7 Operating the CTS - operating feature

7.1 General information regarding operation

TSS-70/130 14.10.2009 10:31:00 **Manualmode keyb.unlocked Stop**	Head-bar
Heading	
Content	Display
Button 1 Button 2 Button 3 Button 4 Button 5	Navigation- and function bar
[Function key icons: light, PAUSE, MANUAL, PROG, ALARM, START/STOP]	Function keys
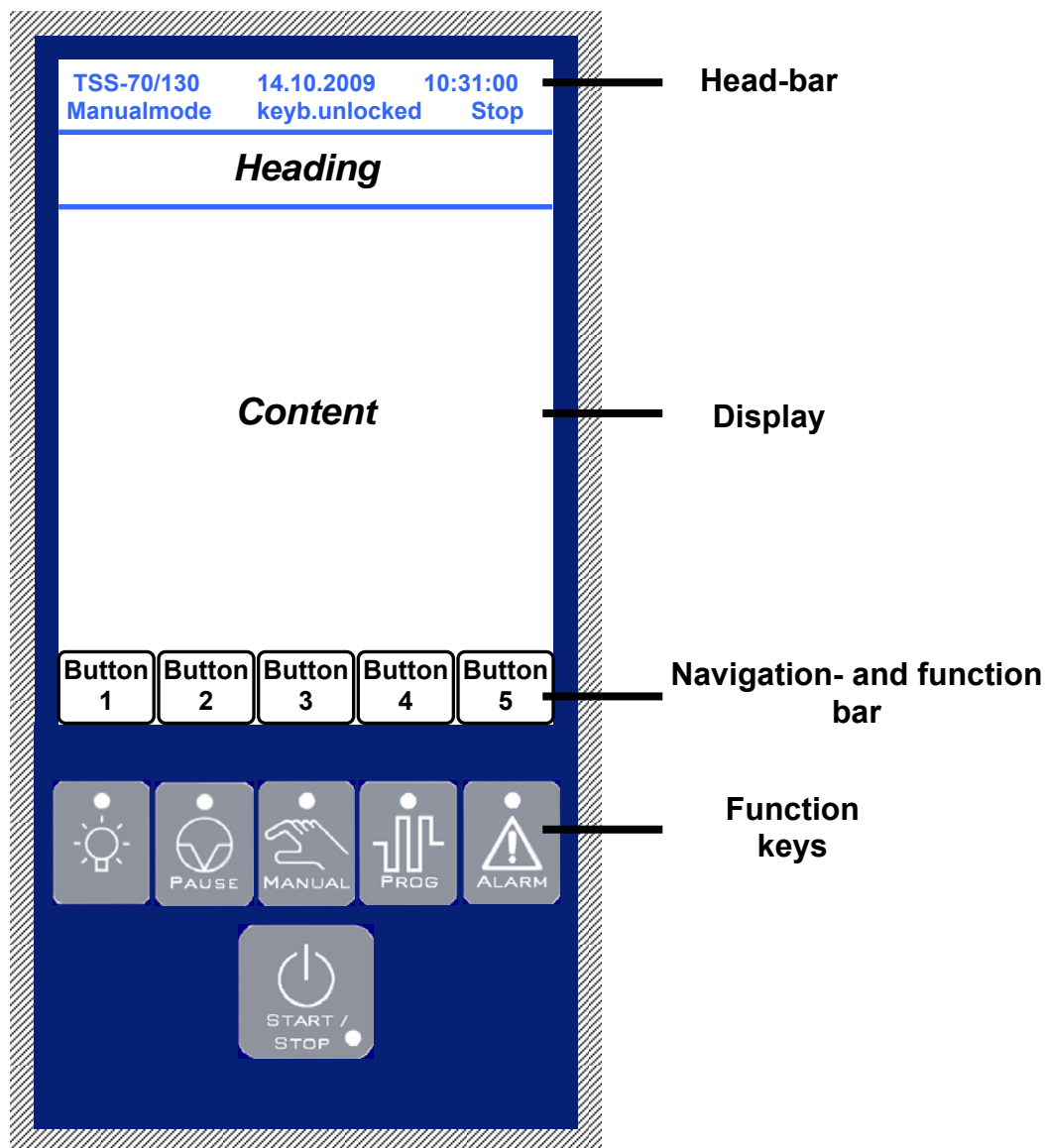
- **Head-bar**

  The most important information for the unit is represented in the head-bar. Time/date, unit type, mode and status can all be viewed at any time.

