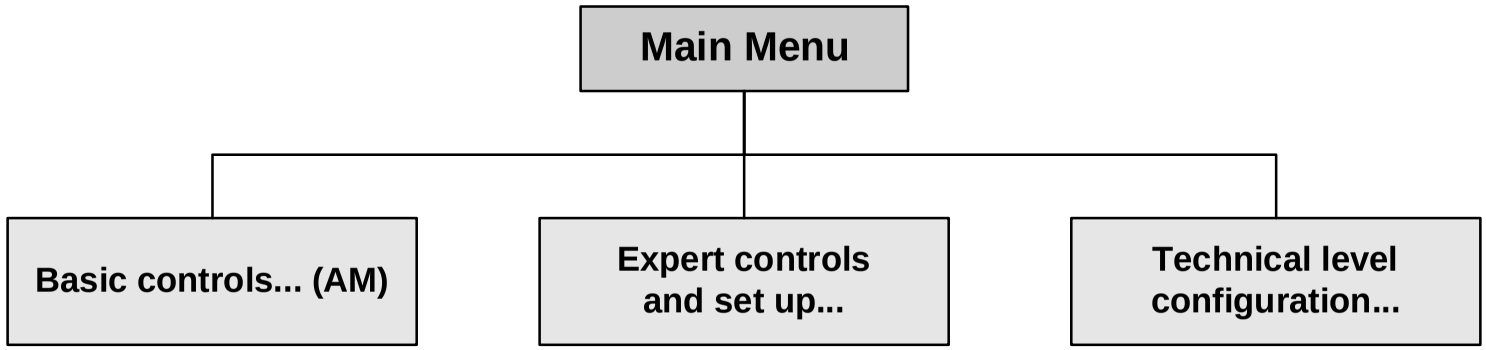
The following illustrations shall make plain the connection between the hardware configuration and the software setup of the modules:

NGA 2000 System via Platform



NGA 2000 System via MLT Analyzer





- Range set-up
- Range and functional control
- Ozonator power enable/disable
- Measurement mode selection: NO/NOx
- Zeroing...
- Spanning...

- Expert analyzer controls... **(AM)**
- Auxiliary module controls... **(I/O's: SIO, DIO)**
- System set up... **(CM)**
- Analyzer module set up... **(AM)**
- Auxiliary module set up... **(Other I/O's)**
- System calibration... **(CM)**

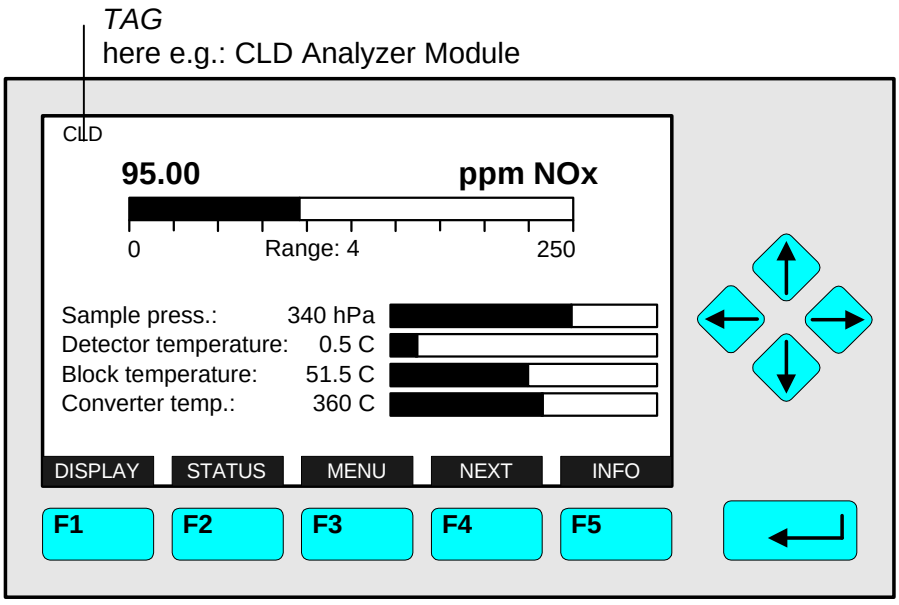
- System set up... **(CM)**
- Service menus... **(AM, CM, I/O's: SIO, DIO and other I/O's)**
- Diagnostic menus... **(AM, CM, I/O's: SIO, DIO and other I/O's)**
- Other module diagnostic menus... **(Other I/O's)**
- Listing of all modules... **(AM, CM, I/O's: SIO, DIO and other I/O's)**

Notes:

* In the menu structure shown above, you will find the most important ramifications of the MLT software 3.1.X for the MLT platform and analyzer versions. The menu points related to the CLD analyzer module are marked with "AM". They belong to the CLD software revision number 2.3.
* At each menu point of the "Expert controls" and "Technical level" you can find which functionality will be set up: AM (Analyzer Module), CM (Control Module), I/O (Input-/Output Module).
* Menu lines ending with three points (...) are followed by submenus with further functions and set-ups.

3.1 Starting and Initializing

After switching on the CLD analyzer module (in a platform or part of a NGA network), the initialization procedure will be performed. A self control of the analyzer modules or the analyzer(s) is running. You can see a sequence of several displays. They show the status of initialization, revision notes of the MLT software and the FISHER-ROSEMOUNT tag. At the end of this procedure you can see the single component display of channel one. It is the origin to all the other channels, menus and submenus.
The instructions of the basic controls (chapter four) are all beginning with the single component display. The actual display might differ from the shown one because the customer can configure it according to his requirements.



Typical starting menu after switching on

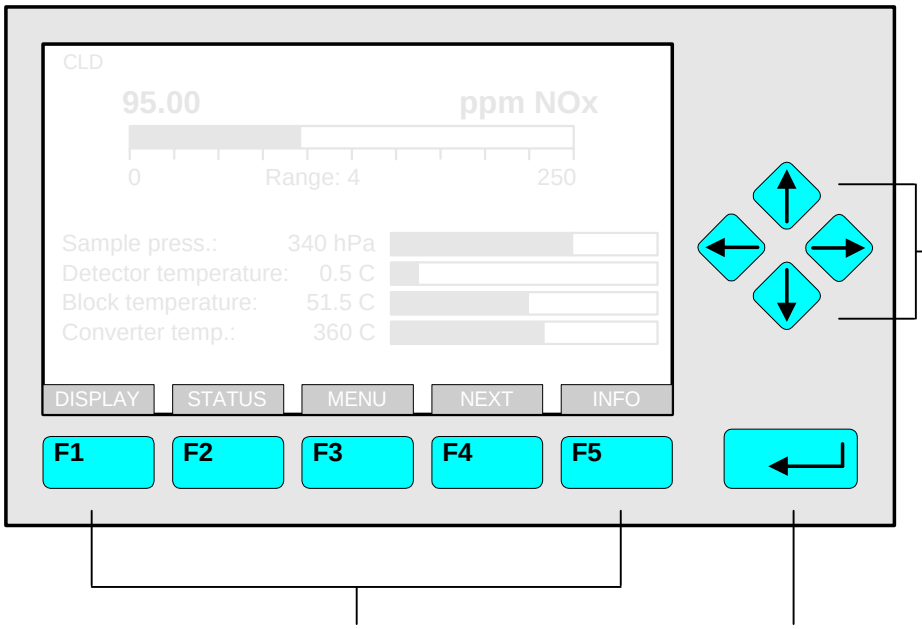
3.2 Display and Function

The LCD-screen shows all measurement values of the analyzer and all customer instructions. You can operate with five function keys, four arrow keys (cursors) and the enter key. The function of each key depends on:

- the type of analyzer/analyzer module used
- the optional auxiliary modules (e.g. I/O boards) used
- the individual menu displayed

In case of power failure all customer specific module parameters are saved by a battery-powered buffer.

3.3 Operating Keys



Cursor keys:
↑ -key / ↓ -key:
- Line up / line down within the same menu
- Alteration of numbers, variables or digits

← -key/ → -key:
- Moving back/forwards between the pages of a menu
- Selection of digits

Function Keys:
- Keys without defined functions
- The current function depends on the menu selected
- The softkey legend is shown on the display above the key

Enter Key:
- To confirm a previously entered value (variable)
- To start a selected function (Alternative: → -key)
- To go into a menu (via menu line)

3.4 Lines

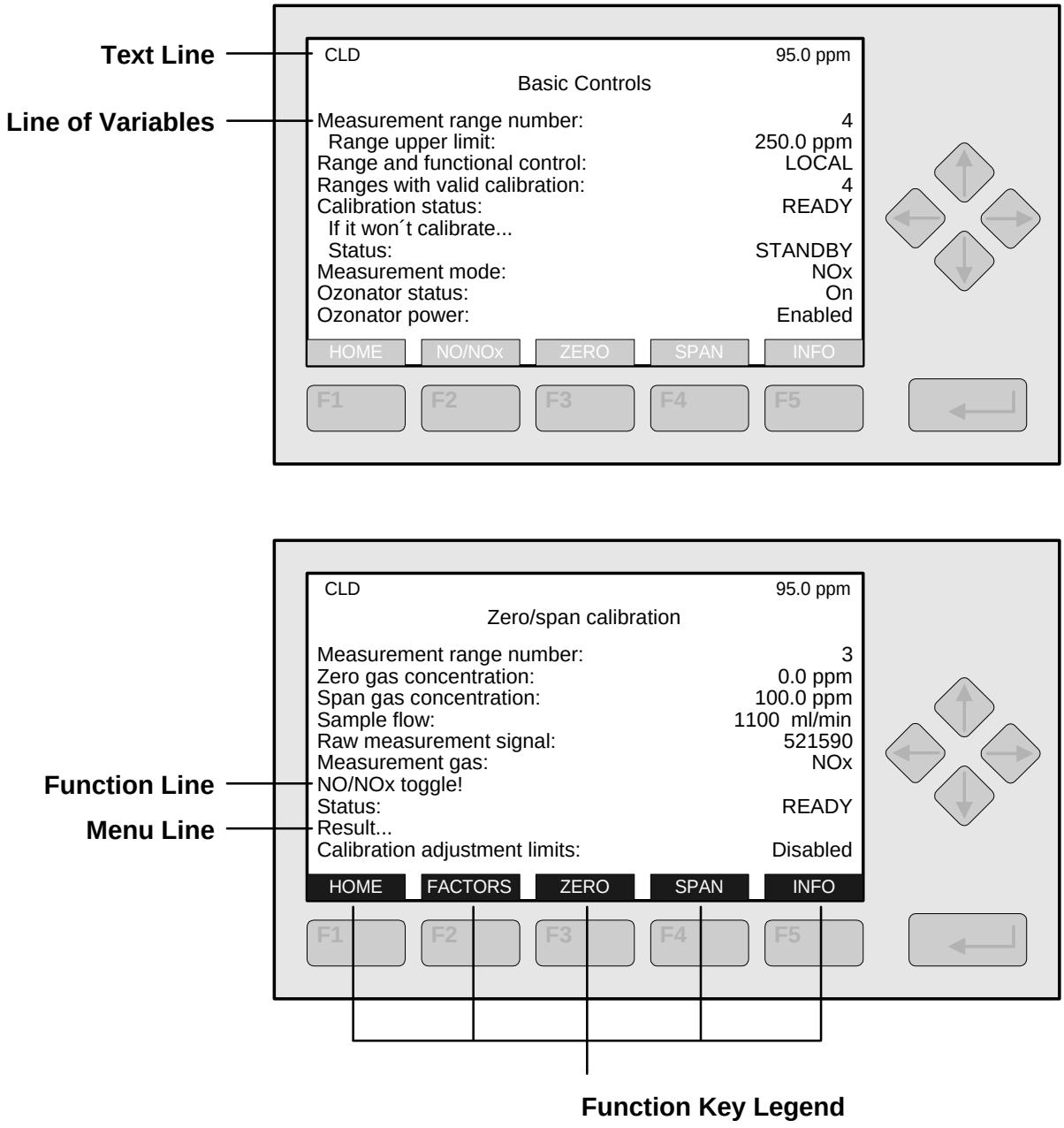
Lines can be selected by the ↓ -key or the ↑ -key. The selected line is displayed white on black. You have four different types of lines in the menu:

Menu line...
- Line ending with three dots.
- You will go to a submenu by pressing the ENTER key or the → -key in such a line.

Function line !
- Line ending with an exclamation-mark.
- You will start a function (e.g. NO/NO_x-toggle) by pressing the ENTER key or the → -key in such a line.

Line of variables:
- Line ending with a colon.
- Display of module parameters (variables).
- Some parameters can be changed (e.g. range number), some parameters display only a status (e.g. calibration status) and cannot be changed.

Text line
- Line without any punctuation marks.
- Only display of informations (e.g. analyzer module tag).



3.5 Important Functions of the Softkeys

DISPLAY

- Change from the single component display to the multi component display.

MEASURE

- Change from the main menu to the single component display.

STATUS (see 3.7!)

- Change to the status report: Display of the most important parameters and status informations of the CLD module or of the current channel.
- If available, this command is always assigned to the F2 key.

MENU
- Change from the single component display to the main menu or from several submenus to higher menus.

ESCAPE or <<<
- Changing back to the last menu page selected.
- Reset of a changed but not confirmed parameter to the former value resp. to zero.

BACK
- Reset of a changed but not confirmed parameter to the former value.

LOCK
- Lock of any operation level, if activated. Each of the three operation levels has to be activated separately.
- F4 key of the main menu.

NEXT
- Change of the channel in the same menu. This will only be possible, if several channels of an analyzer or of combined analyzers are existing. Then, all available channels can be selected one after another.
- In the main menu you can move among all channels of the connected analyzers and analyzer modules. In the submenus you can only move among the channels of the current analyzer or analyzer module.

INFO
- Change to menus containing status or help informations of the actual menu.
- If available, this function is always assigned to the F5 key.

3.6 Entering/Changing of Variables

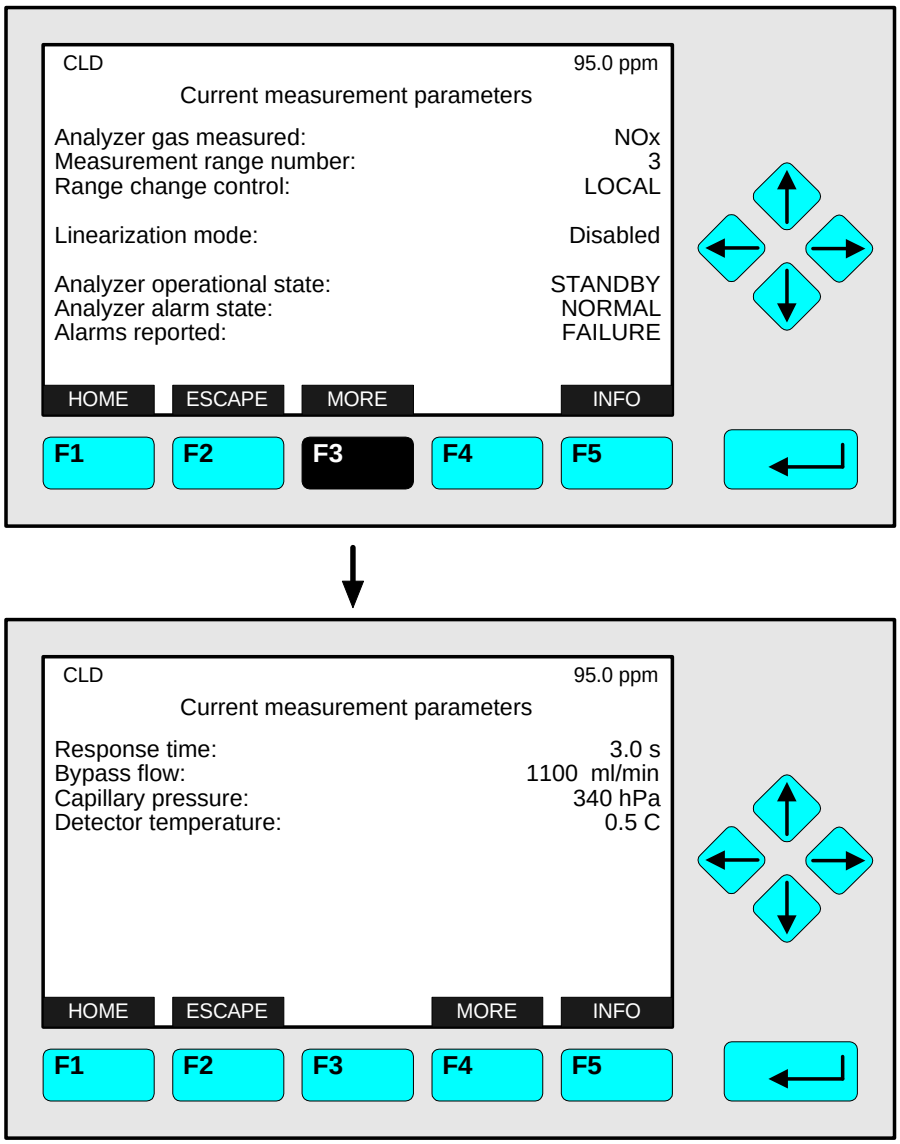
ENTER Key
- If you will press this key in a line of variables, the parameter will be displayed white on black and can be changed. After you will have set up a new value, you can confirm it by pressing the ENTER key again.

↑ -key / ↓ -key
- Function will depend on the variable selected:
  - Changing of the parameter values
  - Scrolling among variables selected
  - Changing of digits or characters
- Numbers consisting of several digits will increase/decrease totally, not digit by digit.

← -key / → -key
- Selection of digits within a parameter.
- For some variables you can change the quantity of digits or characters.

3.7 The STATUS Key

From the single component display or from the main menu you can change with the F2 key (STATUS) to the menu "Current measurement parameters":



In the menu "Current measurement parameters" you can control the status of the CLD analyzer module. With the F3 key (MORE) you can change to a further menu page of this menu. With the F2 key (ESCAPE) you can always go back to the main menu. From the second menu page you can return to the first with the F4 key (MORE) or the ← -key.
In the menu "Current measurement parameters" you will only find status informations. You cannot change the setups there. If you want to modify some parameters, you have to change to the menu "Basic Controls" (see chapter 4) or to the menu "Analyzer module set up" (see chapter 5.1) resp. "Expert analyzer controls" (see chapter 5.5).

In the chapter "Basic Controls" you will find the most important functions to set up your CLD analyzer module via an NGA front panel:

1) Measurement p. 4 - 3pp (Chapter 4.1.1 and 4.1.2, p. 4-3 to 4-6, are only important for systems with several channels.)

2) Calibration p. 4 - 21pp

All steps are figured with detailed illustrations and operation instructions. In the left column you can see display and keyboard of the NGA front panel. In the right column you can read the instructions and notes. All instructions will begin with any single component display and will end with the corresponding single component display after the setups are done. The keys you have to press are illustrated in black. The instructions are completed with notes and further informations.

Example: You want to change from the single component display of NO_x to the main menu

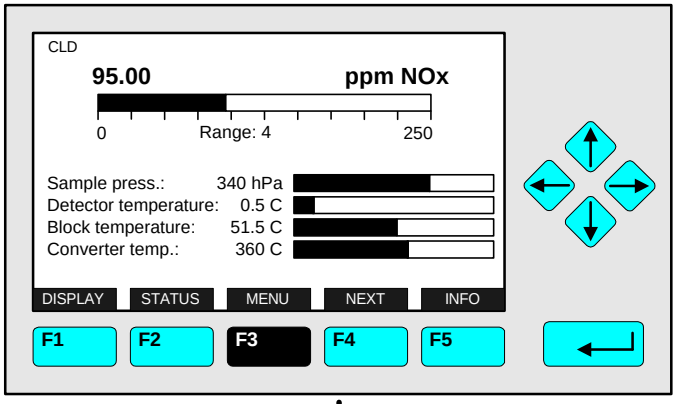
- Picture one shows the starting situation: single component display of NO_x.
- If you press the F3 key you will change to menu page shown in picture 2: Main Menu.

Left column:

LCD and keyboard

Right column:

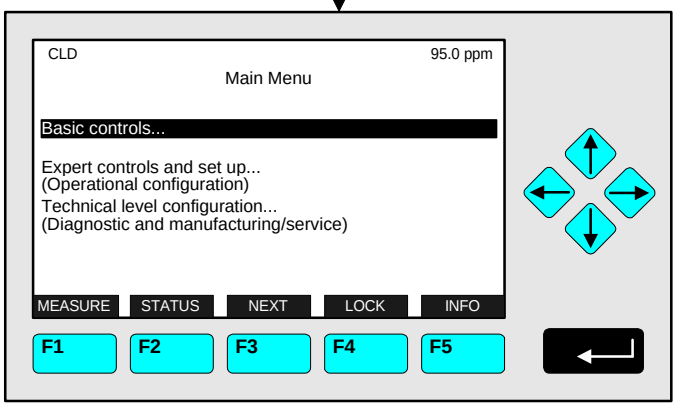
Instructions and notes



⇒ **Change to the Main Menu**

Press F3

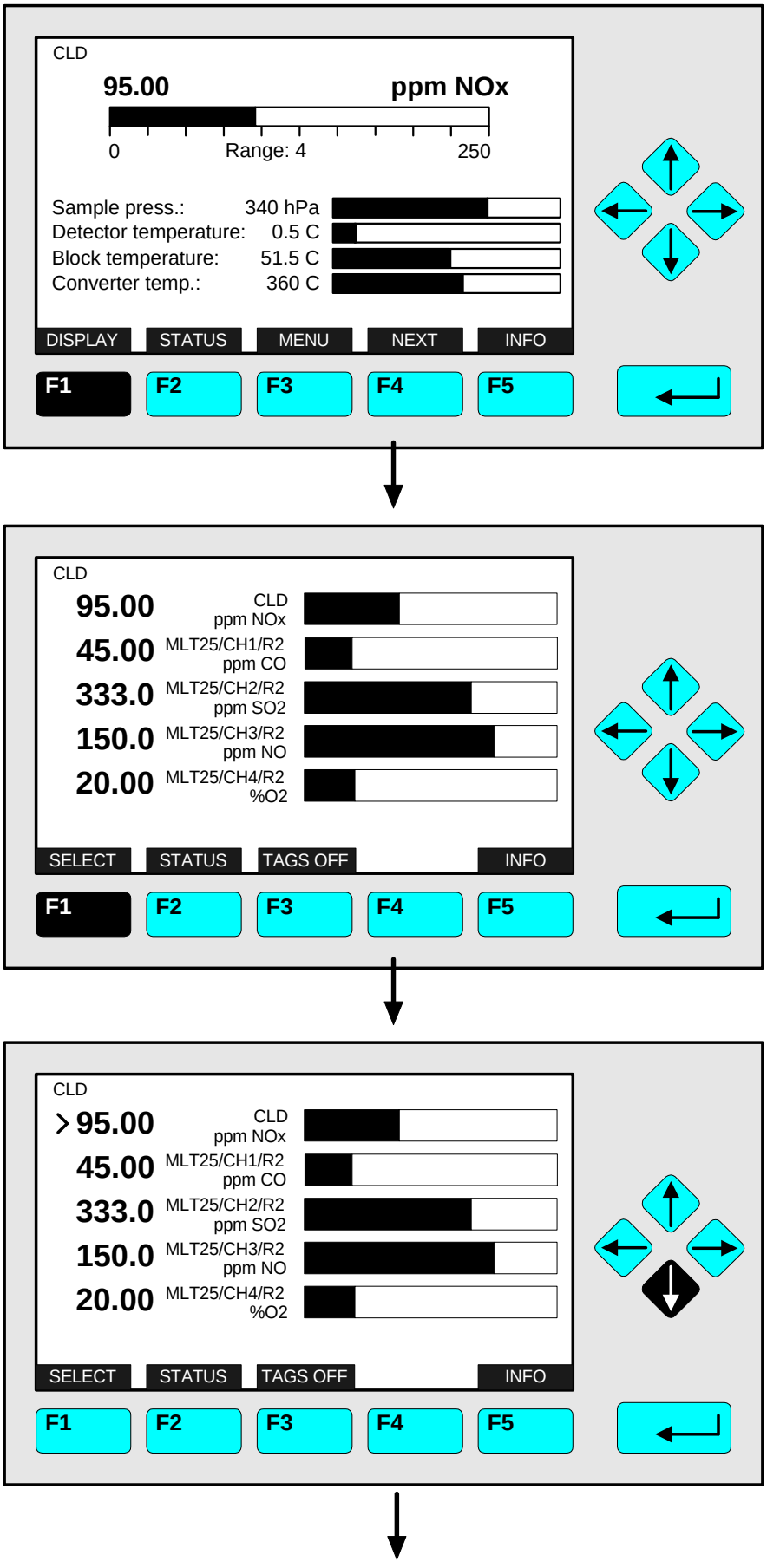
or



⇒ **Next instruction or step, here e.g.: Change to the Basic Controls:**

Press

or



⇒ **Change to the multi component display**

Press **F1**

Note:
You can change to the multi component display from each single component display.

⇒ **Enable the selecting: ">"**

Press **F1**

or ◆

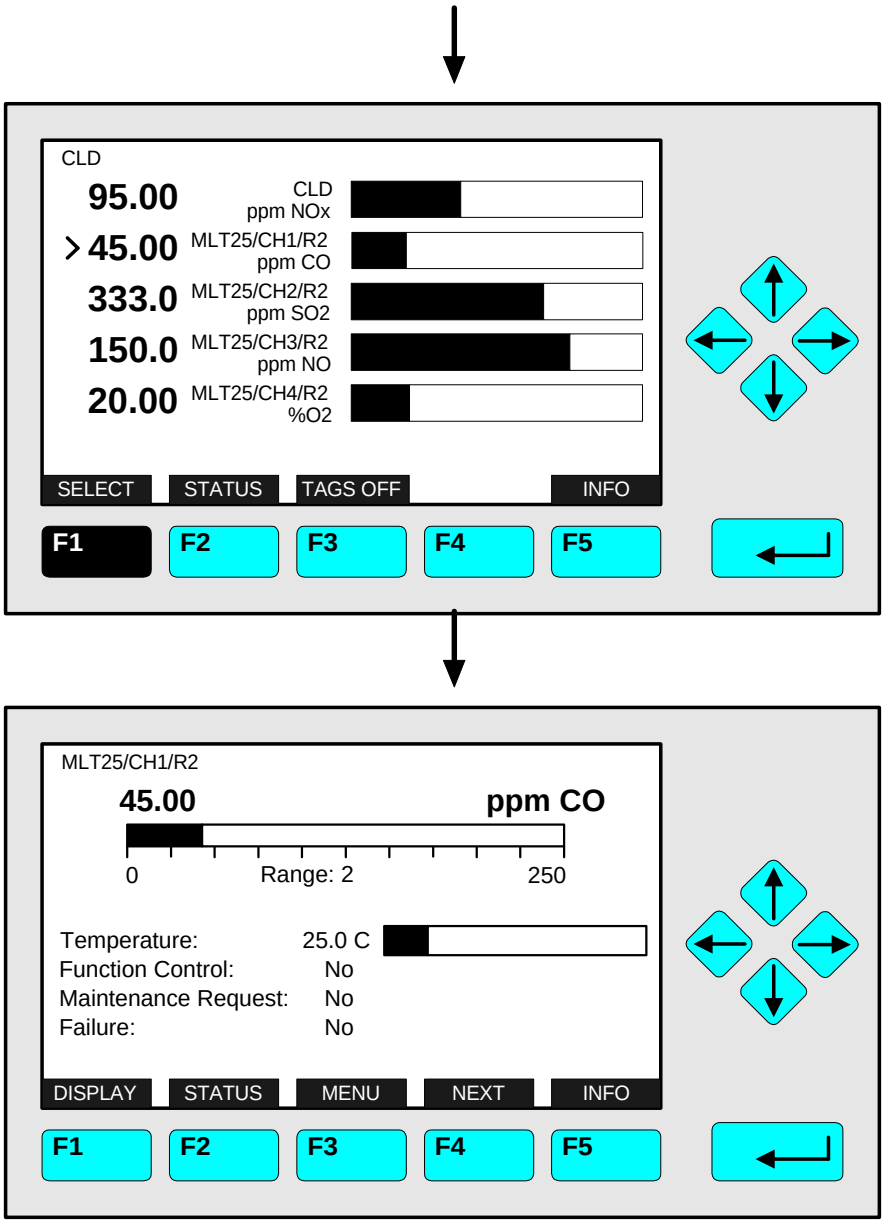
Note:
If no channels of other analyzer modules are combined to the CLD, only the bargraph of the CLD module will be displayed. Then, a change of channel will not be possible !

⇒ **Select any channel**

Press ◆ or ◆

as often as necessary to put the **>** - mark into the selected line.

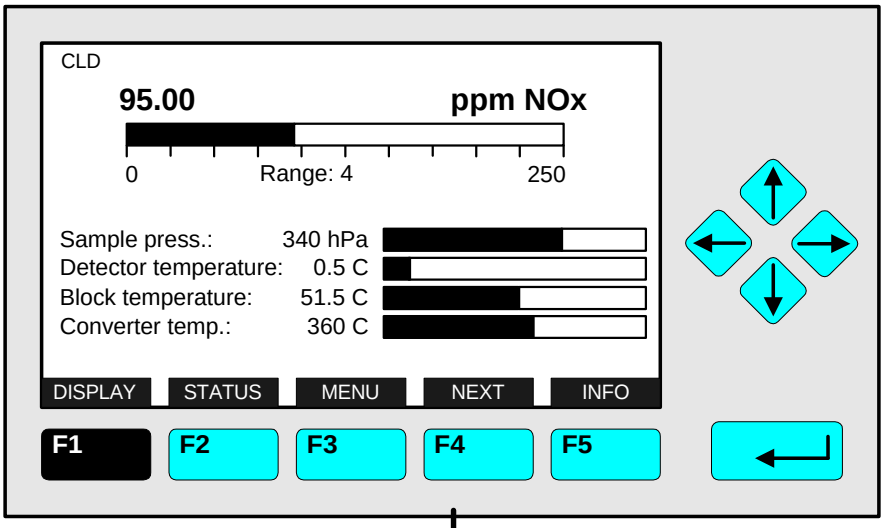
Example:
Change from
NO_X (CLD) to
CO (MLT channel 1)



⇒ **Change to the single component display of the channel selected**

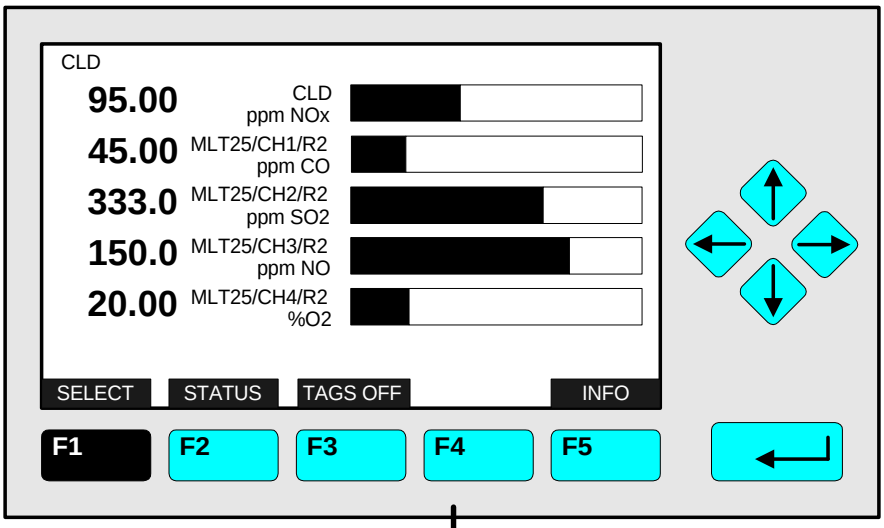
Press **F1**

⇒ **Single component display of the channel selected will appear**



⇒ **Change to the multi component display**

Press F1

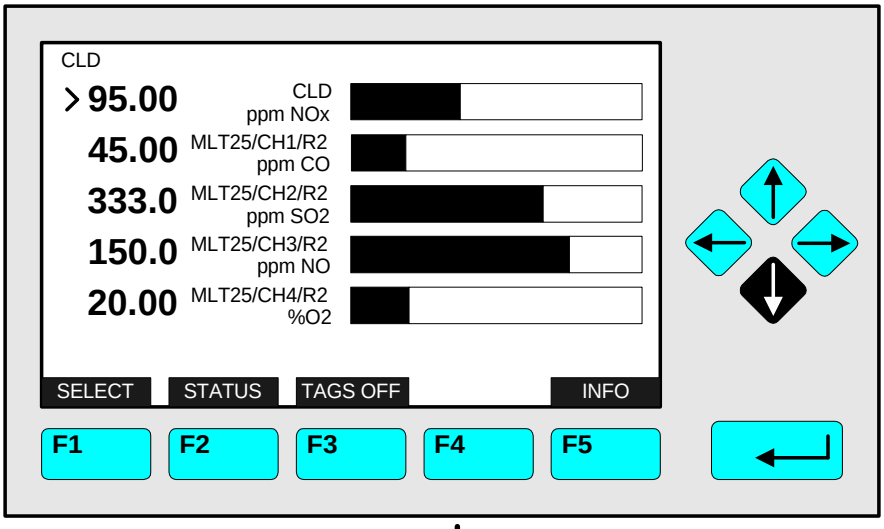


⇒ **Enable the selecting: ">"**

Press F1

or ↓

Note:
If no channels of other analyzer modules are combined to the CLD, only the bargraph of the CLD module will be displayed. Then, the sequence setup will not be possible !

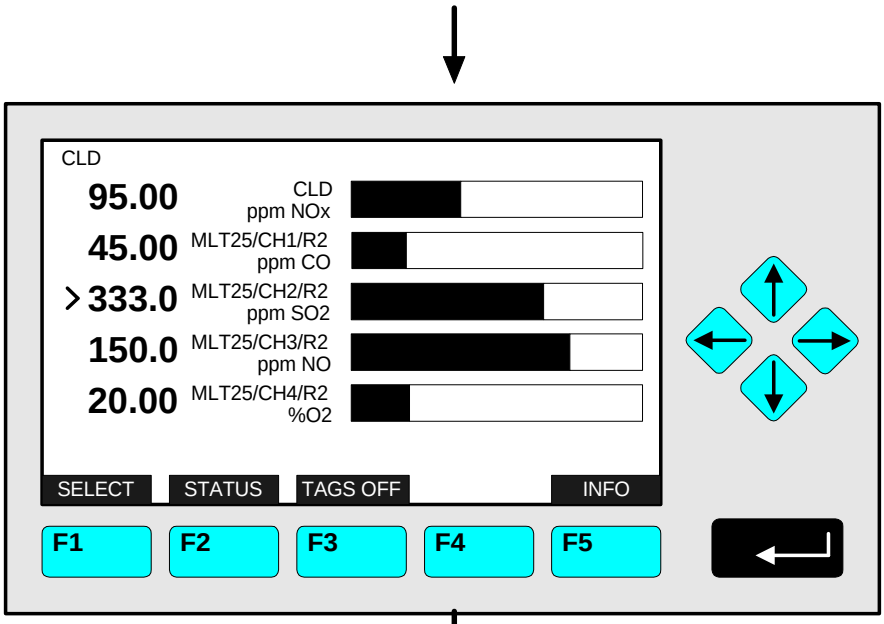


⇒ **Select the channel for position one**

Press ↓ or ↑

as often as necessary to put the **>** - mark into the selected line.

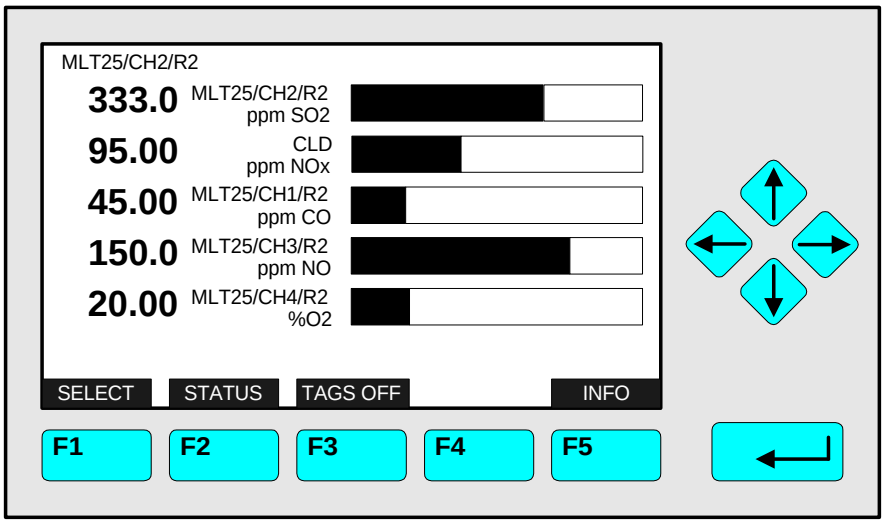
Example:
MLT channel 2 (SO_2) shall appear at position one of the multi component display.



⇒ **Assignation of the channel selected to position one**

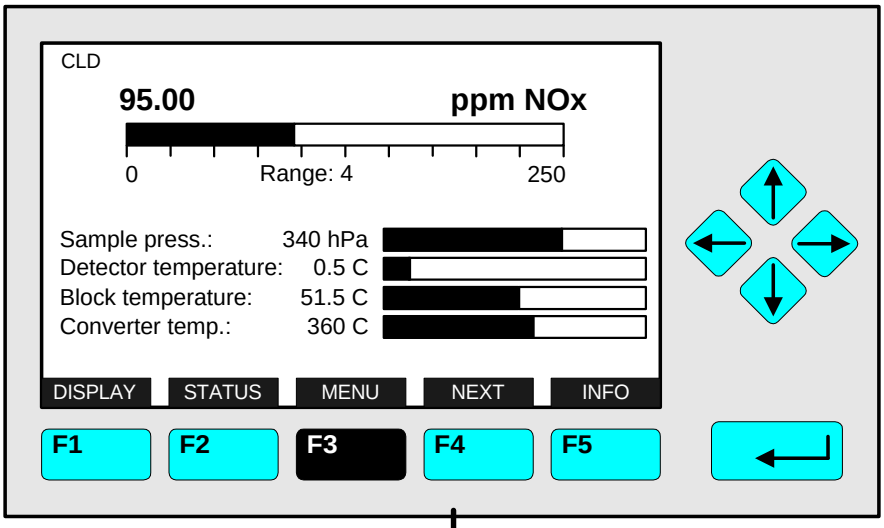
Press 

Note:
The channel selected will appear at position one.
All the other channels will automatically appear one line below their last position.



⇒ **Multi component display will appear with the changed sequence**

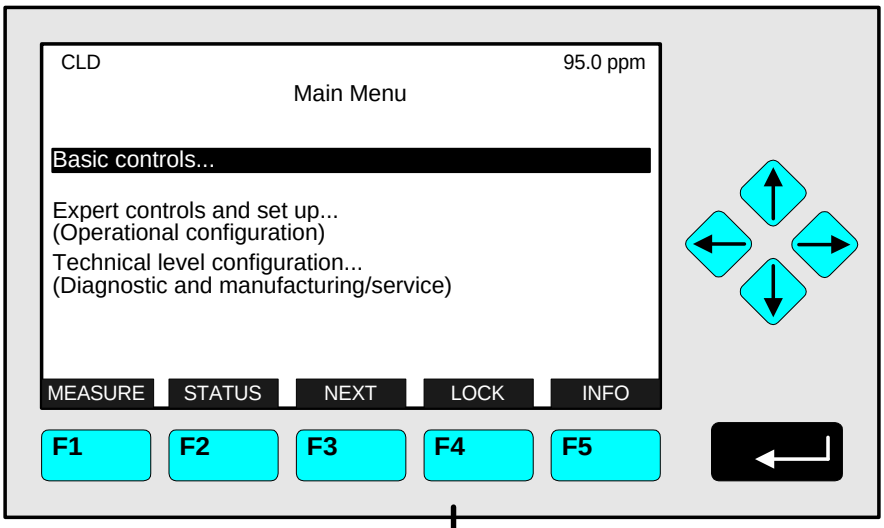
Note:
Now, you can change to any available single component display.
The method is described in the last chapter (4.1.1).



⇒ **Change to the main menu**

Press F3

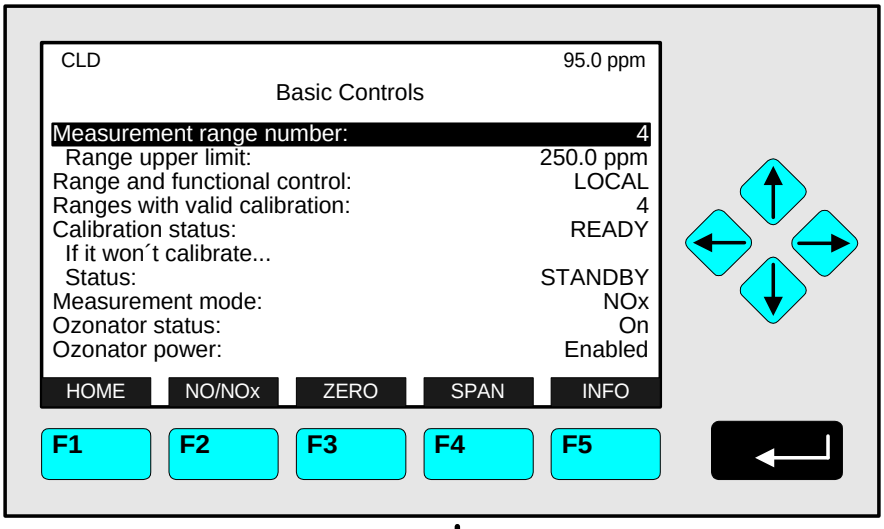
or



⇒ **Change to the basic controls**

Press

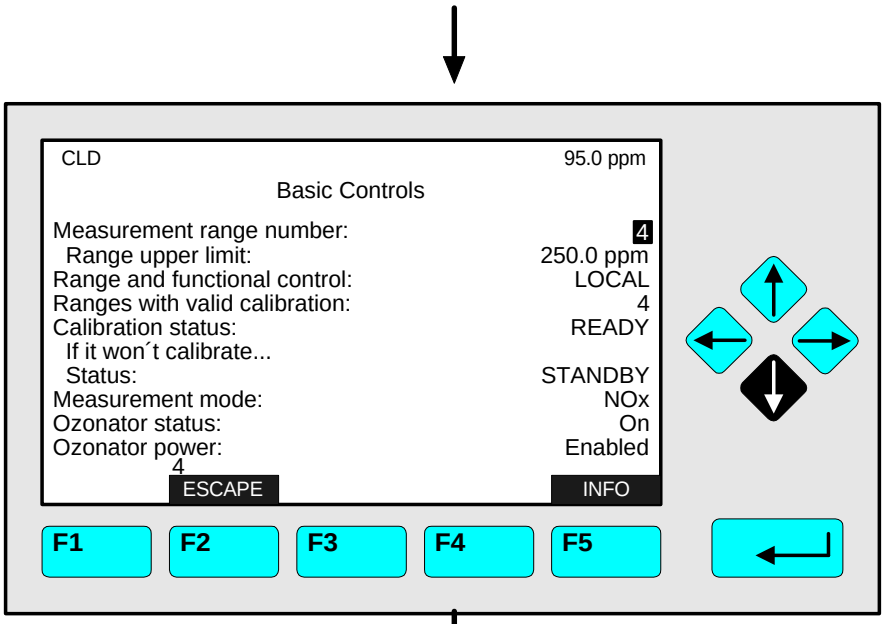
or



⇒ **Choose the measurement range number**

Press

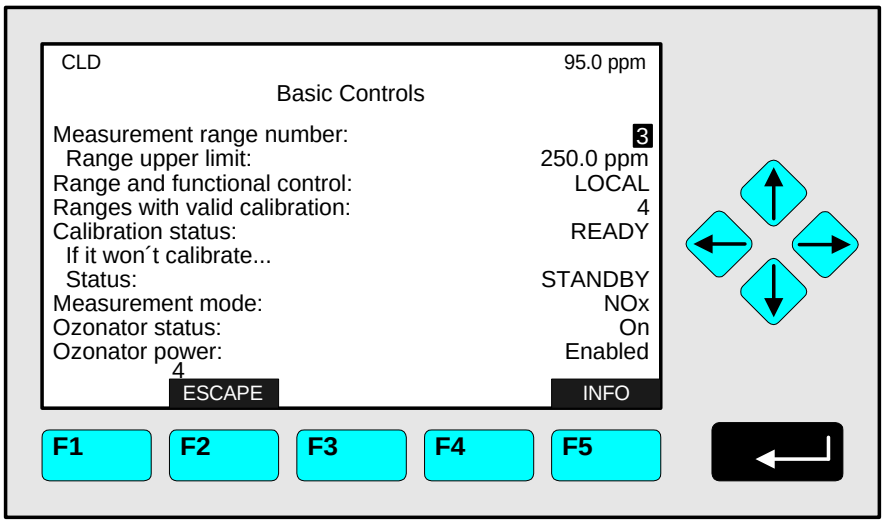
or



⇒ Select the range number

Press ▲ or ▼ as often as necessary to select another range number.

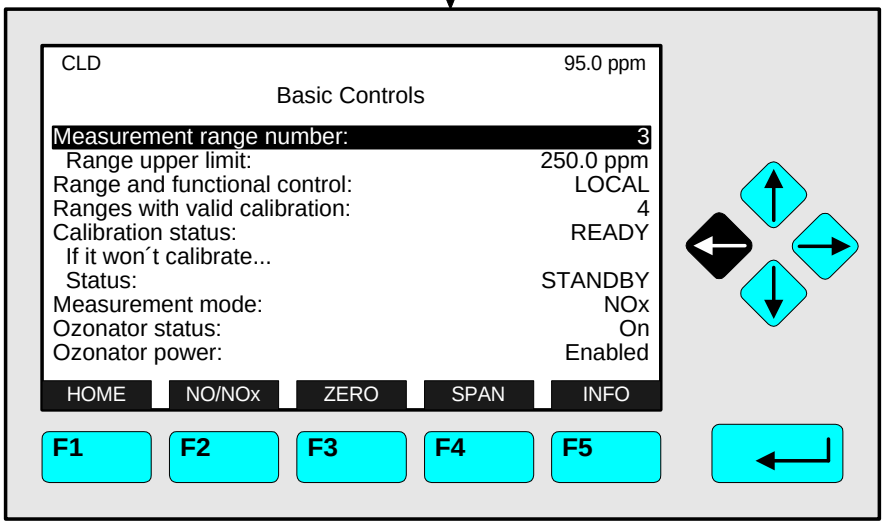
Example:
Change from range 4 (250 ppm) to range 3 (100 ppm)



⇒ Confirm the range selected

Press ↵

Note:
If you don't want to set the new range number, you can reactivate the former selection:
Press F2 (ESCAPE) and confirm it with ENTER.