  TSS-70/130   14.10.2009   10:31:00
  Manualmode   keyb.unlocked   Stop

TSS-70/130:	Unit type
14.10.2009:	current date
10:31:00:	current time
Manualmode:	Unit mode: Hand or program mode
Stop:	Unit status: Stop, start, pause or error
keyb.unlocked/141:	Status of the password protection (keyb.unlocked/locked) / Internal menu-indication

- **Navigation and function bar**

The navigation possibilities are represented in the navigation and function bar. Each button, insofar as it is labeled, represents a function-jump which moves to the respective menu after being pressed. Depending on the respective menu, the buttons can also be set up for functions. The following example should illustrate function examples:

main menu	digital channel	trend graph		

Button 1: Pressing will bring up the main menu
Button 2: Pressing will bring up the notice for the **digital channels**
Button 3: Pressing will bring up the notice for the trend graphic
Button 4: No function
Button 5: No function

Important notice:
This bar is set differently for each menu!!!

- **Function bar**

The function keys are pre-set in the display, as opposed to the navigation and function bar, with fixed functions which can be set up independently from the unit status and mode. The following functions are accessible in this context:

- Internal chamber illumination

Green LED deactivated/off

The internal chamber illumination is deactivated for this status, in other words, the internal chamber is not illuminated. When the key is pressed, the illumination is activated/on.

Green LED activated/on

The internal chamber illumination is activated for this status, in other words, the internal chamber is illuminated. When the key is pressed, the illumination is deactivated/off.

- Manual / operation by hand
This key determines, among other things, the mode of the unit.

Green LED deactivated/off

The manual mode is deactivated in this mode, since a program has been started. When the key is pressed, the analog channels are indicated.

Green LED activated/on

The activated key represents the manualmode. In the head line the words "manualmode" are illuminated. When it is pressed once again, the key is changed into the menu of the analog channels.

- Program mode

Green LED
deactivated/off

In this status, the unit is in manual mode. When the key is pressed, the notice changes into the menu "program selection". There one has the option of selecting a program or creating a new one.

Green LED
activated/on

The activated key represents the program mode. The words "program mode" are then illuminated in the head line. When the key is pressed once again, it changes to the menu "program status", in order to indicate the information from the active program.

- Pause

Green LED
deactivated/off

In this status, the pause key has no effect upon the unit / the controls. If a program is to be active or the chamber is to be manually controlled, the pause function is not active.

Green LED
activated/on

This status puts a program or a manual mode into the mode pause, i.e. the unit is stopped and remains in this current status. If the key is activated/pressed once again, the unit continues from the stopped position of a program or manual mode.

- Alarm

This key represents the error status. It is optically indicated, in this case, whether the unit is indicating an error or is running properly.

Red LED
deactivated/off

There are no notices given in this status.
The error-menu **cannot** be opened when the key is pressed.

Red LED
activated/on

In this status, there is at least one notice. The unit-status then remains at stop and the error-menu can be viewed by pressing the alarm key.

- Start / Stop

The start/stop-key starts and stops the program or the manual mode.