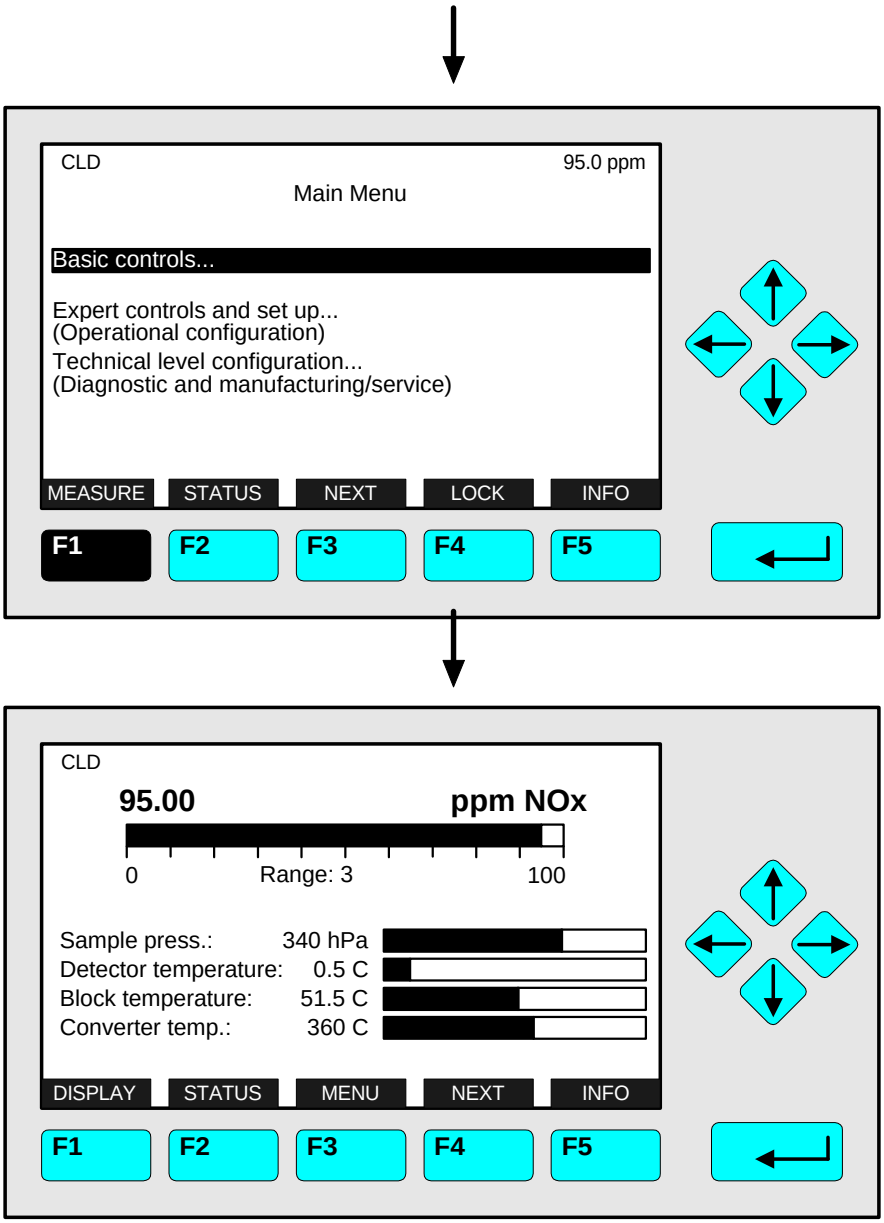


⇒ Change to the main menu

Press ◄ or

2 times F1

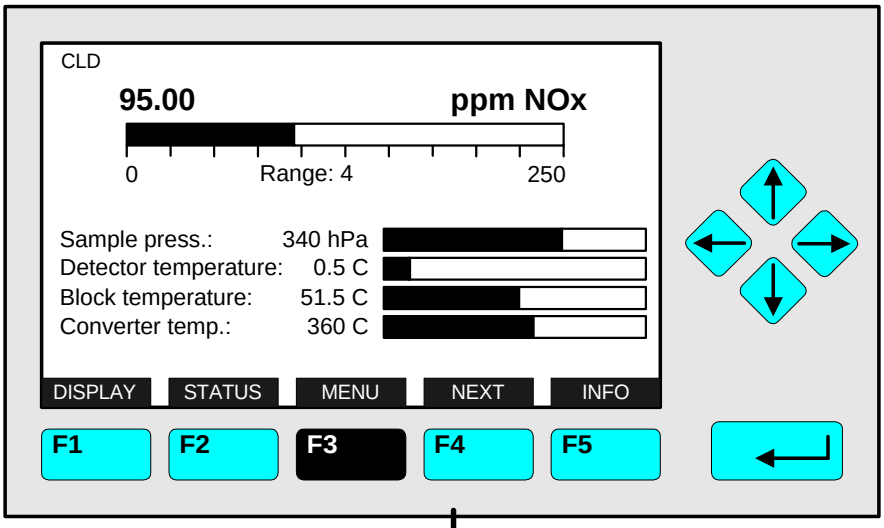
Note:
The range upper limit (line 2) of the range selected will be set up automatically after the range setting is confirmed.



⇒ **Change to the single component display**

Press **F1**

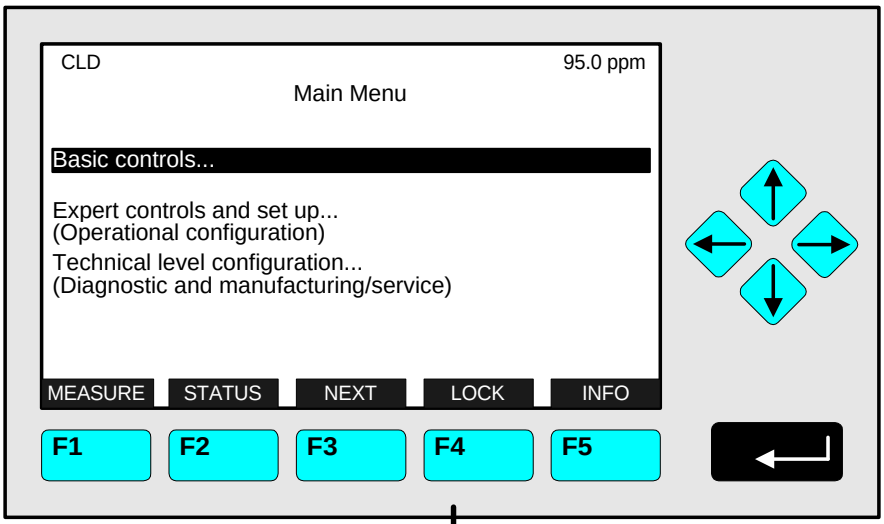
⇒ **Single component display will appear with the new range**



⇒ **Change to the main menu**

Press F3

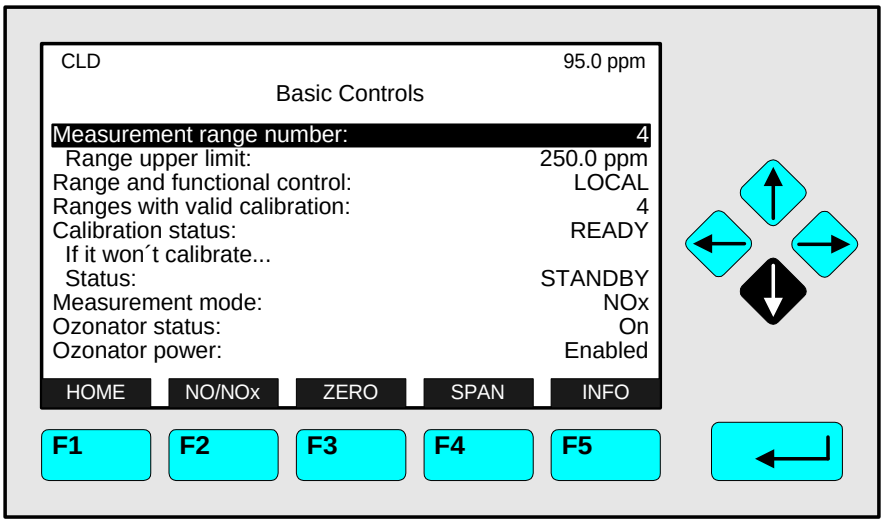
or



⇒ **Cahnge to the basic controls**

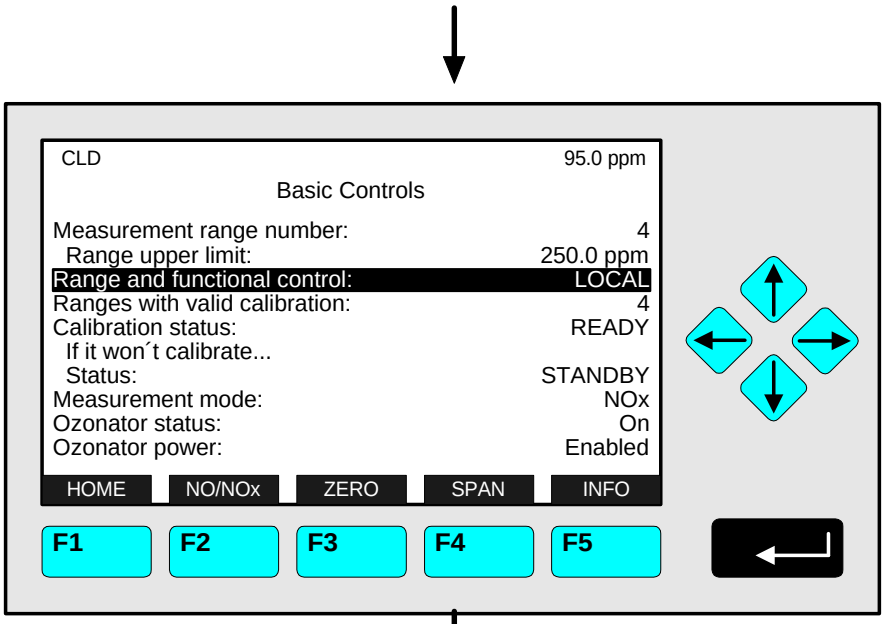
Press

or



⇒ **Change to the line "Range and functional control"**

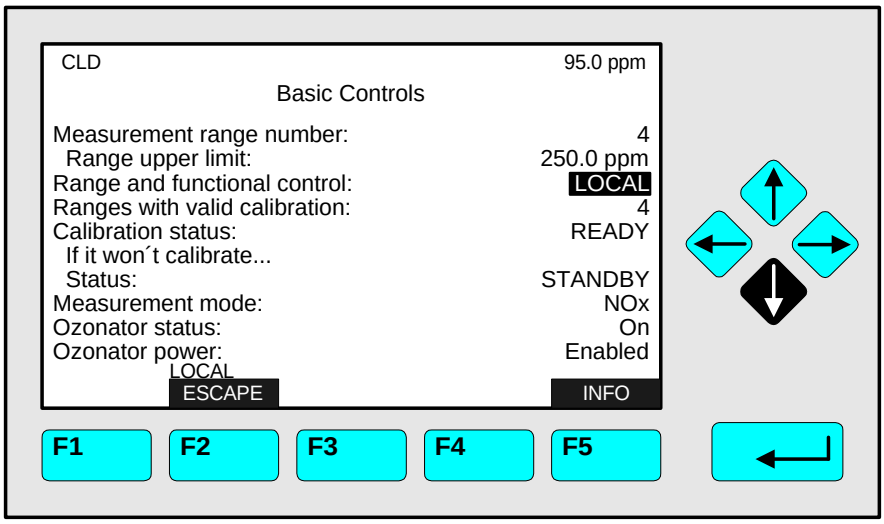
Press or as often as necessary until the line "Range and functional control" will appear white on black.



⇒ **Choose the parameter**

Press ↵

or ↔

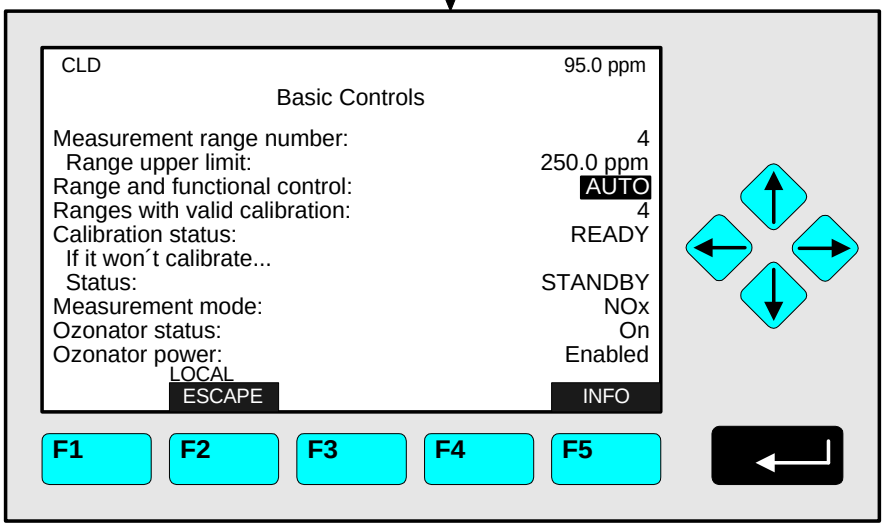


⇒ **Set up the range and functional control you want**

☞ **Pay attention to the note at p. 4-14 !**

Press ↕ or ↕ as often as necessary to select the parameter you want.

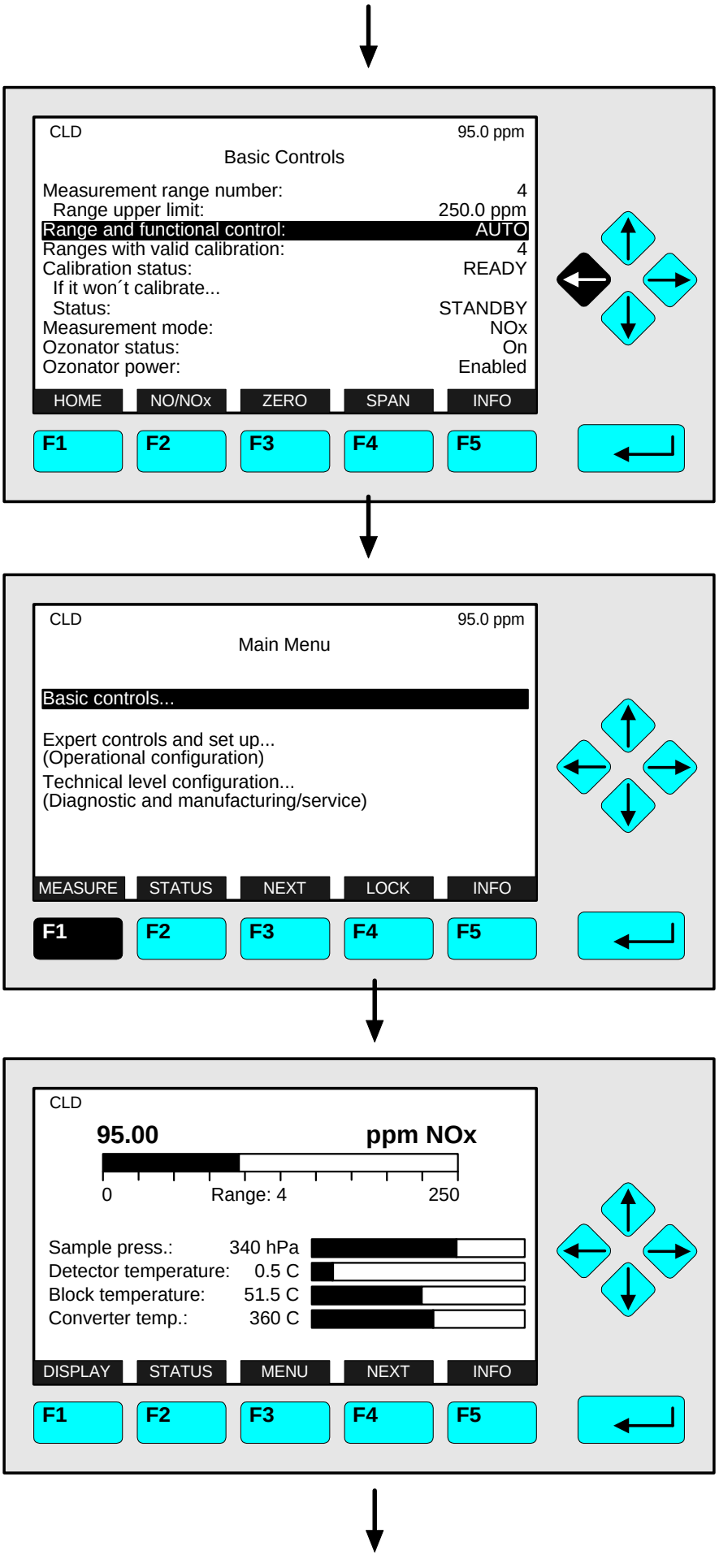
Options:
LOCAL, AUTO, REMOTE



⇒ **Confirm the parameter selected**

Press ↵

Note:
If you don't want to set the new parameter, you can reactivate the former selection:
Press F2 (ESCAPE) and confirm it with ENTER.



⇒ **Change to the main menu**

Press or

2 times **F1**

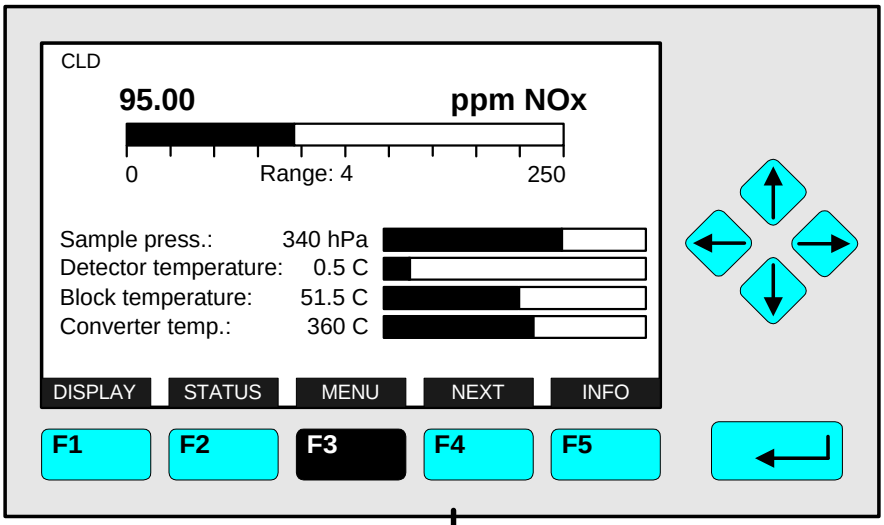
⇒ **Change to the single component display**

Press **F1**

⇒ **Single component display will appear after the changing of the range and functional control**

⇒ **Range and functional control – Options:**

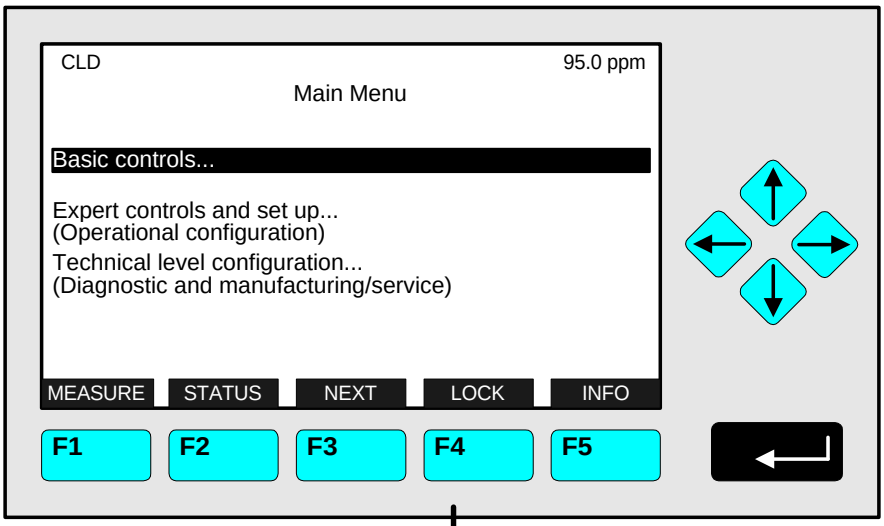
- **LOCAL:**
  The platform will be controlled via the display.
- **AUTO:**
  The range will be selected automatically ("auto range"). This function will only be available with an **I/O board with 3 alarms (PIN 70 656 193)**, because the auto ranging parameters are located on the I/O board (see its own manual)!
- **REMOTE:**
  The range selection will be controlled by digital inputs, e.g. via a **DIO board or I/O board with 3 alarms**.



⇒ **Change to the main menu**

Press F3

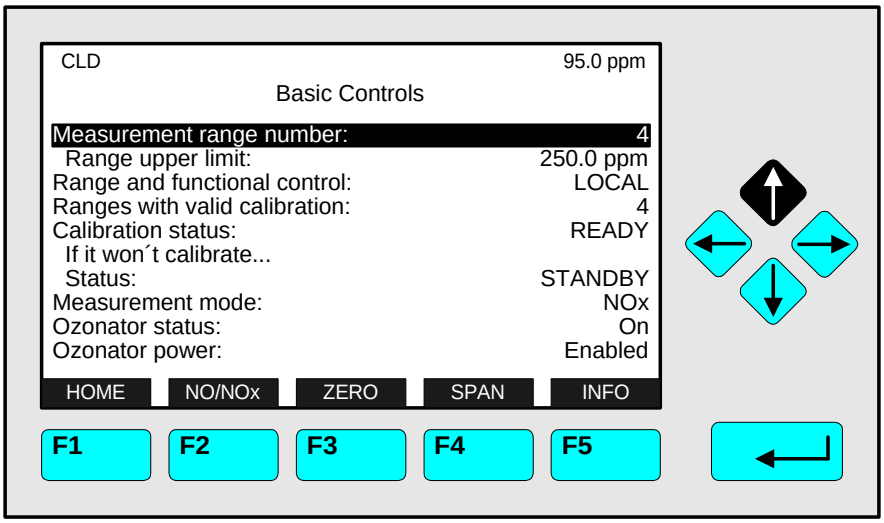
or



⇒ **Change to the basic controls**

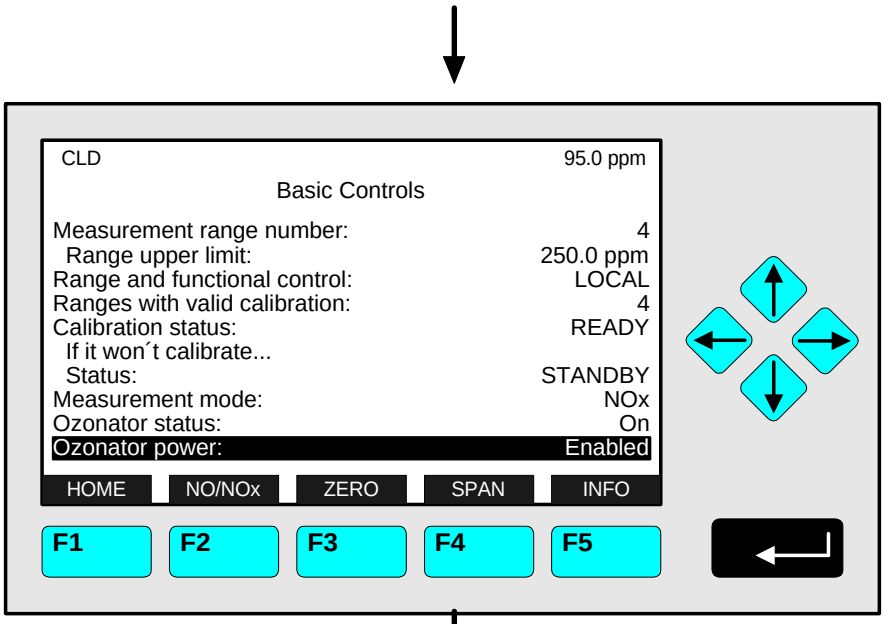
Press

or



⇒ **Change to the line "Ozonator power"**

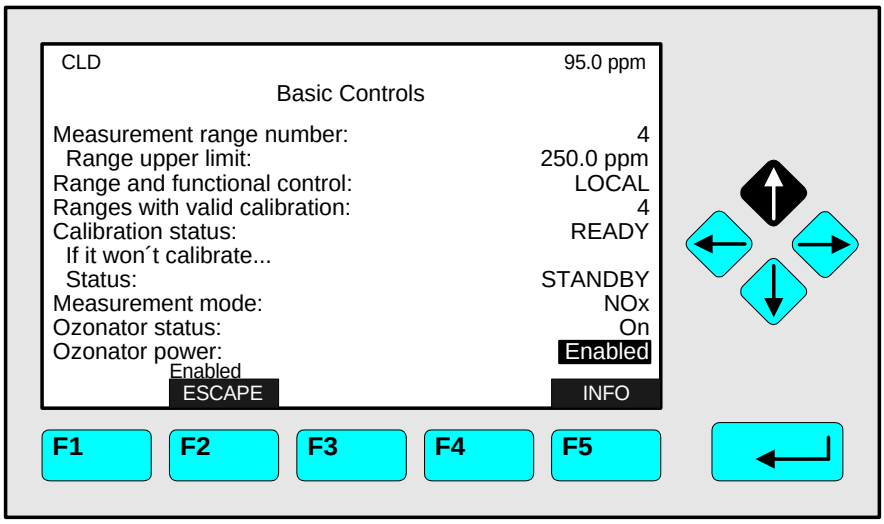
Press or as often as necessary until the line "Ozonator power" will appear white on black.



⇒ **Choose the parameter**

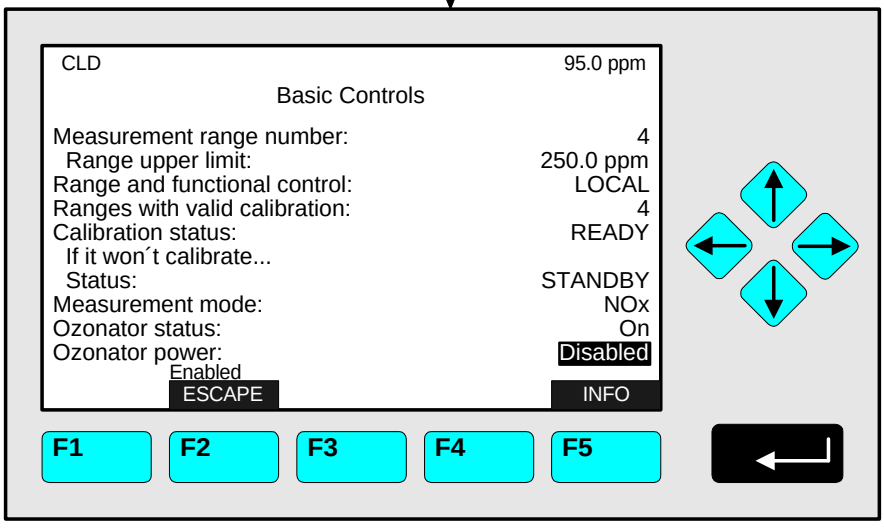
Press ↵

or →



⇒ **Select the ozonator power status you want**

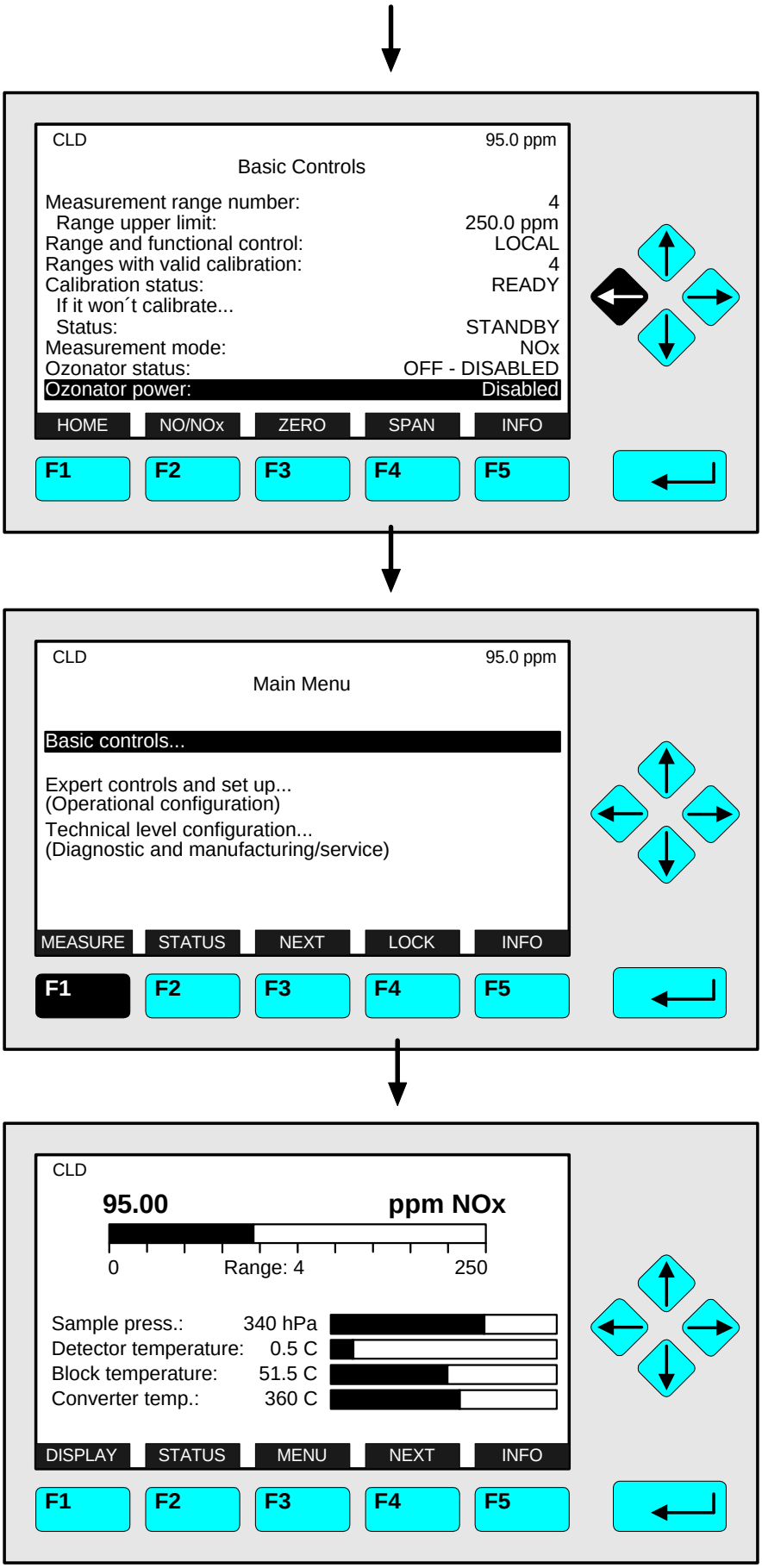
Press ↑ or ↓ to select "Enabled" or "Disabled".



⇒ **Confirm the setup**

Press ↵

Note:
If you don't want to confirm the new selection, you can reactivate the former one:
Press F2 (ESCAPE) and confirm it with ENTER.



⇒ **Change to the main menu**

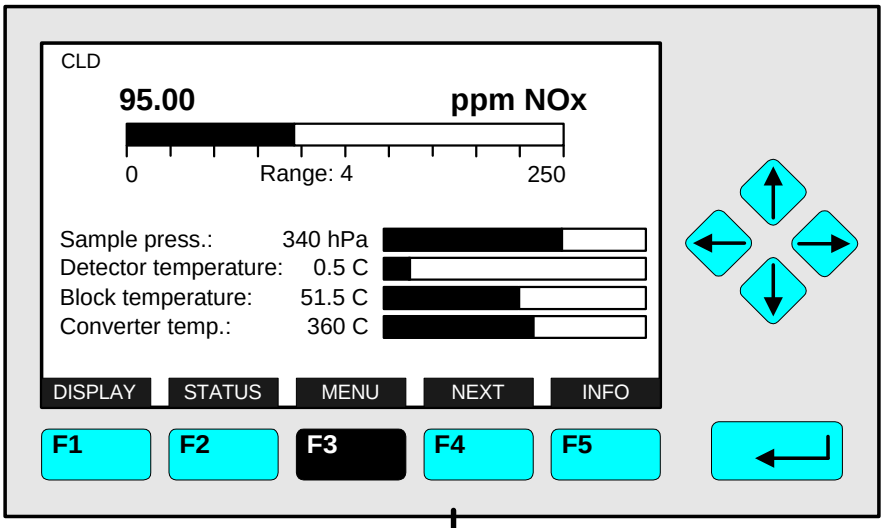
Press ◄ or

2 times **F1**

⇒ **Change to the single component display**

Press **F1**

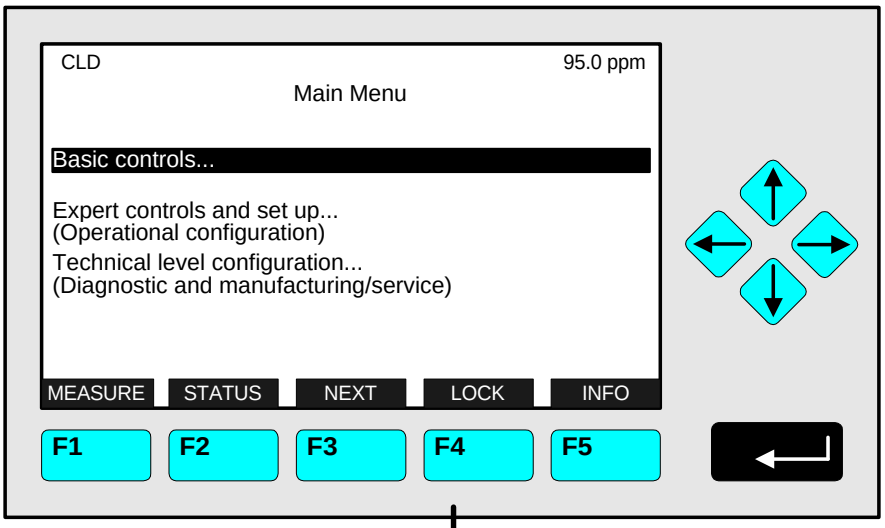
⇒ **Single component display will appear after the setup of the ozonator power status**



⇒ **Change to the main menu**

Press F3

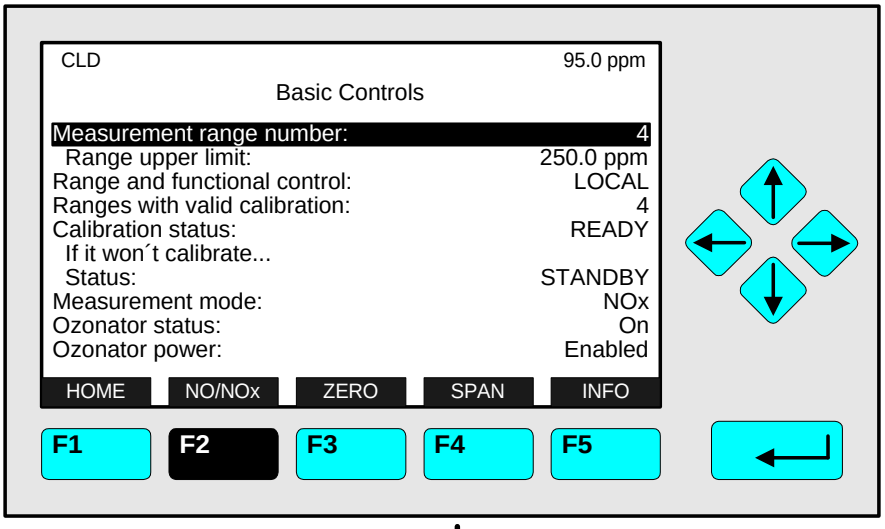
or



⇒ **Change to the basic controls**

Press

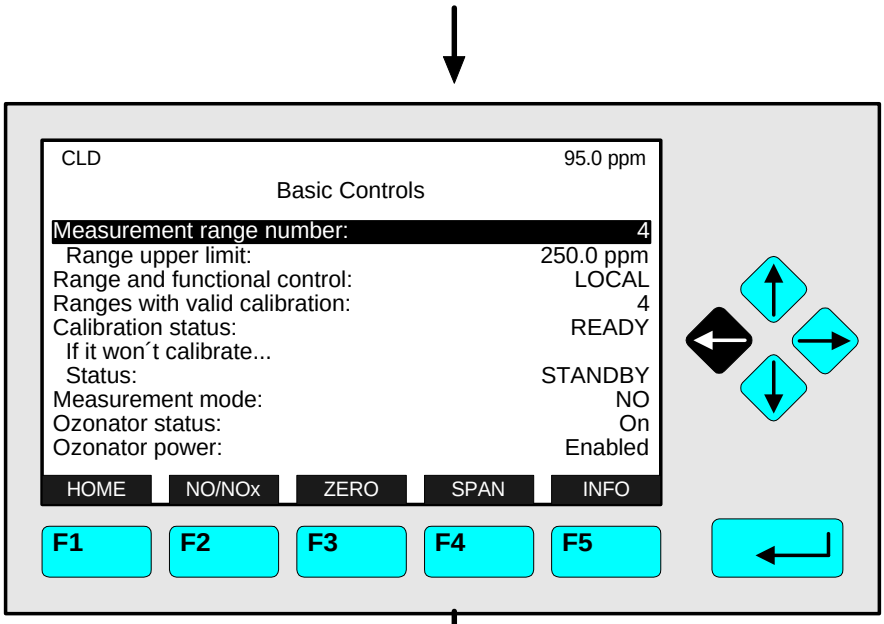
or



⇒ **Select NO ↔ NO_x**

Press F2 to select the measurement mode you want.

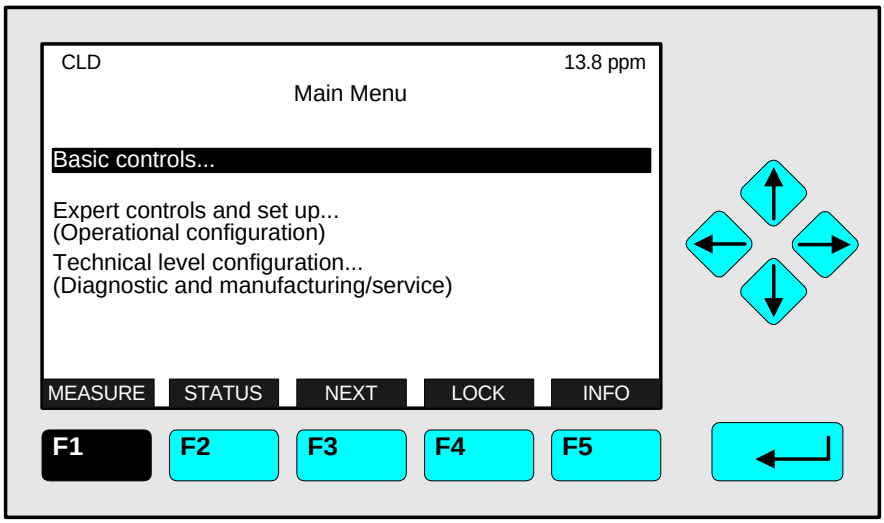
The current selection will be displayed in the line "Measurement mode".



⇒ **Change to the main menu**

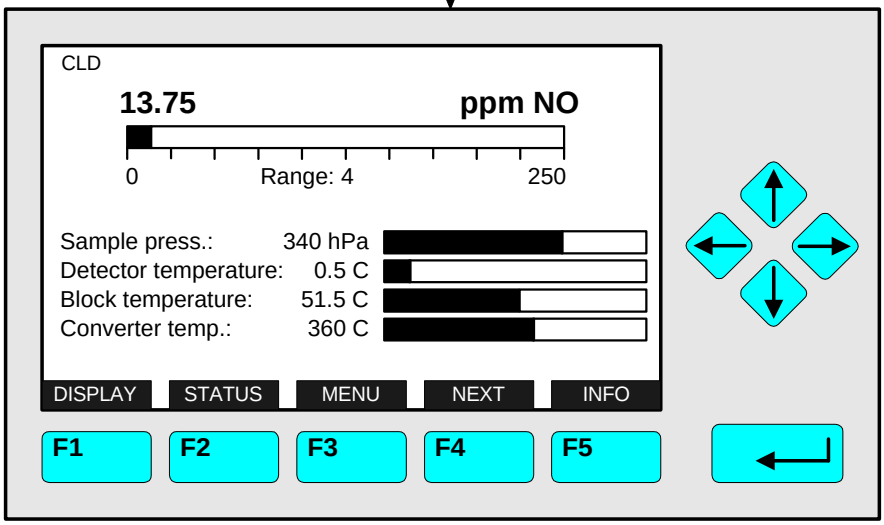
Press ◄ or

2 times **F1**

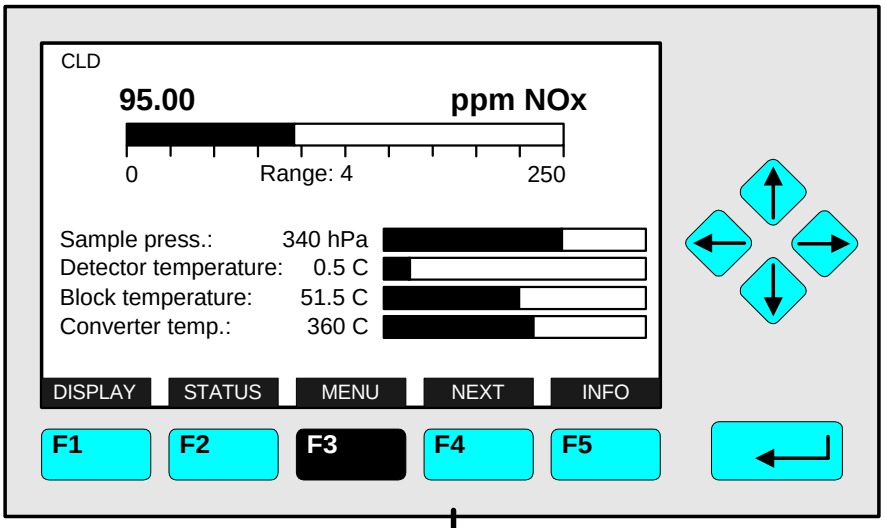


⇒ **Change to the single component display**

Press **F1**



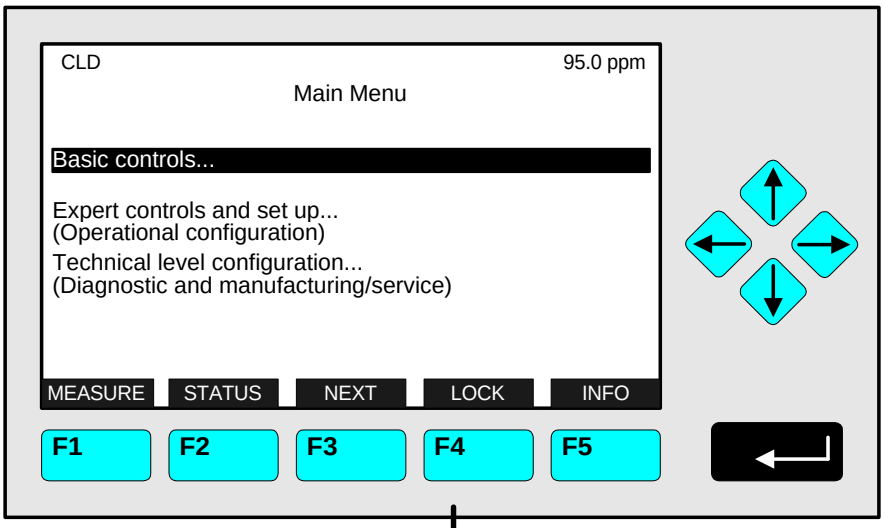
⇒ **Single component display will appear with the measure-ment mode selected**



⇒ **Change to the main menu**

Press F3

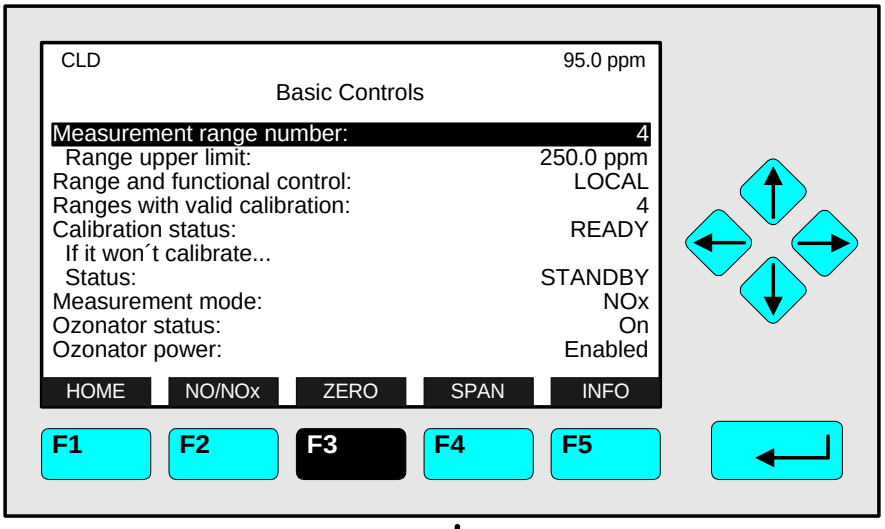
or



⇒ **Change to the basic controls**

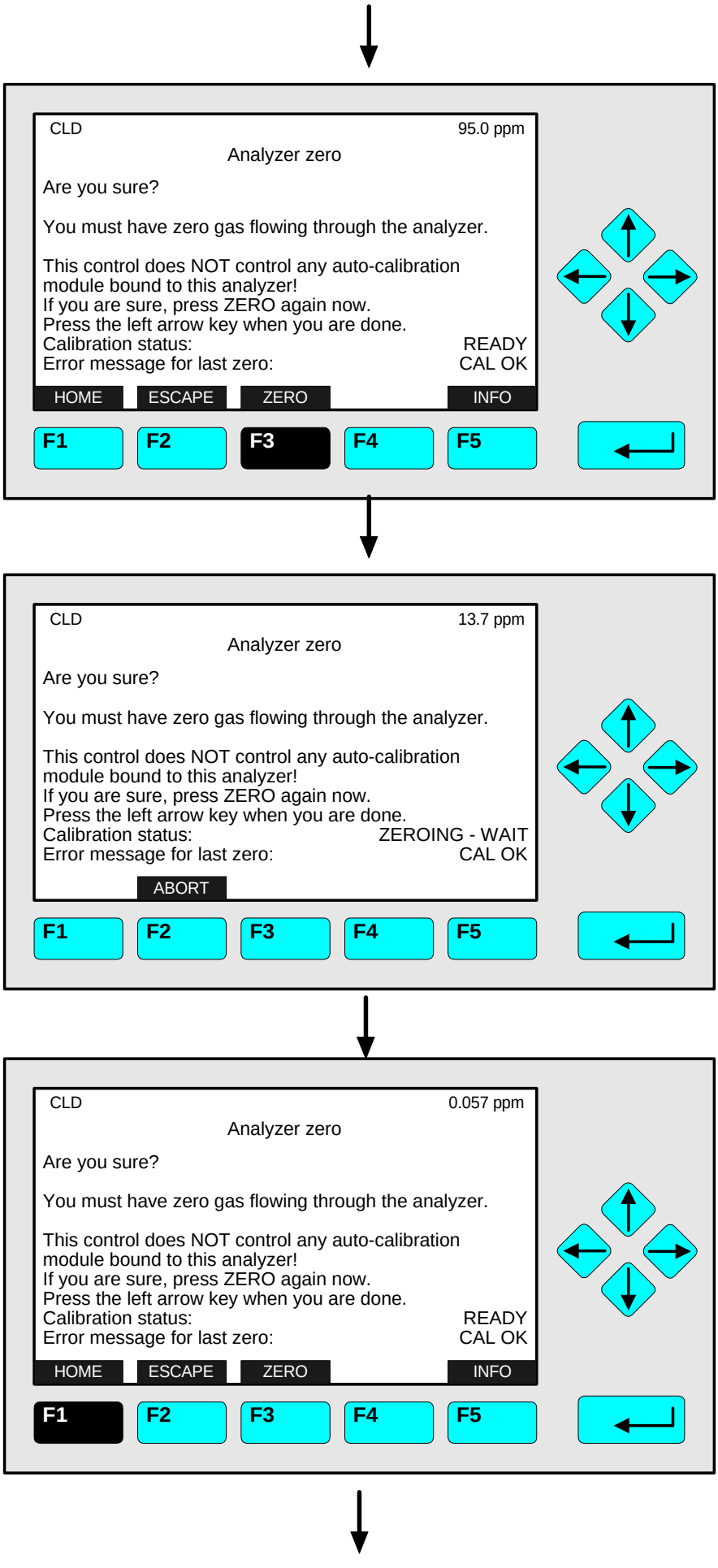
Press

or



⇒ **Change to the submenu "Analyzer zero"**

Press F3



⇒ Start Zeroing

☞ Pay attention to the note at p. 4-23 !

Press **F3**

Caution:
You have to

- flow enough zero gas through the analyzer
- look for a stabilized signal

before starting the zero gas calibration.

Note:
You can go back to the menu "Basic Controls" with the F2 key.

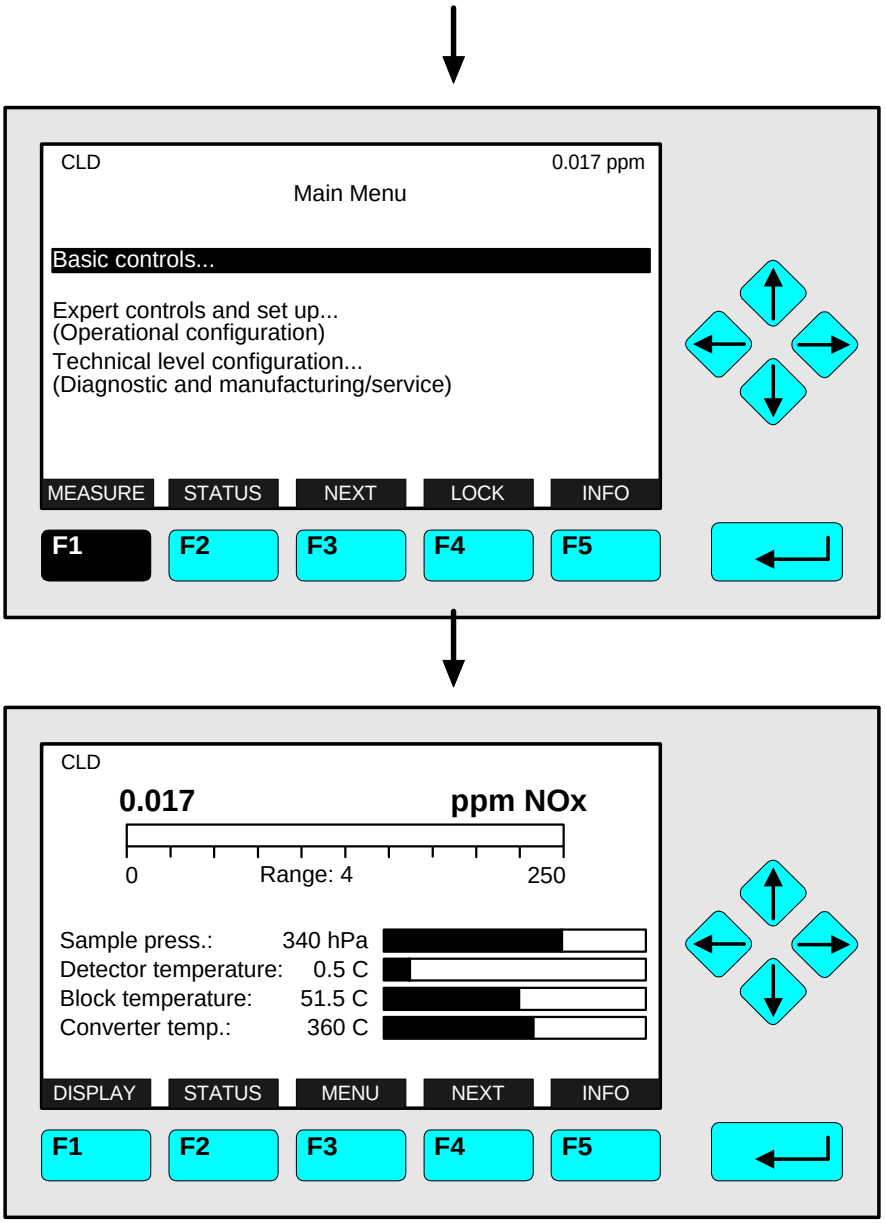
⇒ Zero gas calibration is running

Note:
You can abort the procedure at any time with the F2 key.