Green LED
deactivated/off

Errors are present or the unit does not run in this status.
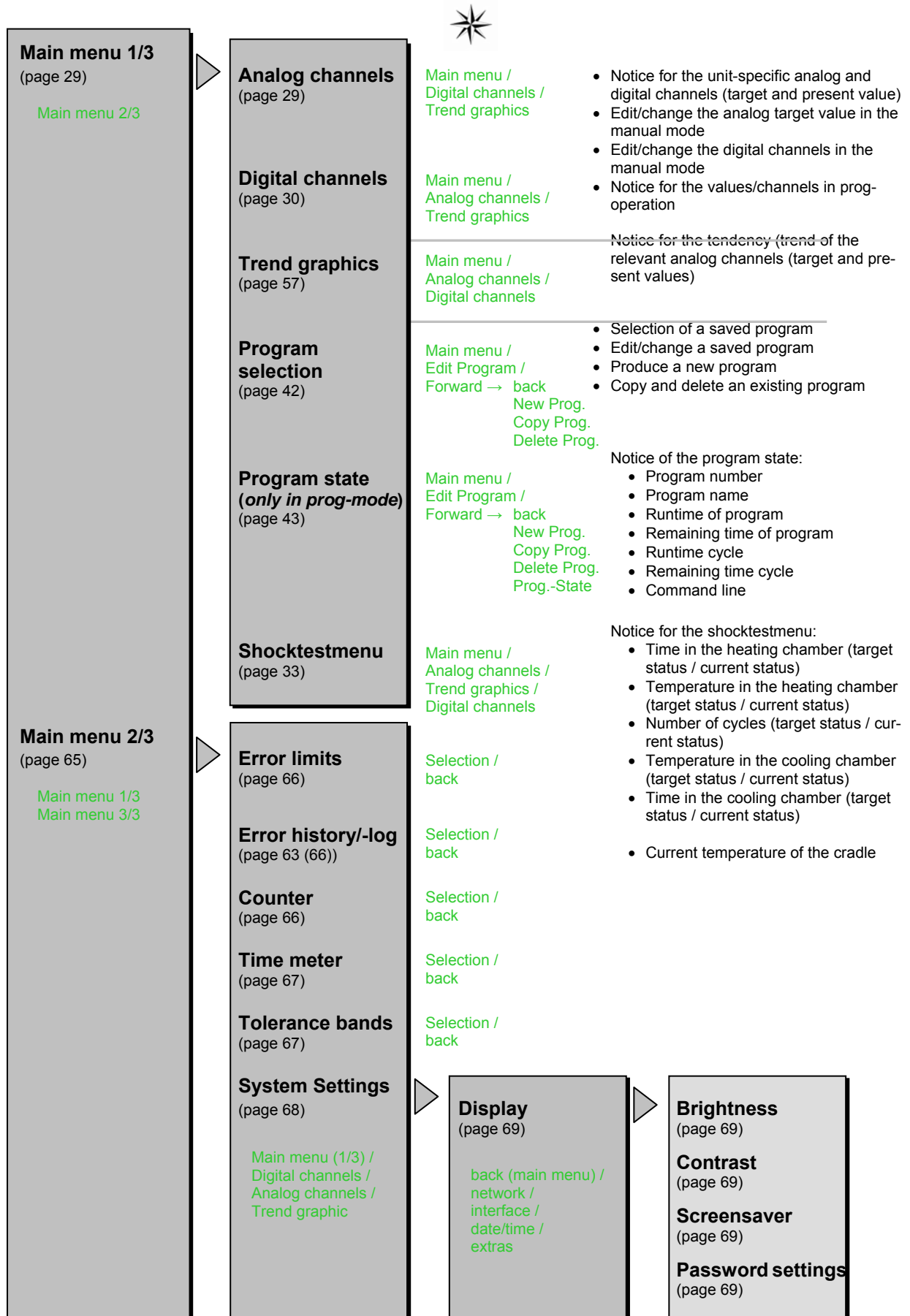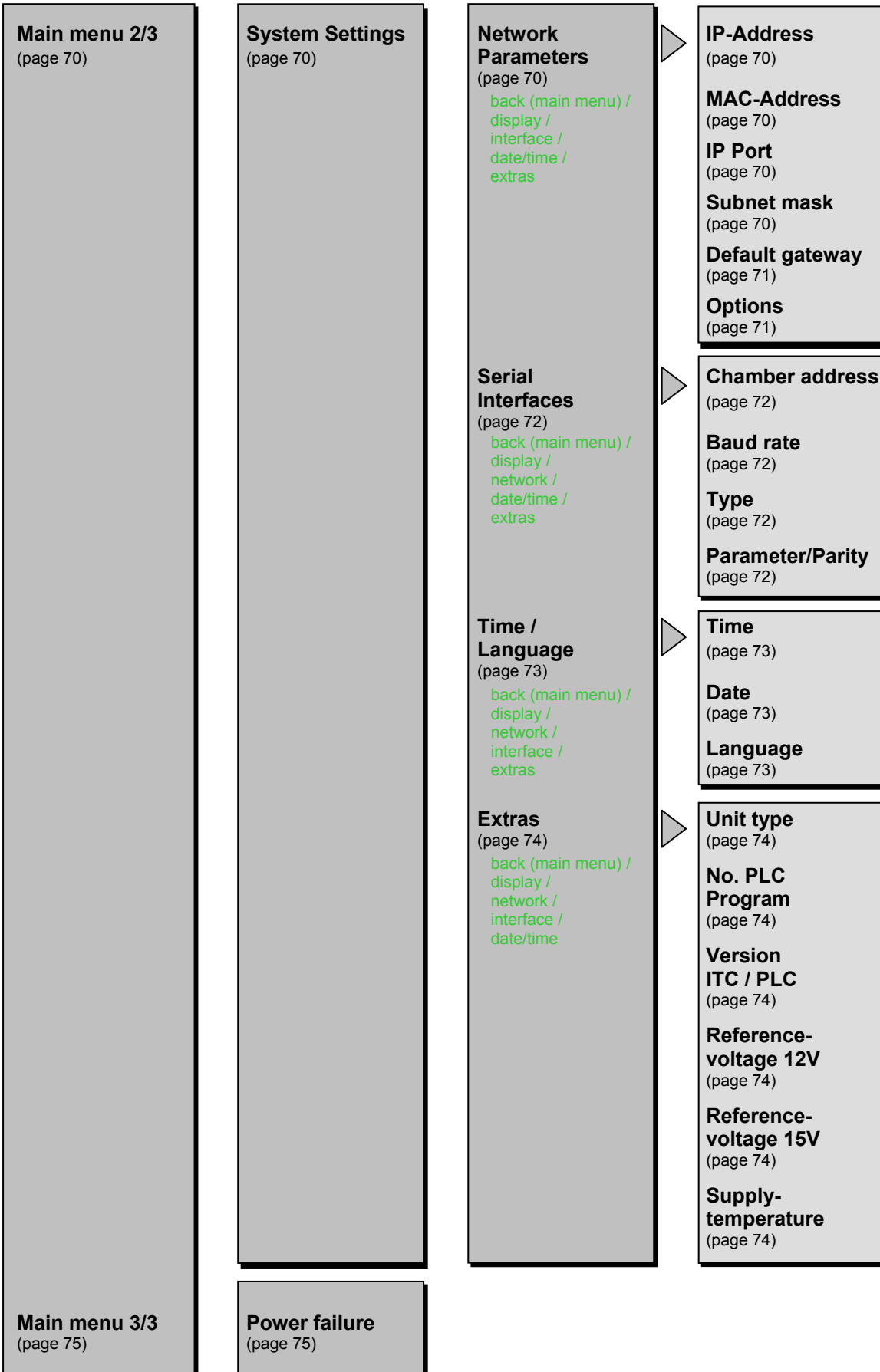
Green LED
activated/on

With this indication, either a program is active or the unit is in manual mode.
In the head line the status "start" is once again indicated.

Comment:

The green LED starts to flash if the device is not ready for operation when the start button is pressed!!!

7.2 Menu tree

Main menu 1/3
(page 29)

Main menu 2/3

Analog channels
(page 29)

Main menu /
Digital channels /
Trend graphics

Digital channels
(page 30)

Main menu /
Analog channels /
Trend graphics

Trend graphics
(page 57)

Main menu /
Analog channels /
Digital channels

- Notice for the unit-specific analog and digital channels (target and present value)
- Edit/change the analog target value in the manual mode
- Edit/change the digital channels in the manual mode
- Notice for the values/channels in prog-operation

Notice for the tendency (trend of the relevant analog channels (target and present values)

Program selection
(page 42)

Main menu /
Edit Program /
Forward → back
          New Prog.
          Copy Prog.
          Delete Prog.

- Selection of a saved program
- Edit/change a saved program
- Produce a new program
- Copy and delete an existing program

Program state
(*only in prog-mode*)
(page 43)

Main menu /
Edit Program /
Forward → back
          New Prog.
          Copy Prog.
          Delete Prog.
          Prog.-State

Notice of the program state:
- Program number
- Program name
- Runtime of program
- Remaining time of program
- Runtime cycle
- Remaining time cycle
- Command line

Shocktestmenu
(page 33)

Main menu /
Analog channels /
Trend graphics /
Digital channels

Notice for the shocktestmenu:
- Time in the heating chamber (target status / current status)
- Temperature in the heating chamber (target status / current status)
- Number of cycles (target status / current status)
- Temperature in the cooling chamber (target status / current status)
- Time in the cooling chamber (target status / current status)