⇒ Change to the main menu

Press **F1**

Alternative:
If you want to continue with the span gas calibration after the zeroing is done, you can go back to the basic controls with the F2 key or the ← -key.
(The spanning will be described in the next chapter: 4.2.2).



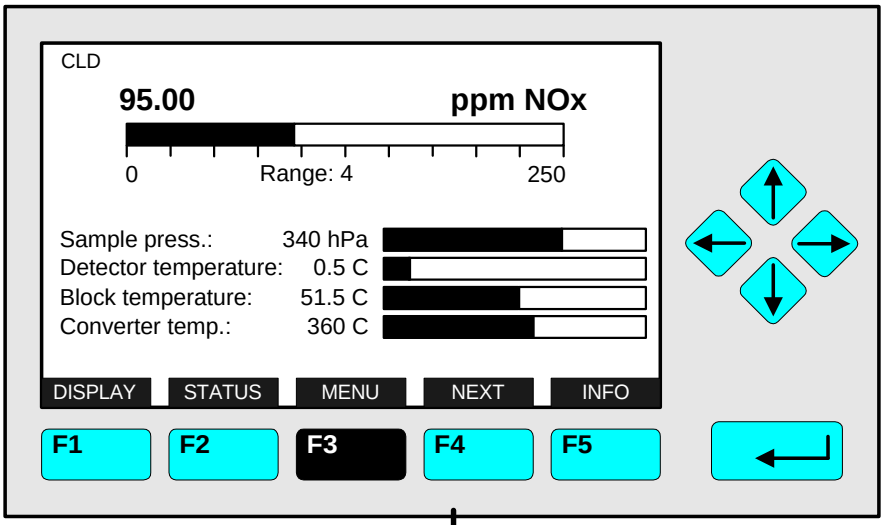
⇒ **Change to the single component display**

Press **F1**

⇒ **Single component display will appear after the zero gas calibration**

⇒ **Notes for zero gas calibration:**

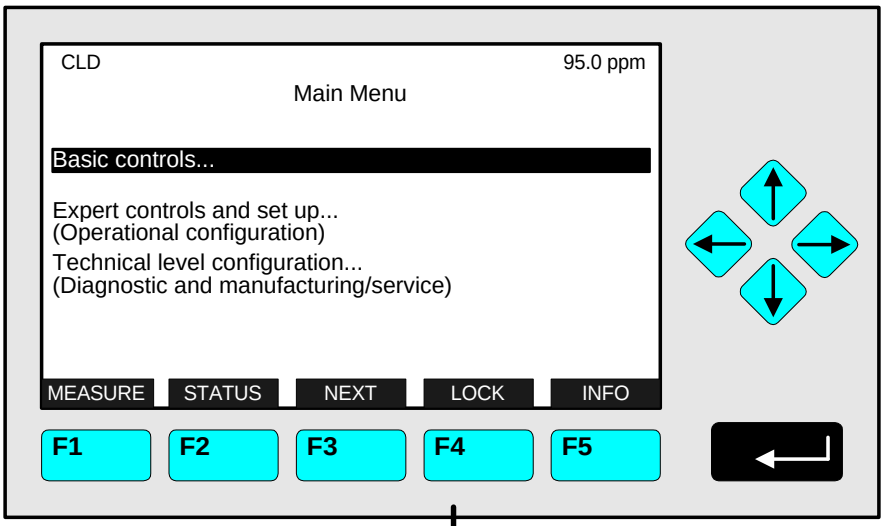
- You can calibrate all ranges together or each range separately with zero gas.
- You have to set up the parameter you want in the menu "Calibration Parameters" (see chapter 5.1.2 S. 5-9).



⇒ **Change to the main menu**

Press F3

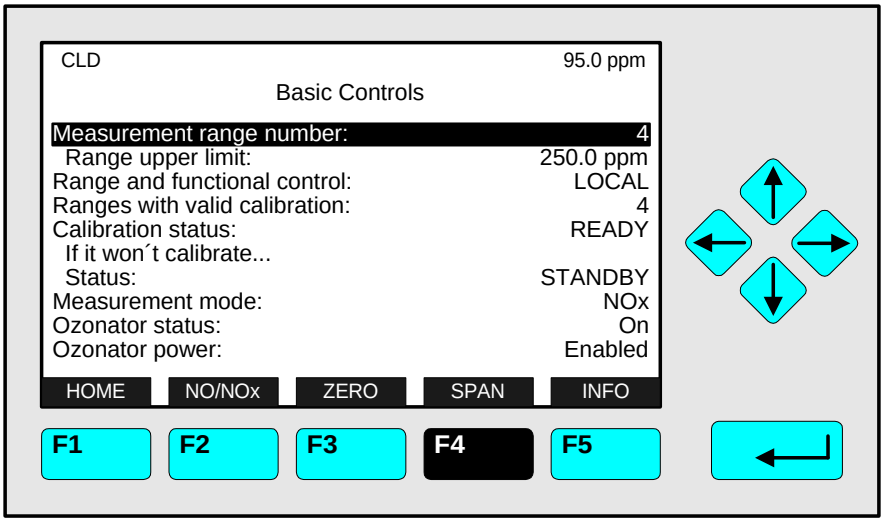
or



⇒ **Change to the basic controls**

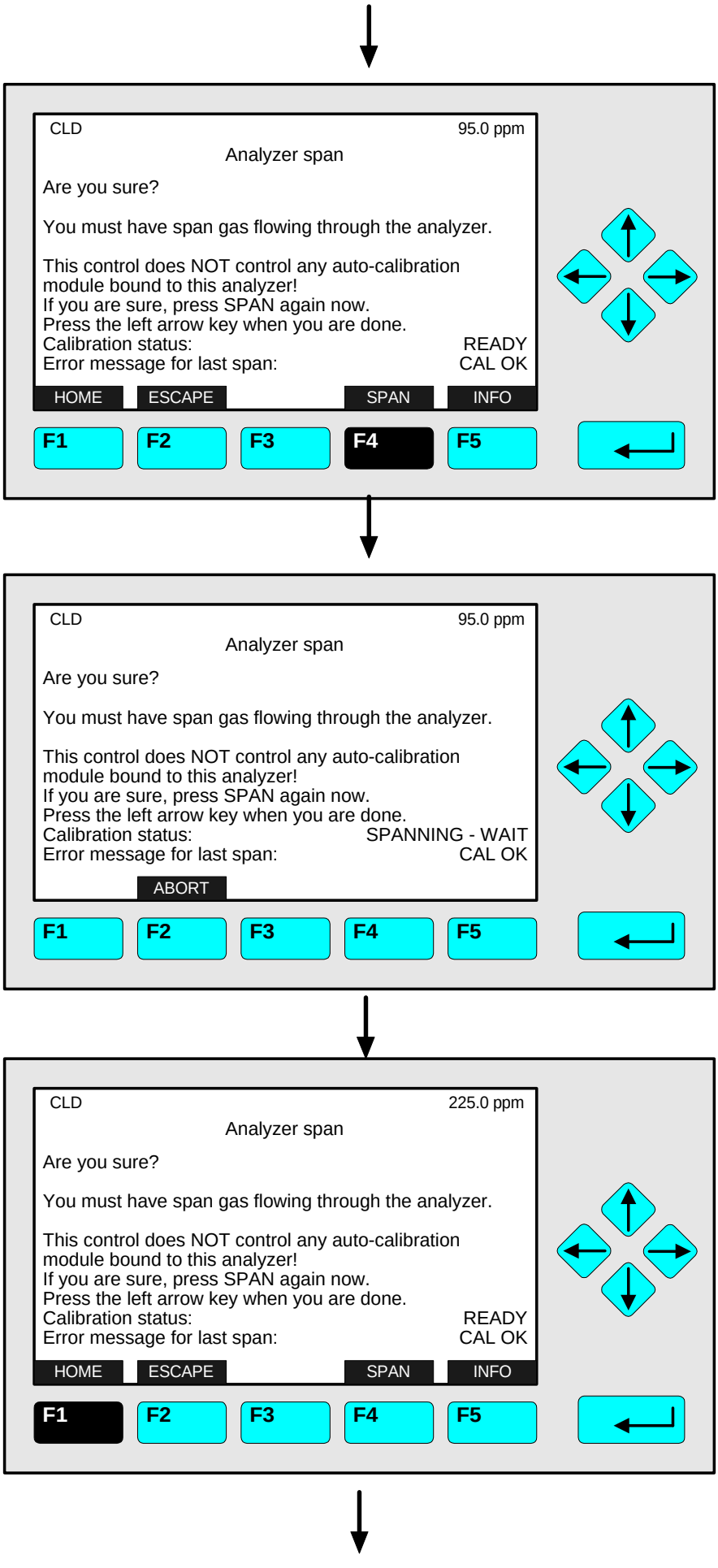
Press

or



⇒ **Change to the submenu "Analyzer span"**

Press F4



⇒ Start Spanning

☞ Pay attention to the note at p. 4-27 !

Press **F4**

Caution:

You have to

- flow enough span gas through the analyzer
- look for a stable signal

before starting the span gas calibration.

Note:

You can go back to the menu "Basic Controls" with the F2 key.

⇒ Span gas calibration is running

Note:

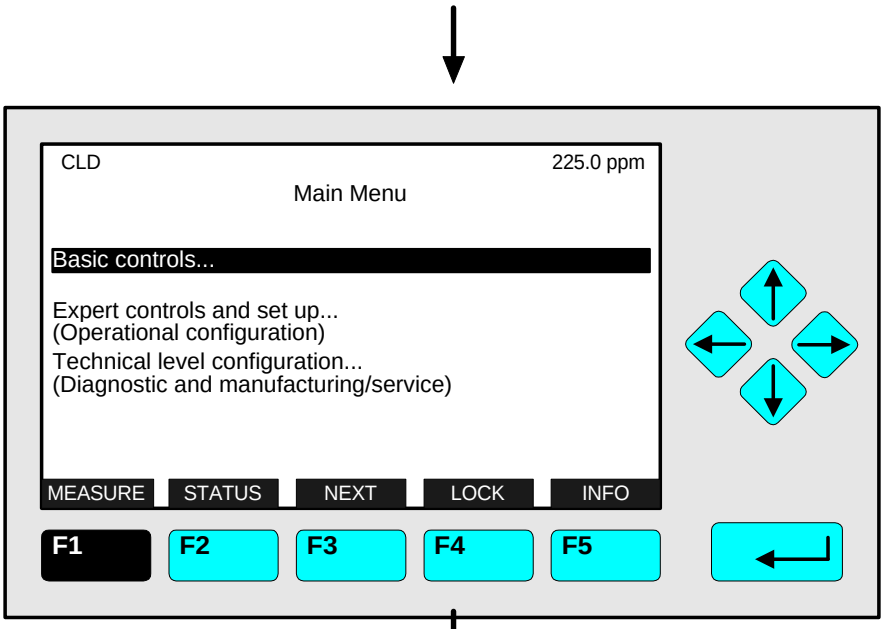
You can abort the procedure at any time with the F2 key.

⇒ Change to the main menu

Press **F1**

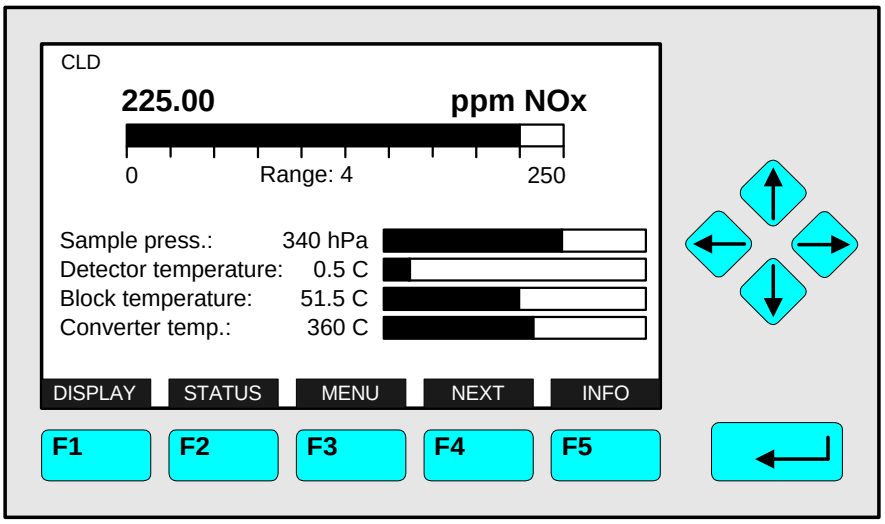
Alternative:

If you want to continue with further setups of the basic controls, you can go back to the corresponding menu with the F2 key or the ← -key.



⇒ **Change to the single component display**

Press **F1**



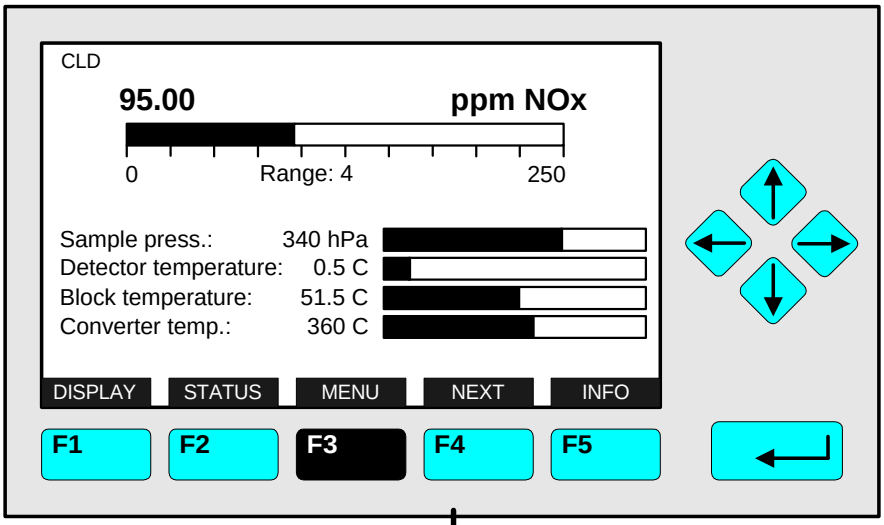
⇒ **Single component display will appear after the span gas calibration**

⇒ **Notes for the span gas calibration:**

- You can calibrate all ranges together or each range separately with span gas. You have to set up the parameter you want in the menu "Calibration Parameters" (see chapter 5.1.2 p. 5-9).
- If it will not be possible to calibrate all ranges with the same span gas, you have to calibrate each range separately!
- The desired value of span gas has to be (!) a value between 10% and 110% of each end of range. Otherwise, no calibration will be running.

Example:

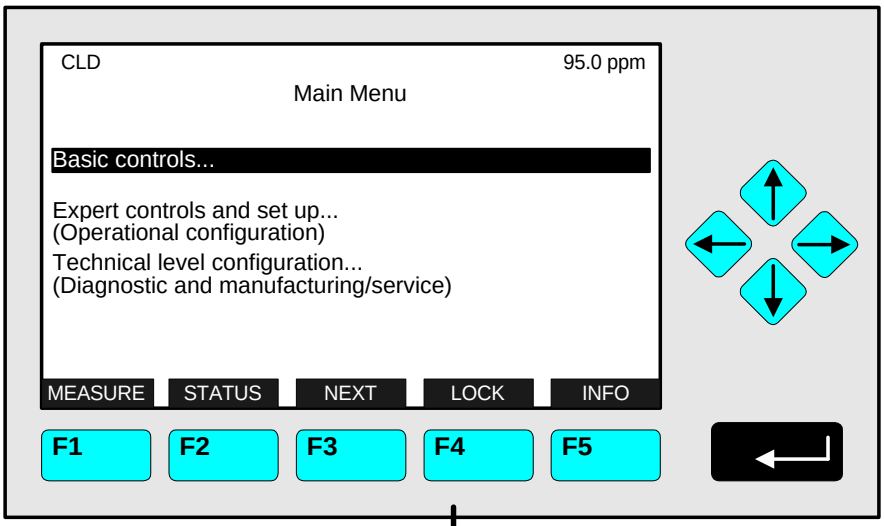
- End of range 1: 50 ppm → Potential span gas setpoints: 5 – 55 ppm
- End of range 2: 250 ppm → Potential span gas setpoints: 25 – 275 ppm
- End of range 3: 1000 ppm → Potential span gas setpoints: 100 – 1100 ppm
- End of range 4: 2500 ppm → Potential span gas setpoints: 250 – 2750 ppm



⇒ **Change to the main menu**

Press F3

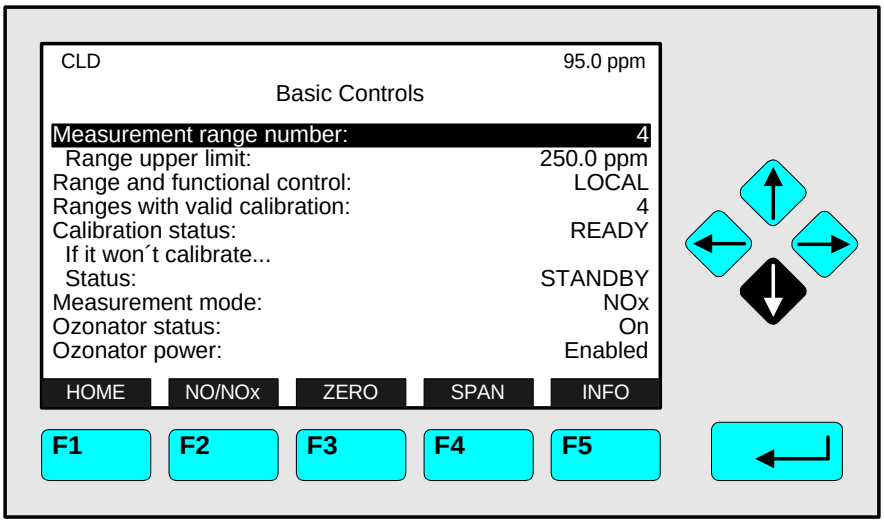
or



⇒ **Change to the basic controls**

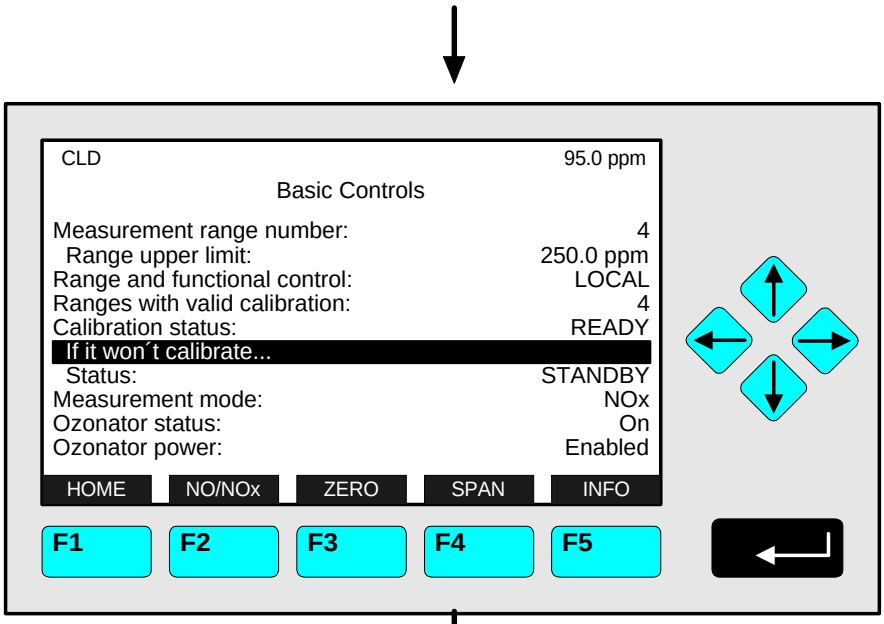
Press

or



⇒ **Change to the line "If it won´t calibrate..."**

Press or as often as necessary until the line "If it won´t calibrate..." will appear white on black.

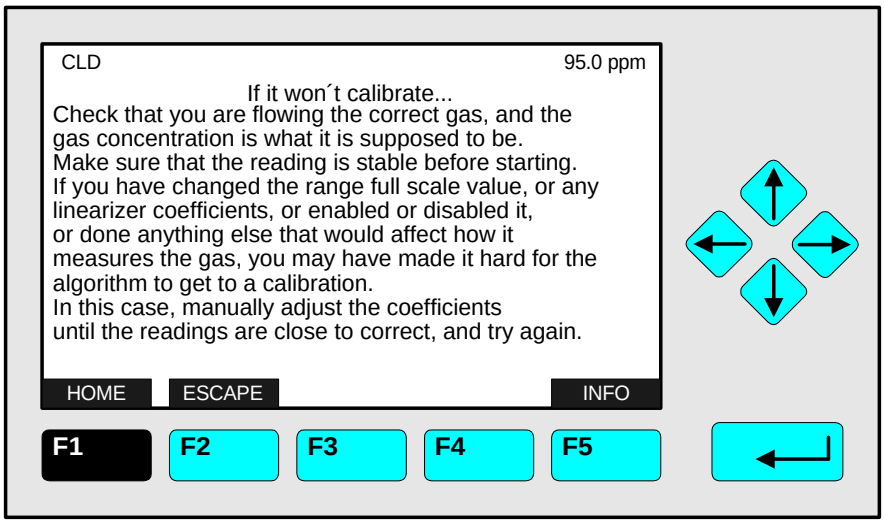


⇒ **Change to the menu page "If it won´t calibrate..."**

Press ↵

Notes:

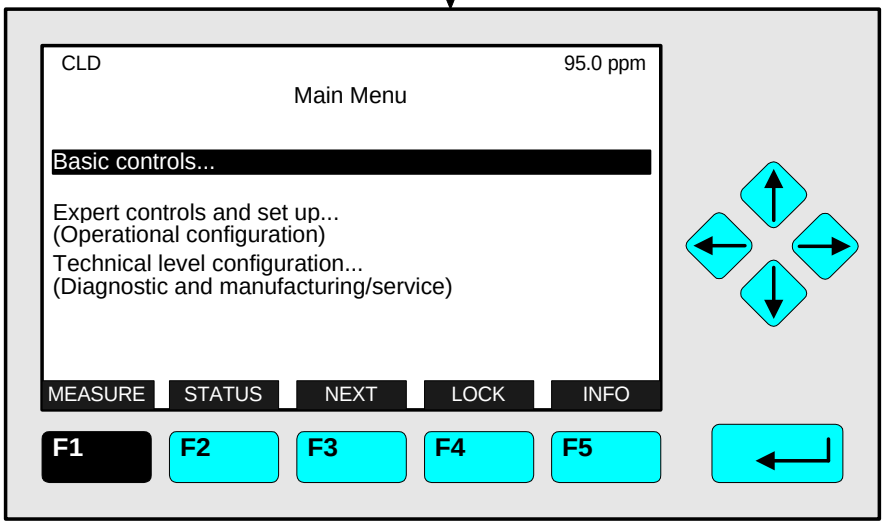
- Follow the instructions on the screen to calibrate succesfully!
- If you have further questions, contact your customer service, please!



⇒ **Change to the main menu**

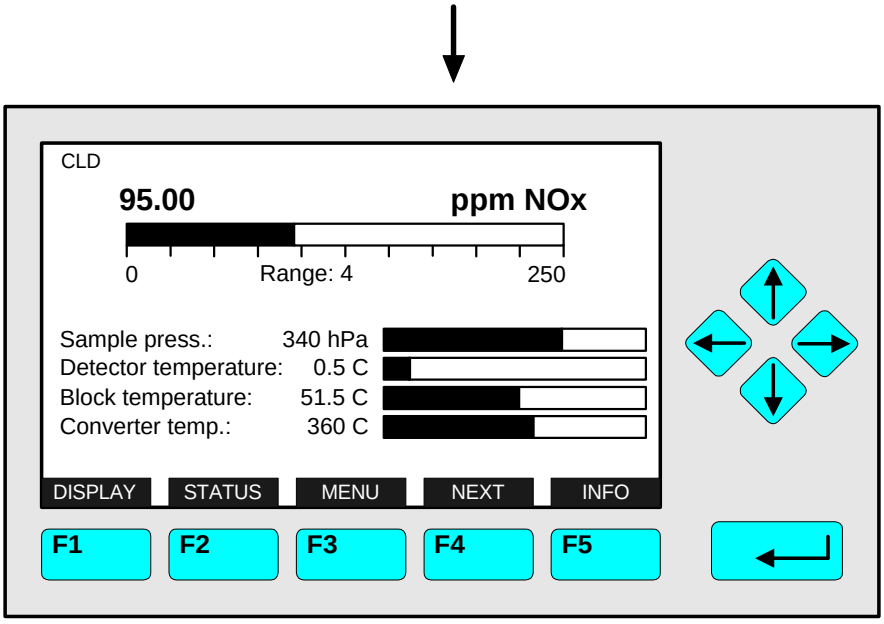
Press F1

Alternative:
If you want to continue with further setups of the basic controls, you can go back to the corresponding menu with the F2 key or the ← -key.



⇒ **Change to the single component display**

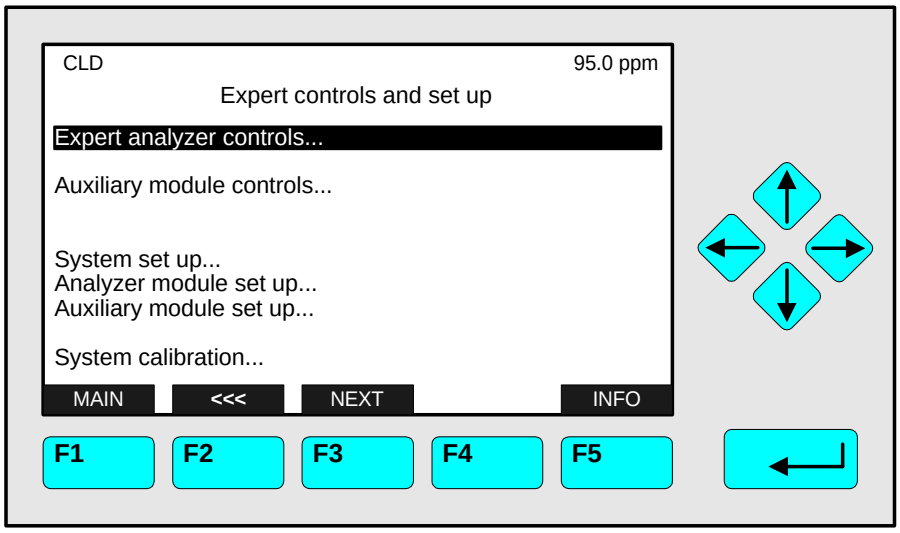
Press F1



⇒ **Single component display will appear**

5 Expert Controls and Set up

If you press the ENTER key or the → -key in the line "Expert controls and set up..." of the "Main Menu" you will change to the following display:



From the menu "Expert controls and set up" you can change to several submenus to set up parameters for the measurement and calibration of your analyzer and analyzer module. Besides you can set up the configuration for auxiliary modules. Which part of these menus are important for you depends on the configuration of your NGA 2000 system.
In the following table you will find a short overview about the contents of the menus and where you will find the description in this manual:

Menu	Important Contents	Chapter in this manual
Expert analyzer controls...	⇒ Zero/Span calibration ⇒ Range settings ⇒ Ozonator power	* 5.5 p. 53 to 60
Auxiliary module controls...	⇒ Configuration of the SIO and of the DIO's installed in a platform or in an MLT analyzer	* 5.2 p. 29 to 44
System set up...	⇒ Front panel control ⇒ Set up of the single component display ⇒ Display resolution	* 5.4 p. 47 to 52
Analyzer module set up...	⇒ Measurement/Calibration parameters set up ⇒ Linearizer parameters set up ⇒ Sensor/Converter/Block parameters set up and optimization	* 5.1 p. 3 to 28
Auxiliary module set up...	⇒ Set up for micro processor controlled auxiliary I/O modules	* 5.3 p. 45
System calibration...	⇒ Zero gas and span gas calibration of all channel automatically	* See Supplement!

Structure of chapter five:

At the begin of any chapter you will find the way to a certain submenu of the MLT software starting from the line "Expert controls and set up" in the "Main Menu". The way will be described with the software catchwords that you have to enter one after another to reach the corresponding submenu. At the end of the catchword listing you will find the illustration of the LCD screen. After that you can read the set up instructions and explanations. Sometimes the illustration will be completed by sketches or further menu pictures.

Example: *You want to set up the zero/span gas concentrations for all ranges of the analyzer module.*

Main Menu — Expert controls and set up

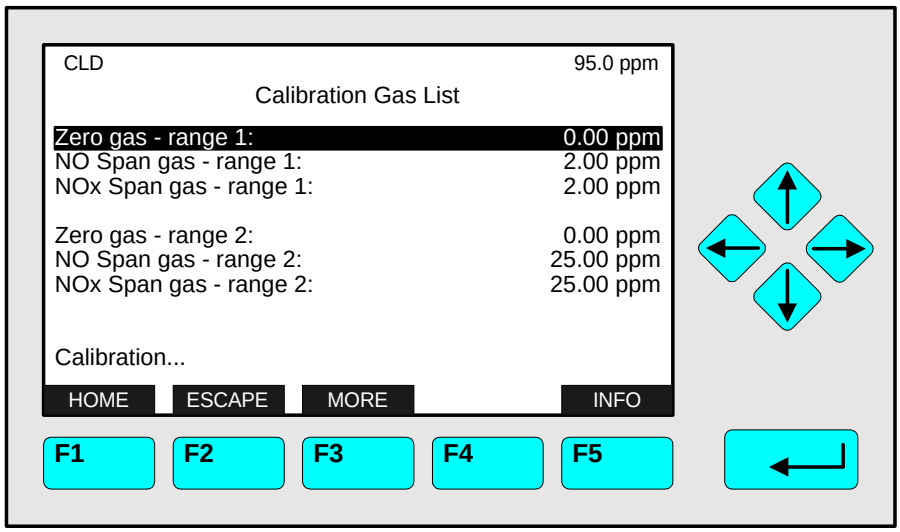
↓

Analyzer module set up

↓

Calibration gas list

↓



In the menu "Calibration Gas List" you can set up the desired zero and span gas values for all ranges. On the first menu page you will find the parameters of range 1 and 2, on the second page you will find the parameters of range 3 and 4. You can reach the second menu page with the F3 key (MORE)...

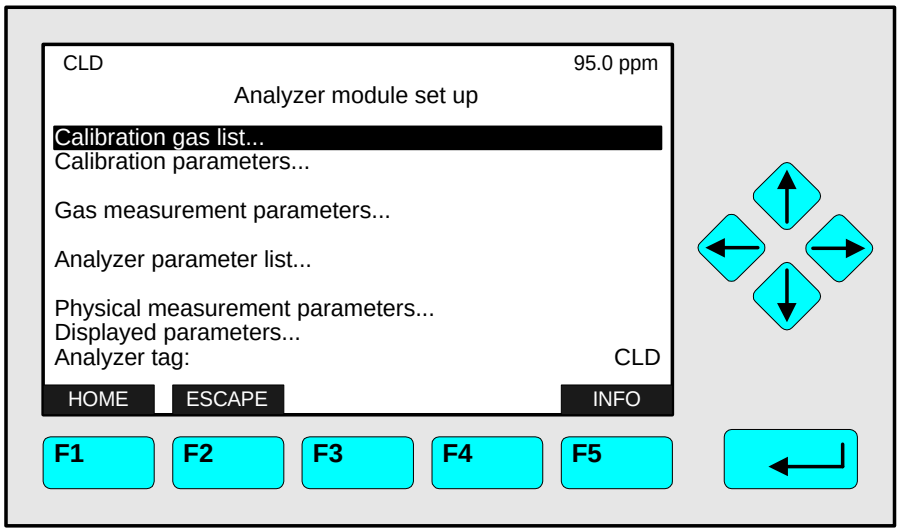
Further explanations and instructions to set up the parameters will follow!

Main Menu — Expert controls and set up

↓

Analyzer module set up

↓



From the menu "Analyzer module set up" you can change to several submenus, where you can set up the measurement and calibration parameters of the CLD analyzer module. Besides, you can go to those submenus where you can set up the parameters of the single component display.

Caution:

Normally, you will find "CLD" as analyzer module tag in the line "analyzer tag".

If the CLD module is part of an analyzer network: You have to change the configuration of the programmable digital inputs and analog outputs, if you change the identification tag ! Because, the parameters of the module source will change ! So, the relations will disappear !

Set up parameters:

- Select the menu line you want or the line of variables "Analyzer tag" with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key;
  Maximum of digits: 30
  Options: alphabet (capital and small letters), umlauts, letters from different languages, 0, 1, 2, ..., 9, +, -, *, /, =, ?, !, %, $ and many others.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

5.1.1 Analyzer Module Set up
Calibration/Calibration Gas List

Main Menu — Expert controls and set up

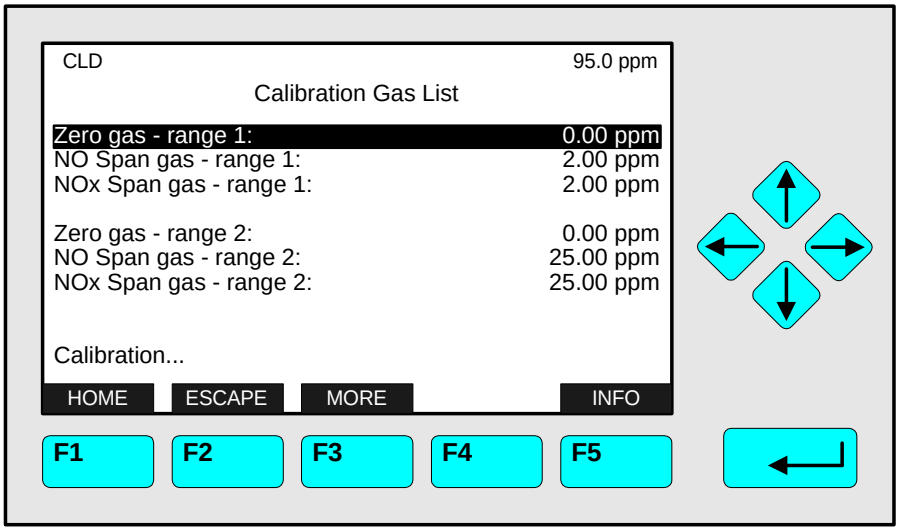
↓

Analyzer module set up

↓

Calibration gas list

↓



In the menu "Calibration Gas List" you can set up the desired zero and span gas values for all ranges. On the first menu page you will find the parameters of range 1 and 2, on the second page you will find the parameters of range 3 and 4. You can reach the second menu page with the F3 key (MORE).
Via the menu line "Calibration..." you can change to the menu "Zero/span calibration", where you can start zeroing and spanning (see next page).

Set up parameters:

- Select the line of variables you want or the menu line "Calibration..." with the ↑ -key or the ↓ -key.
- Select the parameter or change to the menu "Zero/span calibration" with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
  Options zero gas: 0.00 ppm up to the end of range value
  Options span gas: 0.00 ppm up to 120% of the end of range value
  You can set up the end of range values in the menu "Range Settings" (see 5.1.6 p. 5-16).
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

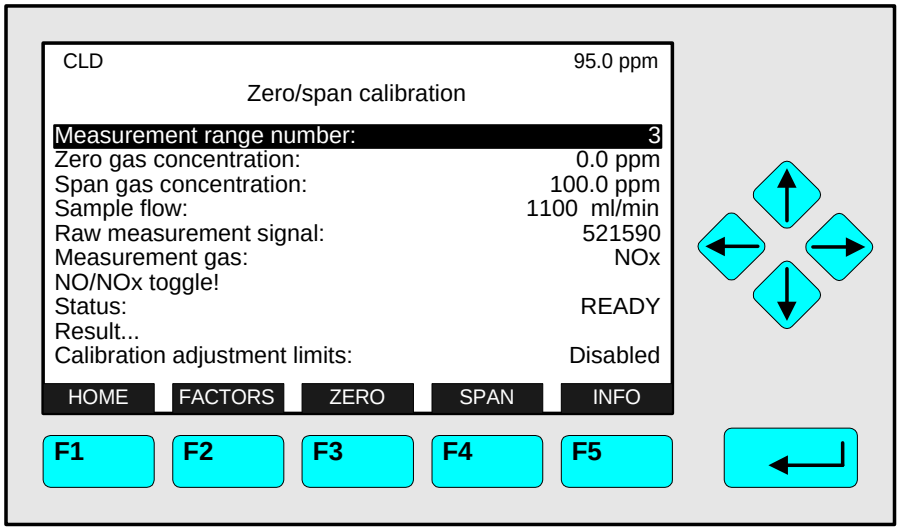
Span gas calibration notes:

- The span gas setpoint of NO and NO_x have to be the same value, because both components will be calibrated simultaneously!
- You can calibrate all ranges together or each range separately with span gas. You have to set up the parameter you want in the menu "Calibration Parameters" (see chapter 5.1.2 p. 5-9).
- If it will not be possible to calibrate all ranges with the same span gas, you have to calibrate each range separately!
- The desired value of span gas has to be (!) a value between 10% and 110% of each end of range. Otherwise, no calibration will be running:
  - Example:

End of range 1:	50 ppm	→ Potential span gas setpoints:	5	–	55 ppm
End of range 2:	250 ppm	→ Potential span gas setpoints:	25	–	275 ppm
End of range 3:	1000 ppm	→ Potential span gas setpoints:	100	–	1100 ppm
End of range 4:	2500 ppm	→ Potential span gas setpoints:	250	–	2750 ppm

How to calibrate:

Change to the menu "Zero/span calibration" via the menu line "Calibration...":



1) Select the measurement range:
   - Press the ENTER key or the → -key in the line "Measurement range number" to enter the parameter. Select the range you want to calibrate with the ↑ -key or the ↓ -key and confirm it with ENTER. The zero gas concentration and the span gas concentration of the range selected will appear in the corresponding lines, automatically.
2) Select the gas component:
   - Go to the line "NO/NOx toggle!" with the ↓ -key and select the gas component you want with the ENTER key or the → -key. The component selected will appear in the line "Measurement gas", automatically.

3) Zeroing:
- Change to the submenu "Analyzer zero" with the F3 key (ZERO).
- Pay attention to the notes on the screen !
- Flow enough zero gas through the CLD.
- Wait for a stable signal (look at the headline of the display). Then, start the zero gas calibration with the F3 key (ZERO). The running procedure will be the same as it is described detailed in chapter 4.2.1 of the basic controls (p. 4-22pp).
- Go back to the menu "Zero/span calibration" with the F2 key or the ← -key after the zero gas calibration will be done (Messages on the display: READY/CAL OK).

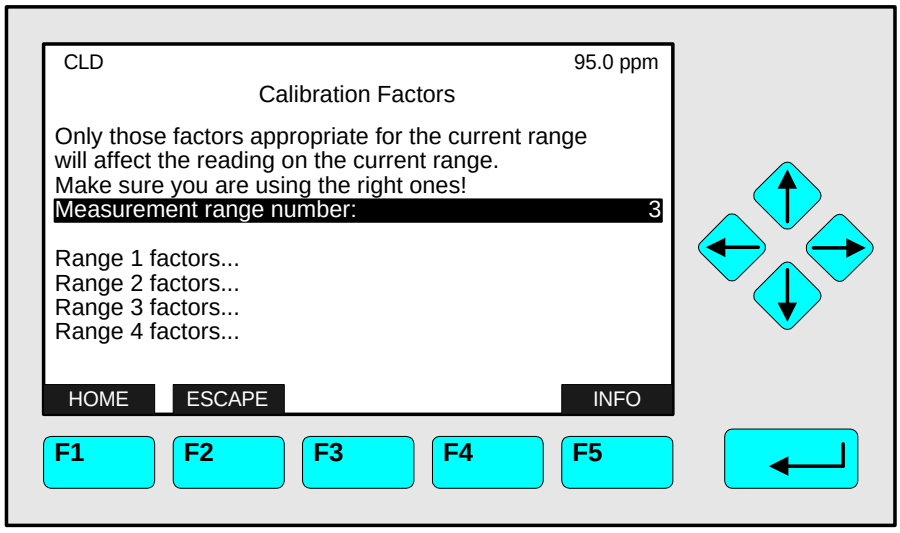
4) Spanning:
- Change to the submenu "Analyzer span" with the F4 key (SPAN).
- Pay attention to the notes on the screen !
- Flow enough span gas through the CLD.
- Wait for a stable signal (look at the headline of the display). Then, start the span gas calibration with the F4 key (SPAN). The running procedure will be the same as it is described detailed in chapter 4.2.2 of the basic controls (p. 4-26pp).
- Go back to the menu "Zero/span calibration" with the F2 key or the ← -key after the span gas calibration will be done (Messages on the display: READY/CAL OK). Alternative: Go back to the "Main Menu" with the F1 key (HOME).

5) Check the calibration results:
- You can change to the submenu "Zero/span diagnostic data" via the line "Result..." of the menu "Zero/span calibration". There you can control the results of the last zero and span calibration. You can go back to the menu "Zero/span calibration" with the F2 key or the ← -key.

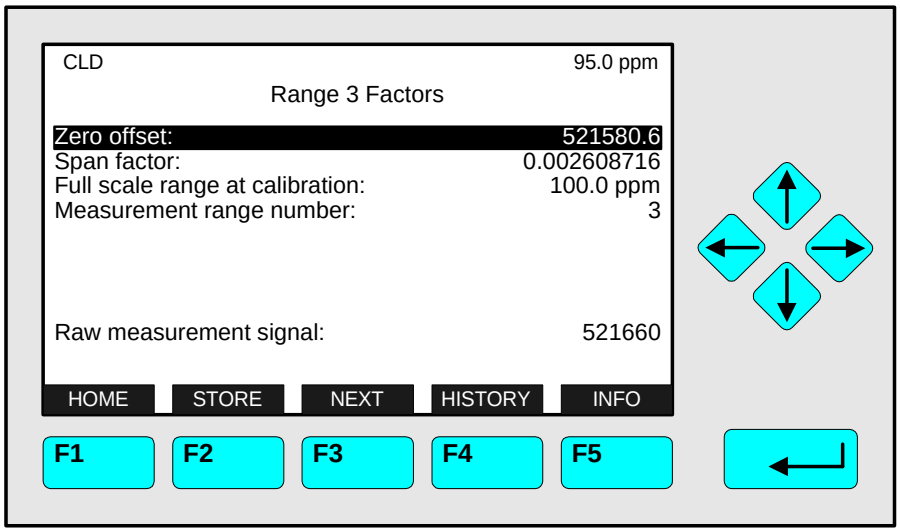
Manual input of calibration factors:

The calibration may be wrong because of a trouble in the gas flow. If a calibration was not successful, you have to repeat it. It is possible that a new start of calibration will not solve the problem, if the measured zero or span gas value will differ from normal signals largely. In that case you have to put in the calibration factors manually:

♦ From the menu "Zero/span calibration" you can change to the submenu "Calibration Factors" with the F2 key (FACTORS):



- Select the range you want in the line "Measurement range number" and change via the line "Range 1/2/3/4 factors..." to the corresponding submenu:



Set up parameters:

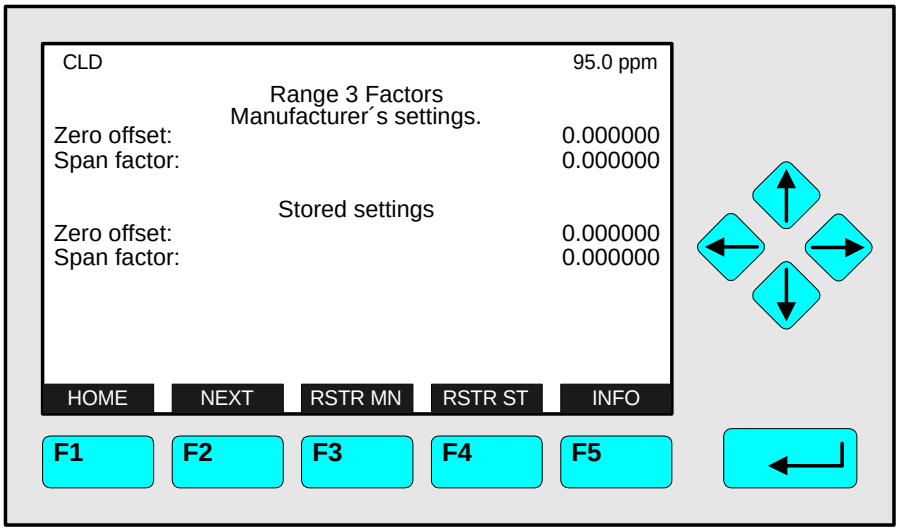
- Press the ENTER key or the → -key in the line "Zero offset" to select the parameter and set up "32700" resp. "524000" with the ↑ -key or the ↓ -key. You may select any digit with the → -key or the ← -key.
  Note: The zero offset is about 32000 counts for the CLD software revision 2.2.1 (16 bit D/A transformer) and about 520000 counts for the revision 2.3 (20 bit D/A transformer).
- Confirm your setup with the ENTER key.
- Go to the line "Span factor" with the ↓ -key.
- Press the ENTER key or the → -key to select the parameter and set up "0.00015" with the arrow keys.
- Confirm your setup with the ENTER key.

Notes:

- You have to set up the factors for all ranges.
- With the parameter "Zero offset" you will fix the zero value. The changing of the zero offset will influence the signal immediately (look at the headline).
- With the parameter "Span factor" you will fix the signal at the span gas setpoint. The changing of the span factor will influence the signal immediately (look at the headline).
- Conditions for the manual input of factors:
  - "Disabled" has to be set up in the line "Calibration adjustment limits" of the menu "Zero/span calibration".
  - "SEPARATELY" has to be set up in the lines "Zero ranges" and "Span ranges" of the menu "Calibration Parameters" (see 5.1.2, p. 5-9).
- **Attention:**
  After the calibration with factors you have to calibrate with zero gas and span gas in the usual way!

Saving the factors:

- You can store the actual zero offset and span factor with the F2 key (STORE) of the menu "Range 1/2/3/4 Factors". You will find the stored settings on the second menu page (see next illustration).
- You can change to the second menu page of the menu "Range 1/2/3/4 Factors" with the F4 key (HISTORY):



- You can change the stored settings against the manufacturer's settings with the F3 key (RSTR MN: Restore the manufacturer's values). The "Zero offset" and the "Span factor" of the first menu page will change according to the setups of the manufacturer's settings.
- You can change the manufacturer's settings against the stored settings with the F4 key (RSTR ST: Restore the "stored" values). The "Zero offset" and the "Span factor" of the first menu page will change according to the setups of the stored settings.

Main Menu — Expert controls and set up

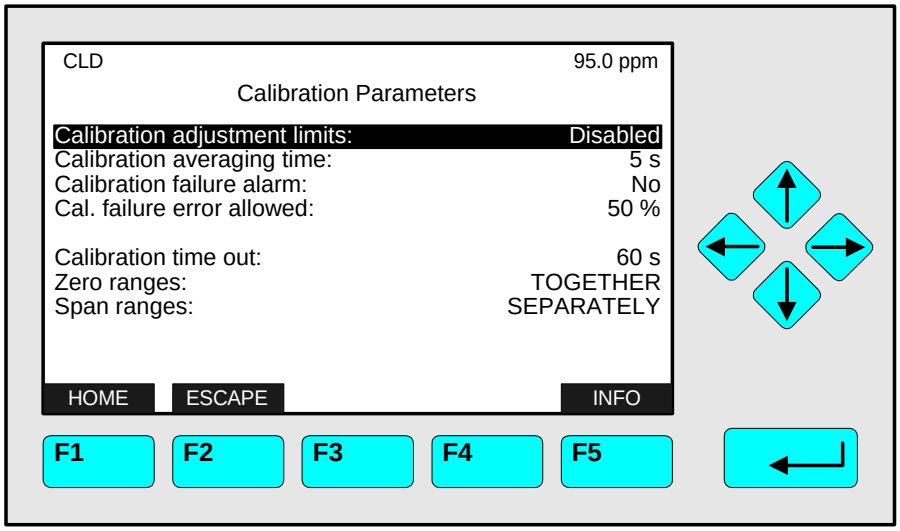
↓

Analyzer module set up

↓

Calibration parameters

↓



In the menu "Calibration Parameters" you can set up several parameters of the zero and span calibration.