- Current temperature of the cradle

Main menu 2/3
(page 65)

Main menu 1/3
Main menu 3/3

Error limits
(page 66)

Selection /
back

Error history/-log
(page 63 (66))

Selection /
back

Counter
(page 66)

Selection /
back

Time meter
(page 67)

Selection /
back

Tolerance bands
(page 67)

Selection /
back

System Settings
(page 68)

Main menu (1/3) /
Digital channels /
Analog channels /
Trend graphic

Display
(page 69)

back (main menu) /
network /
interface /
date/time /
extras

Brightness
(page 69)

Contrast
(page 69)

Screensaver
(page 69)

Password settings
(page 69)

Main menu 2/3
(page 70)

System Settings
(page 70)

Network Parameters
(page 70)
back (main menu) /
display /
interface /
date/time /
extras

IP-Address
(page 70)

MAC-Address
(page 70)

IP Port
(page 70)

Subnet mask
(page 70)

Default gateway
(page 71)

Options
(page 71)

Serial Interfaces
(page 72)
back (main menu) /
display /
network /
date/time /
extras

Chamber address
(page 72)

Baud rate
(page 72)

Type
(page 72)

Parameter/Parity
(page 72)

Time / Language
(page 73)
back (main menu) /
display /
network /
interface /
extras

Time
(page 73)

Date
(page 73)

Language
(page 73)

Extras
(page 74)
back (main menu) /
display /
network /
interface /
date/time

Unit type
(page 74)

No. PLC Program
(page 74)

Version ITC / PLC
(page 74)

Reference-voltage 12V
(page 74)

Reference-voltage 15V
(page 74)

Supply-temperature
(page 74)

Main menu 3/3
(page 75)

Power failure
(page 75)

7.3 *Manual mode*

In the manual mode, the set target-values are regulated as fixed-values. These can be changed during the operation. When the unit is started, it first of all runs at the set target values and keeps these until the unit is stopped or the target values are changed.

The unit runs in manual mode when the green LED of the keys   and
are illuminated.

The manual mode can be started at any time, as long as there are no errors in the unit.

– **Starting the unit:**

From the stopped status (green LED is not illuminated), press the start/stop key to start the unit.
Green LED will begin to **illuminate.**
The status **"start"** will then be indicated in the head bar.

Comment:
The green LED **flashes** until the device's PLC control starts!!!

– **Stopping the unit:**

From the running status (green LED is not illuminated), press the start/stop key to stop the unit. All features of the unit are thereby turned off. With a new start, the condensers are turned on after a delay.
Green LED is **no longer** illuminated.
In the head bar, the status **"stop"** is no longer indicated.

– **Pause:**

From the running status, press the pause key, so that the unit moves into the status pause. All features of the unit are thereby shifted to a standby-status - the condensers are then set to a waiting mode, so that a new start can begin immediately.
Green LED is illuminated.
In the head bar, the status "**pause**" is indicated.

Note:
Prior to opening the unit-hatch, it is recommended to activate the pause-function, since the air-circulator will be turned off. This avoids the blowing of either extremely cold or extremely hot air into the face of the user.

7.3.1 Analog channels

General:

The target values of all indicated analog channels can be changed and shifted into manual mode. Which analog channels are indicated depends on the respective unit and its configuration.

Setting an analog channel:
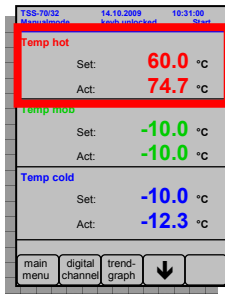
Notice for an analog channel, such as temperature (Temp hot), in the upper heating chamber and represented in red color, is framed in here. In order to change the target value, the red field must be touched with the finger.

A block of numbers will appear thereafter with indication of the variable to be changed (Temp hot - TempWarmk - in this case) and the value that can then be edited/changed.

Enter the desired value through the block of numbers.

For the new temperature value of, for example, 35.00 °C the keys "3" and "5" must be respectively pressed.