Set up parameters:

- Select the line of variables you want with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Line of variables "Calibration adjustment limits:

- **Enabled:** The calibration result will only be accepted within the limit settings. If the results will be out of these limits, you will find a corresponding error message in the menu "Analyzer zero" respectively "Analyzer span". Illustrations of these menus you will find in chapter 4.2.1 p. 4-22 resp. 4.2.2 p. 4-26.
- **Disabled:** The calibration will be possible, even if the calibration results will leave the allowed limits. Compare with the explanations in chapter 5.1.1 p. 5-6/7.

Line of variables "Calibration averaging time":

The value in this line will determine the time range the analyzer will use to get the calibration average. The precision will be better with longer times.
Options: 0 to 60 s; Standard: 5 s

Line of variables "Calibration failure alarm":

The accuracy of the signals may go down after a long use of the analyzer. If you will set up "Yes" in the line "Calibration failure alarm", a warning message will display a wrong or impossible calibration.

Line of variables "Cal. failure error allowed":

If the setpoint will differ more than allowed by the value in this line, a warning message may be displayed. To enable this warning, "Yes" has to be set up in the line "Calibration failure alarm".
Options: 5 to 80%; Standard: 50%

Line of variables "Calibration time out":

If the signal will not be stable after the time out set up in this line, a warning message may be displayed. To enable this warning, "Yes" has to be set up in the line "Calibration failure alarm".
Options: 0 to 300s; Standard: 60s

Lines of variables "Zero ranges/Span ranges":

- **TOGETHER:** All four ranges will be calibrated automatically one after another by zero and span gas.
- **SEPARATELY:** Only the range selected will be calibrated by zero and span gas. You have to set up this parameter, if you want to calibrate with manual factors (see chapter. 5.1.1 p. 5-6/7).
- **Note:** Only, if it is possible to get a span gas setpoint between 10% and 110% of each end of range, you may calibrate all ranges together. Otherwise, only the ranges with this condition will be calibrated automatically. The other ranges will be ignored!

Main Menu — Expert controls and set up

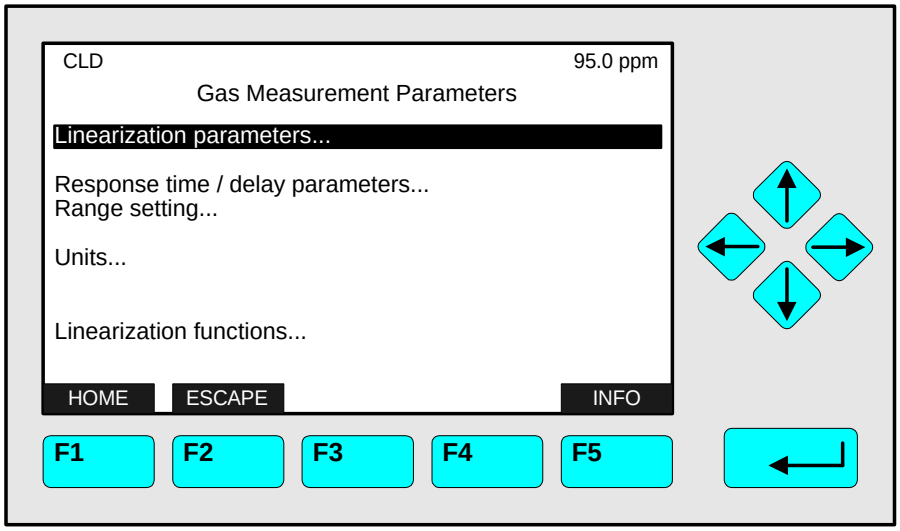
↓

Analyzer module set up

↓

Gas measurement parameters

↓



From the menu "Gas Measurement Parameters" you can change to several submenus, where you can set up parameters of ranges, of measurement units and of linearization:

- Select the line you want with the ↓ -key or the ↑ -key.
- Press the ENTER key or the → -key to change to the corresponding menu.

5.1.4 Analyzer Module Set up
Linearization Parameters

Main Menu — Expert controls and set up

↓

Analyzer module set up

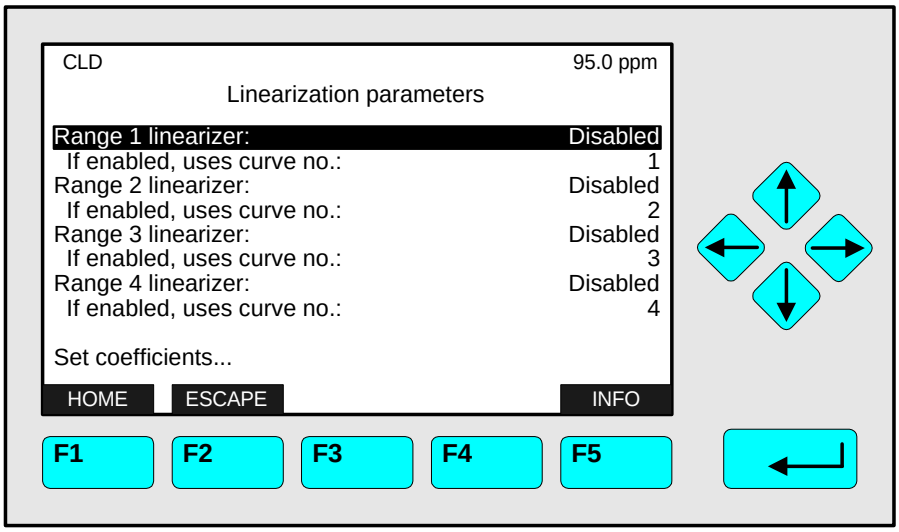
↓

Gas measurement parameters

↓

Linearization parameters

↓



In the menu "Linearization parameters" you can enable the linearization for each range and you can select the linearization curve.

Note:

Normally, the CLD is working linearly in the whole range. Therefore you do not have to linearize generally ! If you will find deviations from the linearization, you should control the ozone and sample gas supply. Optimize it, if necessary! Usually, the reason for deviations will be a defect in the ozone supply.

Set up parameters:

- Select any line of variables or the menu line "Set coefficients..." with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu "Linearity coefficients" with the ENTER key or the → -key.
- Select the parameter you want with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Lines of variables "Range 1/2/3/4 linearizer":

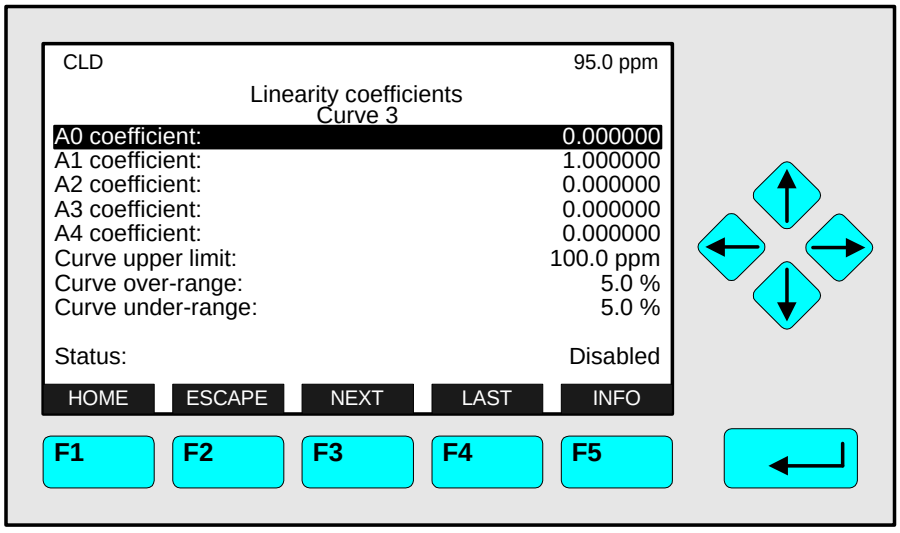
In these lines you can enable the linearization for the range selected.
You have to set up "Disabled" in these lines as long as you will determine the data for linearization. This will be necessary to avoid interferences with existing values during the calculation of the linearization curve.

Lines of variables "If enabled, uses curve no.":

You can select for each range one of the four linearization curves from the menu "Linearity coefficients" (see next illustration).

Menu "Linearity coefficients":

You can change to the menu "Linearity coefficients" via the line "Set coefficients...":



In the menu "Linearity coefficients" you can put in the desired coefficients for the linearization curve selected. With the F3 key (NEXT) you can scroll between the menu pages of all four linearization curves. You will find the number of the curve selected in the head line of each "Linearity coefficients" menu.

Line of variables "Curve upper limit":

In this line you should set up the end of range value for the range you want to determine the linearization curve.

Lines of variables "Curve over-range/Curve under-range":

In these two lines you can determine how many per cent the linearization curve for the range selected shall be over resp. under the range limits.

Line of variables "Status":

In this line you can enable or disable the linearization curve selected. This is the same setup as in the lines "Range 1/2/3/4 linearizer" of the menu "Linearization parameters".

5.1.5 Analyzer Module Set up
Response Time/Delay Parameters

Main Menu — Expert controls and set up

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Analyzer module set up

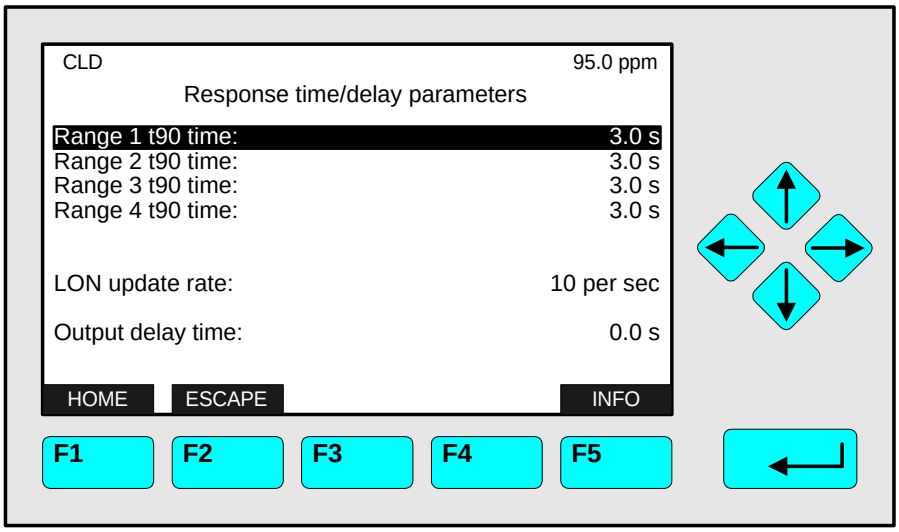
↓

Gas measurement parameters

↓

Response time/delay parameters

↓



In the menu "Response time/delay parameters" you can set up the response time (t_{90} time) of the analyzer for each range and the output delay of the signal.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Lines of variables "Range 1/2/3/4 t90 time":

The t_{90} time is defined as the time that has to run until the analyzer displays 90% of the current concentration after a jump in the concentration level.
Options: 0 to 30 seconds for every range of a channel.

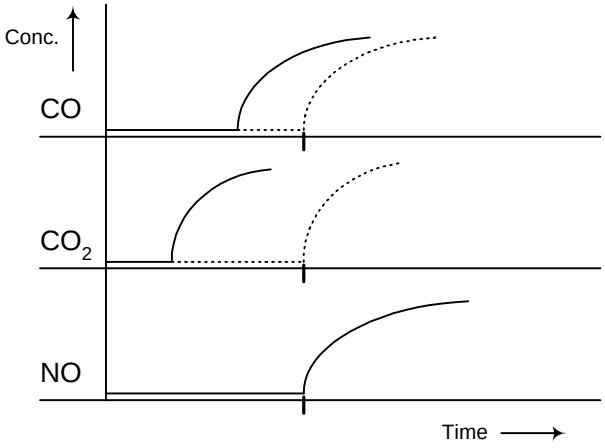
Line of variables "LON update rate":

In this line you can set up the update rate of the network variable.
Options: 1 per sec, 10 per sec, "ASAP" (As fast as possible)

Line of variable "Output delay time":

You can shift the absolute time of the analog output signal for one channel. If you use the right output delay time you can watch the signals of several channels at the same starting time.
Options: 0 to 30 seconds.

Example:



5.1.6 Analyzer Module Set up
Range Settings

Main Menu — Expert controls and set up

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Analyzer module set up

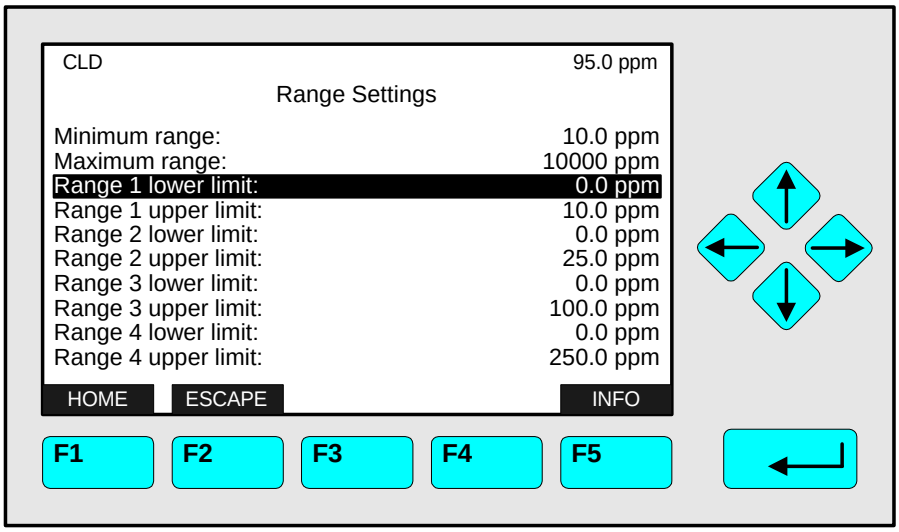
↓

Gas measurement parameters

↓

Range setting

↓



In the menu "Range Settings" you can set up the begin and the end of each range. These values will only be limited by the setups in the line "Minimum range" resp. "Maximum range". The concentrations of these lines are manufacturer's settings and cannot be changed by the customer.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Main Menu — Expert controls and set up

↓

Analyzer module set up

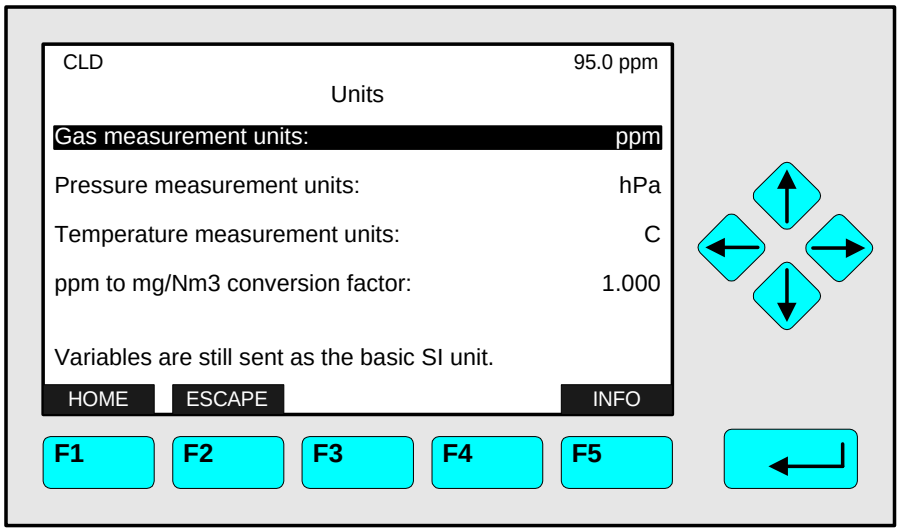
↓

Gas measurement parameters

↓

Units

↓



In the menu "Units" you can set up the units of the analyzer for pressure, temperature and gas concentration.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ↵ -key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.

Options:		
	"Gas measurement units"	ppb, ppm, mg/Nm^3, %
	"Pressure measurement units"	hPa, psig
	"Temperature measurement units"	C, F
	"Conversion factor ppm – mg/Nm^3"	0 to 100

- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

5.1.8 Analyzer Module Set up
Linearization Functions

Main Menu — Expert controls and set up

↓

Analyzer module set up

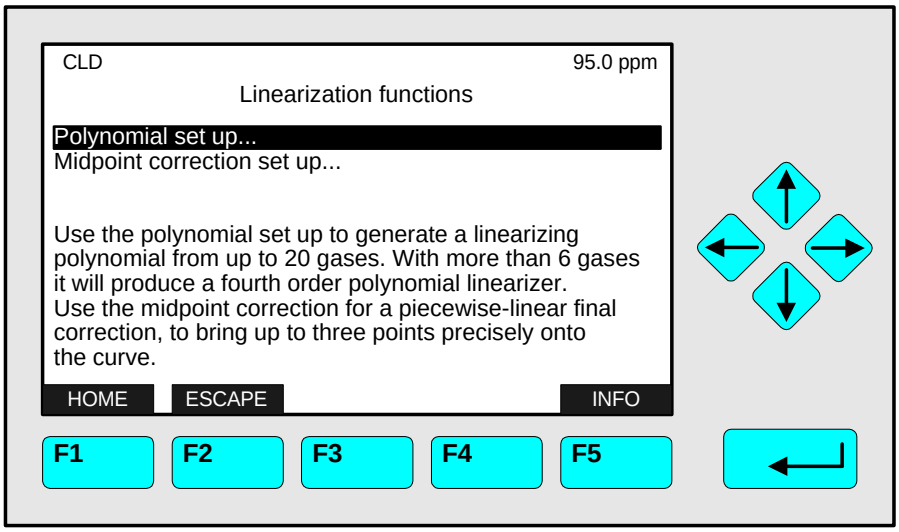
↓

Gas measurement parameters

↓

Linearization functions

↓



From the menu "Linearization functions" you can change to several submenus, where you can linearize the ranges and optimize the linearization functions:

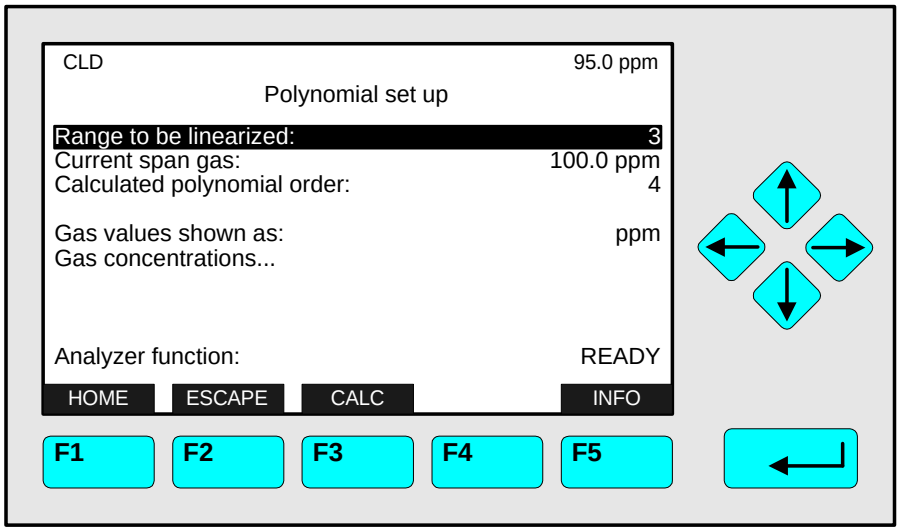
♦ Change to the line you want with the ↓ -key or the ↑ -key.

Note:

Normally, the CLD is working linearly in the whole range. Therefore you do not have to linearize generally ! If you will find deviations from the linearization, you should control the ozone and sample gas supply. Optimize it, if necessary! Usually, the reason for deviations will be a defect in the ozone supply.

Polynomial set up:

Press the ENTER key or the → -key in the line "Polynomial set up..." to change to the corresponding menu:

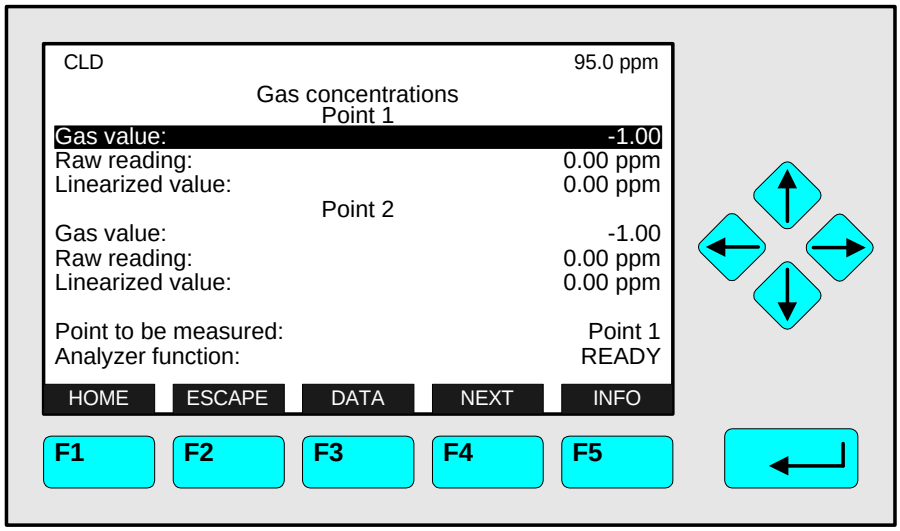


1) Select the range to be linearized:
   - Press the ENTER key or the → -key in the line "Range to be linearized" to select the parameter.
   - Select the range you want with the ↑ -key or the ↓ -key and confirm it with ENTER.

2) Zeroing and Spanning of the range selected:
   - e.g.: Change to the "Main Menu" with the F1 key. Change after that via the line "Basic controls..." to the corresponding menu. Press the F3 key(ZERO) resp. the F4 key (SPAN) to start the calibration (Look at the descriptions in the chapters 4.2.1 p. 4-21 and 4.2.2 p. 4-26).
   - Alternative: Change to the menu "Zero/span calibration" of the "Expert controls" to start the calibration (see 5.1.1 p. 5-5).

3) Determine the display of gas concentration:
   - Press the ENTER key or the → -key in the line "Gas values shown as" to select the parameter.
   - Select the concentration setup you want with the ↑ -key or the ↓ -key and confirm it with the ENTER key:
   - "ppm" for absolute concentrations
   - "Percent of span gas" for relative concentrations, i.e. the gas value will be displayed as percentage of the span gas. This will be necessary, if you will use diluted span gas.

4) How to get the x,y-values to determine the polynomial curve:
   - Press the ENTER key or the → -key in the line "Gas concentrations...“ to change to the corresponding submenu:

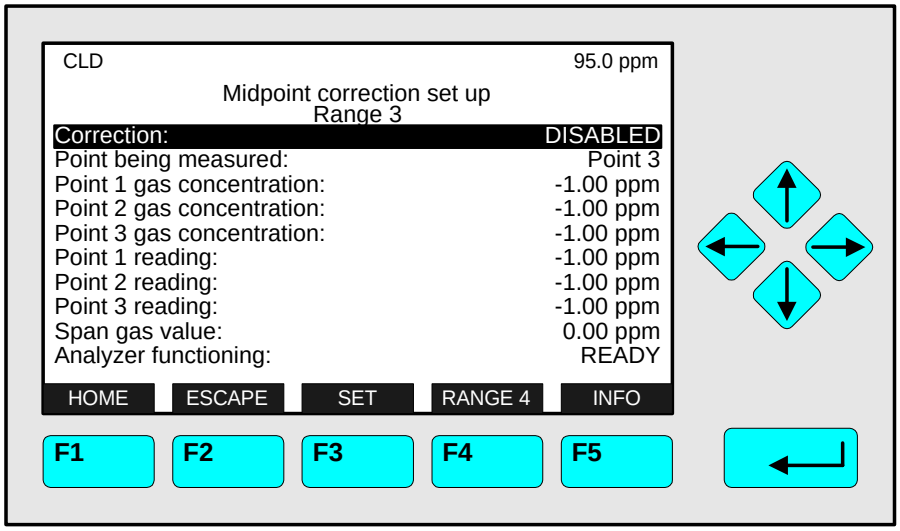


- ♦ Input of the desired values:
  - You will need minimum 6 values to calculate a polynomial curve. In the menu "Gas concentration" are maximum 20 values available.
  - Press the ENTER key or the → -key in the line "Gas value" of "Point 1" to select the parameter.
  - Set up the concentration you want with the ↑ -key or the ↓ -key. If necessary, change the sign with the F4 key ("+/-"). Confirm your input with the ENTER key. It is also possible to select the digits with the ← -key or the → -key and to change the number with the ↑ -key or the ↓ -key.
- ♦ Measuring of the raw values:
  - Flow the analyzer with a defined gas concentration.
  - After the signal will be stable press the F3 key (DATA): The analyzer will store the desired value and the corresponding raw value as "Point 1" to calculate the linearization polynom.
- ♦ Repeat the procedure described to get all values you need to calculate the polynom:
  - Go to the line "Gas value" of "Point 2" with the ↓ -key and set up the desired value.
  - Go to the line "Point to be measured" with the ↓ -key and select "Point 2".
  - Measure the corresponding raw value, store the values with the F3 key and so on...
- ♦ To set up the values of point 3, 4 and all the other points you have to change to further menu pages with the F4 key (NEXT). You can always go back to the last menu page with the F2 key (ESCAPE).

5) Calculation of the polynomial function:
   - You can calculate the linearization polynom in the following way, after you will be ready with the registration of the points:
   - Go back to the menu "Polynomial set up" with the F2 key (ESCAPE) or the ← -key. Then, press the F3 key (CALC): The analyzer will calculate the polynom with the available points and store the coefficients of this function for the range selected.

6) Correction of the linearization polynom, if necessary:

- You can optimize the calculated linearization with maximum three additional points.
- Press the ENTER key or the → -key in the line "Midpoint correction set up..." of the menu "Linearization functions" to change to the corresponding submenu:



a) Range selecting:

- Range 1 will be selected automatically after entering the menu. If you want to select another range to correct, press the F4 key (RANGE 2/3/4). The range selected will be displayed in the headline of the menu.

b) Disable the correction:

- You have to disable the correction mode before calculating the correction data. Otherwise, you will have interferences during the calculation with existing values.
- Press the ENTER key or the → -key in the line "Correction" to select the parameter. Set up "DISABLED" with the ↑ -key or the ↓ -key and confirm it with the ENTER key.

c) Measured point selecting:

- Go to the line "Point being measured" with the ↓ -key.
- Press the ENTER key or the → -key to select the parameter. Select "Point 1" with the the ↑ -key or the ↓ -key and confirm it with the ENTER key.

d) Set up the gas concentration for point 1:

- Go to the line "Point 1 gas concentration" with the ↓ -key.
- Press the ENTER key or the → -key to select the parameter.
- Select any digit with the ← -key or → -key and set up the value you want with the the ↑ -key or the ↓ -key. If necessary, change the sign with the F4 key ("+/-").
- Confirm your set up with the ENTER key.

e) Measuring of the gas concentrations:

- Flow the analyzer with the gas concentration set up of the line "Point 1 gas concentration" and measure the raw value.
- After the signal will be stable press the F3 key (SET): The current signal will be displayed in the line "Point 1 reading". But, the analyzer will equate the raw value with the desired value of this point automatically.

f) Set up further correction points:

- You can repeat the steps c) to e) to determine maximum two further correction points.
- Select "Point 2" resp. "Point 3" in the line "Point being measured". Set up the value you want in the line "Point 2 gas concentration" resp. "Point 3 gas concentration". Measure the gas concentrations and set up the correction with the F3 key.

g) Enable the correction:

- Select "ENABLED" in the line "Correction": The midpoint correction will be done automatically for the range selected with the determined values.

The midpoint correction can be done for each range of the CLD analyzer module.

Main Menu — Expert controls and set up

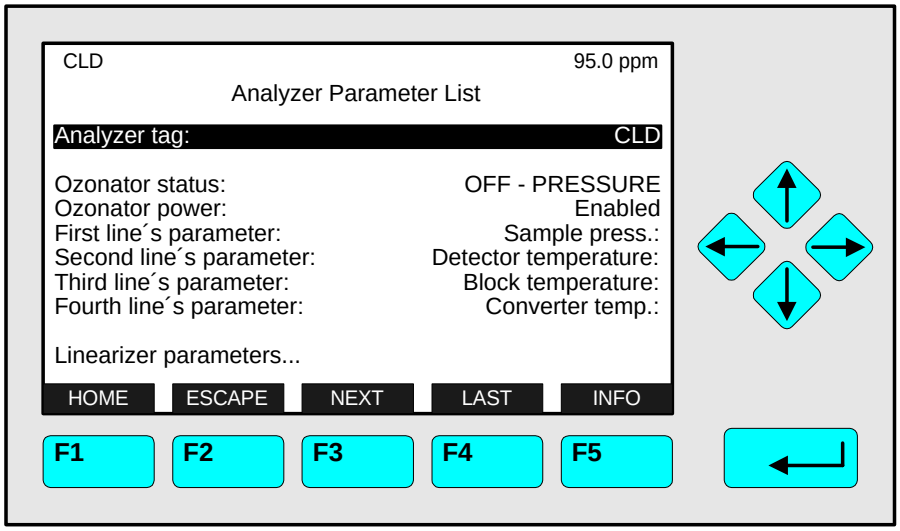
↓

Analyzer module set up

↓

Analyzer Parameter List

↓



In the menu "Analyzer Parameter List" you can set up parameters of the single component display, of the ozonator and the analyzer tag. You can also change to several submenus, where you can set up linearizer parameters, concentration and calibration parameters.

Set up parameters:

- Select any line of variables or the menu line "Linearizer parameters..." with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu "Linearity coefficients" with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Line of variables "Analyzer tag":

You can input a tag of maximum thirty digits. You will find the same line in the menu "Analyzer module set up" (see chapter 5.1 p. 5-3).

Caution:

Normally, you will find "CLD" as analyzer module tag in the line "analyzer tag".

If the CLD module is part of an analyzer network: You have to change the configuration of the programmable digital inputs and analog outputs, if you change the identification tag ! Because, the parameters of the module source will change ! So, the relations will disappear !

Line of variables "Ozonator power":

Options: Enabled/Disabled
The setup of this line will change the displayed message of the line "Ozonator status". That line is not available. The ozonator power setup is also possible in the menu "Basic Controls" (see chapter 4.1.5 p. 4-15).

Lines of variables "First/Second/Third/Fourth line's parameter:

In these lines you can set up which of the following parameters shall be displayed in each of the last four lines of the single component display:

- Sample pressure (bargraph with measured value)
- Sample flow (bargraph with measured value)
- Raw signal (bargraph with measured value)
- Validity (report: valid/invalid)
- Interference (report: On/Off)
- Health (report: Normal/...)
- Operational state (report: STANDBY/...)
- Measurement mode (report: 1/...)
- Linearizer (report: Enabled/Disabled)
- Calibration status (report: READY/...)
- Output delay time (bargraph with value selected)
- t_{90} time (bargraph with value selected)
- Noise level (of concentration)
- NO/NO_x (Display: NO/NOx)
- Detector temperature (bargraph with measured value)
- Block temperature (bargraph with measured value)
- Converter temperature (bargraph with measured value)
- Ozonator (report: OFF - ENABLED/OFF - DISABLED)

Menu line "Linearizer parameters...":

Via this line you can change to the submenu "Linearity coefficients", where you can set up the coefficients of the linearization curves manual. You can also reach the menu "Linearity coefficients" via the menu "Linearization parameters". These menus are described detailed in chapter 5.1.4 p. 5-12/13.

Ramifications via function keys:

With the F3 key (NEXT) of the menu "Analyzer Parameter List" you can change to further menu pages, where you can set up the following concentration and calibration parameters:

- Control mode
- Output delay time
- Begin and end of all four ranges
- t_{90} time (response time) for all ranges
- Linearizer enabling/disabling for each range
- Calibration averaging time

- Calibration failure alarm
- Calibration failure error allowed
- Calibration time out
- Zero and span gas calibration of the ranges together or separately
- Enabling/Disabling of the calibration adjustment limits
- Set up of the zero gas concentration of each range
- Set up of the NO and NO_x span gas concentration of each range

You can also set up all these parameters in the menus "Calibration Gas List", "Calibration Parameters", "Response time/delay parameters" and "Range Settings". You can find the descriptions of these menus in the chapters 5.1.1 p. 5-4, 5.1.2 p. 5-9/10 and 5.1.5/6 p. 5-14 to 16.

With the F4 key (LAST) of the menu "Analyzer Parameter List" you can change to the menu page "Calibration Gases", where you can set up the NO and NO_x span gas concentrations of each range. This menu page is the same page you will reach by pressing the F3 key (NEXT) several times.

5.1.10 Analyzer Module Set up

Physical Measurement Parameters

Main Menu — Expert controls and set up

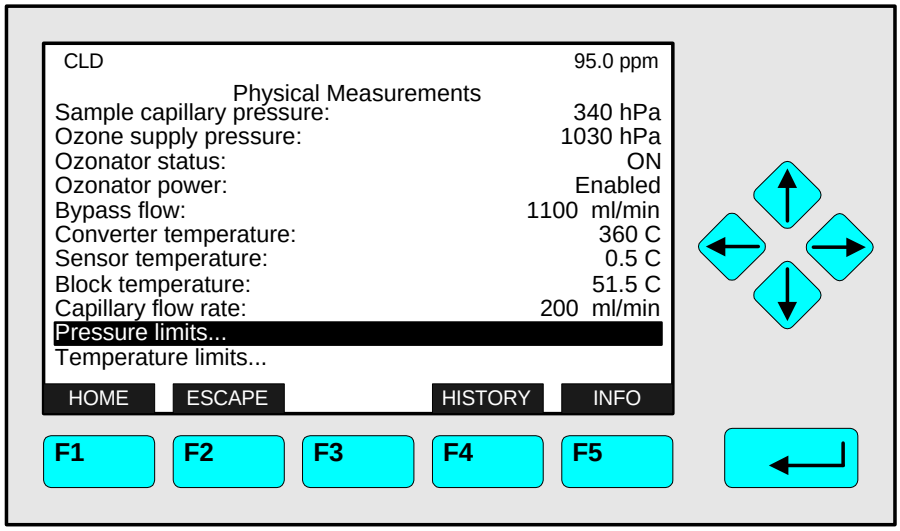
↓

Analyzer module set up

↓

Physical measurement parameters

↓



In the menu "Physical Measurements" you can find several physical measurement parameters of the CLD analyzer module like ozonator power, converter temperature or capillary flow rate. Via the menu lines "Pressure limits..." and "Temperature limits..." you can change to the corresponding submenus, where you can set up several pressure parameters and temperature parameters of the analyzer.
The violation of the limits in the submenus may start alarm reports, if the alarm report is enabled in the diagnostic menus of the analyzer module (see 6.3.2 p. 6-27). Besides, the limits of the submenus will be begin and end of the bargraphs in the single component display, if activated (see 5.1.9 p. 5-24).

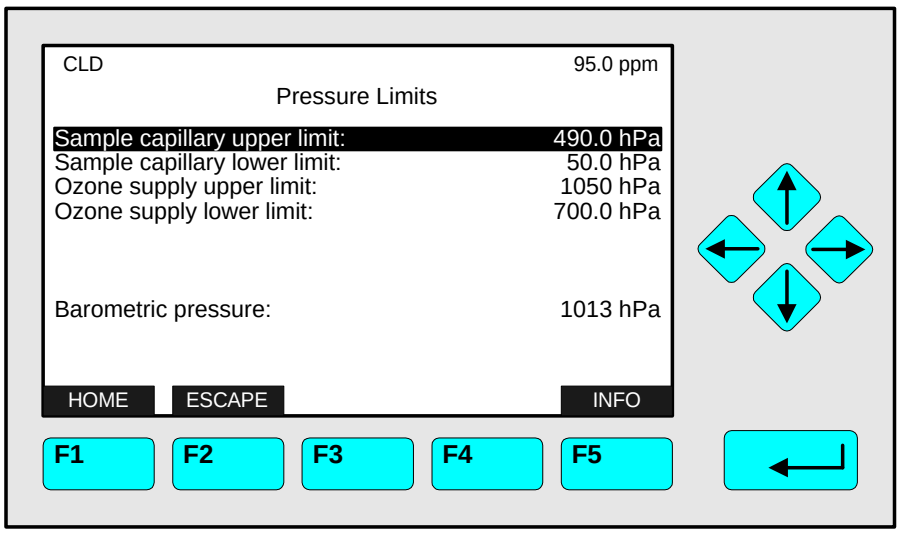
Changing to the submenus:

- Select the line you want with the ↑ -key or the ↓ -key.
- Press the ENTER key or the → -key to change to the corresponding submenu.

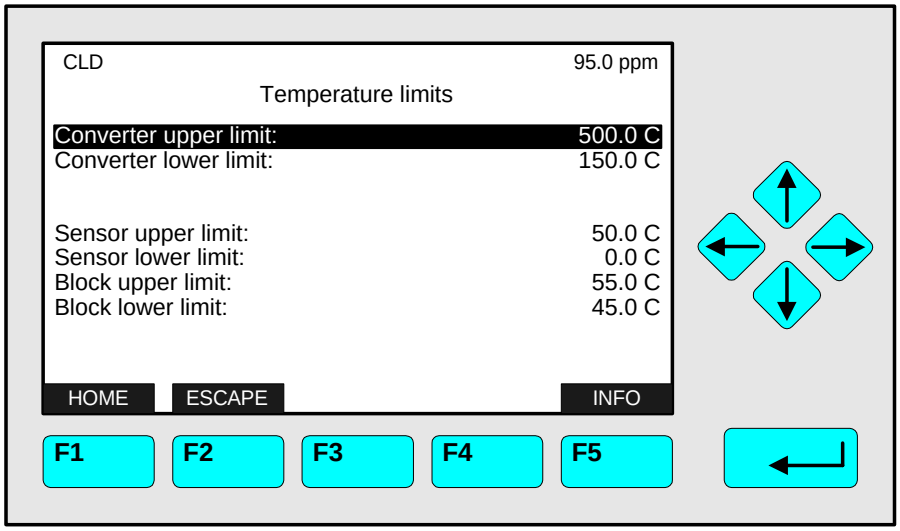
Note:

You should control the sample capillary pressure, the ozone supply pressure and the bypass flow in this menu after starting up your CLD. The values displayed in these lines should be equivalent to the original manufacturer's data sheet to avoid measurement errors.

Menu "Pressure Limits":



Menu "Temperature Limits":



Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Options:

- Pressures: 0 to 3000 hPa
- Temperatures: 0 to 500 °C for converter; 0 to 75 °C for sensor and block

5.1.11 Analyzer Module Set up
Displayed Parameters

Main Menu — Expert controls and set up

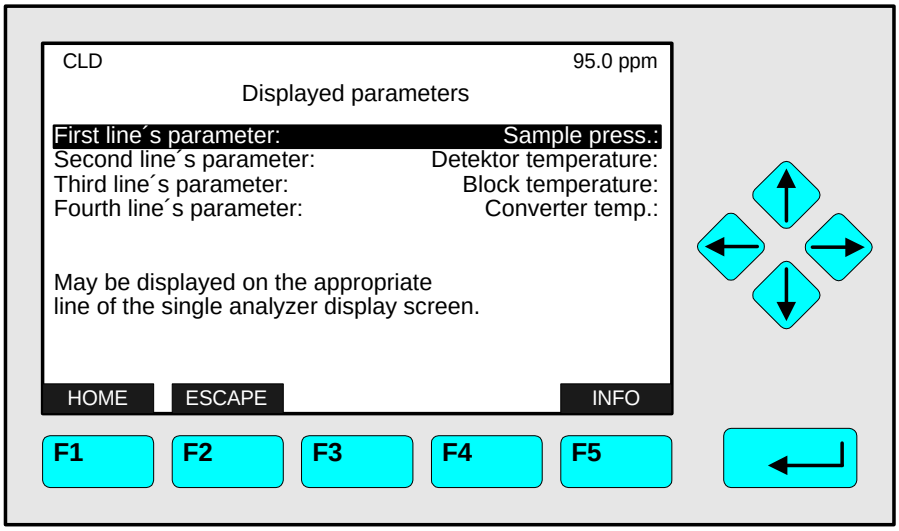
↓

Analyzer module set up

↓

Displayed parameters

↓



In the menu "Displayed Parameters" you can determine which parameters shall be displayed in the last four lines of the single component display. These are the same parameters you can set up in the menu "Analyzer Parameter List" (see 5.1.9 p. 5-23).

Set up parameters:

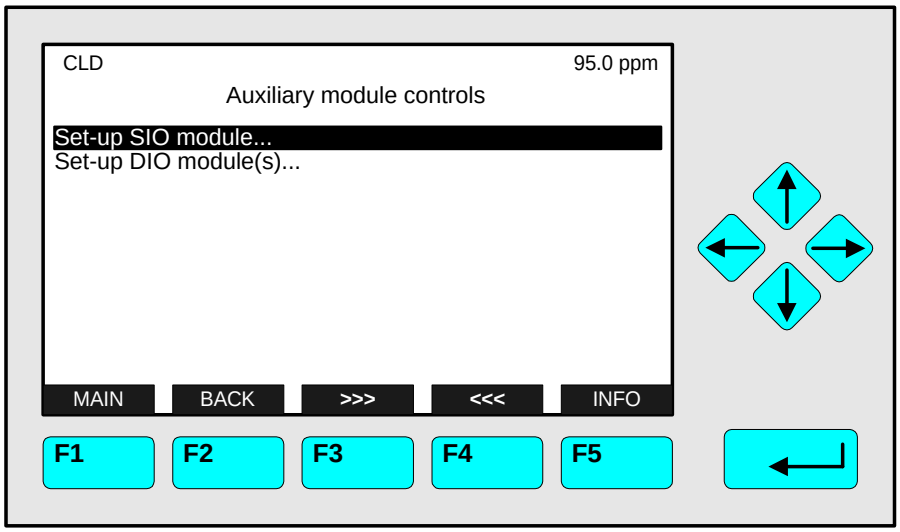
- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select the parameter you want with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Main Menu — Expert controls and set up

↓

Auxiliary module controls

↓



From the menu "Auxiliary module controls" you can change to some submenus where you can set up the parameters for the SIO module and the DIO modules of the MLT analyzer or platform:

- Press the ENTER key or the → -key in the line "Set-up SIO module..." or in the line "Set-up DIO module(s)..." to change to the corresponding submenus.

5.2.1 Auxiliary Module Controls
Local SIO Configuration Sections

Main Menu — Expert controls and set up

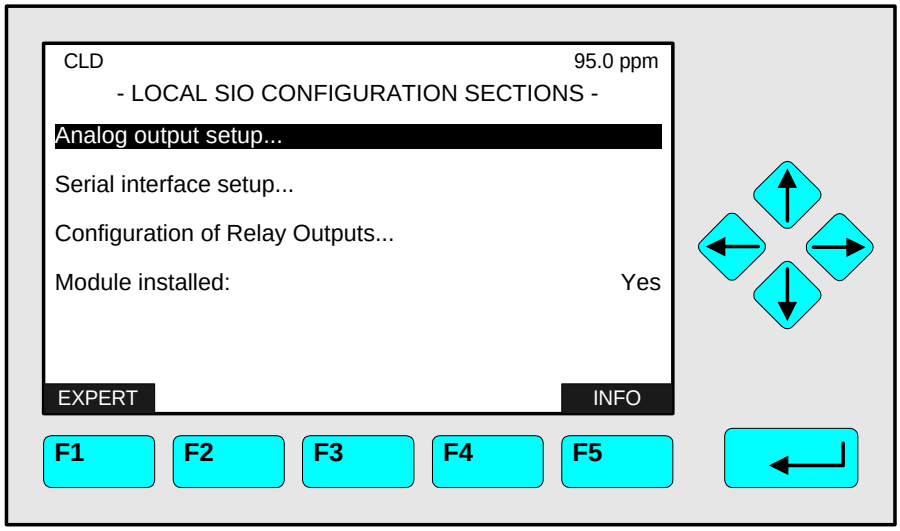
↓

Auxiliary module controls

↓

Set-up SIO module

↓



From the menu "LOCAL SIO CONFIGURATION SECTIONS" you can change to submenus to control and set up several output configurations of the auxiliary SIO module. General Configuration of a SIO board (the whole specification is in another manual):

- Analog outputs: minimum 2, maximum 8
- Serial interface (RS 232 or RS 485) to connect the analyzer with a external computer
- Three relay outputs

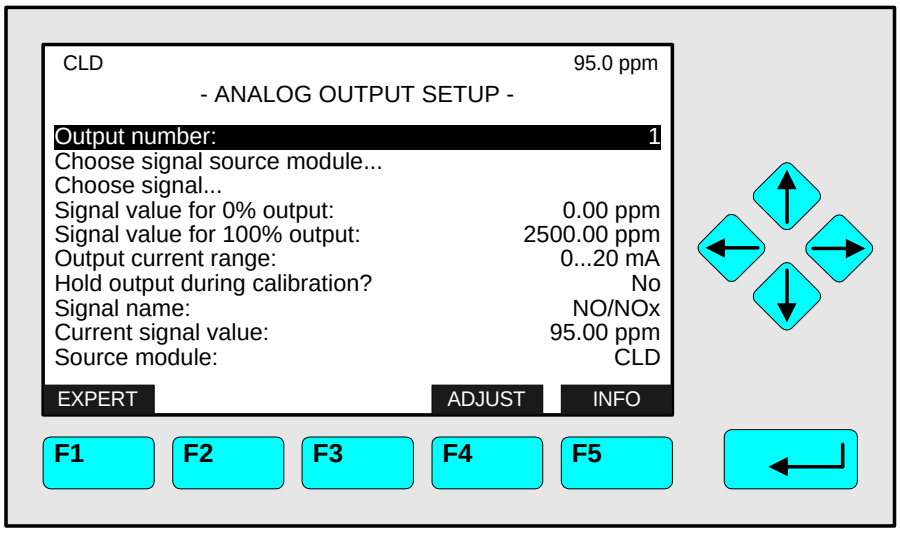
If there is a SIO module installed in the platform or in the MLT analyzer, you have to put in "Yes" in the line "Module installed", otherwise "No".

Set up parameters:

- Select the line of variables or any menu line with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Select the parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Analog Output Setup:

Press the ENTER key or the → -key in the line "Analog output setup..." to change to the corresponding submenu:



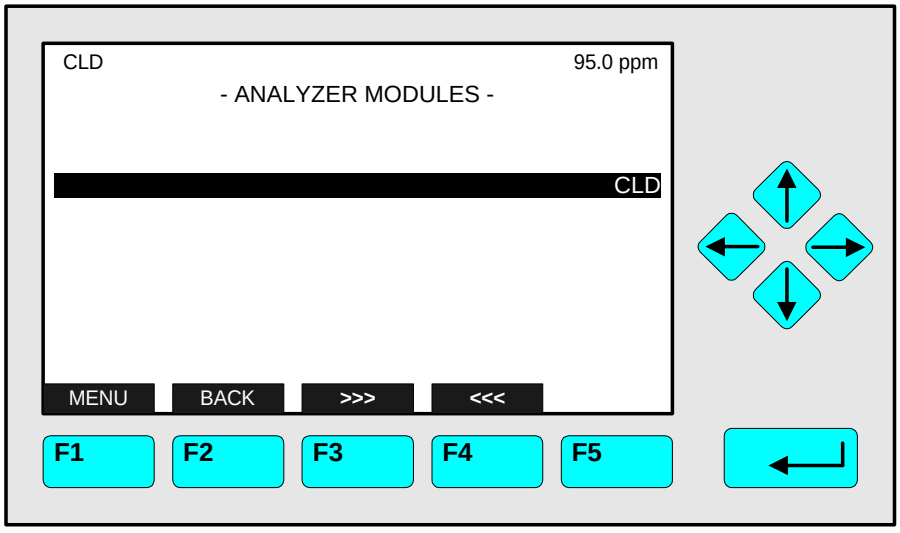
Configuration of the analog output:

1) Select the analog output number:
You can set up all parameters in the menu "ANALOG OUTPUT SETUP" separately for each of the available analog outputs. The number of outputs depends on the hardware configuration of the SIO module (minimum: 2, maximum: 8).

- Press the ENTER key or the → -key to select the output number and adjust the value you want with the ↑ -key or the ↓ -key.
- Confirm the number selected with the ENTER key.