By pressing the key "Enter" the entry is then completed.
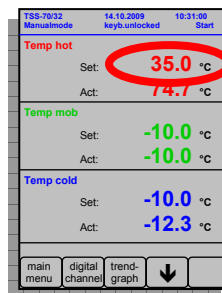
The block of numbers is thereafter closed and the new temperature target value is carried over to the indicator.

Note:

- **For target values with a comma position, a point must be included in the block of numbers, instead of the usual comma.**
  For example: T = − 47.50°C

[-] [4] [7] [.] [5] [Enter]
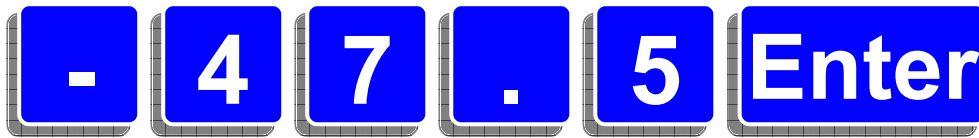
- **If there is a mistake in typing, there is a delete-key to erase the entered numbers one after the other.**

[←]
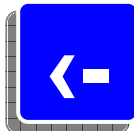
- **If the enter-key is confirmed without indication of a new value, the block of numbers is then closed without an affect upon the target value.**

[Enter]

7.3.2 Digital channels

General:

Digital channels are elements which can assume the status of either "0" or "1", "on" or "off". If one wishes to change a digital channel, then it means that the channel negates - it is changed to the opposite.
For the following channels, a set channel ("1"/"one") is surrounded by a green element.
A non set channel ("0"/"out") is not surrounded by a green element

The following graphics should illustrate this:

Channel [Lift up]
= 1 - active

Channel [Lift down]
= 0 - not active

Channel [Customer Outputs]* = 0 - not active

Channel [Defrost]
= 0 - not active

| TSS-70/32 | 14.10.2009 | 10:31:00 |
| Manualmode | keyb.unlocked | Start |

Digitalchannel

Softkeys	**Indicators**
Lift up	Temp hot
Lift down	Temp cold
Dig.outp1	Door look
Dig.outp2	
Defrost	

| main menu | analog channel | trend-graph | | |

Channel [temperature hot]
= 1 - active

Channel [temperature cold]
= 1 - active

Channel [Door lock] = **1** - **active**

* These digital customer outputs are floating (potential-free) contacts, with which (for example) the test item can be guided.

With indication of the digital channels, the following variations are differentiated:

- **Indicators**

  Indicators are digital channels, which are only indicated. They cannot be changed.

- **Softkeys**

  Softkeys are digital channels, which can both be indicated as well as changed.

Changing the status of a digital channel (softkeys):
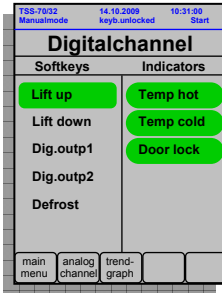
For this example there are five softkeys.
The digital channel "lift down" is not active at the moment, i.e. it carries the logical value 0, since the cradle is currently located in the upper heating chamber → channel "lift up" is active.
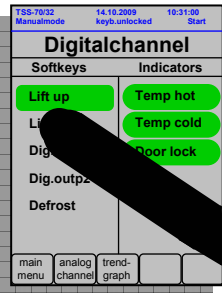
If the cradle is to be moved downwards, thereby activating the channel, i.e. assuming the logical value 1, the field for the channel must be pressed.
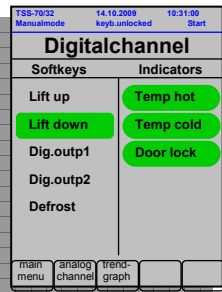
If the digital channel "lift down" has been successfully changed from the guidance, and thereby the unit (to the value 1), then the channel is set to green.

If this channel "lift down" is to be deactivated once again, in other words set to the value 0, one must proceed analog for activation of the channel (press the channel - after successful return of the channel through the control unit, the channel is represented once again without the green element).

Note:

With a change command for a digital channel, this channel is pre-selected to the respective value. Whether or not the alteration can be executed, depends on the unit-configuration at that moment:

– **OK**

The procedure will be executed as described above.

– **not OK**

The procedure will not be executed. However, the channel is pre-selected, in other words, the procedure will be executed once the unit configuration allows it
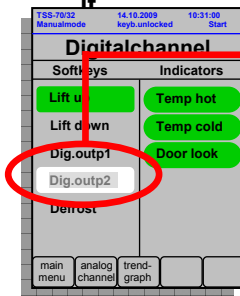
The channel begins to blink. This is the signal that the configuration will not allow that the unit, at this time, can be changed.