2) Choose the signal source module:

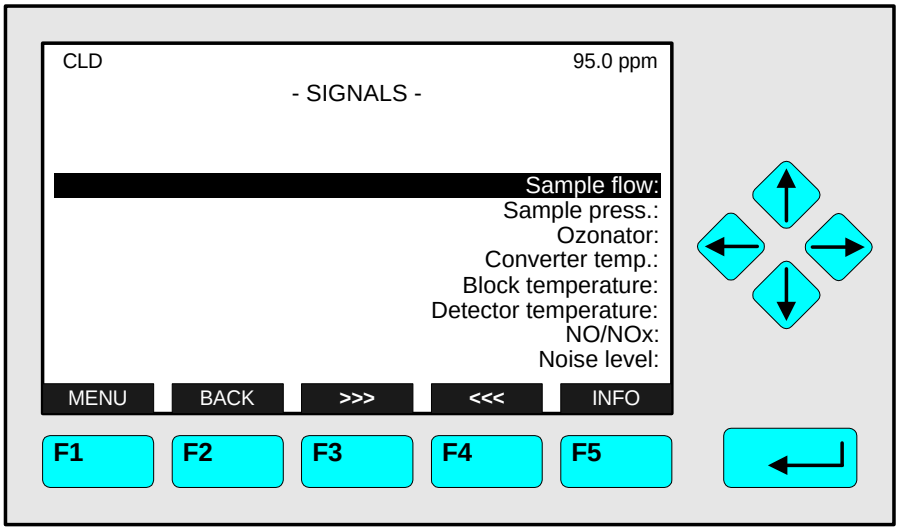
- Change with the ↓ -key to the line "Choose signal source module..."
- Change to the submenu "ANALYZER MODULES" with the ENTER key or the → -key. The tags of all analyzer modules combined with the platform or the MLT analyzer will appear:



- Go to the line you want with the ↑ -key or the ↓ -key.
- Select the tag of the channel with the ENTER key or the → -key:
  The display will go back to the menu "ANALOG OUTPUT SETUP" automatically.
  The tag of the channel selected will appear in the line "Source module".

3) Select any signal:

- Change to the line "Choose signal" with the ↓ -key.
- Press the ENTER key or the → -key to change to the submenu "SIGNALS":



- Change to the line you want with the ↑ -key or the ↓ -key.
  You can change with the F3 key (>>>) to further menu pages containing other available signals:
  - t_{90} time
  - Output delay time
  - Calibration status
  - Linearizer
  - Measurement mode
  - Operational state
  - Health
  - Interference
  - Validity
  - Raw signal
  - Primary Variable
- Press the ENTER key or the → -key to select the signal:
  The display will go back to the menu "ANALOG OUTPUT SETUP" automatically.
  The signal selected will appear in the line "Signal name".

4) Determination of the output signal values:
You can determine the signal value for the 0% output and the 100% output in the lines "Signal value for 0% output" or "Signal value for 100% output". So you have the possibility to zoom out a certain part of the whole range.

- *Example:*
  - Range from 0 to 1000 ppm
  - 0% value shall be 400 ppm, 100% value shall be 700 ppm
  - Analog output is normally: 0V = 0 ppm 10V = 1000 ppm
  - After changing the output signal: 0V = 400 ppm 10V = 700 ppm
- Change to the line "Signal value for 0% output" or "Signal value for 100% output" with the ↓ -key.
- Select the value with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key. Confirm it with the ENTER key.

Note:

If you change the measurement range the adjustment done in this menu will disappear and go back to the standard values of the range! To change the output signal values permanently, you have to change the adjustments in the menu "Range Settings"!
(see 5.1.6 p. 5-16)

Attention:

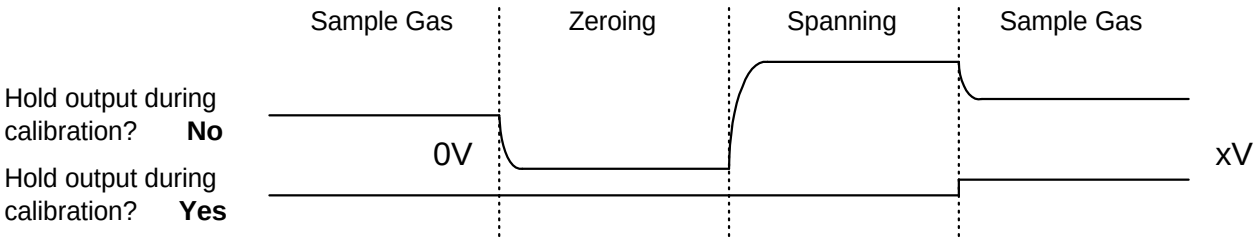
The signal range at the analog output should not be less than the littlest measurement range. Otherwise, it is possible that the noise level will be very high at the analog output!

5) Determination of the output current range:
- Select to the line "Output current range" with the ↓ -key.
- Press the ENTER key or the → -key to select the range and select the value you want with the ↑ -key or the ↓ -key.
- Confirm the new adjustment with the ENTER key.

Options: 0...20 mA (and automatically 0...10V) or 4...20 mA (2...10V).

6) Analog output during calibration:
In the line "Hold output during calibration?" you can determine the signal drift of the analog output and of the limits during calibration:

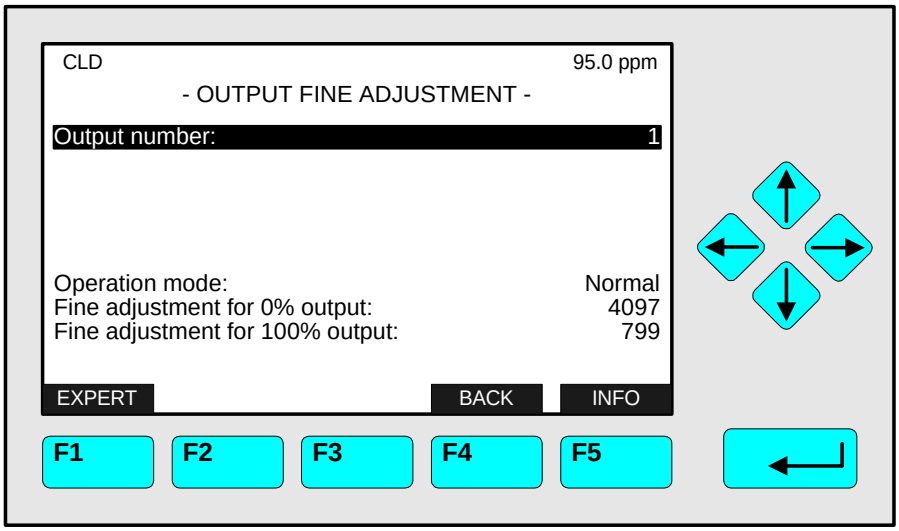
- **Yes:** During the whole calibration the analog output signal and the status of the limits are fixed to the last value before calibration.
- **No:** The analog output signal and the status of the limits are following to the measurement signal during the whole calibration procedure.



Note:

- The adjustments "Yes/No" are valid for all kinds of calibrations of a platform SIO or MLT analyzer SIO: manual, time controlled, AK controlled and system calibration.

7) Fine adjustment of the analog output:
If you press the F4 key in the menu "ANALOG OUTPUT SETUP" you can change to the submenu "OUTPUT FINE ADJUSTMENT", where you can do the fine adjustments of the analog output:



In the line "Output number" the output number selected in the menu "ANALOG OUTPUT SETUP" will appear. If you want you can change the number in the submenu "OUTPUT FINE ADJUSTMENT":

- Press the ENTER key or the → -key to select the output number and adjust the value you want with the ↑ -key or the ↓ -key. Options: 1, ..., 8.
- Confirm the number selected with the ENTER key.

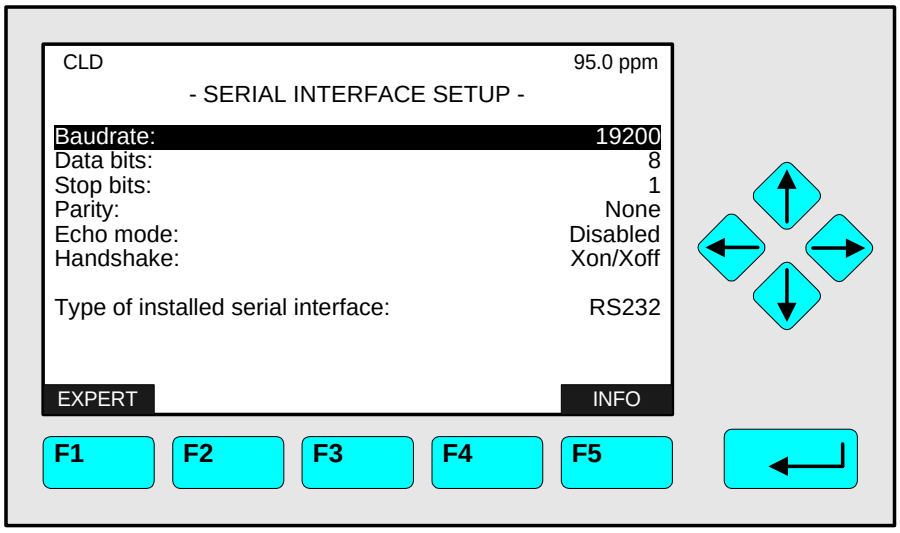
<u>Set up fine adjustment of the analog output:</u>

- Press the ENTER key or the → -key in the line "Operation mode" to select the parameter and adjust one of the following parameters with the ↑ -key or the ↓ -key:
  - **Normal:** The absolute measurement signal will be sent to the analog output.
  - **Adjust 0V:** Coordination between the display and the analog output for 0V with fine adjustment 0%.
  - **Adjust 10V:** Coordination between the display and the analog output for 10V with fine adjustment 100%.
- Confirm the new parameter with the ENTER key.
- Press the ENTER key or the → -key in the line "Fine adjustments for 0% output" or "Fine adjustment for 100% output" to select the corresponding value.
- Adjust the value you want with the ↑ -key or the ↓ -key and confirm it with the ENTER key. Options: 3500 - 4800 for 0% and 750 - 900 for 100%.

The last three lines of variables in the menu "Analog output setup" only display some values of the analog output! They are not available.

Serial interface setup:

Press the ENTER key or the → -key in the line "Serial interface setup..." of the menu "LOCAL SIO CONFIGURATION SECTIONS" to change to the corresponding submenu:



In the submenu "SERIAL INTERFACE SETUP" you can determine the parameters of the data transfer between the MLT analyzer or platform and external implements. The setups in this menu are depending on the configuration of the analyzer resp. platform and the corresponding implement. The specification of the serial interface is described in another manual.

Set up parameters:

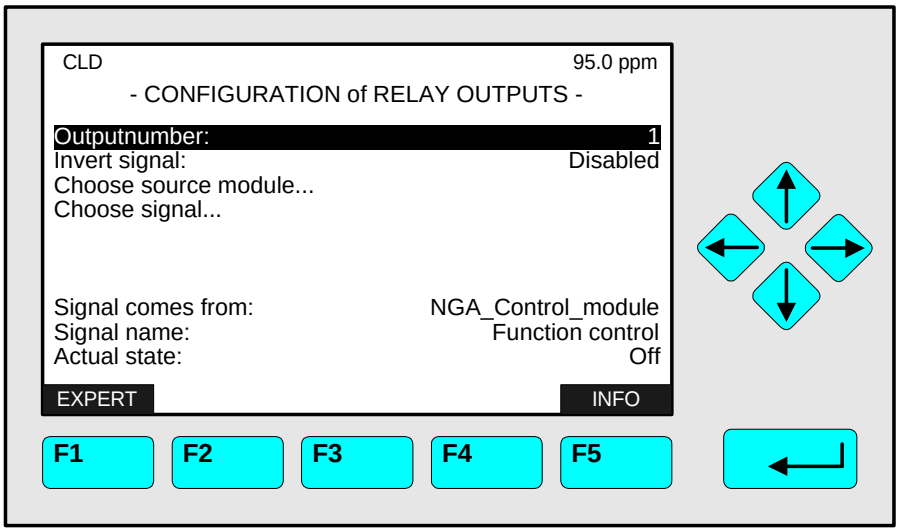
- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Options:

Baudrate:	300	1200	2400	4800	9600	19200
Data bits:	7	8				
Stop bits	1	2				
Parity:	None	Even	Odd			
Echo mode:	Enabled	Disabled				
Handshake:	None	Xon/Xoff				
Type of installed serial interface:	RS 232	RS 485_2X	RS 485_4X	None		

Configuration of Relay Outputs:

Press the ENTER key or the → -key in the line "Configuration of Relay Outputs..." of the menu "LOCAL SIO CONFIGURATION SECTIONS" to change to the corresponding menu:



There are three relays on any SIO board. With a jumper you can determine the relay contact status: NO (normally opened) or NC (normally closed). Informations about the whole specification of the SIO board you can find in another manual.
In the menu "CONFIGURATION of RELAY OUTPUTS" you have to determine the configuration of the three relay outputs!

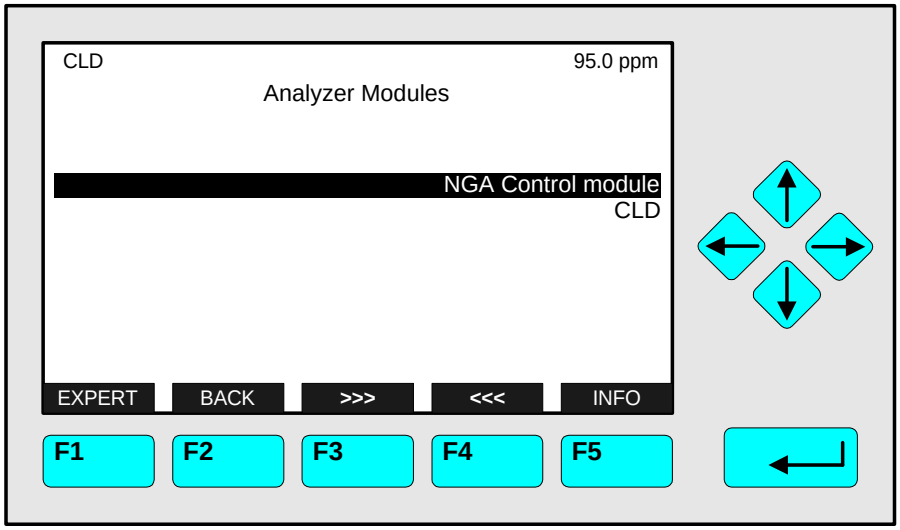
Configuration set up:

1) Select the output number:

- Press the ENTER key or the → -key in the line "Outputnumber" and adjust the output number one, two or three with the ↑ -key or the ↓ -key.
- Confirm the number selected with the ENTER key.

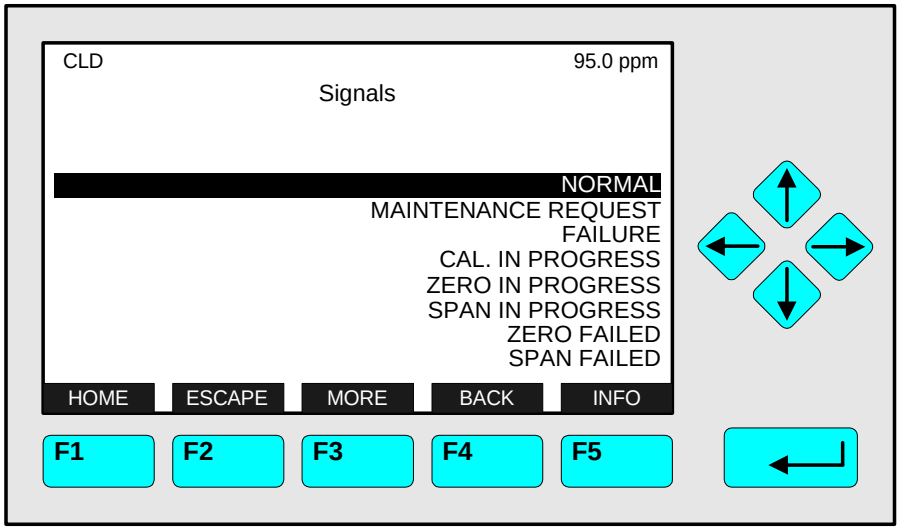
2) Choose the source module:

- Change with the ↓ -key to the line "Choose source module...".
- Change to the submenu "Analyzer Modules" with the ENTER key or the → -key. (illustration see next page)
  All analyzer modules joint to the platform or to the MLT analyzer and the control module are available.
- Go to the line you want with the ↑ -key or the ↓ -key. If there are more than eight source modules available you have to press the F3 key to go to another menu page.
- Select the tag of the module with the ENTER key or the → -key:
  The display will go back to the menu "CONFIGURATION of RELAY OUTPUTS" automatically. The tag of the module selected will appear in the line "Signal comes from".



3) Select any signal:

- Change to the line "Choose signal..." with the ↓ -key.
- Press the ENTER key or the → -key to change to the submenu "Signals":



- Go to the line you want with the ↓ -key or the ↑ -key.
  With the F3 key you can go to other menu pages containing further available signals:
  - RANGE OVERFLOW
  - RANGE UNDERFLOW
  - FLOW TO LOW
  - FLOW TO HIGH
  - RANGE 1, 2, 3, 4
  - OZONATOR OFF
  - NOx MODE
  - NO MODE
  - or further signals, if need be:

All signals of the control module and of the analyzer modules joint to the platform or MLT analyzer (e.g. CLD, FID, MLT AM) are available in the menu "SIGNALS". The signals shown above will appear by using a CLD module as source module.

- Select the signal with the ENTER key or the → -key:
  The display will go back to the menu "CONFIGURATION of RELAY OUTPUTS" automatically. The signal selected will appear in the line "Signal name".

4) Invert signal:
You can decide if the measurement signal should be inverted at the relay output. This can be necessary to combine a failure with an alarm control.

- Press the ENTER key or the → -key in the line "Invert signal" to select the parameter and adjust "Enabled" or "Disabled" with the ↑ -key or the ↓ -key.
- Confirm the parameter selected with the ENTER key.

The last three lines of variables in the menu "Configuration of relay outputs" only display some adjustments of the relay output selected! They are not available:

- "Signal comes from:" displays the source module selected for the current relay output.
- "Signal name:" displays the signal selected for the current relay output.
- "Actual state:" displays if the relay status of the current relay is "On" or "Off".

Main Menu — Expert controls and set up

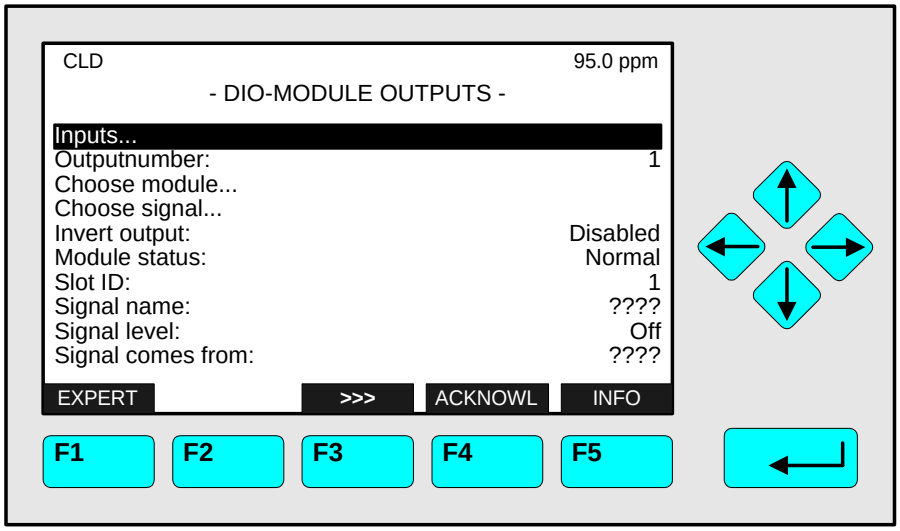
↓

Auxiliary module controls

↓

Set-up DIO module(s)

↓



In the menu "DIO-MODULE OUTPUTS" you can set up the output configuration of the DIO modules combined to the control module (platform or MLT analyzer). Besides you can change to the submenu "DIO-MODULE INPUTS" to configure the inputs of the auxiliary DIO modules.
Every DIO module is composed of 8 digital inputs and 24 digital outputs. If there exist several DIO modules in the platform you can change to the setup menu of each with the F3 key. The tag number of the DIO board selected will appear in the line "Slot ID". The changing with the F3 key is not available for MLT analyzers because only one DIO can be installed in it.
The 24 digital outputs are composed of 3 units with 8 outputs. If there is a short circuit or an overload in one unit it will be switched off and saved against destruction. After the defect is removed the board is available immediately. You only have to press the F4 key. Informations about the whole specification of the DIO board you will find in another manual.

Set up parameters:

- Select any line of variables or any menu line with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Adjust a new value or select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Line of variables "Invert output":

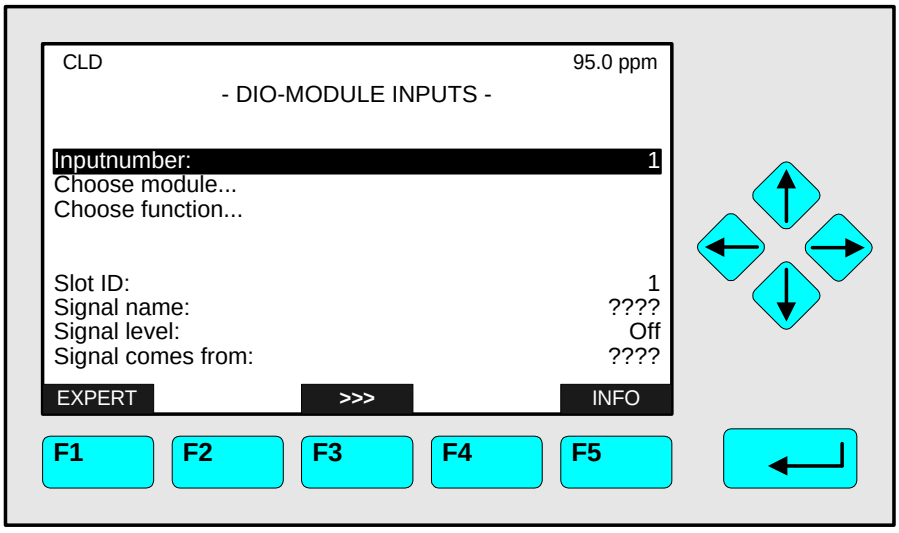
Select "Enabled" in the line "Invert output" if you want to invert the measurement signal at the actual digital output, otherwise select "Disabled". The output inversion can be necessary for instance, if you want to combine a failure with an alarm control.

The last five lines of variables in the menu "DIO-module outputs" only display some adjustments of the DIO output selected! They are not available:

- "Module status:" displays the status of the current DIO board.
- "Slot ID:" displays the tag number of the DIO board selected.
- "Signal name:" displays the signal selected for the current DIO output.
- "Signal level:" displays the status of the signal selected.
- "Signal comes from:" displays the source module selected for the current DIO output.

Configuration of the DIO module inputs:

Press the ENTER key or the → -key in the line "Inputs..." to change to the corresponding submenu:



In the menu "DIO-MODULE INPUTS" you have to determine the configuration of all of the eight DIO module inputs!

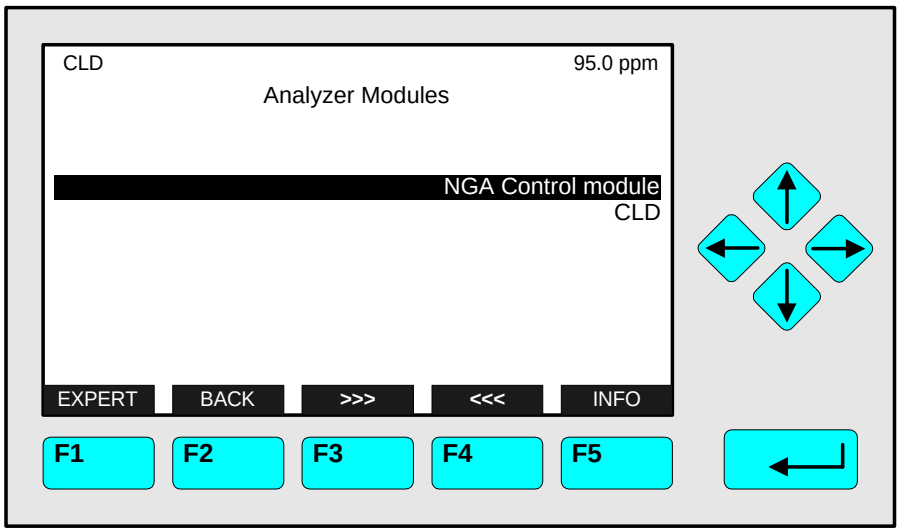
DIO input configuration setup:

1) Select the input number:

- Press the ENTER key or the → -key in the line "Inputnumber" and adjust an input number (1, ..., 8) with the ↑ -key or the ↓ -key.
- Confirm the number selected with the ENTER key.

2) Choose the module:

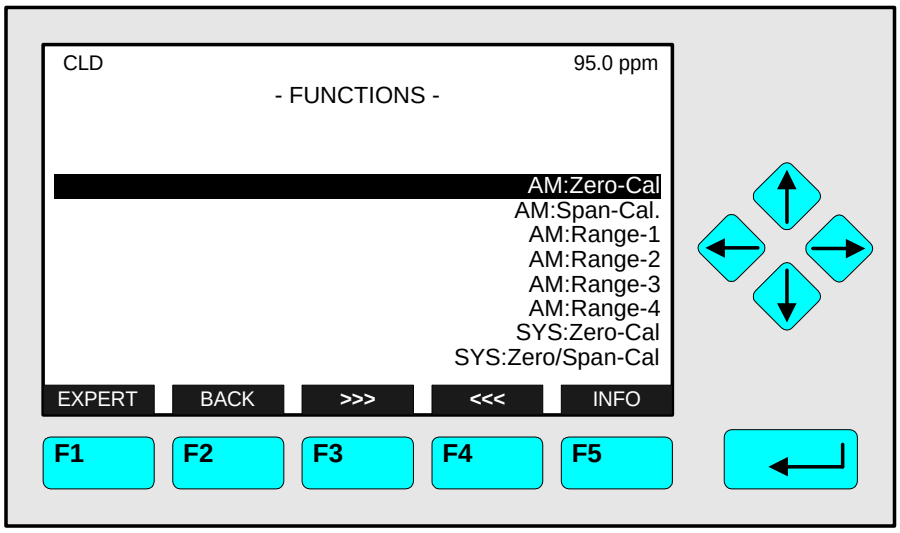
- Change with the ↓ -key to the line "Choose module...".
- Change to the submenu "ANALYZER MODULES" with the ENTER key or the → -key. All modules joint to the platform or to the analyzer are available.



- Go to the line you want with the ↑ -key or the ↓ -key. If there are more than eight source modules available you have to press the F3 key to go to another menu page.
- Select the tag of the module with the ENTER key or the → -key:
  The display will go back to the menu "DIO-MODULE INPUTS" automatically.
  The tag of the module selected will appear in the line "Signal comes from".

3) Select any function:

- Change to the line "Choose function..." with the ↓ -key.
- Press the ENTER key or the → -key to change to the submenu "FUNCTIONS":



- Go to the line you want with the ↓ -key or the ↑ -key. With the F3 key you can go to other menu pages containing further available signals:
  - SYS:Program-Cal
  - SYS:Cancel-Cal
  - SYS:CAL-Test-Mode
  - SYS:AM-Zero-Gas

- SYS:AM-Span-Gas1, 2, 3, 4
- SYS: Function control
- AM: Hold Outputs
- CLD-AM: NOx

♦ Select the function with the ENTER key or the → -key:
The display will go back to the menu "DIO-MODULE INPUTS" automatically.
The function selected will appear in the line "Signal name".

The last four lines of variables in the menu "DIO-module inputs" only display some adjustments of the DIO input selected! They are not available:

♦ "Slot ID:" displays the tag number of the DIO board selected. If there exist several DIO modules in the platform you can change to the setup menu of each with the F3 key. The tag number of the DIO board selected will appear in the line "Slot ID".

♦ "Signal name:" displays the signal selected for the current DIO input.

♦ "Signal level:" displays the status of the signal selected.

♦ "Signal comes from:" displays the source module selected for the current DIO input.

Configuration of the DIO module outputs:

1) Select the output number:

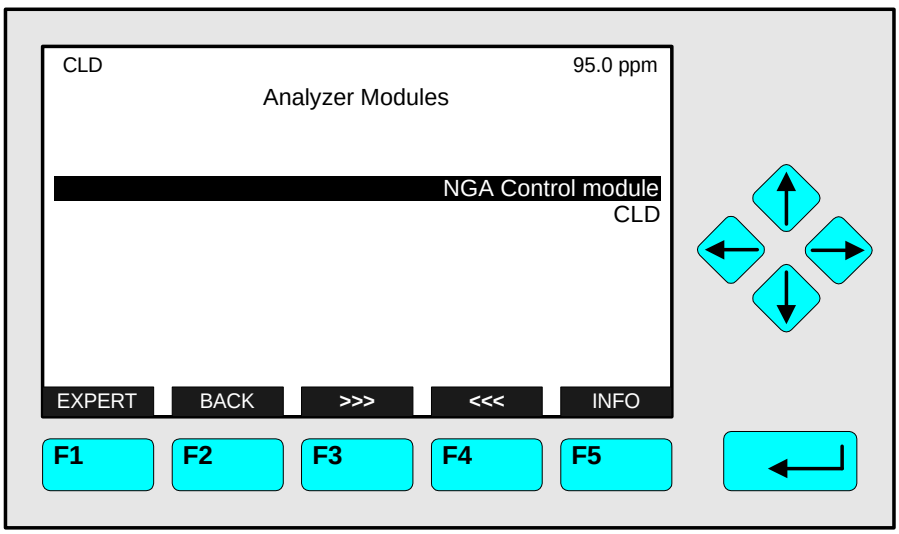
♦ Press the ENTER key or the → -key in the line "Outputnumber" of the menu "DIO-MODULE OUTPUTS" and adjust an output number (1, ..., 24) with the ↑ -key or the ↓ -key.

♦ Confirm the number selected with the ENTER key.

2) Choose the module:

♦ Change with the ↓ -key to the line "Choose module...".

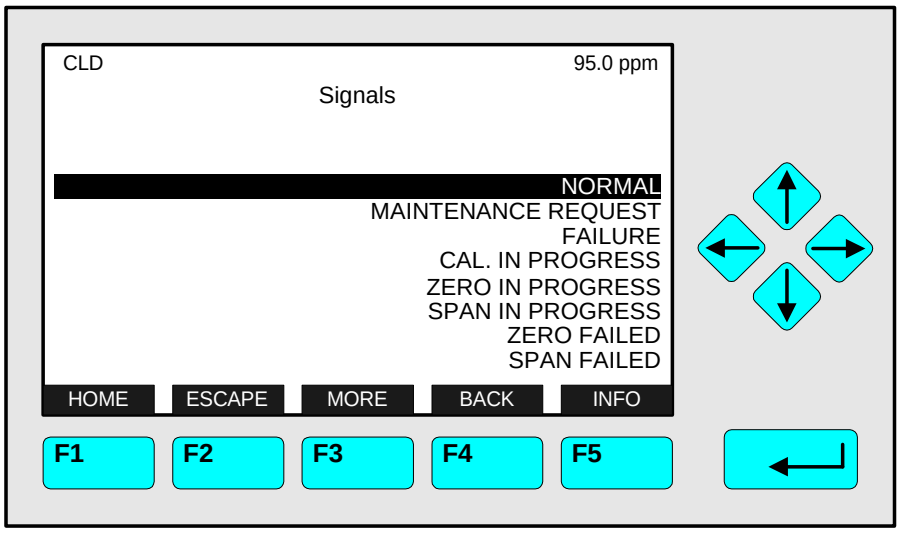
♦ Change to the submenu "ANALYZER MODULES" with the ENTER key or the → -key.
All modules joint to the platform or to the analyzer are available:



- Go to the line you want with the ↑ -key or the ↓ -key. If there are more than eight source modules available you have to press the F3 key to go to another menu page.
- Select the tag of the module with the ENTER key or the → -key:
  The display will go back to the menu "DIO-MODULE OUTPUTS" automatically.
  The tag of the module selected will appear in the line "Signal comes from".

3) Select any signal:

- Change to the line "Choose signal..." with the ↓ -key.
- Press the ENTER key or the → -key to change to the submenu "Signals":



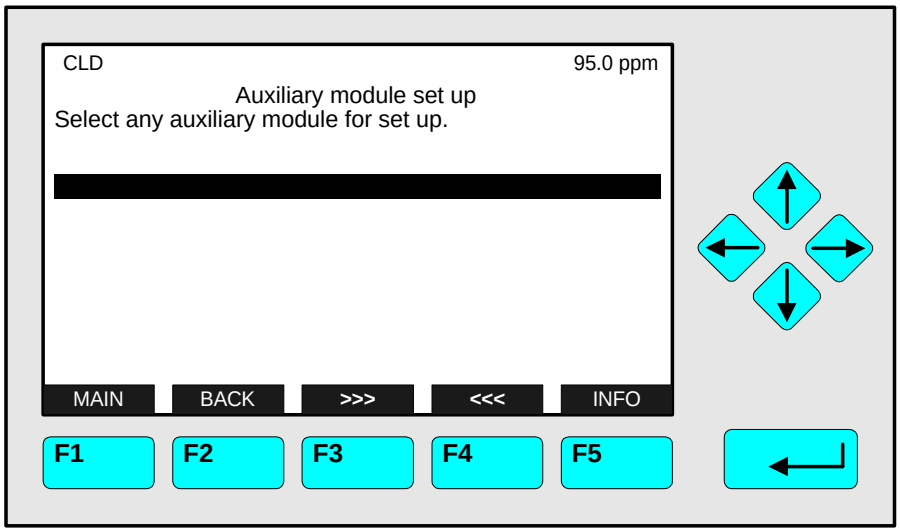
- Go to the line you want with the ↓ -key or the ↑ -key. With the F3 key you can go to other menu pages containing further available signals:
  - RANGE OVERFLOW
  - RANGE UNDERFLOW
  - FLOW TO LOW
  - FLOW TO HIGH
  - RANGE 1, 2, 3, 4
  - OZONATOR OFF
  - NOx MODE
  - NO MODE
  - and further signals, if need be:
    All signals of the control module and of the analyzer modules joint to the platform or MLT analyzer (e.g. CLD, FID, MLT AM) are available in the menu "SIGNALS".
    The signals shown above will appear by using a CLD module as source module.
- Select the signal with the ENTER key or the → -key:
  The display will go back to the menu "DIO-MODULE OUTPUTS" automatically. The signal selected will appear in the line "Signal name".

Main Menu — Expert controls and set up

↓

Auxiliary module set up

↓



In the menu "Auxiliary module set up" you can select any of the following types of micro processor controlled auxiliary modules:

1) I/O Module with three alarms
2) Autocal I/O
3) Syscal I/O

If one of these auxiliary modules is available you will find its corresponding tag in a line of this menu. If there exist more than eight of such modules you can change to another menu page with the F3 key.
Press the ENTER key or the → -key in the line where the tag of the module is displayed to change to the setup submenus of the corresponding I/O board.

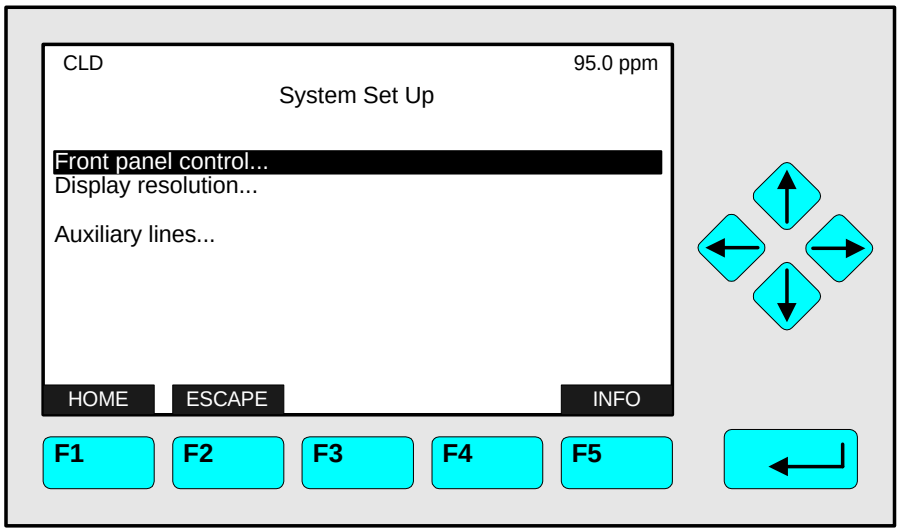
For further Informations please contact your customer service or look at the manual of the I/O board!

Main Menu — Expert controls and set up

↓

System set up

↓



From the menu "System Set Up" you can change to several submenus to set up different parameters of the LCD and the single component display of the platform.

- Scroll with the ↓ -key or the ↑ -key to select the menu line you want.
- Press the ENTER key or the → -key in the line selected to change to the corresponding submenu.

5.4.1 System Set Up
Front panel control

Main Menu — Expert controls and set up

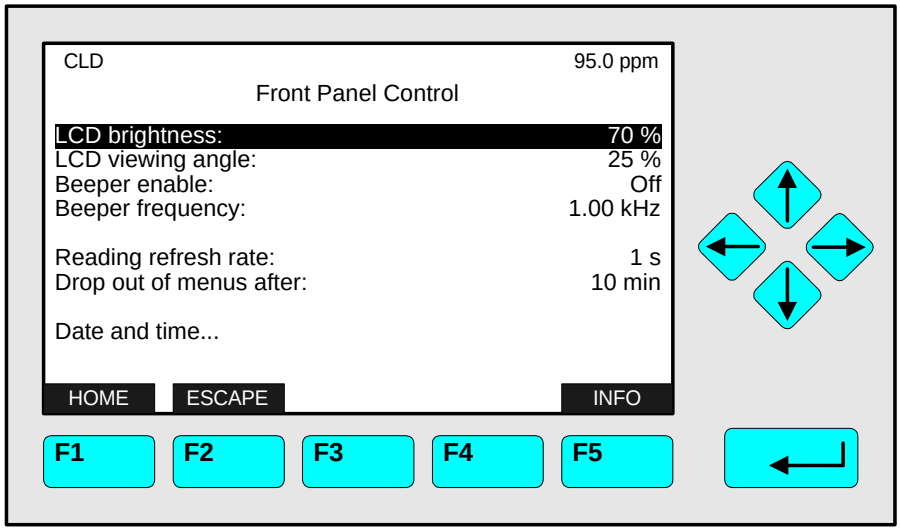
↓

System set up

↓

Front panel control

↓



In the menu "Front panel control" you can set up several display parameters.

Set up parameters:

- Select any line of variables or the menu line with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Lines of variables "LCD brightness" and "LCD viewing angle":

In these two lines you can determine the quality of the LCD reproduction. The best values depend on your position to the screen and on the light of the environment.

- Options: 20 to 100% for LCD brightness and 10 to 80% for LCD viewing angle.
- Usually: 70 to 90% (brightness) and 20 to 30% (angle).
- **Caution:** Be careful with the changing of these values! Perhaps you can not read the display any longer if you use very extreme values! It is not possible to load standard values via keyboard!

Lines of variables "Beeper enable" and "Beeper frequency":

The functionality of these two lines is not available at the moment!

Line of variables "Reading refresh rate":

In this line you can determine how often the display shall be built up in a certain time interval. Options: 1s to 60s. Standard: 1s.

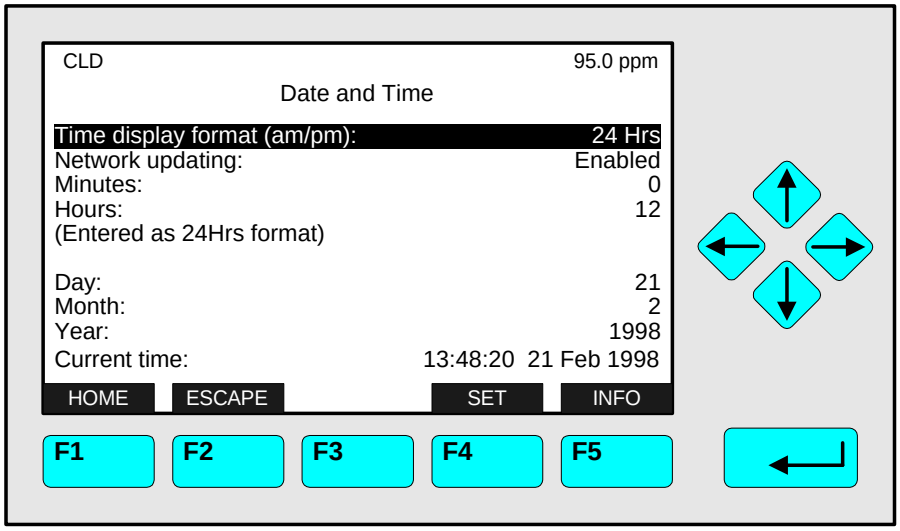
Line of variables "Drop out of menus after":

In this line you can decide if and after which time without front panel operations the display shall change from the current menu to the single component display.

- Options: 10s, 30s, 1min, 5min, 10min, 30min, Never.

Date and time set up:

Press the ENTER key or the → -key in the line "Date and time..." to change to the corresponding submenu:



In the menu "Date and Time" you can set up the date and the time of the control module (platform or MLT analyzer).

Line of variables "Time display format (am/pm)":

In this line you can decide if the time of the control module should be displayed in the 12 hours format or in the 24 hours format.

Line of variables "Network updating":

Select "Enabled" if you want that all modules combined with the platform or the MLT analyzer can use the date and time setup of the control module. Else, select "Disabled".

Set up a new date or time:

1) Press the ENTER key or the → -key in the line "Minutes", "Hours", "Day", "Month" or "Year" to select the corresponding number.
2) Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.

- Options: Minutes: 0 to 59, Hours: 0 to 23, Day: 1 to 28/30/31 depending on the month selected, Month: 1 to 12, Year: 1996 to 2035.

3) Press the F4 key to set the new date or time. The new adjustment will appear in the line "Current time". The display in this line will be refreshed every five second.

5.4.2 System Set Up
Display resolution

Main Menu — Expert controls and set up

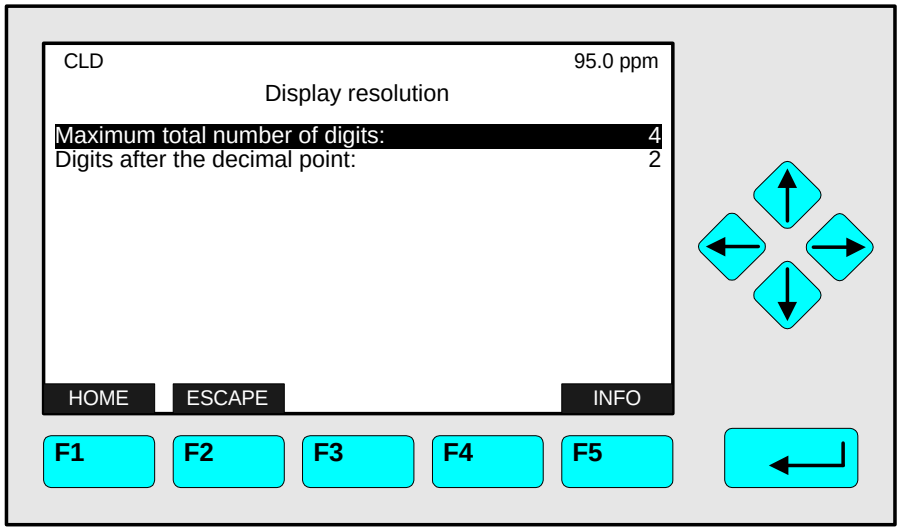
↓

System set up

↓

Display resolution

↓



In the menu "Display resolution" you can determine the number of digits for the display of the measured values. These numbers do not alter the accuracy of measurement. The adjustments are not valid for the analyzer module!

Set up parameters:

- Select one of the two lines of variables with the ↓ -key or the ↑ -key.
- Select the number with the ENTER key or the → -key.
- Select the digit with the ↑ -key or the ↓ -key.
  Options: Maximum total number of digits: 3, 4, 5, 6
  Digits after the decimal point: 0, 1, 2, 3.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Example:

- Measured number: 1.2345
- Select 3 for total number of digits and 2 for digits after decimal point.
- The screen will display: 1.23

Main Menu — Expert controls and set up

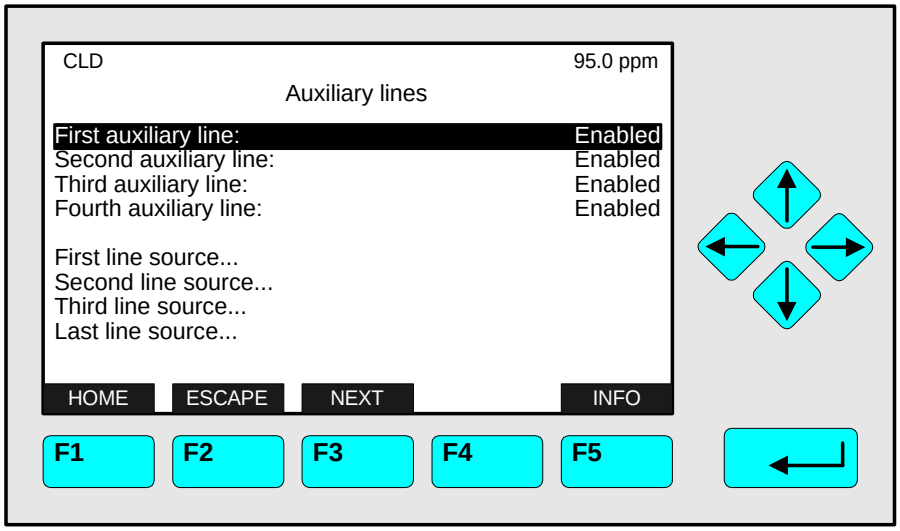
↓

System set up

↓

Auxiliary lines

↓



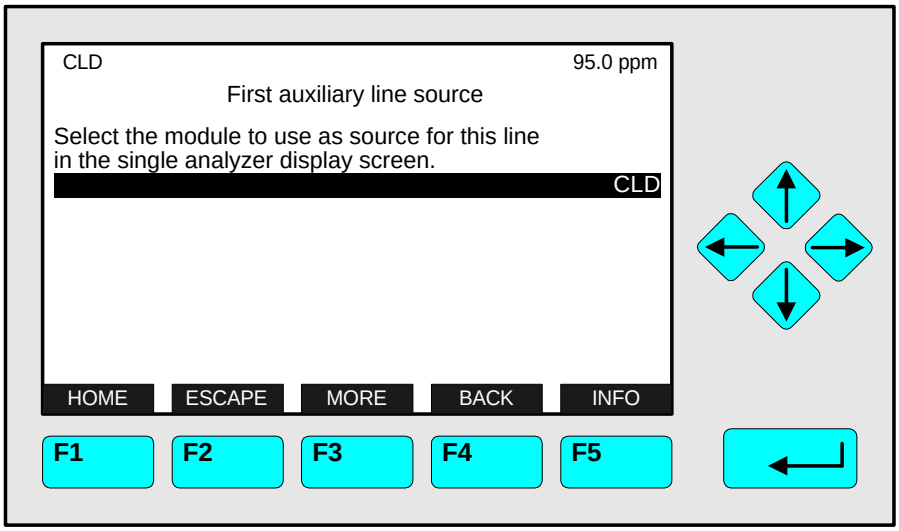
In the menu "Auxiliary lines" you can determine if the last four lines in the single component display of the current channel shall appear. If you want to set up the lines of the other channels of the joint analyzer modules, press the F3 key.

Set up parameters:

- Select any line of variables or any menu line with the ↓ -key or the ↑ -key.
- Select the parameter with the ENTER key or the → -key.
- Select "Enabled" or "Disabled" with the ↑ -key or the ↓ -key to enable or disable the display of the corresponding auxiliary line in the single component display.
- Confirm the parameter selected with the ENTER key or cancel and go back to the last adjustment with the F2 key.

Choose the source module for the auxiliary lines:

Press the ENTER key or the → -key in the line "First line source...", "Second line source...", "Third line source..." or "Last line source..." to change to the corresponding submenu. The tags of all modules combined with the platform or the MLT analyzer are available:



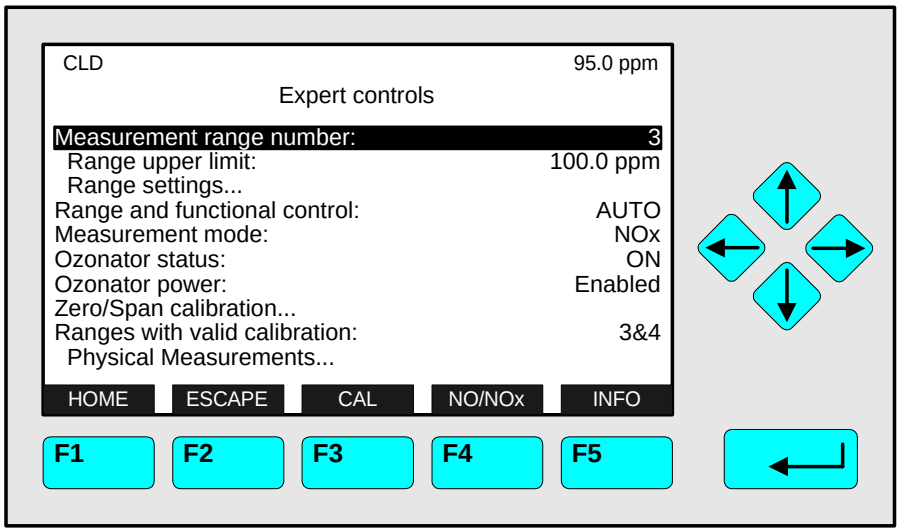
- Go to the line you want with the ↑ -key or the ↓ -key. If there are more than eight source modules available you have to press the F3 key to go to another menu page.
- Select the tag of the module with the ENTER key or the → -key:
  The display will go back to the menu "Auxiliary lines" automatically.
  The selection will be done.