And consequently, the inhibiting factors will be omitted, or one must wait for the appropriate configuration.

In this case, the softkey will only be activated after the cradle has moved downwards, since the digital output2 is directly connected to the "lift down" channel (in this example).

7.4 *Shocktestmenu*

7.4.1 Basic information regarding the shocktestmenu

Essentially, the shocktestmenu is a special kind of a program.
This shocktest program is designed for quick production and changing of program cycles for the shocktest chamber and serves to allow the cradle to proceed according to the following predefined points:

- Waiting-**time** of the cradle in the heating chamber **up** (target and current values)
- **Temperature** in the heating chamber **up** (target and current values)
- Number of program-**cycles** (→ program-**runs)** (target and current values)
- **Temperature** in the cooling chamber **down** (target and current values)
- Waiting-**time** for the cradle in the cooling chamber **down** (target and current values)

- Temperature of the cradle (current value)

A cycle begins in the warm phase. During the first cycle, the waiting-time only begins to run after the difference between the target and current values in the heating chamber is less than the allowed tolerance (wait-function). After the cradle change, the waiting-times run down directly - there are no further wait-functions programmed.

The shocktest program is explained in more detail in the following graphic:

Shocktest graphic:
Schematic illustration for the location of the cradle. Depending on the position of the cradle, it will be shown in either the heating or the cooling chamber.

TSS-70/32	14.10.2009	10:31:00
Programmode	keyb.unlocked	Start

Set	upper time	Left
20 Min		- - - Min

Set	Temp hot	Act
60.0 °C		72.2 °C

Set	Cycles	Act
10 x		2 x

Set	Temp cold	Act
-10.0 °C		-10.1 °C

Temp mob

-9.9 °C

Set	lower time	Left
20 Min		2 Min

main menu	analog channel	trend-graph	digital channel	prog. status

upper Time:
Indication of how long the cradle stays up in the heating chamber.
Set: total time
Left: remaining time

Temp (hot) heating chamber:
Temperature in the upper chamber (heating chamber)
Set: target temp
Act: actual temp

Cycles:
Indication of how many cycles the cradle runs
Set: Cycles total
Act: Cycles run so far

Temp (cold) cooling chamber:
Temp indication in the lower chamber (cooling chamber)
Set: Target temp
Act: actual temp

Lower Time:
Indication of how long the cradle stays down, i.e. in the cooling chamber.
Set: total time
Left: remaining time

Temp mob. (Temp in the mobile cradle)
Temperature indication of the mobile cradle

Notice:

> Since the cradle is only to be found either up in the heating chamber or down in the cooling chamber, only one wait-time can be indicated. In the illustration above, the cradle can be seen in the lower cooling chamber (2 minutes remaining) - for this reason a current time indication of --- min is given in the upper heating chamber.

7.4.2 Operating the Shocktestmenu

In the operation/handling of the shocktestmenu it gives following differences regarding the unit-mode:

- **Manual Mode:**

  – **In stop-state**
Unit mode:	manual mode
Manual key:	on (green LED illuminates)
Program key:	off (green LED does not illuminate)
Target-indicated of the times:	„manual"

  – **In start-state**
Unit mode:	manual mode
Manual key:	on (green LED illuminates)
Program key:	off (green LED does not illuminate)

  The unit runs completely in the **manual mode**.
  In other words all analog channels (e.g. temperatures) and all digital channels (e.g. cradle movement) are controled over the respective menu.

- **Program Mode (shockeditor):**

  – **In stop-state**
Unit mode:	Edit shockprog.
Manual key:	on (green LED illuminates)
Program key:	**blink** (green LED blinks)
Target-indicated of the times:	Value e.g. 30min

  The shocktest-program can be changed in this unit state - input of temperatures, waiting-times and numbers of cycles (target value).
  The **pretempering** (compare next chapter 7.4.3) is not indicated in the shocktest-menu. Therefore these values must be set and change in the menu of the analog channels. With the message „**Info!** Analog value has been received in standard shockprogram " the changes of the channels is confirmed.