Main Menu — Expert controls and set up

↓

Expert analyzer controls

↓



In the menu "Expert Controls" you can set up several measurement parameters of the analyzer as range or gas selection. Besides, you can change to further menus, where you can start calibrations for instance.

Set up parameters:

- Select the line of variables or the menu line with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Select the parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Lines of variables "Measurement range number", "Range upper limit" and menu line "Range settings...":

You can set up the current range for the analyzer in the line "Measurement range number". A change in this line will change the end of range value automatically in the line "Range upper limit". You cannot change the end of range value there. To change it you have to go to the menu "Range Settings" via the corresponding menu line. This procedure will be described on page 5-55 (chapter 5.5.1).

Line of variables "Range and functional control":

- **LOCAL:**
  The platform will be controlled via the display.

- **AUTO:**
  The range will be selected automatically ("auto range"). This function will only be available with an **I/O board with 3 alarms (PIN 70 656 193)**, because the auto ranging parameters are located on the I/O board (see its own manual)!
- **REMOTE:**
  The range selection will be controlled by digital inputs, e.g. via a **DIO board or I/O board with 3 alarms**.

Line of variables "Measurement mode":

If this line is selected: Press the F4 key (NO/NOx) to set up NO or NO_x as sample gas.

Lines of variables "Ozonator power", "Ozonator status":

You can enable or disable the ozonator in the line "Ozonator power". The actual status will be displayed in the line "Ozonator status" automatically.

Menu line "Zero/Span calibration...":

Via this line you can change to the menu "Zero/Span calibration", where you can set up and start the calibration. This menu will be described on page 5-56 (chapter 5.5.2). You can also reach that menu with the F3 key (CAL).

Line of variables "Ranges with valid calibration":

In this line you will find the ranges with successful calibration results.

Menu line "Physical Measurements...":

Via this line you can change to the menu "Physical Measurements", where you will find some pressure results and temperature results of the CLD analyzer module. This menu will be described on page 5-60 (chapter 5.5.3).

Main Menu — Expert controls and set up

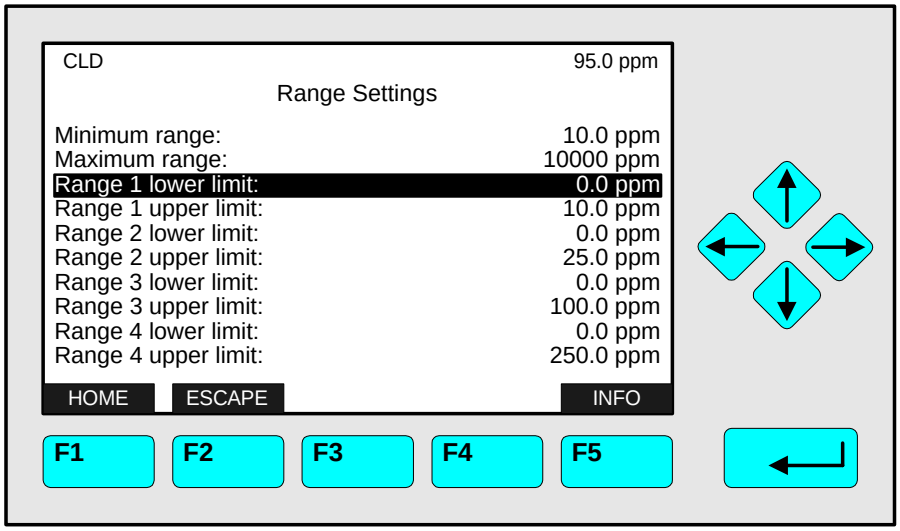
↓

Expert analyzer controls

↓

Range settings

↓



In the menu "Range Settings" you can set up the begin and the end of each range. These values will only be limited by the setups in the line "Minimum range" resp. "Maximum range". The concentrations of these lines are manufacturer's settings and cannot be changed by the customer.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

5.5.2 Expert Analyzer Controls
Zero/Span Calibration

Main Menu — Expert controls and set up

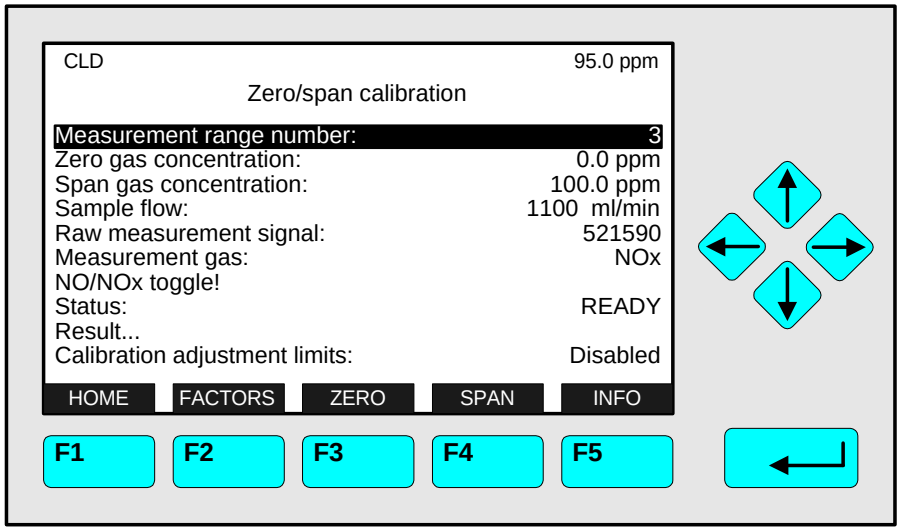
↓

Expert analyzer controls

↓

Zero/Span calibration

↓



In the menu "Zero/span calibration" you can set up and start the calibration of the analyzer. The procedure and the menus are the same as described for the analyzer module in chapter 5.1.1 (p. 5-5).

How to calibrate:

1) Select the measurement range:
   - Press the ENTER key or the → -key in the line "Measurement range number" to enter the parameter. Select the range you want to calibrate with the ↑ -key or the ↓ -key and confirm it with ENTER. The zero gas concentration and the span gas concentration of the range selected will appear in the corresponding lines, automatically.

2) Select the gas component:
   - Go to the line "NO/NOx toggle!" with the ↓ -key and select the gas component you want with the ENTER key or the → -key. The component selected will appear in the line "Measurement gas", automatically.

3) Zeroing:
   - Change to the submenu "Analyzer zero" with the F3 key (ZERO).
   - Pay attention to the notes on the screen !
   - Flow enough zero gas through the CLD.
   - Wait for a stable signal (look at the headline of the display). Then, start the zero gas calibration with the F3 key (ZERO). The running procedure will be the same as it is described detailed in chapter 4.2.1 of the basic controls (p. 4-22pp).
   - Go back to the menu "Zero/span calibration" with the F2 key or the ← -key after the zero gas calibration will be done (Messages on the display: READY/CAL OK).

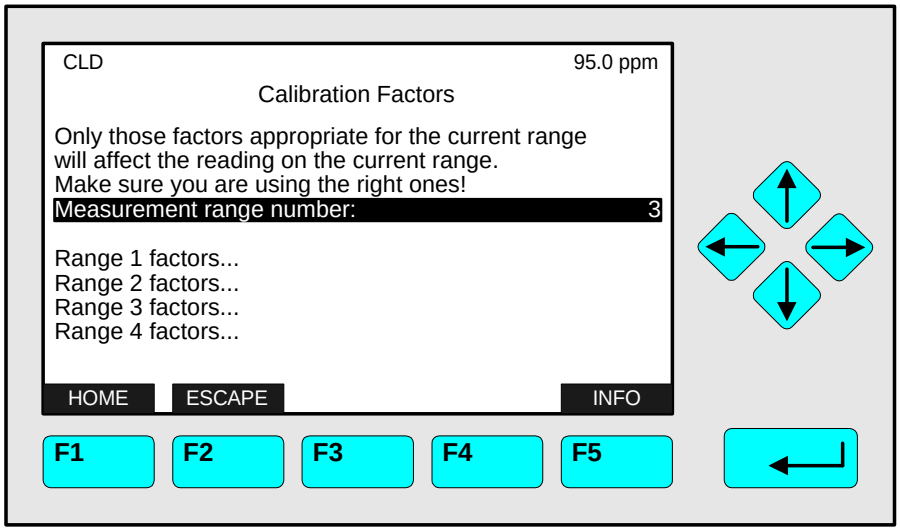
4) Spanning:
- Change to the submenu "Analyzer span" with the F4 key (SPAN).
- Pay attention to the notes on the screen !
- Flow enough span gas through the CLD.
- Wait for a stable signal (look at the headline of the display). Then, start the span gas calibration with the F4 key (SPAN). The running procedure will be the same as it is described detailed in chapter 4.2.2 of the basic controls (p. 4-26pp).
- Go back to the menu "Zero/span calibration" with the F2 key or the ← -key after the span gas calibration will be done (Messages on the display: READY/CAL OK). Alternative: Go back to the "Main Menu" with the F1 key (HOME).

5) Check the calibration results:
- You can change to the submenu "Zero/span diagnostic data" via the line "Result..." of the menu "Zero/span calibration". There you can control the results of the last zero and span calibration. You can go back to the menu "Zero/span calibration" with the F2 key or the ← -key.

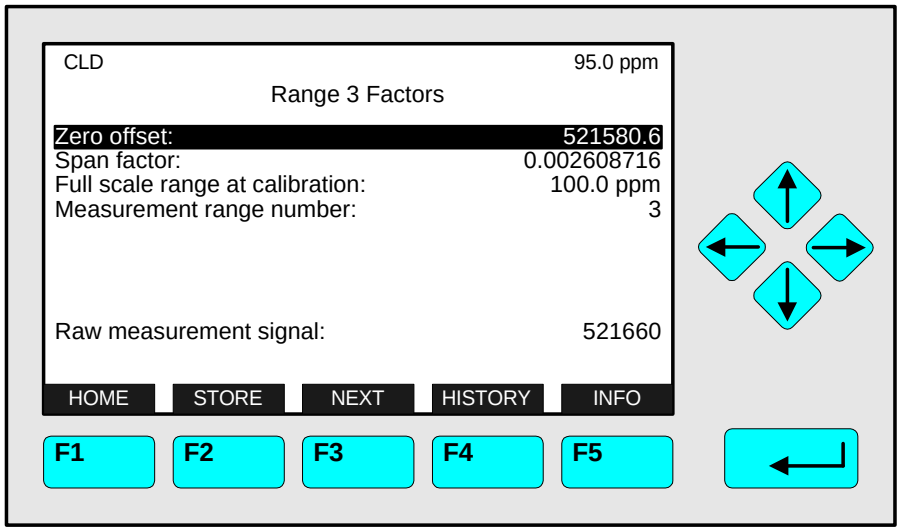
Manual input of calibration factors:

The calibration may be wrong because of a trouble in the gas flow. If a calibration was not successful, you have to repeat it. It is possible that a new start of calibration will not solve the problem, if the measured zero or span gas value will differ from normal signals largely. In that case you have to put in the calibration factors manually:

♦ From the menu "Zero/span calibration" you can change to the submenu "Calibration Factors" with the F2 key (FACTORS):



♦ Select the range you want in the line "Measurement range number" and change via the line "Range 1/2/3/4 factors..." to the corresponding submenu:



Set up parameters:

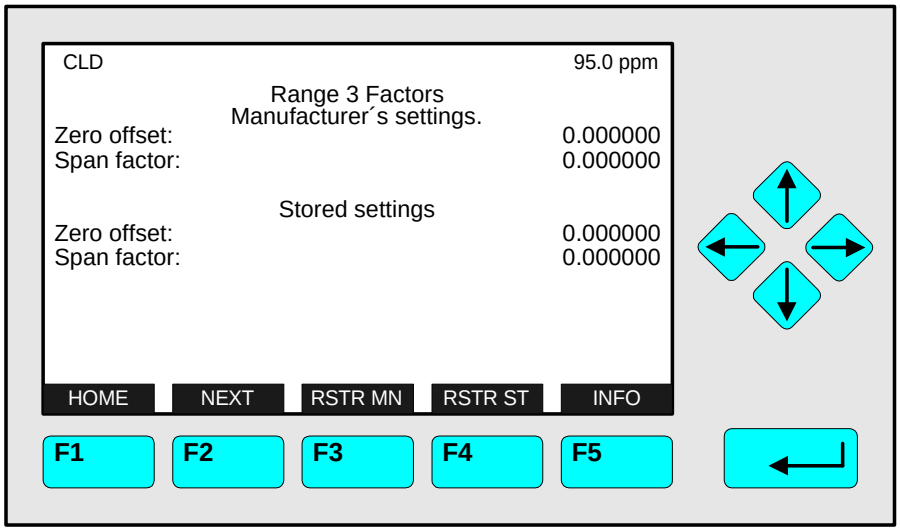
- Press the ENTER key or the → -key in the line "Zero offset" to select the parameter and set up "32700" resp. "524000" with the ↑ -key or the ↓ -key. You may select any digit with the → -key or the ← -key.
  Note: The zero offset is about 32000 counts for the CLD software revision 2.2.1 (16 bit D/A transformer) and about 520000 counts for the revision 2.3 (20 bit D/A transformer).
- Confirm your setup with the ENTER key.
- Go to the line "Span factor" with the ↓ -key.
- Press the ENTER key or the → -key to select the parameter and set up "0.00015" with the arrow keys.
- Confirm your setup with the ENTER key.

Notes:

- You have to set up the factors for all ranges.
- With the parameter "Zero offset" you will fix the zero value. The changing of the zero offset will influence the signal immediately (look at the headline).
- With the parameter "Span factor" you will fix the signal at the span gas setpoint. The changing of the span factor will influence the signal immediately (look at the headline).
- Conditions for the manual input of factors:
  - "Disabled" has to be set up in the line "Calibration adjustment limits" of the menu "Zero/span calibration".
  - "SEPARATELY" has to be set up in the lines "Zero ranges" and "Span ranges" of the menu "Calibration Parameters" (see 5.1.2, p. 5-9).
- **Attention:**
  After the calibration with factors you have to calibrate with zero gas and span gas in the usual way!

Saving the factors:

- You can store the actual zero offset and span factor with the F2 key (STORE) of the menu "Range 1/2/3/4 Factors". You will find the stored settings on the second menu page (see next illustration).
- You can change to the second menu page of the menu "Range 1/2/3/4 Factors" with the F4 key (HISTORY):



- You can change the stored settings against the manufacturer's settings with the F3 key (RSTR MN: Restore the manufacturer's values). The "Zero offset" and the "Span factor" of the first menu page will change according to the setups of the manufacturer's settings.
- You can change the manufacturer's settings against the stored settings with the F4 key (RSTR ST: Restore the "stored" values). The "Zero offset" and the "Span factor" of the first menu page will change according to the setups of the stored settings.

5.5.3 Expert Analyzer Controls
Physical Measurements

Main Menu — Expert controls and set up

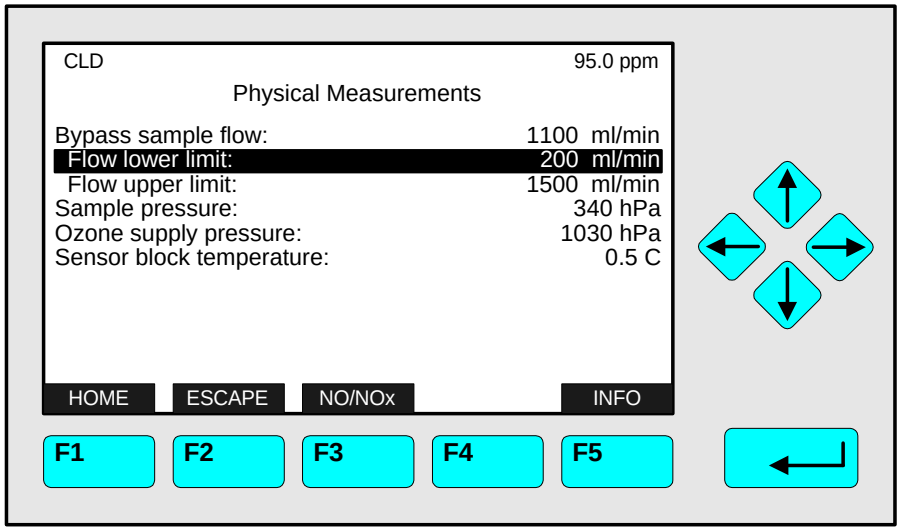
↓

Expert analyzer controls

↓

Physical Measurements

↓



In the menu "Physical Measurements" you can find some pressure results and temperature results of the CLD analyzer module. Besides, you can set up flow limits. You can select the gas component with the F3 key (NO/NOx).

Set up parameters:

- Select the line "Flow lower limit" or "Flow upper limit" with the ↑ -key or the ↓ -key.
- Press the ENTER key or the → -key to select the parameter.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  Options: -200 to +2000 ml/min for the lower limit (sign changing with F4 "+/-")
  0 to 2000 ml/min for the upper limit
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

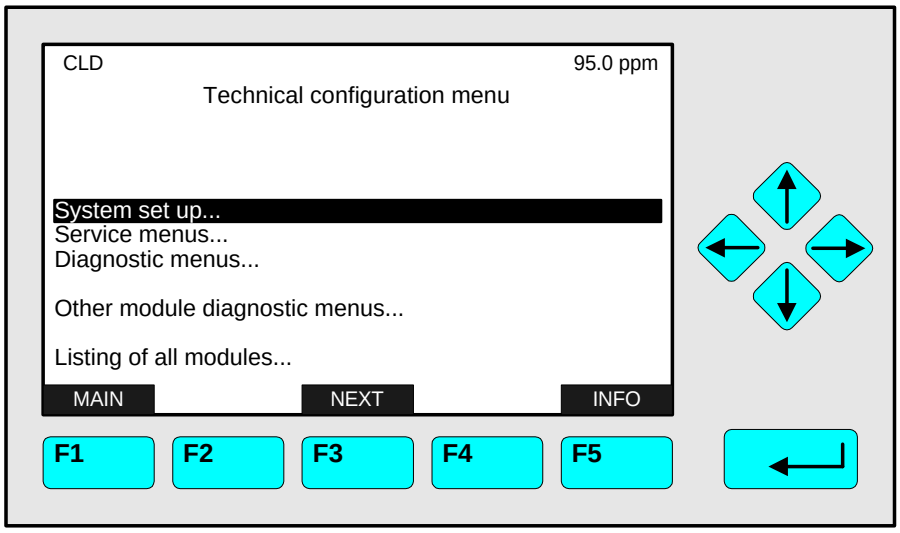
Lines of variables "Bypass sample flow", "Sample pressure", "Ozone supply pressure" and "Sensor block temperature":

These are information lines. They are not available.

Lines of variables "Flow lower limit", "Flow upper limit":

The violation of these limits may start an alarm report, if it is enabled in the diagnostic menus (see 6.3 p 6-27).

If you press the ENTER key or the → -key in the line "Technical level configuration..." of the "Main Menu" you will change to the following display:



From the menu "Technical level configuration" you can change to several submenus to set up the system parameters of the platform, of the analyzer or of the analyzer module. Besides you can set up or control the software and hardware configuration of the control module or of the analyzer modules. Some of the system parameters in chapter 6 you can also set up in several submenus of the expert controls (chapter 5.4 p. 5-47 to 5-52).
In the following table you will find a short overview about the contents of the menus and where you will find their description in this manual:

Menu	Important Contents	Chapter in this manual
System set up...	⇒ Configuration of the LCD-screen and front panel control ⇒ Binding of uncategorized I/O modules with the platform ⇒ Setup of security codes of the different operating levels	* 6.1 p. 3 to 16
Service menus...	⇒ Manufacturing and service data of the control module and the analyzer modules	* 6.2 p. 17 to 24
Diagnostic menus...	⇒ Error messages of the control module software and of the analyzer modules software	* 6.3 p. 25 to 43
Other module diagnostic menus...	⇒ not available at the moment; reserved for error messages of "none-NGA-modules" software	* 6.4 p. 44
Listing of all modules...	⇒ Overview of all modules connected to the platform or the MLT analyzer	* 6.5 p. 45

Structure of chapter six:

The structure of chapter six is analogous to the structure of chapter five:
At the begin of any chapter you will find the way to a certain submenu of the software starting from the line "Expert controls and set up" in the "Main Menu". The way will be described with the software catchwords that you have to enter one after another to reach the corresponding submenu. At the end of the catchword listing you will find the illustration of the LCD screen. After that you can read the set up instructions and explanations containing further menu pictures, if necessary.

Example: *You want to optimize the converter efficiency.*

Main Menu — Technical level configuration

↓

Diagnostic menus

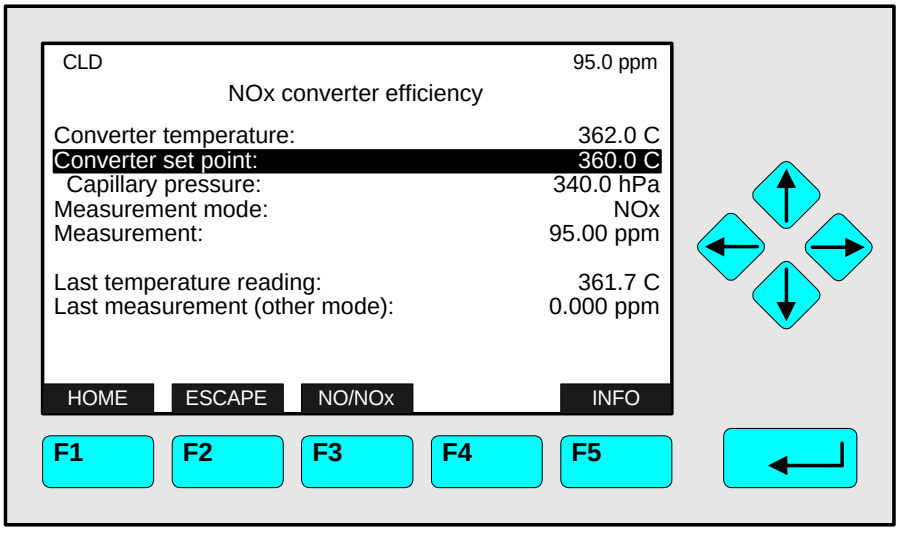
↓

Analyzer module diagnostics

↓

NOx converter efficiency

↓



In this menu you can optimize NOx converter efficiency.

1) Set up the desired converter temperature (set point):
   - Press the ENTER key or the → -key to select the parameter
   - Select any digit you want to change with the ← -key or the → -key and ...

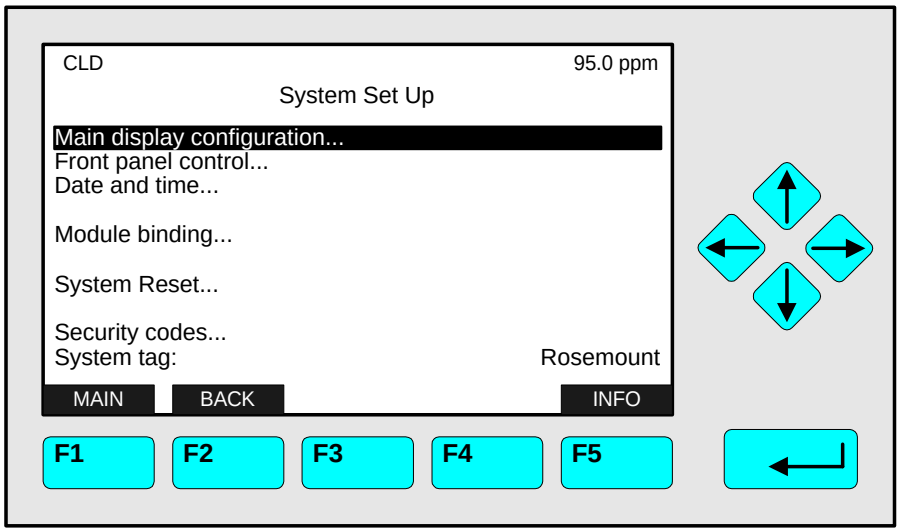
Further explanations and instructions to set up the parameters will follow !

Main Menu — Technical level configuration

↓

System set up

↓



From the menu „System set up“ you can change to several submenus where you can set up principally:

- LCD resolution
- Contents of the single component display
- Binding of auxiliary modules to the platform or the analyzer
- Set up of the security codes of the different operating levels

Changing to the submenus:

- Scroll with the ↑ -key or the ↓ -key to select the menu line you want.
- Press the ENTER key or the → -key in the line selected to change to the corresponding submenu.

6.1.1 System set up

Main Display Configuration

Main Menu — Technical level configuration

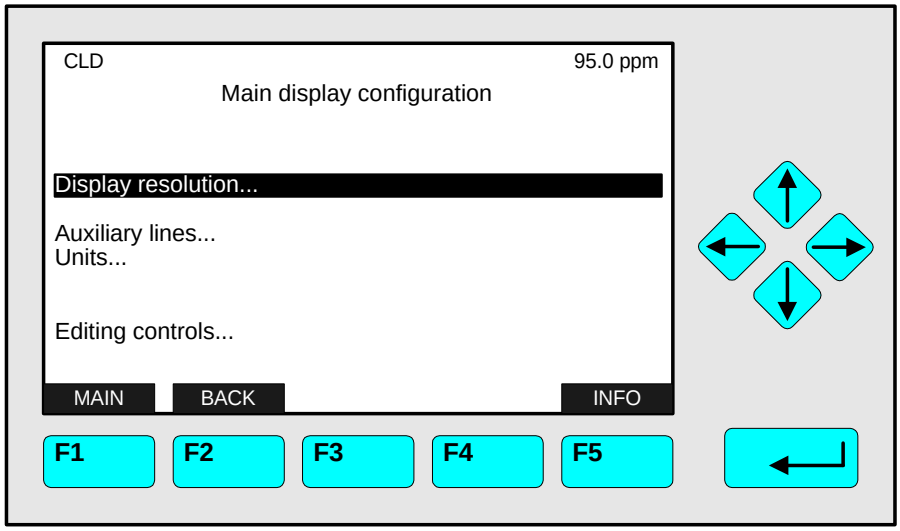
↓

System set up

↓

Main display configuration

↓



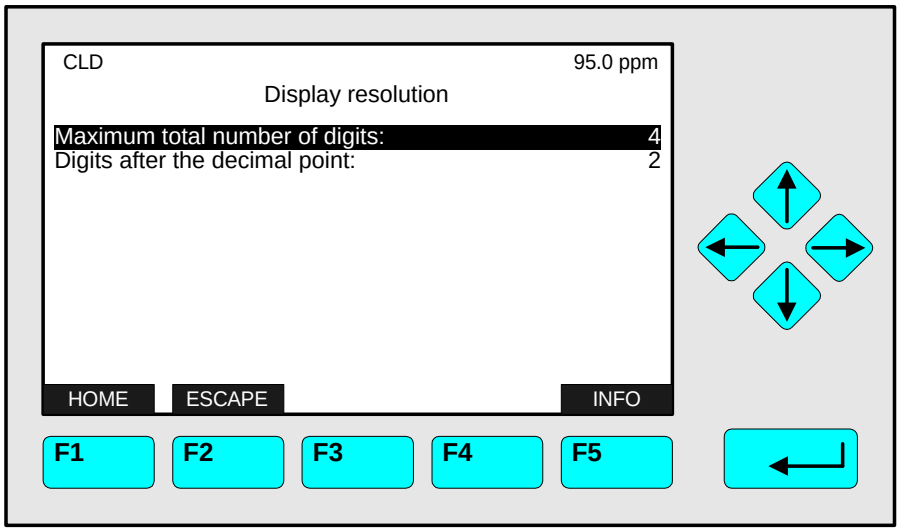
From the menu "Main display configuration" you can change to several submenus where you can set up the front panel control, the LCD resolution and some contents of the single component display.

Changing to the submenus:

- Scroll with the ↑ -key or the ↓ -key to select the menu line you want.
- Press the ENTER key or the → -key in the line selected to change to the corresponding submenu.

Menu line "Display resolution...":

Via the line "Display resolution..." you will change to the corresponding submenu (illustration look next page) where you can determine the number of digits for the display of the measured values. These numbers do not alter the accuracy of measurement. You can reach the submenu "Display resolution" via the menu "Expert controls and set up", too (see 5.4.2 p. 5-50).



Set up the number of digits:

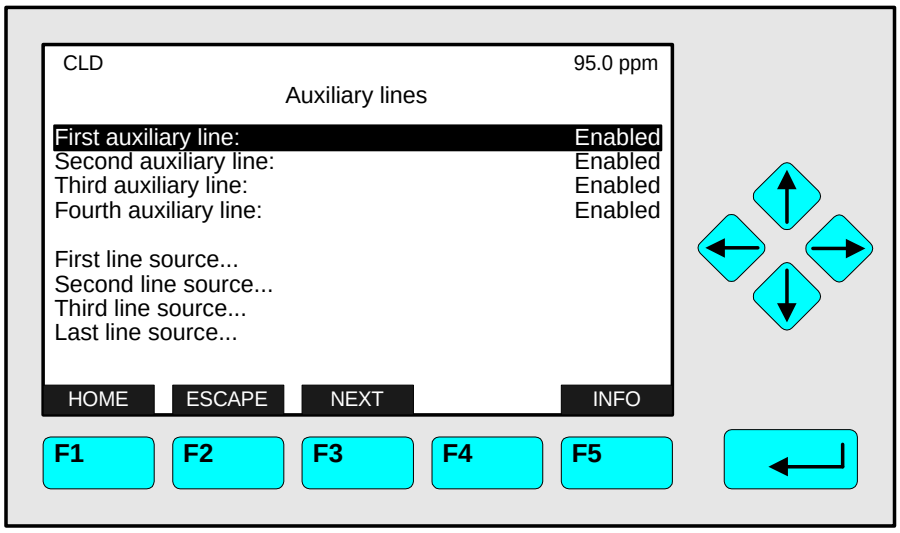
- Select one of the two lines of variables with the ↓ -key or the ↑ -key.
- Select the number with the ENTER key or the → -key.
- Select the digit with the ↑ -key or the ↓ -key.
  Options: Maximum total number of digits: 3, 4, 5, 6
  Digits after the decimal point: 0, 1, 2, 3.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Example:

- Measured number: 1.2345
- Select 3 for total number of digits and 2 for digits after decimal point.
- The screen will display: 1.23

Menu line "Auxiliary lines...":

From the menu "Main display configuration" you can change via the line "Auxiliary lines..." to the corresponding menu:



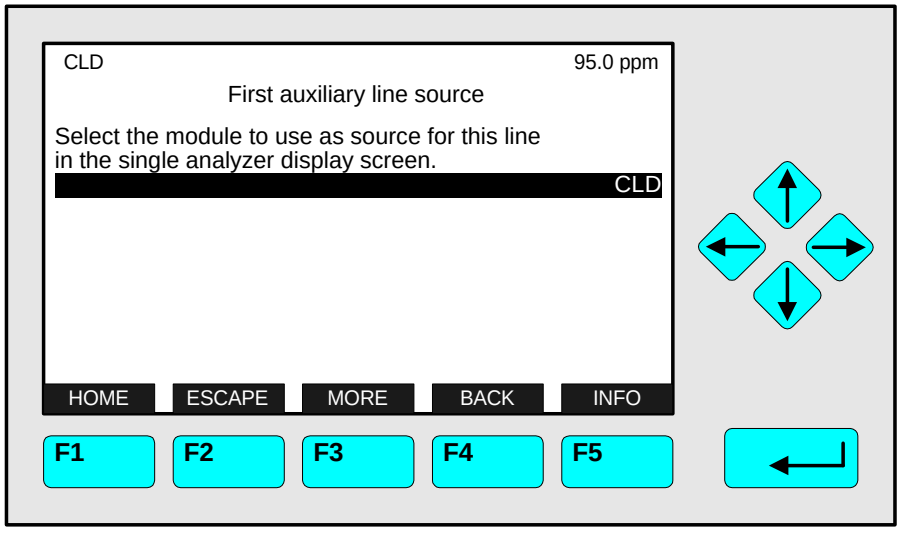
In the menu "Auxiliary lines" you can determine if the last four lines in the single component display of the current channel shall appear. If you want to set up the lines of the other channels of the joint analyzer modules, press the F3 key.

Set up parameters:

- Select any line of variables or any menu line with the ↓ -key or the ↑ -key.
- Select the parameter with the ENTER key or the → -key.
- Select "Enabled" or "Disabled" with the ↑ -key or the ↓ -key to enable or disable the display of the corresponding auxiliary line in the single component display.
- Confirm the parameter selected with the ENTER key or cancel and go back to the last adjustment with the F2 key.

Choose the source module for the auxiliary lines:

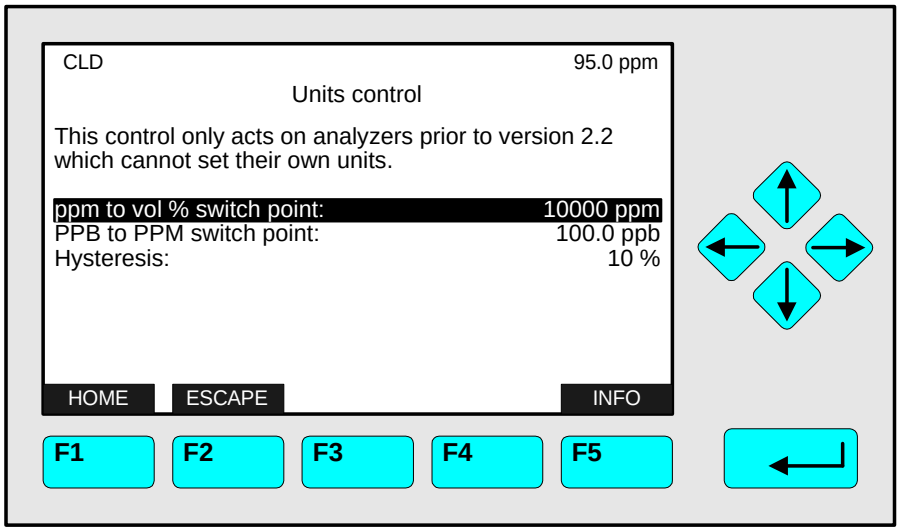
You will change via the line "First line source...", "Second line source...", "Third line source..." or "Last line source..." to the corresponding submenus. The tags of all modules combined with the platform or MLT analyzer are available:



- Go to the line you want with the ↑ -key or the ↓ -key.
  If there are more than eight source modules available you have to press the F3 key to go to another menu page.
- Select the tag of the module with the ENTER key or the → -key:
  The display will go back to the menu "Auxiliary lines" automatically.
  The selection will be done.

Menu line "Units...":

From the menu "Main display configuration" you can change via the line "Units..." to the submenu "Units control":



In the menu "Units control" you can determine the switch point for the signal value from ppb to ppm, respectively from ppm to vol%. But, the set-ups in this menu are only operative for earlier versions of analyzers or analyzer modules. The switching will work automatically depending on the signal value for analyzers from the version 2.2 on.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Lines of variables "ppm to vol% switch point" and "PPB to PPM switch point":

In these lines you can determine which signal value shall switch the displayed concentration from ppb to ppm resp. from ppm to vol% (or reverse).

Line of variables "Hysteresis":

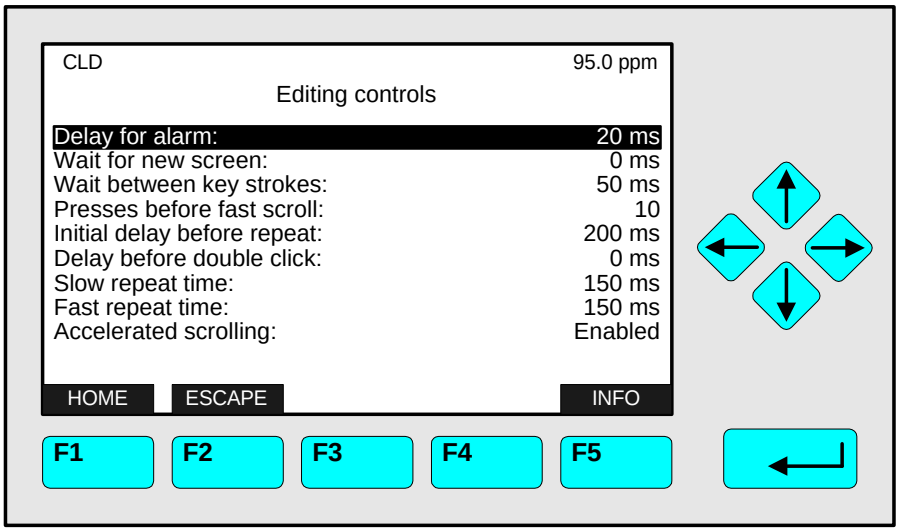
The value selected in this line will determine the range for the switching of the concentration unit.

Example:

- Hysteresis is 10% and switch point ppm <–> vol% is 10000 ppm
- The concentration value displayed will change with increasing signal values from ppm to vol% at: 11000 ppm, i.e. the concentration of 11000 ppm will be displayed as 1.1%.
- The concentration value displayed will change with decreasing signal values from vol% to ppm at: 0.9%, i.e. the concentration 0.9% will be displayed as 9000 ppm.

Menu line "Editing controls...":

From the menu "Main display configuration" you can change via the menu line "Editing controls..." to the corresponding submenu:



In the menu "Editing controls" you can set up a lot of parameters to control the LCD by the keyboard. In any line of variable of this menu you can read which set up is possible.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Main Menu — Technical level configuration

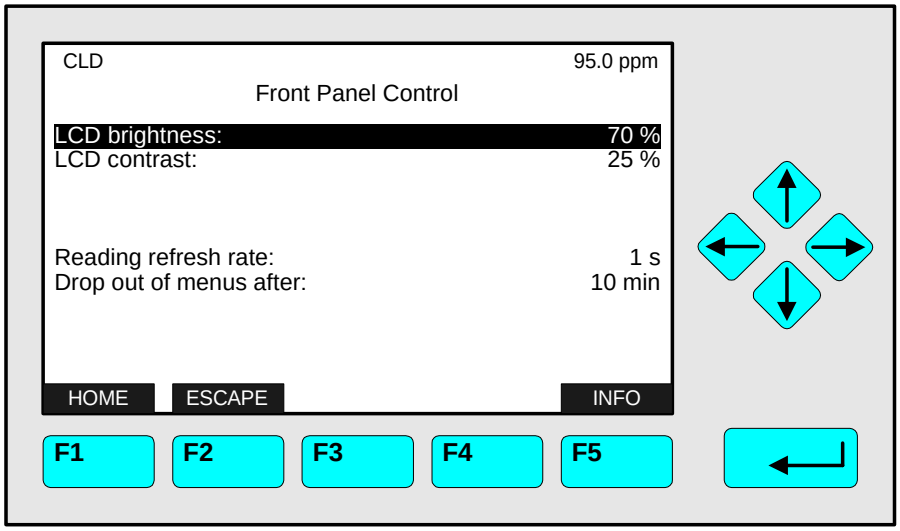
↓

System set up

↓

Front panel control

↓



In the menu "Front Panel Control" you can set up several display parameters. You can set up the same parameters in the menu "Front Panel Control" of the "Expert controls and set up" menus (see 5.4.1 p. 5-48).

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Lines of variables "LCD brightness" and "LCD contrast":

In these two lines you can determine the quality of the LCD reproduction. The best values depend on your position to the screen and on the light of the environment.

- Options: 20 to 100% for LCD brightness and 10 to 80% for LCD contrast.
- Usually: 70 to 90% (brightness) and 20 to 30% (angle).
- **Caution:** Be careful with the changing of these values! Perhaps you can not read the display any longer if you use very extreme values! It is not possible to load standard values via keyboard!

Line of variables "Reading refresh rate":

In this line you can determine how often the display shall be built up in a certain time interval. Options: 1s to 60s. Standard: 1s.

Line of variables "Drop out of menus after":

In this line you can decide if and after which time without front panel operations the display shall change from the current menu to the single component display.
Options: 10s, 30s, 1min, 5min, 10min, 30min, Never.

Main Menu — Technical level configuration

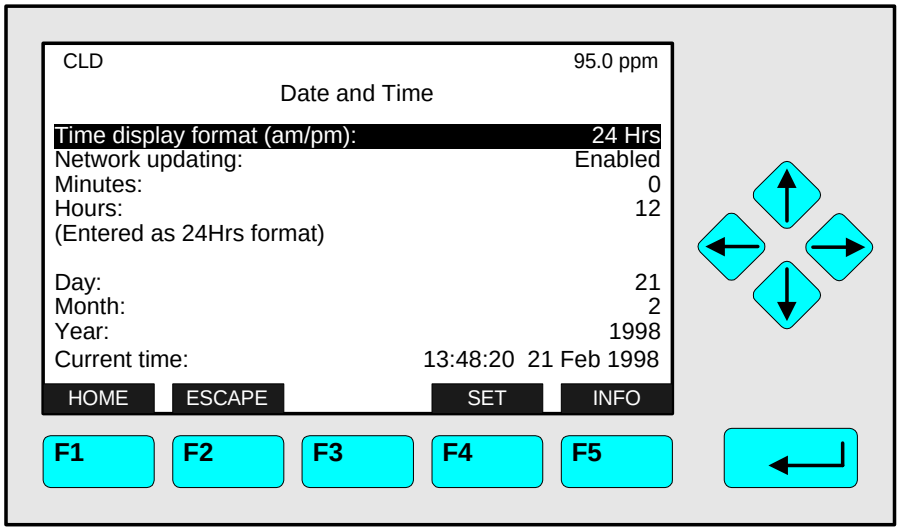
↓

System set up

↓

Date and time

↓



In the menu "Date and Time" you can set up the date and the time of the control module (platform or MLT analyzer). You will find the same menu via the "Expert controls and set up" menus (see 5.4.1 p. 5-49).

Line of variables "Time display format (am/pm)":

In this line you can decide if the time of the control module should be displayed in the 12 hours format or in the 24 hours format.

Line of variables "Network updating":

Select "Enabled" if you want that all modules combined with the platform or MLT analyzer can use the date and time setup of the control module. Else, select "Disabled".

Set up a new date or time:

1) Press the ENTER key or the → -key in the line "Minutes", "Hours", "Day", "Month" or "Year" to select the corresponding number.
2) Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
   - Options: Minutes: 0 to 59, Hours: 0 to 23, Day: 1 to 28/30/31 depending on the month selected, Month: 1 to 12, Year: 1996 to 2035.
3) Press the F4 key to set the new date or time. The new adjustment will appear in the line "Current time". The display in this line will be refreshed every five second.

6.1.4 System set up
Module Binding

Main Menu — Technical level configuration

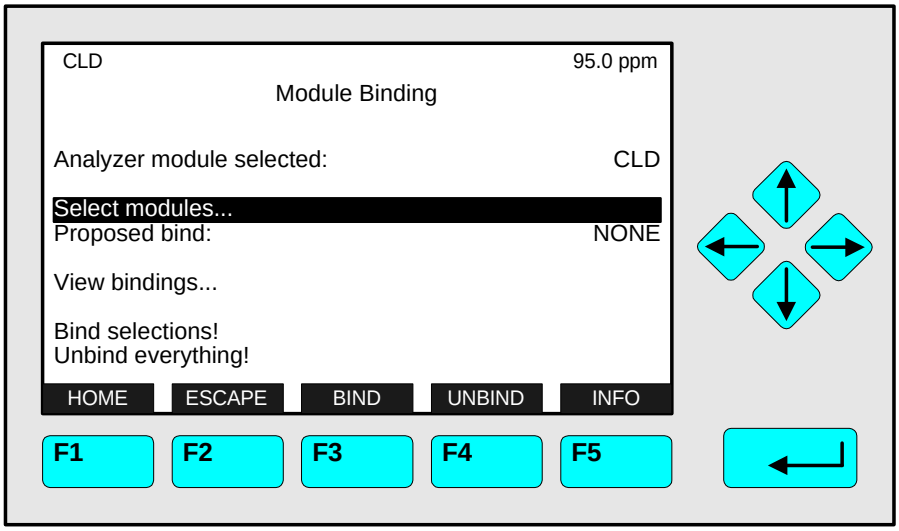
↓

System set up

↓

Module binding

↓



In the menu "Module Binding" you can bind with the analyzer modules the following types of micro processor controlled I/O modules connected to the platform:

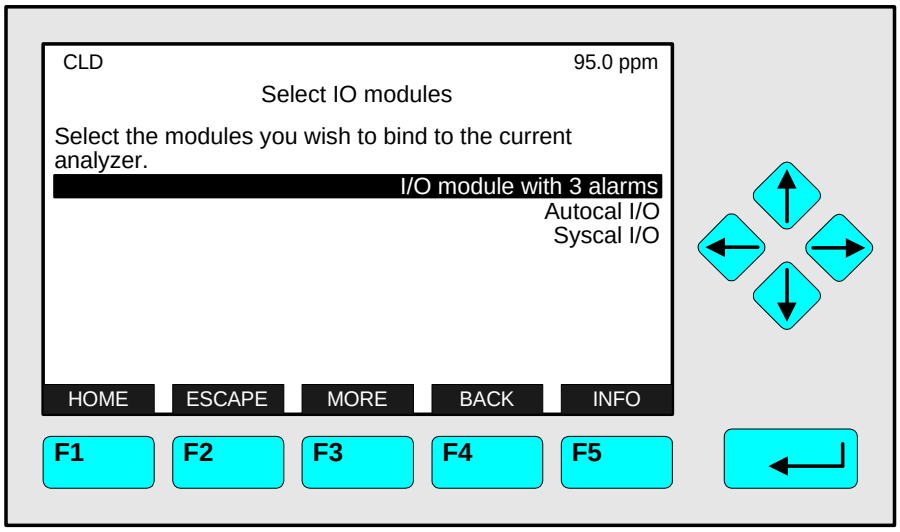
1) I/O module with three alarms
2) Autocal I/O
3) Syscal I/O

You can unbind all existing bindings between the analyzer module and the I/O modules if you press the F4 key (UNBIND) or if you press the ENTER key or the → -key in the line "Unbind everything!".

<u>Module binding:</u>

1) Select the channel you want:
- ♦ Change to the "Main Menu" with the F1 key (HOME).
- ♦ With the F3 key (NEXT) in the "Main Menu" you can select the analyzer module you want to bind with an I/O module:
  The channel selected will appear in the tag (left above in the headline of the display).
- ♦ Go back to the menu "Module Binding" via the menus "Technical level configuration" and "System set up":
  The tag of the analyzer module selected will appear in the line "Analyzer module selected".

2) Select the I/O module you want:
- ♦ Press the ENTER key or the → -key in the line "Select modules..." to change to the submenu "Select I/O modules":



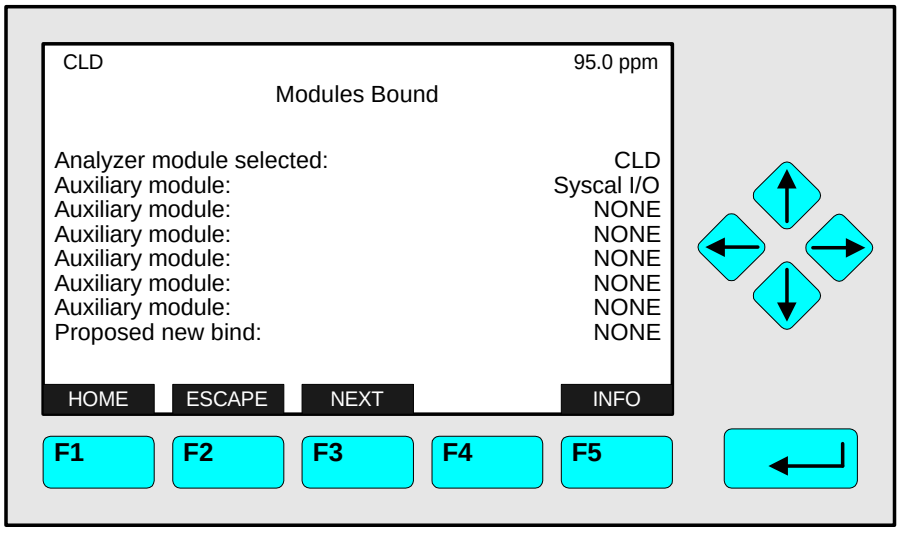
- Change to the line you want with the ↑ -key or the ↓ -key.
  If there exist more than eight unbound I/O modules (e.g. Autocal I/O) you can change to another menu page with the F3 key (MORE).
- Press the ENTER key or the → -key to select the tag of the I/O module you want:
  The display will go back to the menu "Module Binding" automatically.
  The tag of the I/O module selected will appear in the line "Proposed bind".

3) Binding:

- Press the ENTER key or the → -key in the line "Bind selections!" or press the F3 key (BIND) to bind the modules selected:
  The control module will change to the initializing mode and the binding will be done, automatically.
- Repeat the steps 1) to 3) to bind further modules you want.

4) Check bindings:

- Press the ENTER key or the → -key in the line "View bindings..." to change to the submenu "Modules Bound" where you will find all I/O modules bound to the channel selected:



6.1.5 System set up
System Reset

Main Menu — Technical level configuration

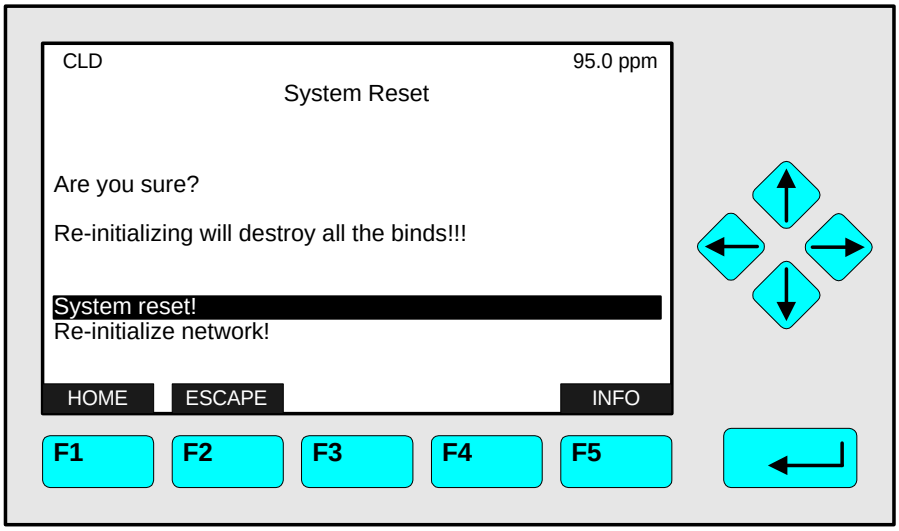
↓

System set up

↓

System Reset

↓



You can start the following functions in the menu "System Reset":

1) System Reset:

- The MLT analyzer or the platform will change to the initializing mode automatically, if you press the ENTER key or the → -key in the line "System reset!":
  This reboot is analogous to the "switching on" of the control module.

2) Re-initialize network:

- Change to the line "Re-initialize network!" with the ↑ -key or the ↓ -key.
- Press the ENTER key or the → -key to start the function.

Caution: With the function "Re-initialize network!", you will delete all bindings between analyzer modules and I/O modules and all configuration data of the SIO and DIO modules will disappear!

Main Menu — Technical level configuration

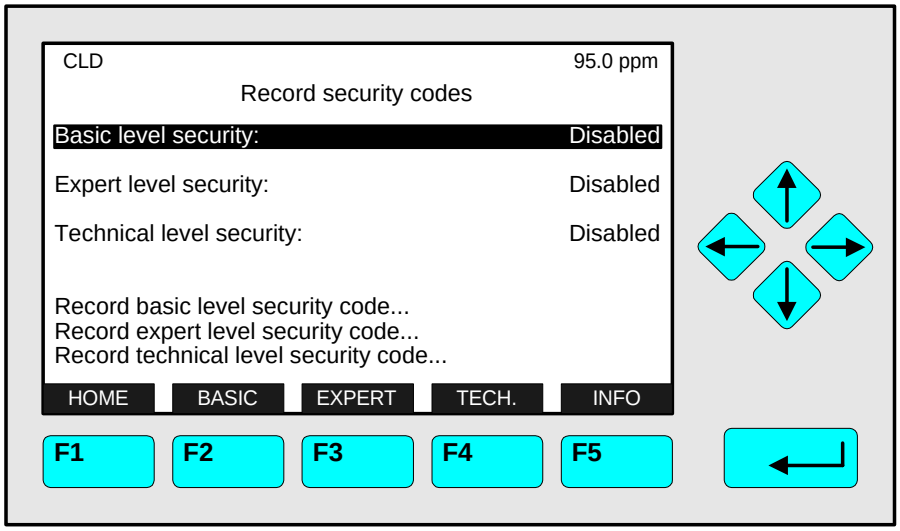
↓

System set up

↓

Security codes

↓

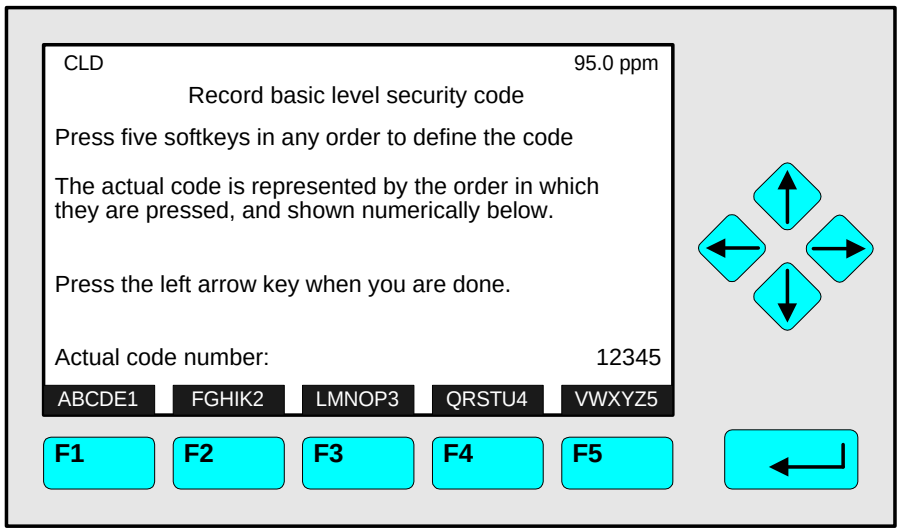


In the menu "Record security codes" you can enable a security code for each the "Basic controls", for the "Expert controls and set up" and for the "Technical level configuration".
Caution: If you enable a security code and forget it, you will not have any possibility to enter the locked level!

How to record and to enable the security codes:

1) Determination of the code number for the:

- *"Basic controls"* (standard: 12345):
  - Go to the line "Record basic level security code..." with the ↑ -key or the ↓ -key and change to the corresponding submenu with the ENTER key or the → -key (see illustration on the next page).
  - Alternative: Press F2.
- *"Expert controls and set up"* (standard: 12345):
  - Go to the line "Record expert level security code..." with the ↑ -key or the ↓ -key and change to the corresponding submenu with the ENTER key or the → -key (menu page is analogous to the one of the basic level, see illustration on the next page).
  - Alternative: Press F3.
- *"Technical level configuration"* (standard: 54321):
  - Go to the line "Record technical level security code..." with the ↑ -key or the ↓ -key and change to the corresponding submenu with the ENTER key or the → -key (menu page is analogous to the one of the basic level, see illustration on the next page).
  - Alternative: Press F4.



- Put in the code you want with the function keys F1, ..., F5:
  The sequence of the code numbers will appear in the line "Actual code number".
  Note: "1" is attached to F1, "2" to F2 and so on.
  The characters displayed above the function keys are not displayed as code numbers.
  Example:
  - Security code you want is: 53412
  - You have to press the sequence: F5 F3 F4 F1 F2
- You can press the function keys as often you want to give in the number you want at any digit of the code. If the input of the security code is done you can go back to the menu "Record security codes" with the ← -key.

2) Enable the security code:

- With the ↑ -key or the ↓ -key you can change to the line:
  - "Basic level security" to enable the code for the "Basic controls".
  - "Expert level security" to enable the code for the "Expert controls and set up".
  - "Technical level security" to enable the code for the "Technical level configuration".
- Press the ENTER key or the → -key to select the parameter and adjust "Enabled" with the ↑ -key or the ↓ -key. Confirm it with the ENTER key.

3) Change to a level locked by security code:

- Go back to the "Main Menu" with F1 (HOME).
- Try to change to the locked level via the corresponding menu line with the ENTER key or the → -key:
  A menu page will appear with the invitation to enter the security code. The parameter in the line "Security code" is "Ready".
- Enter the security code with the right sequence of function keys. The symbol "*" will appear in the line "Security code" for each input. If the code is wrong, "Ready" will appear again in this line. Then you cannot change to the locked level. If the code is correct, the display will change automatically to the locked level after the last digit of the code is entered.

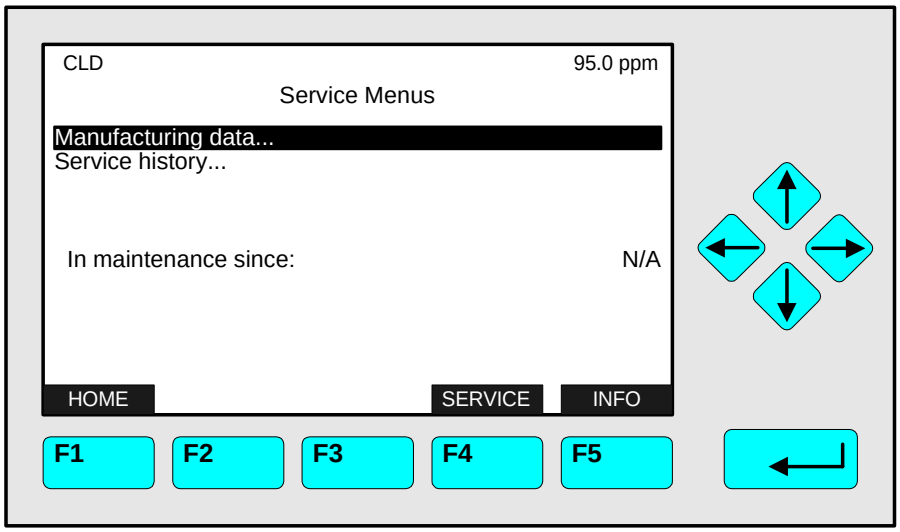
Note: If you have entered a level by security code, this level will be unlocked generally. If you want to enter this level only by security code, you have to press the F4 key (LOCK) in the "Main Menu" after each return from the specific level!

Main Menu — Technical level configuration

↓

Service menus

↓



From the menu "Service menus" you can change to several submenus where you can set up or control:

- Manufacturing data of the control module or the analyzer module
- Service data of the control module or the analyzer module

Changing to the submenus:

- Scroll with the ↑ -key or the ↓ -key to select the menu line you want.
- Press the ENTER key or the → -key in the line selected to change to the corresponding submenu.

6.2.1 Service Menus
Control Module Data

Main Menu — Technical level configuration

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Service menus

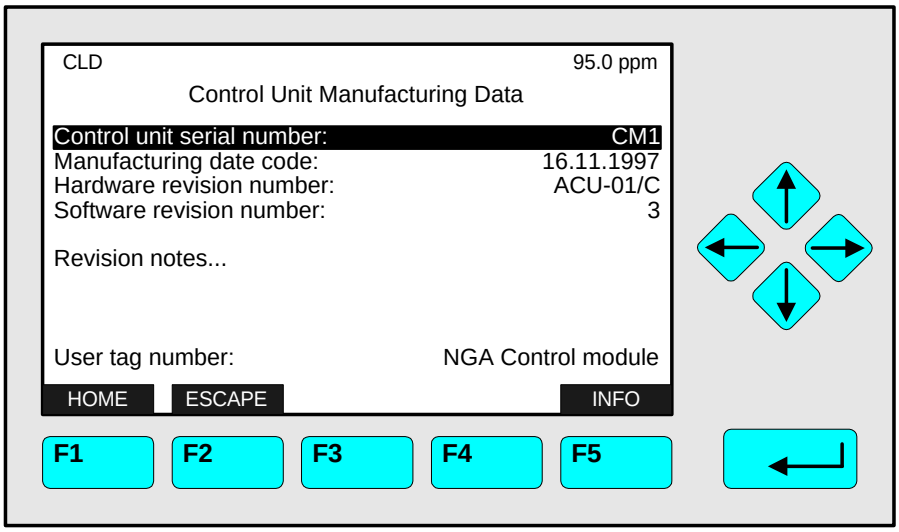
↓

Manufacturing data

↓

Control module data

↓



In the menu "Control Unit Manufacturing Data" you will find the hardware and the software revision number and the serial number of the control module.
The control module data in the first four lines are set up by the manufacturer. It is only necessary to change the data if something as the software revision number will change.
Note: If you have questions about the control module give the serial number of the first line to the customer service!
You can change via the line "Revision notes..." to the corresponding submenu where you will find the current revision note of the NGA software.
In the line "User tag number" you will find the control module tag of the platform.

Set up parameters:

- Select any line of variables or the menu line with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Main Menu — Technical level configuration

↓

Service menus

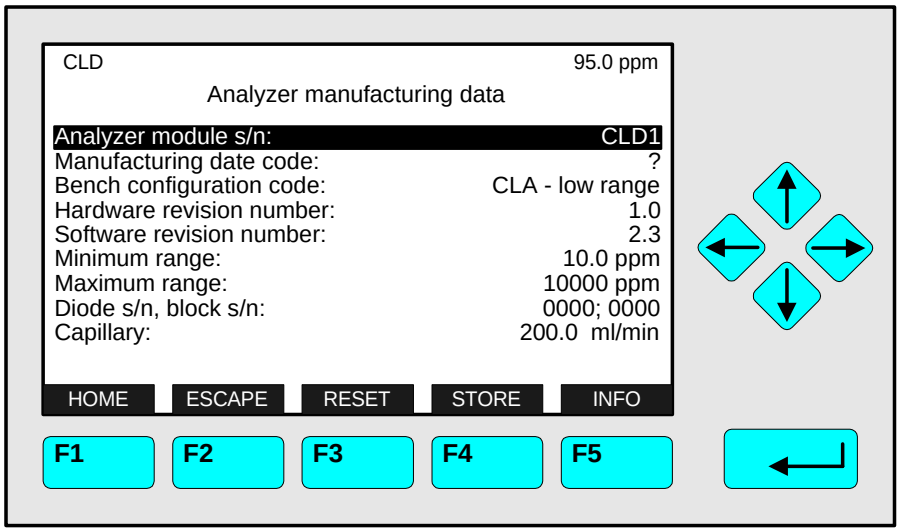
↓

Manufacturing data

↓

Analyzer module data

↓



In the menu "Analyzer manufacturing data" you will find the hardware revision number, the software revision number and the serial number of the CLD analyzer module. Besides, you can set up some measurement parameters.

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Lines of variables "Analyzer module s/n", "Manufacturing date code", "Bench configuration code" and "Diode s/n, block s/n":

The data in these lines are specific CLD analyzer module data. They were set up by the manufacturer during the first startup procedure of the module. A changing of these data will only be necessary, if hardware setups or software setups will be changed. Only specialists should change these parameters.
Note: The serial number of your CLD analyzer module you will find in the line "Analyzer module s/n". Please give this number to your customer service, if you have questions about your CLD analyzer module!

Lines of variables "Hardware revision number" / "Software revision number":

In these information lines you will find the hardware revision number and the software revision number of the CLD analyzer module. You cannot select these lines.

Lines of variables "Minimum range" / "Maximum range":

In these lines you can set up which begin of range and which end of range shall be the limit for all ranges. That means: No begin of range in the menu "Range Settings" (chapter 5.1.6 p. 5-16 or 5.5.1 p. 5-55) can be minor as the value of the line "Minimum range" and no end of range in the menu "Range Settings" can be major as the value of the line "Maximum range".

Options:	*Minimum range*	0 to 1000 ppm
	Maximum range	0 to 10000 ppm

Line of variables "Capillary":

In this line you can set up the capillary flow: 50 to 1000 ml/min.

Caution:

- **If you change the values in the lines "Minimum range", "Maximum range" and "Capillary" you will change measurement procedure of the CLD !**
  That means:
  The amplifying steps will be preselected by these parameters automatically.
- **Wrong parameters in these lines will produce error measurements automatically !**
- **Therefore, you should not change the setups in these lines !**

Main Menu — Technical level configuration

↓

Service menus

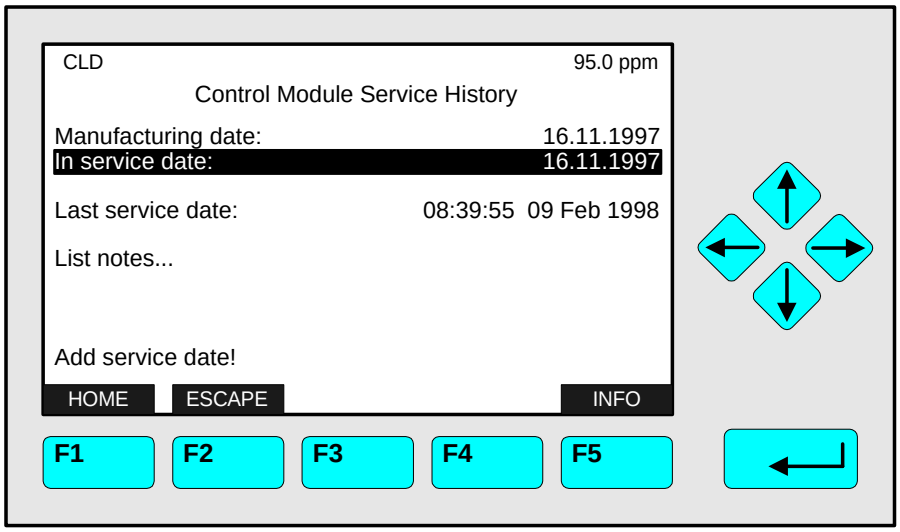
↓

Service history

↓

Control module history

↓



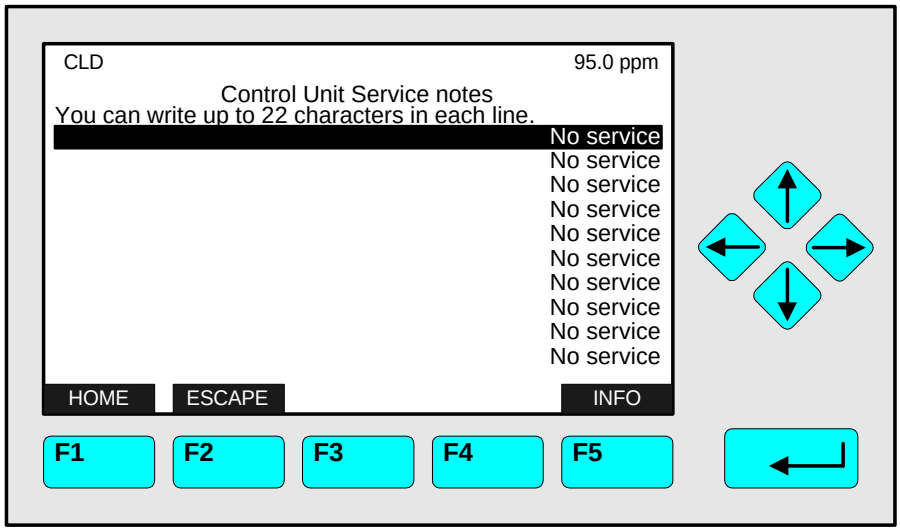
In the menu "Control Module Service History" you will find the manufacturing date of the control module and the date since the control module is in service. Besides, you can find the last service date in the corresponding line. After service is done you can set up a new service date with the function "Add service date!". The new date will appear in the line "Last service date:" after you will have changed to the single component display.

Set up parameters:

- Select the line "In service date:", the line "List notes..." or the line "Add service date!" with the ↓ -key or ↑ -key.
- Press the ENTER key or the → -key to select the variable, to start the function or to change to the submenu.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Menu line "List notes...":

Via the line "List notes..." you can change to the submenu "Control Unit Service notes" where you can give in a short note about the service you have done:



Set up notes:

- Select the line you want with the ↑ -key or ↓ -key.
- Select the parameter with the ENTER key or the → -key.
- Select the digit you want to change with the → -key or the ← -key and adjust the new value with the ↑ -key or the ↓ -key;
  Maximum of digits for each line: 30
  Options: alphabet (capital and small letters), umlauts, letters from different languages, 0, 1, 2,..., 9, +, -, *, /, =, ?, !, %, $ and many others.
- Confirm the note with the ENTER key or cancel and go back to the last note with the F2 key.

Note: You can set up any digit more fast by holding the ↑ -key or the ↓ -key. The scrolling will accelerate!

Main Menu — Technical level configuration

↓

Service menus

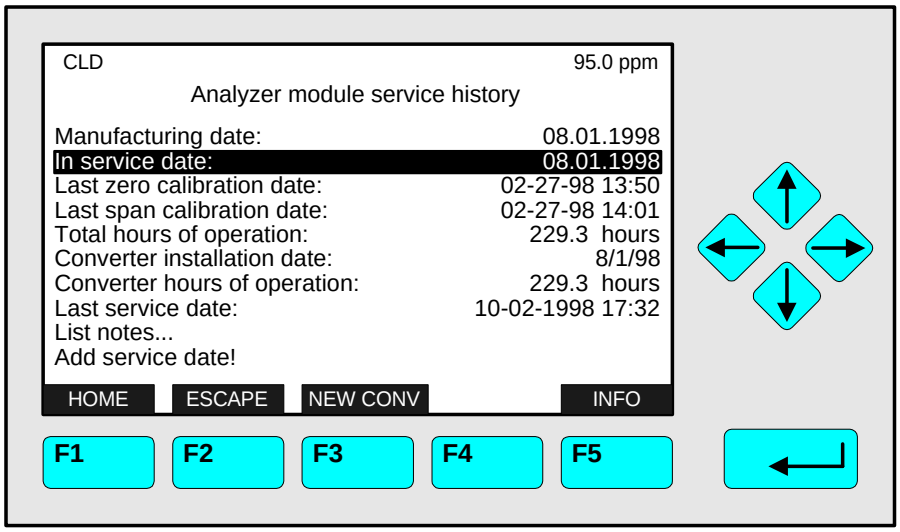
↓

Service history

↓

Analyzer module history

↓



In the menu "Analyzer module service history" you will find the manufacturing date and the service date of the CLD analyzer module. In the line "Last service date" you can set up the actual date of maintenance. You only have to press the ENTER key in the line "Add service date!" and the actual date will appear in the line "Last service date".

Caution: Do not press the F3 key (NEW CONV) !

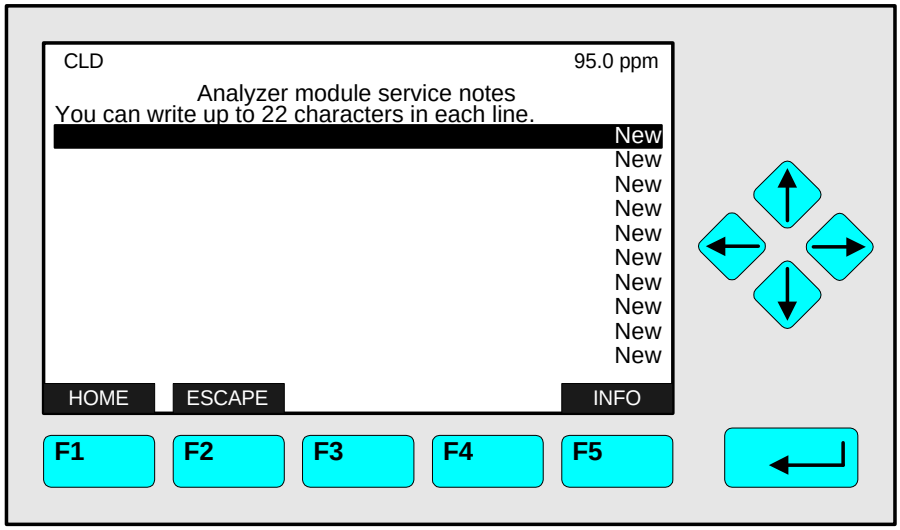
With the F3 key you will load the data of the Master-EPROM ! All stored data will be deleted !

Set up parameters:

- Select the line "In service date", the line "List notes..." or the line "Add service date!" with the ↑ -key or the ↓ -key.
- Press the ENTER key or the → -key to select the variable, to start the function or to change to the submenu.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Menu line "List notes...":

Via the line "List notes..." you can change to the submenu "Analyzer module service notes" where you can give in a short note about the service you have done:



Set up notes:

- Select the line you want with the ↑ -key or ↓ -key.
- Select the parameter with the ENTER key or the → -key.
- Select the digit you want to change with the → -key or the ← -key and adjust the new value with the ↑ -key or the ↓ -key;
  Maximum of digits for each line: 30
  Options: alphabet (capital and small letters), umlauts, letters from different languages, 0, 1, 2,..., 9, +, -, *, /, =, ?, !, %, $ and many others.
- Confirm the note with the ENTER key or cancel and go back to the last note with the F2 key.

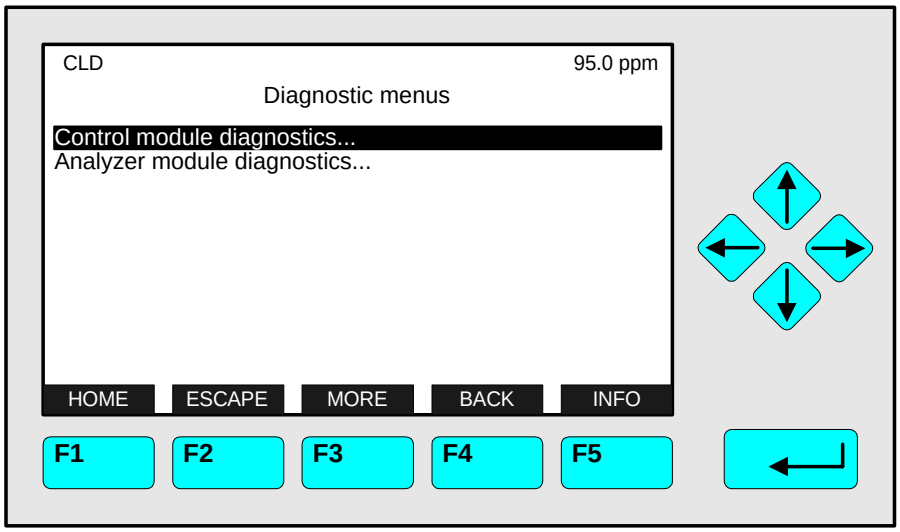
Note: You can set up any digit more fast by holding the ↑ -key or the ↓ -key. The scrolling will accelerate!

Main Menu — Technical level configuration

↓

Diagnostic menus

↓



From the menu "Diagnostic menus" you can change to submenus where you will find software error messages of the control module or of the analyzer module. If need be, you can remove the error messages in these menus.

Changing to the submenus:

- Scroll with the ↑ -key or the ↓ -key to select the menu line you want.
- Press the ENTER key or the → -key in the line selected to change to the corresponding submenu.

6.3.1 Diagnostic Menus
Control Module Diagnostics

Main Menu — Technical level configuration

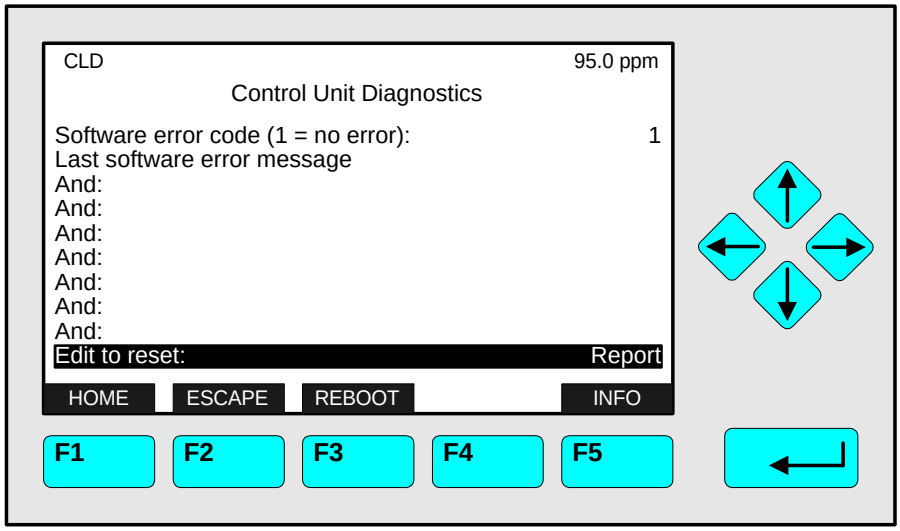
↓

Diagnostic menus

↓

Control module diagnostics

↓



In the menu "Control Unit Diagnostics" you can find software error messages of the control module. If such messages are available, you can act in the following way:

1) Make a note of the error messages.

2) Reset the message:
   - Press the ENTER key or the → -key in the line "Edit to reset".
   - Set up "Reset" with the ↑ -key or the ↓ -key and confirm it with the ENTER key: The error messages will disappear if the reason is not existing any longer.
   - If the error messages keep displayed:

3) System reset:
   - Change to the menu "System Reset" with the F3 key (REBOOT).
   - Press the ENTER key or the → -key in the line "System reset!" to reboot (see 6.1.5 p. 6-14).

4) Check the error messages:
   - Go again to the menu "Control Unit Diagnostics".
   - If the error messages are still existing, contact your customer service, please.
   - If the error messages are disappeared, you should set up the report status again: Set up "Report" in the line "Edit to reset".

Main Menu — Technical level configuration

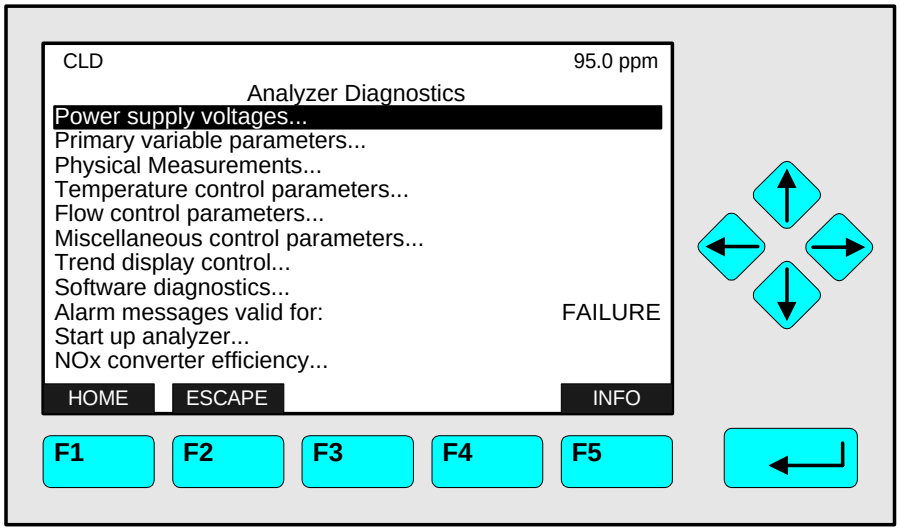
↓

Diagnostic menus

↓

Analyzer module diagnostics

↓



From the menu "Analyzer Diagnostics" you can change to several submenus, where you can set up and control some measurement parameters and calibration parameters of the CLD analyzer module.

Set up parameters:

- Select any menu line or the line of variables "Alarm messages valid for" with the ↑ -key or the ↓ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Select the parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Line of variables "Alarm messages valid for":

Options:

- FAILURE
- SAFETY FAILURE
- ANY
- WARNING

6.3.2.1 Diagnostic Menus
Power Supply Voltages

Main Menu — Technical level configuration

↓

Diagnostic menus

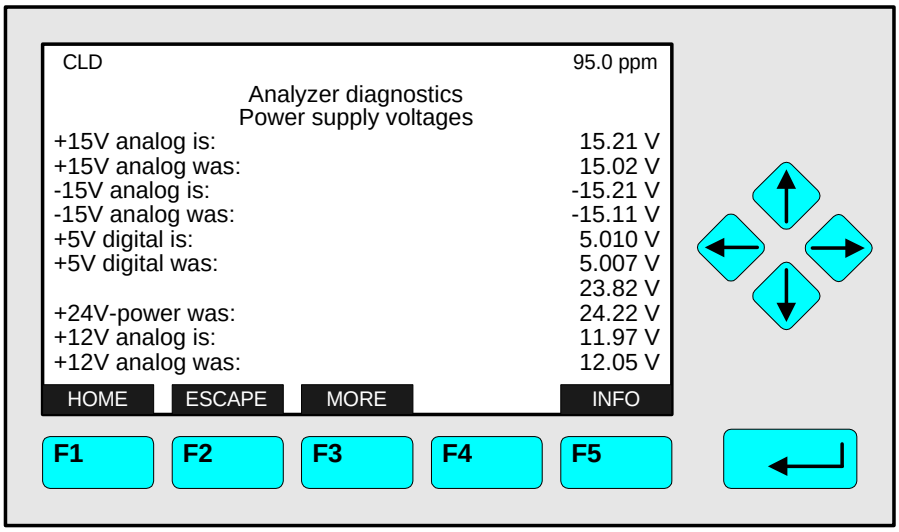
↓

Analyzer module diagnostics

↓

Power supply voltages

↓



In the submenu "Power supply voltages" you can find the current value of the power supplies ("is"-lines) and the values when the CLD analyzer module was manufactured ("was"-lines).

Main Menu — Technical level configuration

↓

Diagnostic menus

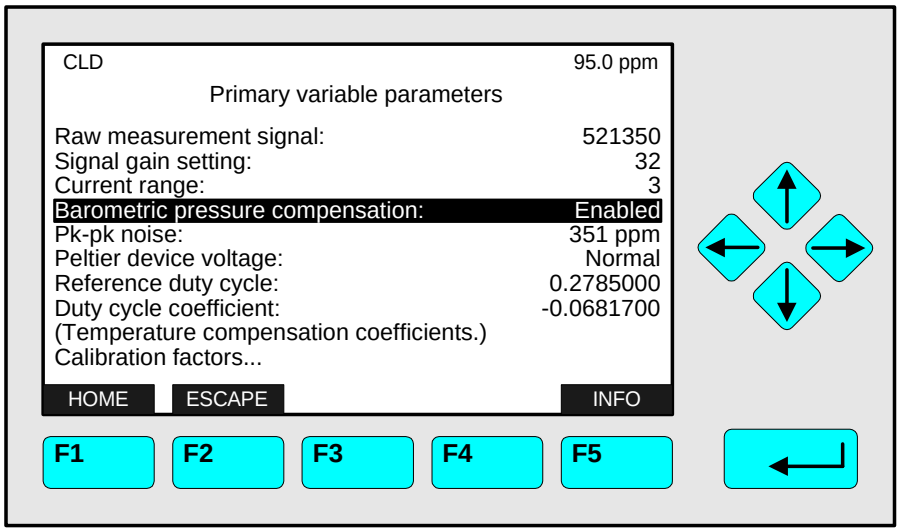
↓

Analyzer module diagnostics

↓

Primary variable parameters

↓



In the menu "Primary variable parameters" you will find the parameters that the CLD analyzer module will use to calculate its primary variables internal. Besides, you can change to the submenu "Calibration Factors", where you can set up manual the factors for zero/span calibration of the ranges.

Set up parameters:

- Select the line of variables you want or the menu line "Calibration factors..." with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu "Calibration Factors" with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  resp. select the whole parameter with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Line of variables "Barometric pressure compensation":

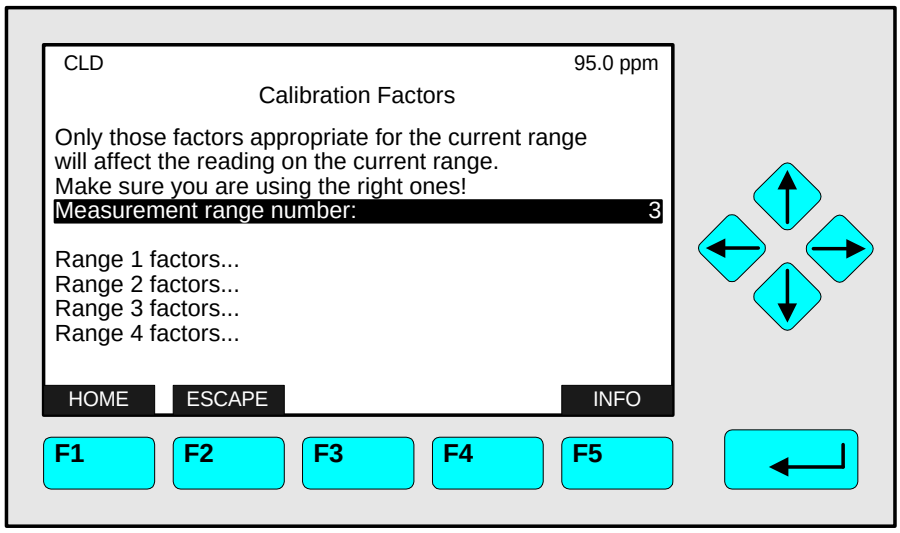
Barometric pressure compensation may be enabled if another analyzer has a pressure measurement device, and is set to report its reading.

Lines of variables "Reference duty cycle" and "Duty cycle coefficient":

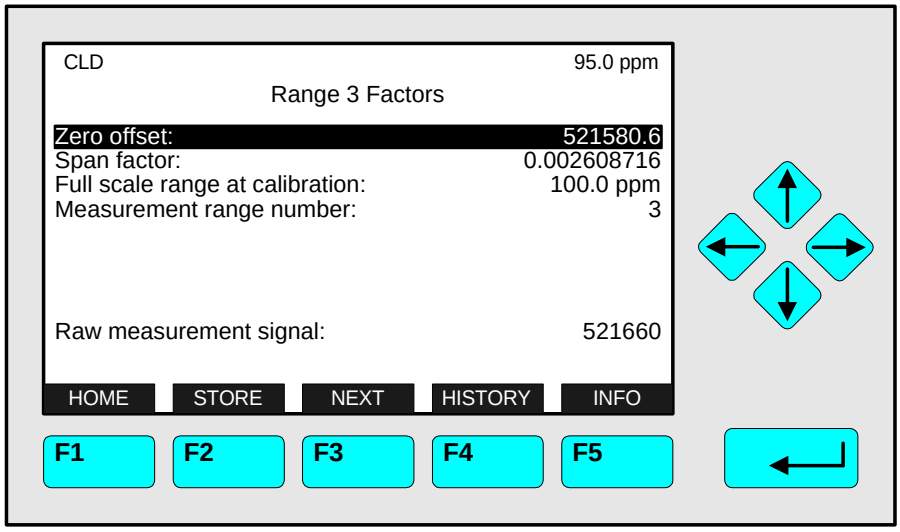
These parameters will be set up during the first startup of the CLD analyzer module by the manufacturer. Do not alter them !

Menu line "Calibration factors..."

Via the menu line "Calibration factors..." you can change to the corresponding submenu:



In the menu "Calibration Factors" you can select the range you want to calibrate with manual factors in the line "Measurement range number". This may be necessary if a calibration was not successful, e.g. because of a trouble in the gas flow. It is possible that a new start of calibration will not solve the problem, if the measured zero or span gas value will differ from normal signals largely.
You can also reach the menu "Calibration Factors" via the menu "Zero/Span calibration" of the Expert controls and set up menus (look at chapter 5.1.1 p. 5-6).
You have to set up the factors for each range separately in the menus "Range 1/2/3/4 Factors". You will reach each menu via the corresponding line:



Set up parameters:

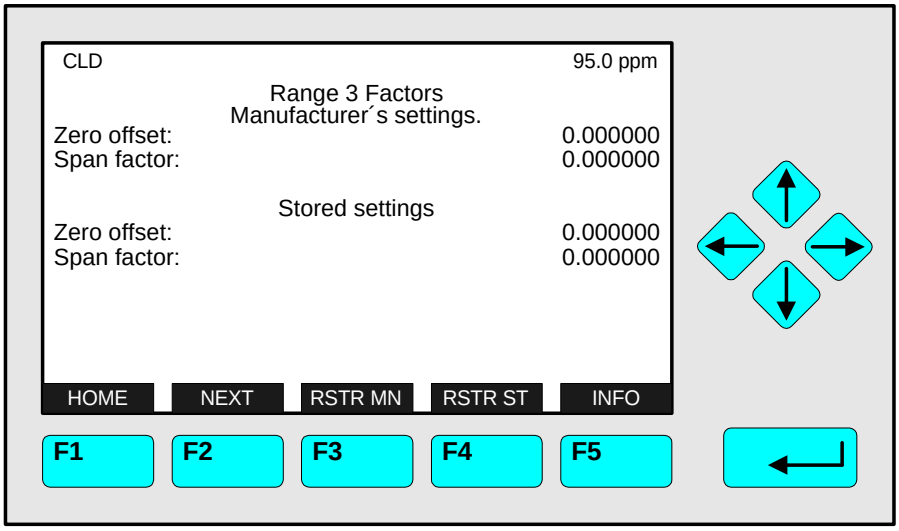
- Press the ENTER key or the → -key in the line "Zero offset" to select the parameter and set up "32700" resp. "524000" with the ↑ -key or the ↓ -key. You may select any digit with the → -key or the ← -key.
  Note: The zero offset is about 32000 counts for the CLD software revision 2.2.1 (16 bit D/A transformer) and about 520000 counts for the revision 2.3 (20 bit D/A transformer).
- Confirm your setup with the ENTER key.
- Go to the line "Span factor" with the ↓ -key.
- Press the ENTER key or the → -key to select the parameter and set up "0.00015" with the arrow keys.
- Confirm your setup with the ENTER key.

Notes:

- You have to set up the factors for all ranges.
- With the parameter "Zero offset" you will fix the zero value. The changing of the zero offset will influence the signal immediately (look at the headline).
- With the parameter "Span factor" you will fix the signal at the span gas setpoint. The changing of the span factor will influence the signal immediately (look at the headline).
- Conditions for the manual input of factors:
  - "Disabled" has to be set up in the line "Calibration adjustment limits" of the menu "Zero/span calibration". Look at page 5-5 of chapter 5.1.1.
  - "SEPARATELY" has to be set up in the lines "Zero ranges" and "Span ranges" of the menu "Calibration Parameters" (see 5.1.2, p. 5-9).
- **Attention:**
  After the calibration with factors you have to calibrate with zero gas and span gas in the usual way!

Saving the factors:

- You can store the actual zero offset and span factor with the F2 key (STORE) of the menu "Range 1/2/3/4 Factors". You will find the stored settings on the second menu page (see illustration on the next page).
- You can change to the second menu page of the menu "Range 1/2/3/4 Factors" with the F4 key (HISTORY):



- You can change the stored settings against the manufacturer's settings with the F3 key (RSTR MN: Restore the manufacturer's values). The "Zero offset" and the "Span factor" of the first menu page will change according to the setups of the manufacturer's settings.
- You can change the manufacturer's settings against the stored settings with the F4 key (RSTR ST: Restore the "stored" values). The "Zero offset" and the "Span factor" of the first menu page will change according to the setups of the stored settings.

Main Menu — Technical level configuration

↓

Diagnostic menus

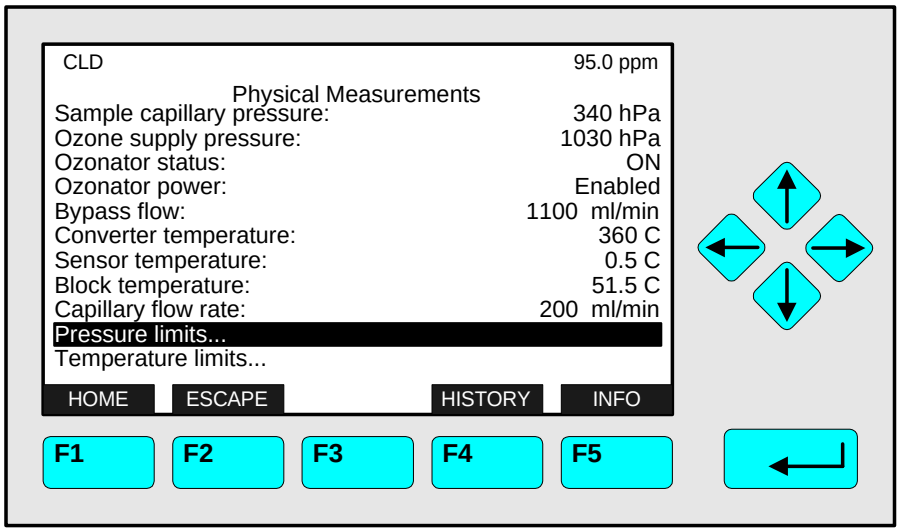
↓

Analyzer module diagnostics

↓

Physical Measurements

↓



In the menu "Physical Measurements" you can find several physical measurement parameters of the CLD analyzer module like ozonator power, converter temperature or capillary flow rate. Via the menu lines "Pressure limits..." and "Temperature limits..." you can change to the corresponding submenus, where you can set up several pressure parameters and temperature parameters of the analyzer.
The violation of the limits in the submenus may start alarm reports, if the alarm report is enabled in the menu "Analyzer Diagnostics" (see 6.3.2 p. 6-27). Besides, the limits of the submenus will be begin and end of the bargraphs in the single component display, if activated (see 5.1.9 p. 5-24).
You can also reach the menu "Physical Measurements" via the menu "Analyzer module set up" of the expert controls and set up menus (chapter 5.1.10 p. 5-26).

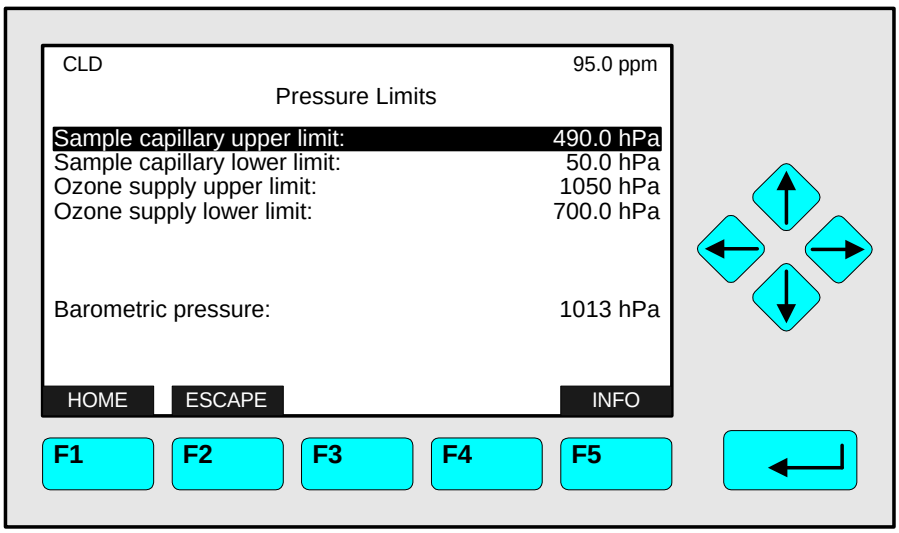
Changing to the submenus:

- Select the line you want with the ↑ -key or the ↓ -key.
- Press the ENTER key or the → -key to change to the corresponding submenu.

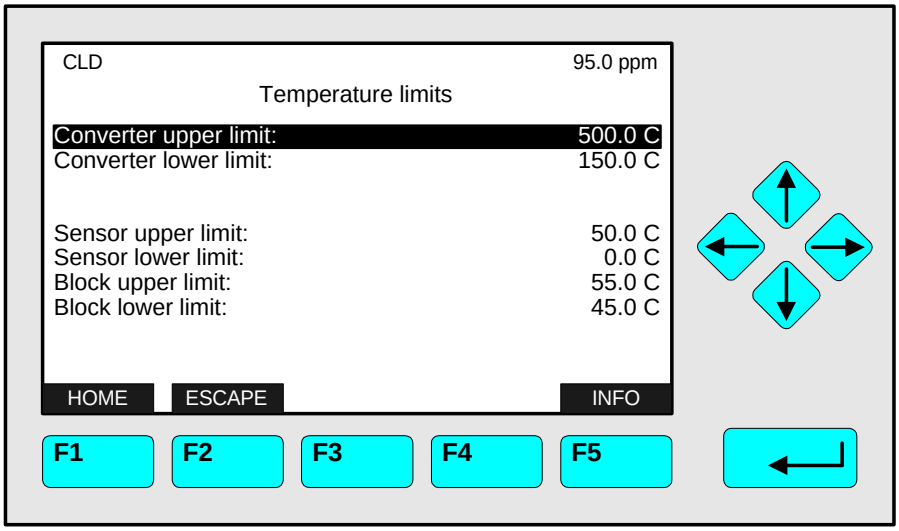
Note:

You should control the sample capillary pressure, the ozone supply pressure and the bypass flow in this menu after starting up your CLD. The values displayed in these lines should be equivalent to the original manufacturer's data sheet to avoid measurement errors.

Menu "Pressure Limits":



Menu "Temperature Limits":



Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Options:

- Pressures: 0 to 3000 hPa
- Temperatures: 0 to 500 °C for converter; 0 to 75 °C for sensor and block

Main Menu — Technical level configuration

↓

Diagnostic menus

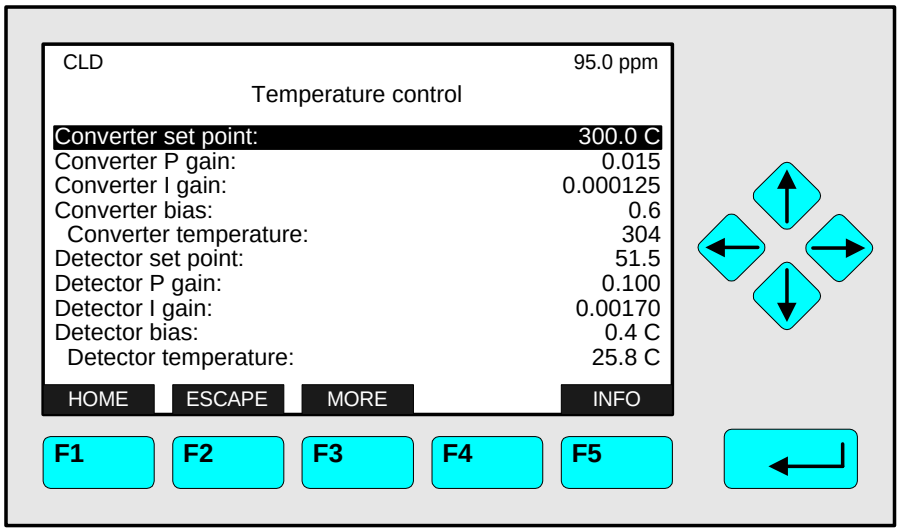
↓

Analyzer module diagnostics

↓

Temperature control parameters

↓



In the menu "Temperature control" you will find the parameters of the converter's and detector's PID controller. Besides, you can set up the converter set point in this menu. So, you can optimize the effectiveness of the converter.
If there are more than ten parameters available, you can change to another menu page with the F3 key.

Set up parameters:

- Press the ENTER key or the → -key in the line "Converter set point" to select the parameter.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key
  Options: 0 to 420 °C; Standard: 300 °C to 380 °C.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

6.3.2.5 Diagnostic Menus

Flow control parameters

Main Menu — Technical level configuration

↓

Diagnostic menus

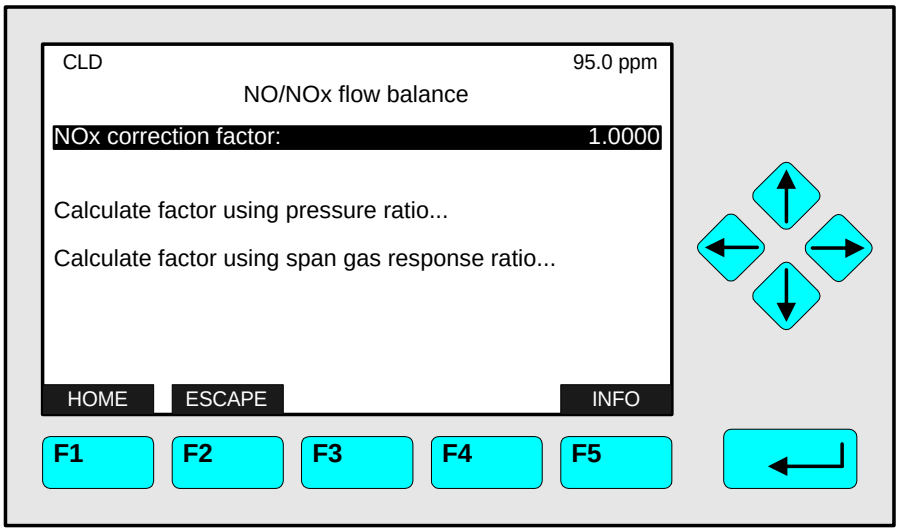
↓

Analyzer module diagnostics

↓

Flow control parameters

↓



In the menu "NO/NOx flow balance" you can set up or calculate an NO_x to NO flow correction factor.
Since the sample flows through different paths in the NO and NO_x modes of analysis, there are differences in the flows entering the reaction chamber in the two modes. So the CLD may produce wrong results of analysis. To compensate the different flow rate you can set up a correction factor manually or calculate it in two different methods.

Note:

- This menu page will only be available in the software revision 2.3! The correction function will only be valid for the CLD hardware "CLD 2" without flow balance valve!
- The NO/NO_x compensation of the former models will have to be done with the flow balance valve! In that case, you will not find the menu page shown above.

Set up parameters:

- Select the line of variables or the menu line with the ↓ -key or the ↑ -key.
- Select the variable or change to the submenu with the ENTER key or the → -key.
- Select any digit with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or cancel and go back to the last value with the F2 key.

Line of variables "NOx correction factor":

In this line you can set up the NO_x to NO flow correction factor.
Options: 0.1 to 10

Menu line "Calculate factor using pressure ration...":

Via this line you can change to a submenu, where you can start the calculation of an NO/NO_x correction factor. This method will calculate the correction factor using the capillary pressure ratio between NO and NO_x:

1) Give NO and NO_x to the analyzer with the same pressure and flow as you would do for a sample detection.
2) Press the F3 key (CALC): The NO/NO_x correction factor will be calculated by the signals automatically.

Menu line "Calculate factor using span gas response ratio...":

Via this line you can change to a submenu, where you can start the calculation of an NO/NO_x correction factor. This method will calculate the correction factor using the span gas pressure ratio between NO and NO_x:

1) Give span gas to the analyzer with the same pressure and flow as you would do for a sample detection.
2) Press the F3 key (CALC): The NO/NO_x correction factor will be calculated by the signals automatically.

6.3.2.6 Diagnostic Menus

Miscellaneous control parameters

Main Menu — Technical level configuration

↓

Diagnostic menus

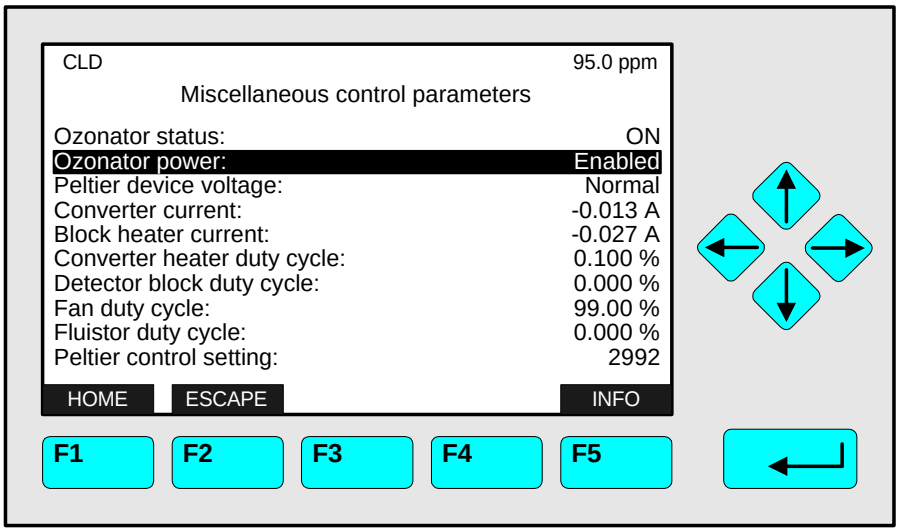
↓

Analyzer module diagnostics

↓

Miscellaneous control parameters

↓



In the menu "Miscellaneous control parameters" you will find some converter parameters and detector parameters. Besides, you can switch on or off the ozonator in this menu.. The set up of the ozonator power is also possible in the menu "Basic Controls" (chapter 4.1.5 p. 4-16) or in the menu "Expert controls" (chapter 5.5 p. 5-54) or in the menu "Analyzer Parameter List" (chapter 5.1.9 p. 5-24).

Set up parameters:

- Press the ENTER key or the → -key to select the parameter.
- Select "Enabled" or "Disabled" with the the ↑ -key or the ↓ -key:
  The report in the line "Ozonator status" will change according to the selection.
- Confirm the new setup with the ENTER key or
  cancel and go back to the last one with the F2 key.

Main Menu — Technical level configuration

↓

Diagnostic menus

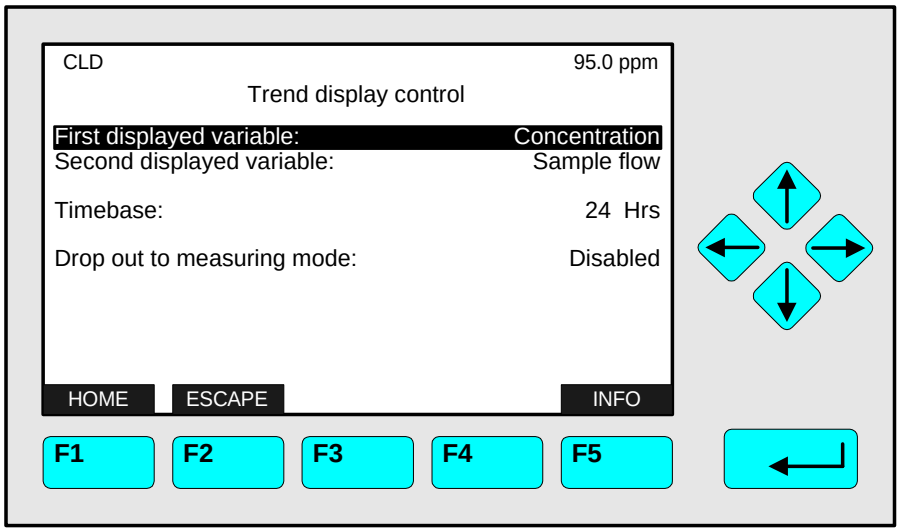
↓

Analyzer module diagnostics

↓

Trend display control

↓



The analyzer stores 24 hours of 15 minute averages. In the menu "Trend display control" you can make these values available to a PC for two different variables.
Note: The trend display control is not available at the moment !

Set up parameters:

- Select any line of variables with the ↓ -key or the ↑ -key.
- Select the variable with the ENTER key or the → -key.
- Select the parameter you want with the ↑ -key or the ↓ -key.
- Confirm the new value with the ENTER key or
  cancel and go back to the last value with the F2 key.

Lines of variables "First/Second displayed variable":

In these two lines you can set up one of the following parameters:

- Sample pressure
- Sample flow
- Concentration
- Noise level (of concentration)
- Raw signal

- Converter temperature
- Block temperature
- Detector temperature
- Ozone pressure

Line of variables "Timebase":

In this line you will find the period of storing values. This setup is done by the manufacturer. You cannot change it.

Line of variables "Drop out to measuring mode":

- Enabled
- Disabled

Main Menu — Technical level configuration

↓

Diagnostic menus

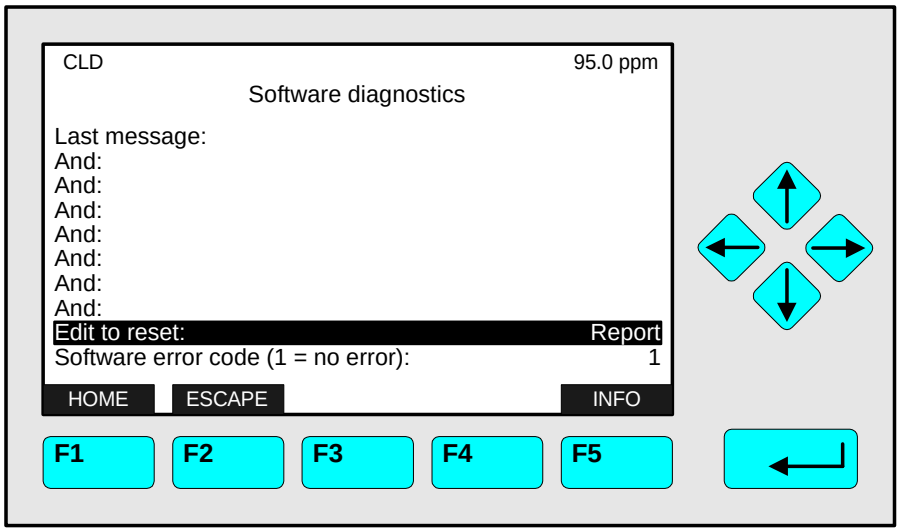
↓

Analyzer module diagnostics

↓

Software diagnostics

↓



In the menu "Software diagnostics" you can find software error messages of the CLD analyzer module software.

Handling of error messages:

1) Make a note of the error messages.

2) Reset the message:
- Press the ENTER key or the → -key in the line "Edit to reset".
- Set up "Reset" with the ↑ -key or the ↓ -key and confirm it with the ENTER key: The error messages will disappear if the reason is not existing any longer and the parameter "Report" will appear again, automatically.
- If the error messages are still existing, contact your customer service, please.

6.3.2.9 Diagnostic Menus

Analyzer start up

Main Menu — Technical level configuration

↓

Diagnostic menus

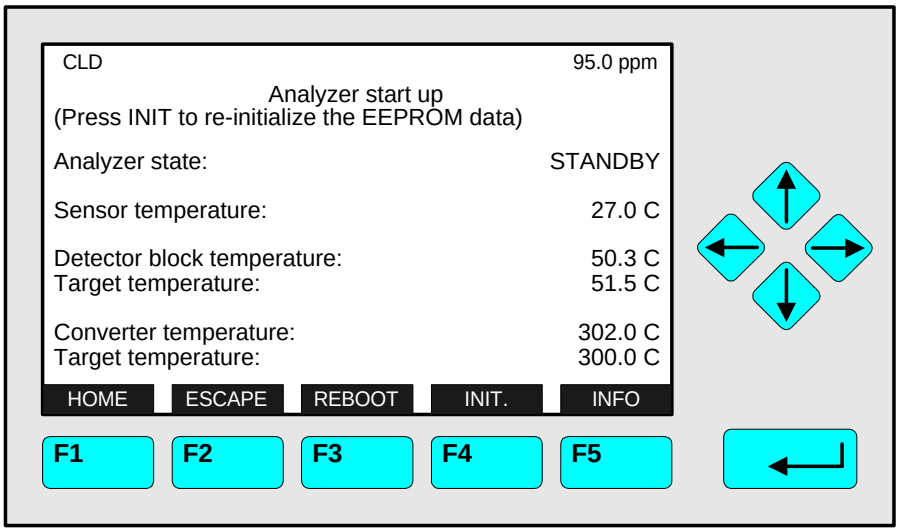
↓

Analyzer module diagnostics

↓

Start up analyzer

↓



In the menu "Analyzer start up" you will find the actual and target temperatures of the converter and of the detector block. Besides, you can reboot the analyzer module and re-initialize the EPROM in this menu:

1) Reboot:
   - To restart the analyzer you have to press the F3 key.
   - This reboot will start your analyzer in the same way as you do by switching on.
   - If you flow the analyzer with zero gas during this time: The NO signal should be "0".

2) Re-initializing of the EPROM:
   - If you press the F4 key you will update the EPROM data.
   - **Caution:**
     The analyzer will go back to the default values using this function !
     After that you have to do a new start up, completely !

Main Menu — Technical level configuration

↓

Diagnostic menus

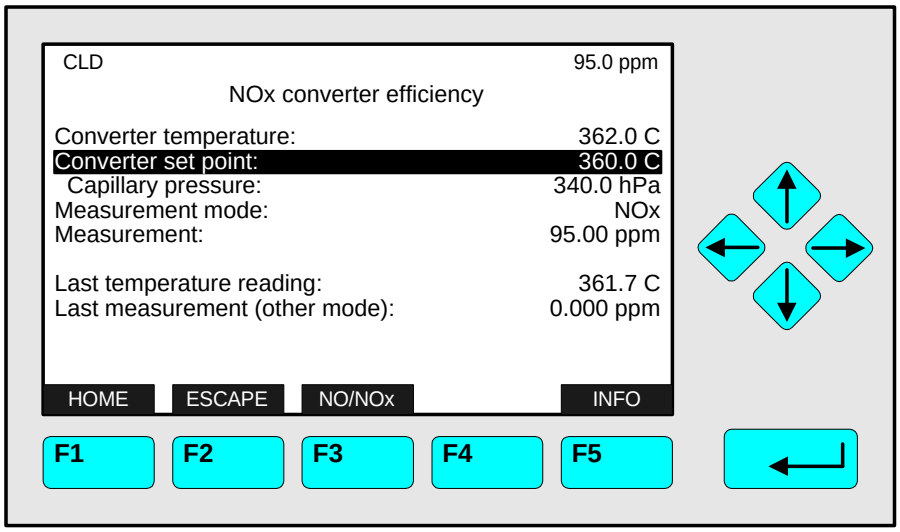
↓

Analyzer module diagnostics

↓

NOx converter efficiency

↓



In this menu you can optimize NOx converter efficiency.

1) Set up the desired converter temperature (set point):
   - Press the ENTER key or the → -key to select the parameter
   - Select any digit you want to change with the ← -key or the → -key and adjust a new value with the ↑ -key or the ↓ -key.
   - Let the temperature stabilize.

2) Apply a test gas:
   - Apply a test gas and select NO or NO_x with the F3 key:
     The component selected will appear in the line "Measurement mode".

3) Store the reading and the temperature:
   - Press the F3 key (NO/NOx) again after the reading will be stabilized:
     The current signal and the actual converter temperature will be stored automatically and displayed in the line "Last measurement" resp. "Last temperature reading".

4) Optimize the temperature:
   - Compare the stored values with the actual values in the lines "Measurement" and "Converter temperature".
   - Repeat the steps 1) to 3) to get the optimized converter temperature you want:
     Change the converter set point as desired, let it stabilize, apply test gas, F3, ...

Note: The steps 2) to 4) will only be available using the CLD software revision 2.3 !

6.4 Other Module Diagnostic Menus

Main Menu — Technical level configuration

↓

Other module diagnostic menus

↓

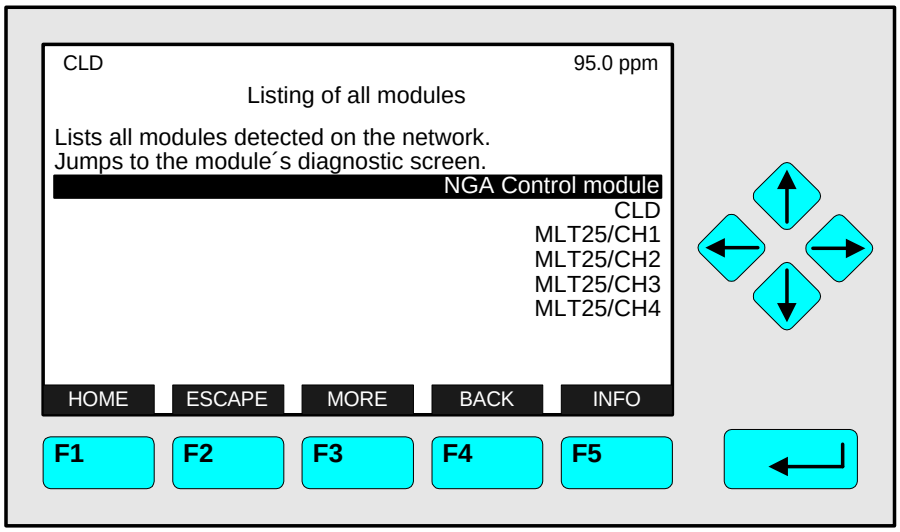
Further menus are not available at the moment:
In later software revisions it shall be possible to control the internal working status (e.g. software messages) of the uncategorized modules via this menu point. This would be analogous to the "Diagnostic menus" that inform about the working status of the current analyzer module.

Main Menu — Technical level configuration

↓

Listing of all modules

↓



In the menu "Listing of all modules" you will find the tags of all modules combined with the platform or the MLT analyzer. If there are more than eight modules combined, you have to press the F3 key to go to another menu page.

Set up:

- Go to the line you want with the ↑ -key or the ↓ -key.
- Select the tag of any module with the ENTER key or the → -key:
  The display will change automatically to the corresponding diagnostic menu.
  (Look at chapter 6.3.2 p. 6-27)

NGA-2000

Software Manual

Supplement: System Calibration

Software Version CLD 2.3

Software Version Platform / MLT 3.1.X

Table of Contents

1 Introduction

In opposite to the possibility to zero and span each analyzer module (channel) individually and independently from the others, ***System-Calibration*** (**SYSCAL**) allows to combine the calibration procedures of all into a common process.

This is been achieved with a new assignment of the valves. The idea is not longer to require for each gas of each analyzer an own valve.
Instead of we have a pool of valves. The valves of this pool can be assigned to the different gases of the analyzers. That also means different analyzers can share the same valve for their gases. So we have the possibility to reduce the number of valves and also the consumption of calibration gases.

The program, which will allow this, runs on the Control Module (CM) and needs the programmable I/O (DIO and SIO).

The displayed menus are also inscripted with the appropriate network variables.

2 Valves for system calibration

Before using the system calibration we have to put together the required valve pool. There are three types of I/O-modules supporting this:

- DIO - 24 digital outputs / 8 digital inputs (max. 4 modules per CM)
- SIO - 3 digital outputs (max. 1 module per CM)
- [CVU - 4 digital outputs (max. 4 modules per CM)]

Software supports up to 16 system valves.

2.1 Assigning an output-port to a system valve

Assigning of an output can be accomplished by using the menus for selected output module (DIO, SIO or CVU).
There we have to select the NGA Control Module as the Source Module. Control module then provides the signals for system valve V1...V16.

For example the DIO:

Expert controls and set up...
↓
Auxiliary module controls...
↓
Set-up DIO module(s)...
↓

- DIO-MODULE OUTPUTS-		
Inputs...		
Outputnumber:	**1**	**DIOOUTNUMC**
Choose module...		
Choose signal...		
Invert output:	**DISABLED**	**DIOOUTINVC**
Module status:	**NORMAL**	**DIOMODSTAC**
Slot ID:	**1**	**DIOSLOTIDC**
Signal name:	**SYS:VALVE-1**	**DIOOUTSIGC**
Signal level:	**OFF**	**DIOOUTSTATC**
Signal comes from:	**NGA Control Module**	**DIOOUTSRCC**

There we have to

- select "Outputnumber"
- then choose „NGA Control Module“ as module
- then choose the wanted valve „SYS: VALVE-x“ as signal

It is also possible to configure the DIO-outputs via LON-Variables (i.e. SLTA-adapter or AK-protocol).

Therefore is the LON-variable "DIOOUT_ENTRYSIG" which corresponds to DIOOUTSIGC and evaluates enum-values of ST1NAME (enum-values 0..19) or ST2NAME (enum-values 20..39).

For digital output we have to setup variables in following order.

1. DIOSLOTIDC
2. DIOOUTNUMC
3. DIOOUTSRCC
4. DIOOUT_ENTRYSIG SYS: VALVE-1 = 20 (enum-value in ST2NAME)
   SYS: VALVE-2 = 21
   . .
   . .
   . .
   SYS:VALVE-16 = 35

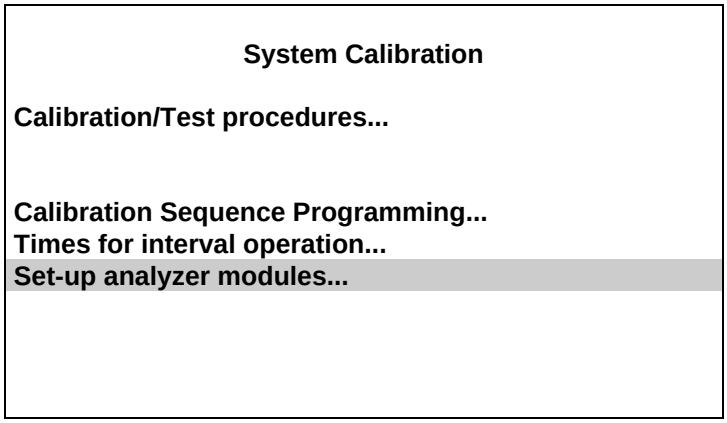
For each needed system valve we have to repeat these appropriate selections.

It is also possible to distribute the system valves onto different output modules.

3 Operating System Calibration

Because there are many possibilities how to use SYSCAL it must be customized through the Expert Operator. There we can find the menu „System Calibration“ from were we can do the required setups and start routines.

Expert controls and set up...
↓
System Calibration...
↓



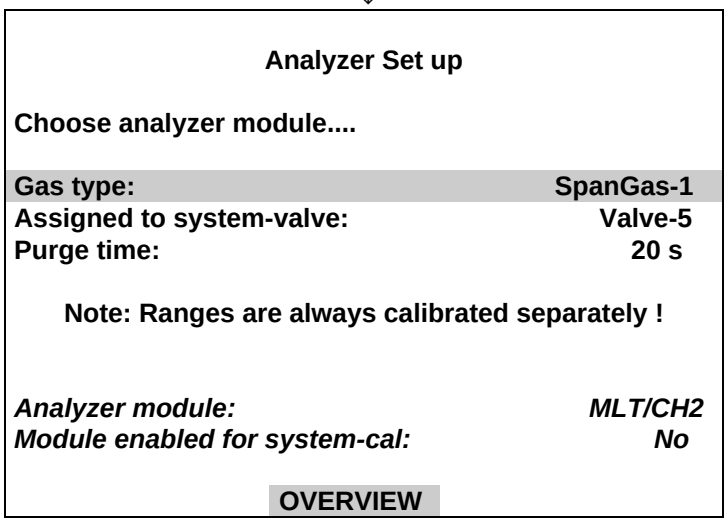
Meaning of displayed menu points:

- Calibration/Test procedures...: starting and stopping of system calibration and test procedures
- Calibr. Sequ. Programming...: programming of user defined calibration sequences
- Times for interval operation...: setting up of automatically started system calibrations
- Set-up analyzer modules...: include and setup different analyzer modules into system calibration.

3.1 Set-up analyzer modules

Before we can run any system calibration features we have to include the different analyzer modules(**AM**) into system calibration by setup needed parameters. Only after correct setting up, an AM is included into system calibration and only then it makes sense to go into the other menus.

Expert controls and set up...
↓
System Calibration...
↓
Set-up analyzer modules...
↓



Setting up an AM for system calibration means **assigning valves from system valve pool.**
The Control Module provides support of up to **16 system-valves** V1....V16. We have to decide which valves deliver which gases for an analyzer module. Also we have to know the purge time from a valve to the AM.

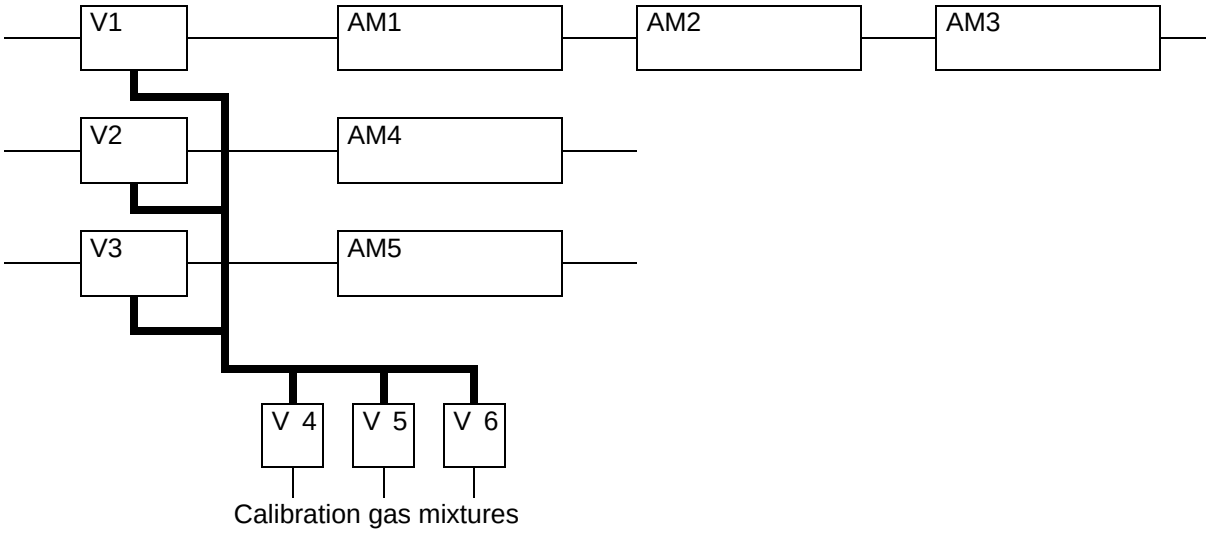
For each of the following types in the parameter „Gas type“ we have to assign a valve and the appropriate purge time :

- SAMPLE-GAS
- ZERO-GAS
- SPANGAS-1 (spangas for range 1)
- SPANGAS-2 (spangas for range 2)
- SPANGAS-3 (spangas for range 3)
- SPANGAS-4 (spangas for range 4)

Conditions for the assignment:

- **Once a valve has been assigned to be a sample gas valve for any AM it must not be used for zero or span gases !**
- **The zero valve of an AM can not be a span valve of the same AM.**
- **All gas types have to be assigned to a system-valve.**

Example for an analyzer-system:



Appropriate assignment:

	AM1	AM2	AM3	AM4	AM5
SAMPLE-GAS	V1	V1	V1	V2	V3
ZERO-GAS	V4	V4	V5	V5	V6
SPANGAS-1	V5	V5	V4	V6	V5
SPANGAS-2	V5	V5	V4	V6	V5
SPANGAS-3	V6	V5	V4	V4	V4
SPANGAS-4	V6	V5	V4	V4	V4

This assigning procedure is to perform for all analyzer modules which should be included in system calibration.
To display the assigned valves and purge times for each AM we can push the softkey „Overview“.

If we want to exclude an AM from SYSCAL we can do this by entering an invalid valve.
We can watch in the display whether an AM is enabled for system calibration.

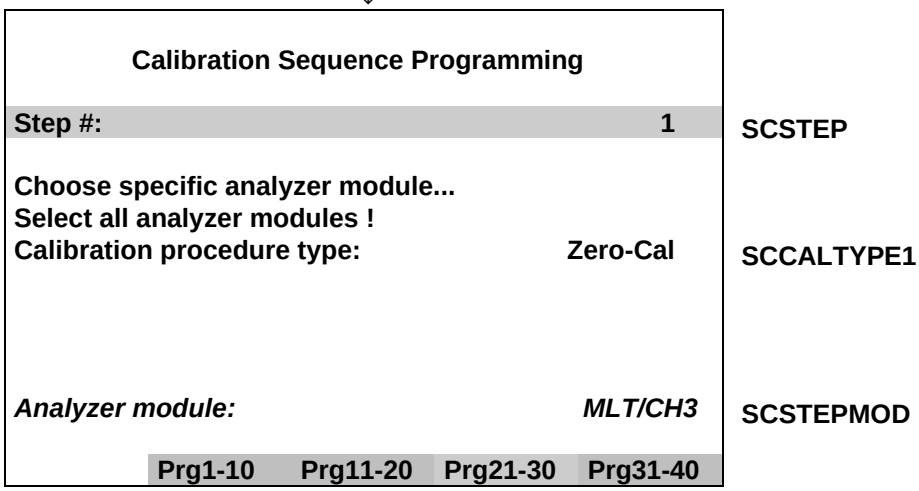
Attention: Remember to assign a system valve to an output-port!

3.2 Programming Calibration Sequences

Beside the standard programs „zero calibration“ and „zero/span calibration“ it is possible to run the system calibration in an user definable order of up to 40 steps.

The menu to set-up this feature looks as follows.

Expert controls and set up...
↓
System Calibration...
↓
Calibration sequence programming...
↓



For programming the sequence you must

1. select „Step #“
2. select „Calibration procedure type“
3. select module

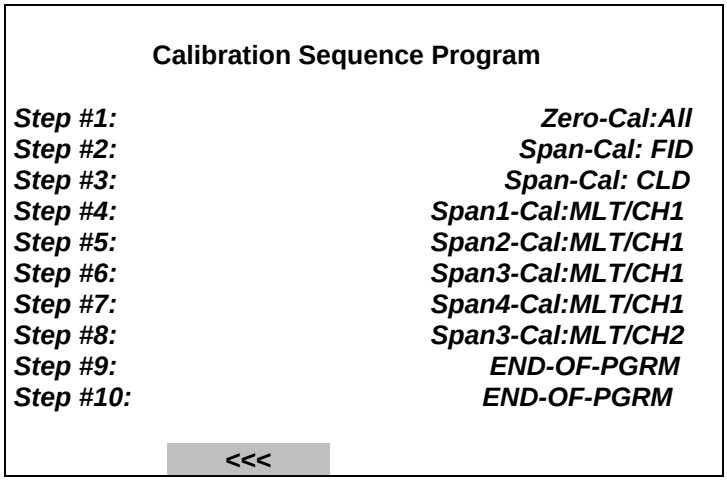
Repeat this order for all program steps.

The programmable „Calibration procedure types“ are:

1.	NOP	no operation (for deleting a step in an existing program)
2.	ZERO-CAL	do a zero calibration
3.	SPAN-CAL	do a span-calibration for all available ranges
4.	ZERO/SPAN-CAL	do a zero-cal then a span-cal for all available ranges
5.	SPAN1-CAL	do a span calibration only for range #1
6.	SPAN2-CAL	do a span calibration only for range #2
7.	SPAN3-CAL	do a span calibration only for range #3
8.	SPAN4-CAL	do a span calibration only for range #4
9.	END-OF-PROG	end of sequence

For each step we have the choice to select a specific AM or to activate the step for all enabled AMs.

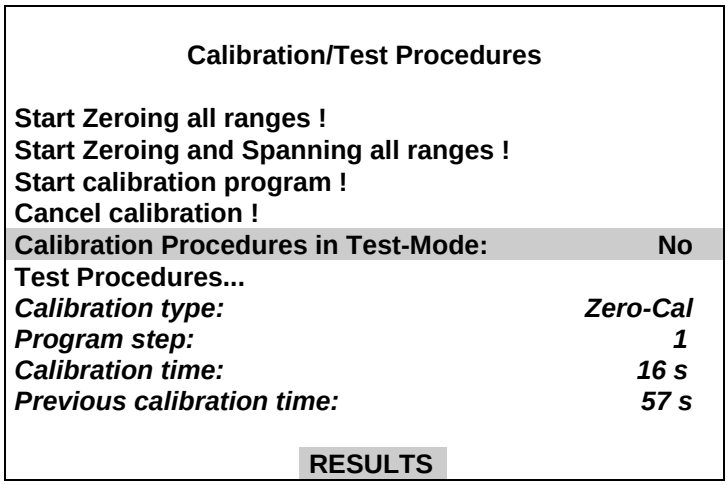
After the program is input, the displayed softkeys can give an overview of the current program:



3.3 Set-up general parameters

One general parameter is "Calibration Procedures in Test-Mode". It is located in the menu "Calibration/Test procedures".

Expert controls and set up...
↓
System Calibration...
↓
Calibration/Test procedures...
↓



SCTESTMOD

SCCALTYPE2
SCPROGSTEP
SCCALTIME1
SCCALTIME2

With this parameter we can run all the calibration procedures either in the defined mode or in a test mode. The test mode means that the valve switching and waiting for purge times is done in the same manner like in the normal calibration procedure.
The only difference is that the single calibrations of the modules and the appropriate times the modules would need for the calibration are not done.

A further general parameter is "Timeout for Gastest". It is located in the menu "Test procedures".

Expert controls and set up...
↓
System Calibration...
↓
Calibration/Test Procedures...
↓
Test procedures...
↓

Test Procedures

Gastest of specific module:	**Sample-Gas**	**SCTESTGAS**
Timeout for gastest (0 = no timeout):	**180 s**	**SCTIMEOUT**
Choose specific analyzer module...		
Procedure time:	***61 s***	
Analyzer-module:	**MLT/CH3**	**SCSTEPMOD**

This parameter is related to the possibility to activate a gas valve of a specific module for test purposes. Here we can determine a time after which an activated gastest automatically switches back onto SAMPLE-GAS.
Is this parameter set to "0" no automatic back switching is done.

3.4 Controlling System Calibration

After setting-up there is the possibility to start 3 different modes:

system zero-calibration:	In this mode a zero-cal of all modules, which are enabled for SYSCAL, will be performed. The order of modules depends on purge time for zero-valves because the whole calibration is time optimized.
system zero/span-calibration:	In this mode will be performed a zero-cal and a span-cal for every enabled AM. The order of calibration is optimized to have a minimum of calibration time. The only condition is to have for each AM first the zero-cal and after this the span-cal. With zero-cal an AM is zeroed with all ranges together, the span-cal is done separately for all available ranges. A range is available if its span-gas value is > 0.0.
user defined sequence program:	In this mode the user is responsible for the optimization. See setup of this mode.
gas test:	It is also possible to switch for test purposes onto a specific gas of a specific module. A calibration is not done.

Any mode can be started by the following instances:
- Manually by operator interaction
- Triggered by programmable input (DIO)
- AK-protocol command
- Programmed time-automatic (no gas test possible!)
- LON-Variable CMFUNC

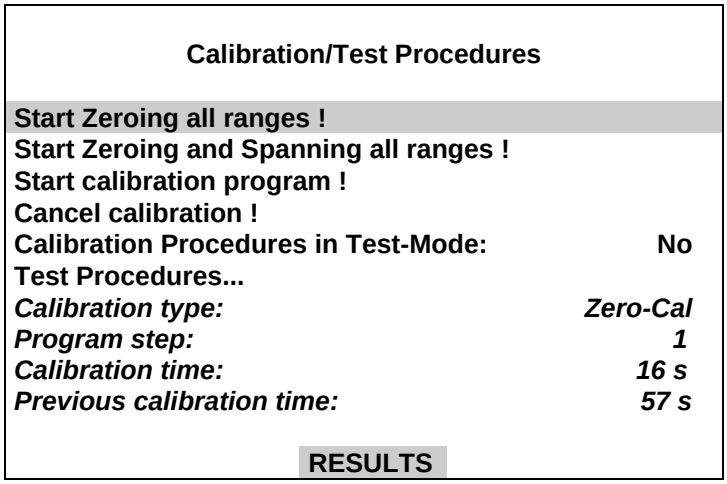
It is also possible to cancel a running system calibration. This can be done by the following instances:
- Manually by operator interaction
- Triggered by programmable input (DIO)
- AK-protocol command
- LON-Variable CMFUNC

There is no priority by which way SYSCAL can be started. If SYSCAL was started it can not be restarted by a further instance. Only after canceling it can be restarted.

3.4.1 Control via menu system

The possibility to control via menu is located in the menu page „Calibration/Test procedures“. There can be started and stopped any kind of system calibration respectively test procedure.

Expert controls and set up...
↓
System Calibration...
↓
Calibration/Test procedures...
↓



During a running SYSCAL there can be watched current information:

- running calibration type
- running program step of user defined program (other modes than user program show a „0“!)
- consumed calibration time
- calibration time of last valid SYSCAL

The result of calibration for included AMs is displayed in an own menu page. This can be achieved by softkey „RESULTS“ from different menu pages of SYSCAL.

Calibration Results		
Change analyzer module...		
Analyzer module:	***CLD***	**SCMODULE**
Enabled for system-cal:	***No***	**SCCONTROL**
Successful zero+span calibrated ranges:	***1+2+4***	**SCVALIDITY**
Zero-Calibration failed on any analyzer module:	***No***	**SCRESULT1**
Span-Calibration failed on any analyzer module:	***Yes***	**SCRESULT2**

Remember to run the calibration procedures as a test without actually to calibrate assert parameter "Calibration Procedures in Test-Mode" to <Yes>.

It is also possible to switch for test purposes onto a specific gas of a specific module. This possibility is located in menu "Test procedures".

Expert controls and set up...
↓
System Calibration...
↓
Calibration/Test Procedures...
↓
Test procedures...
↓

Test Procedures		
Gastest of specific module	**Sample-Gas**	**SCTESTGAS**
Timeout for gastest (0 = no timeout)	**180 s**	**SCTIMEOUT**
Choose specific analyzer module...		
Analyzer-module:	**MLT/CH3**	**SCSTEPMOD**

Here we first choose the specific analyzer module and then we select at the parameter "Gastest of specific module" the required gas.

Each of the following types is possible:

- SAMPLE-GAS (test mode deactivated)
- ZERO-GAS
- SPANGAS-1 (spangas for range 1)
- SPANGAS-2 (spangas for range 2)
- SPANGAS-3 (spangas for range 3)
- SPANGAS-4 (spangas for range 4)

With parameter "Timeout for Gastest" we can determine a time after which the activated gastest switches automatically back onto SAMPLE-GAS.

Is this parameter set to "0" the automatic back switching is not done automatically and user must break this mode with a "Cancel Calibration"-Command.

3.4.2 Control System Calibration by LON-Variables

SYSCAL can also be controlled by LON-Variable CMFUNC. Setting this variable will cause the appropriate function (see following table).

CMFUNC	function which is started
1	system zero-calibration
2	system zero/span-calibration
3	user defined sequence program
4	cancel a running system calibration

We can also realize some other functionality with setting of LON-Variables. Herefore see the appropriate menu pages, where the concerned variables are documentated.

For example: "Test procedures".

Test Procedures		
Gastest of specific module	**Sample-Gas**	**SCTESTGAS**
Timeout for gastest (0 = no timeout)	**180 s**	**SCTIMEOUT**
Choose specific analyzer module...		
Analyzer-module:	**MLT/CH3**	**SCSTEPMOD**

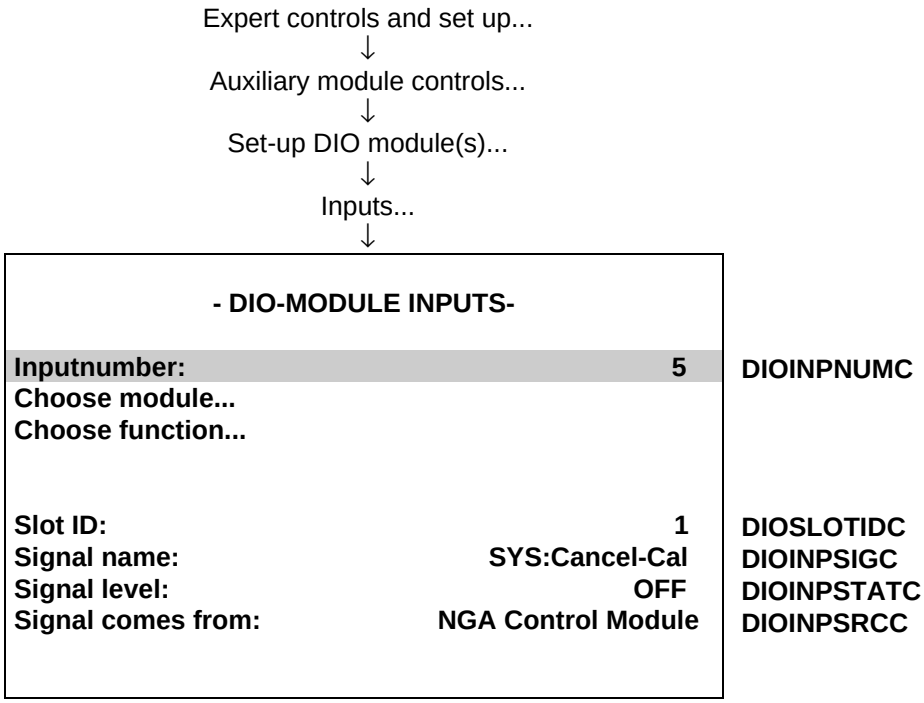
Here we have first to set variable SCSTEPMOD similar to the TAG of the requested analyzer module. Setting SCTIMEOUT will set the timeout.
And setting variable SCTESTGAS to the appropriate enum-value will start the procedure.

Table of enum-values and procedures:

SCTESTGAS-function	????	Zero-Gas	SAMPLE-Gas	SpanGas-1	SpanGas-2	SpanGas-3	SpanGas-4
enum-value	0	1	2	3	4	5	6

3.4.3 Control System Calibration by Programmable Input

We can use the possibility to control SYSCAL by triggering with a programmable input.
This feature is supported by inputs of the DIO-Module.
Assigning of an programmable input can be accomplished by using the menus for DIO module.



There we have to select
1. wanted input number
2. the appropriate module as Source Module (see following table)
3. the wanted function for system calibration

The provided functions for system calibration are:

function	source module	function (positive edge)	function (negative edge)	enum-value in STINAME
SYS:ZERO-CAL	CM	start system zero-calibration	-	6
SYS:ZERO/SPAN-CAL	CM	start system zero/span-calibration	-	7
SYS:PROGRAM-CAL	CM	start user defined sequence program calibration	-	8
SYS:CANCEL-CALIB	CM	stop a running procedure	-	9
SYS:CAL-Test-Mode	CM	switches into test mode	switches off test mode	10
SYS:AM-Zero-Gas	AM	switches zerogas-valve	stop a running procedure	11
SYS:AM-Span-Gas1	AM	switches spangas-valve for range 1	stop a running procedure	12
SYS:AM-Span-Gas2	AM	switches spangas-valve for range 2	stop a running procedure	13
SYS:AM-Span-Gas3	AM	switches spangas-valve for range 3	stop a running procedure	14
SYS:AM-Span-Gas4	AM	switches spangas-valve for range 4	stop a running procedure	15

Please take notice that all actions are edge-triggered. Therefore take care of functionality of positive as well as negative edge.

It is also possible to configure the DIO-inputs only per LON-Variables (i.e. SLTA-adapter or AK-protocol). Therefore is the LON-variable "DIOINP_ENTRYSIG" which corresponds to DIOINPSIGC and evaluates enum-values of STINAME.

For each digital input we have to setup variables in following order.

1. DIOSLOTIDC
2. DIOINPNUMC
3. DIOINPSRCC
4. DIOINP_ENTRYSIG (see enum-value in STINAME)

3.4.4 Control System Calibration by AK-protocol command

We can start and stop SYSCAL over serial interface by AK-protocol commands. Therefore the commands **SCAL, STBY** and **ASTZ** has to be used.

Start-Command: SCAL Kx m (n)

m (type of SYSCAL)	Kx (channel number)	n (optional parameter)
0 = ZERO-CAL	K0	n = 1: switch into test mode
1 = ZERO/SPAN-CAL	K0	
2 = PROGRAM	K0	else: switch into normal mode
3 = TEST ZERO-GAS	K1...999	timeout in sec
4 = TEST SPAN-GAS1	K1...999	timeout in sec
5 = TEST SPAN-GAS2	K1...999	timeout in sec
6 = TEST SPAN-GAS3	K1...999	timeout in sec
7 = TEST SPAN-GAS4	K1...999	timeout in sec

If optional parameter n is not in command string the appropriate variable is not changed.

Starting condition: All attached AMs are in the Standby-Mode (AK STBY) and the variable CALSTAT is 0, otherwise the response is BUSY (BS).

Stop-Command: STBY K0

Only using K0 will stop running SYSCAL-procedure (besides all the procedures of the other AMs).

Check-Command: ASTZ K0

The ASTZ K0 command gives the information if a SYSCAL-procedure is running or not.
If running it returns a „SCAL“ if not this string is missed.

3.4.5 Time controlled System Calibration

To activate a time controlled system calibration we have to set-up this in a own menu page.

Expert controls and set up...
↓
System Calibration...
↓
Times for interval operation...
↓

Times for Interval Operation

Zero-Cal is:	**Disabled**	**SCSTZERO**
Start of interval time:	**16 h**	**SCBGNZERO**
Interval time:	**800 h**	**SCIVZERO**
Zero/Span-Cal is:	**Enabled**	**SCSTZEROSPAN**
Start of interval time:	**10 h**	**SCBGNZEROSPA**
Interval time:	**1600 h**	**SCIVZEROSPAN**
Program-Cal is:	**Disabled**	**SCSTPRGM**
Start of interval time:	**10 h**	**SCBGNPRGM**
Interval time:	**50 h**	**SCIVPRGM**
Next calibration events...		

For the 3 different SYSCAL-modes there is the possibility to

- enable/disable the activation
- determine start of time calculations (start time of current day)
- determine in which time intervals after start time the activation is done

The logic for the time calculations is as follows.

The basic is the respectively parameter „Start of interval time“ (**SIV-time**). By changing this SIV-time or changing the „interval time“ (**IV-time**) the basic is new calculated as date of current day and time of the SIV-Time (only entire hours possible). This basic stays valid (also after a program reset!) until new values for SIV-time or IV-time are entered.

Basic-time = SIV-Time of current day

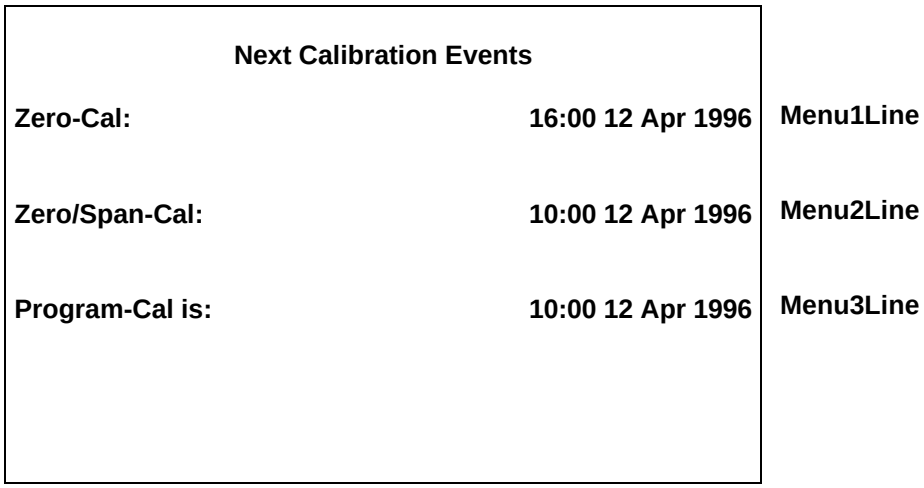
The next start of SYSCAL (**ACT-time**) happens at

ACT-time = Basic-time + IV-time

Is the calculated ACT-time before present point of date/time then there are added further IV-times until it is later.

We can display the calculated ACT-times in menu page „next calibration events“...

Expert controls and set up...
↓
System Calibration...
↓
Times for interval operation...
↓
Next calibration events...
↓



3.5 Calibrate single Analyzers

Each specific analyzer has still the possibility to start a calibration over other instances than SYSCAL. For this functionality we now have some additional considerations.

- Do not start a calibration of a single AM during a running SYSCAL. This will confuse the valve switching and the calibration commands of SYSCAL. Therefore look also for all automatic start instances of an analyzer.

- A single calibration cannot use the purge times of system valve settings. Instead of we have to setup the AMs own parameters in the manner to wait for the required purge time after a valve switching.

- It is refused to start single calibration of a second AM if the needed calibration gas valve is also any calibration gas valve of the first started AM.

These considerations are valid for all AMs which are included into SYSCAL.