  – **In start-state**
Unit mode:	program mode
Manual key:	off (green LED does not illuminate)
Program key:	on (green LED illuminates)

  The unit runs completely in the **program mode** and execute the shocktest program.

Notice:
- **Because it concerns in the shocktest program a special representation of a normal program, the shocktest program can be changed also in the program selection. In this selection, the single difference is the program number: The shocktest program possesses always the number 99!**
  If the shocktest program changed, all information of the shocktestmenu is represented.

- **With the program key in the program mode you can jump very fast and allways in the program state or in the shocktestmenu:**
First push of the program key:	jump in the program state
Second push of the program key:	jump in the shocktestmenu

- **In the program mode, the internal, digital channel "automatic" is set to 1. This channel is a system channel. He is set only over the respective user mode and is represented therefore not in the menu of the digital channels.**
  This channel serves to the control between shocktest-unit and an external CID-software.

7.4.3 Pretempering

When the cradle moves into a chamber, the ambient temperature in that chamber is altered. The size of this alteration depends on the chamber temperature, the cradle and the items to be tested as they enter into the chamber. In order to return to the desired target value as quickly as possible after the cradle change, the heating chamber is heated up to a certain value above the target-value, prior to the change. Conversely, the cooling chamber is cooled down to a certain value below the target-value, prior to the change.

These values are defined as **pretempering.** The value is positive for the heating chamber - **pretempering heating chamber** and for the cooling chamber it is negative - **pretempering cooling chamber**.

These variable pretemperings are analog channels, so that they can be optimized for the target-values entered and, particularly, for the mass of the item to be tested. (Changes in the analog channels: see chapter 7.3.1 Analog channels - page 29)
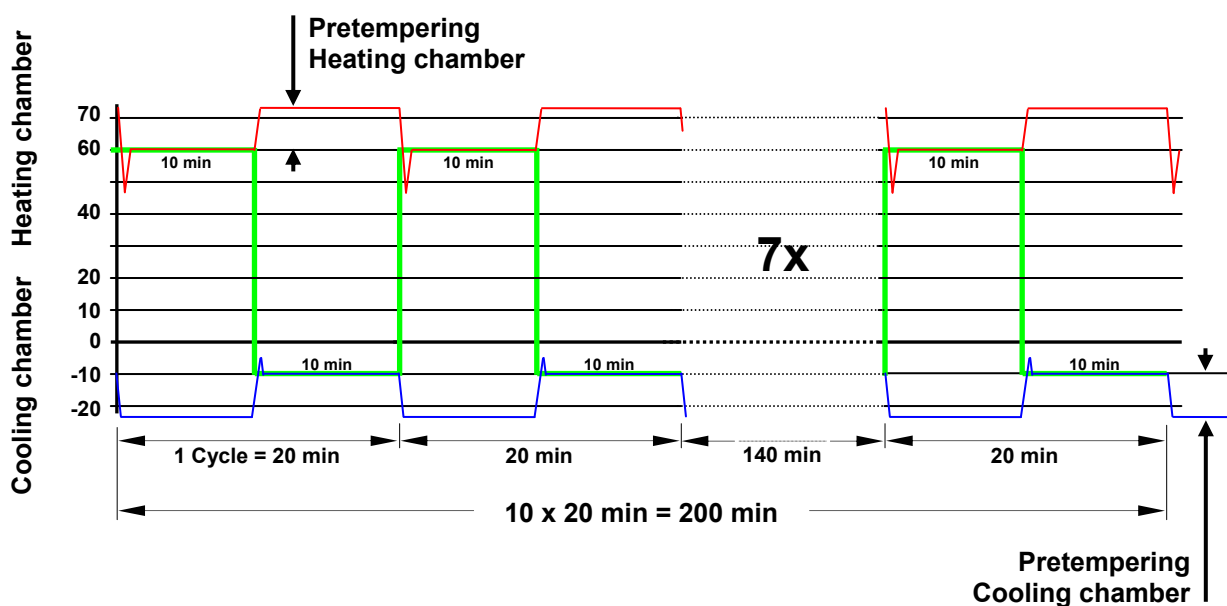
Comments regarding this diagram:

- The thick reference line, which varies within the range of +60°C to -10°C, represents the taget-temperature for the **cradle.**
- The thin reference line in the upper-half of the schematic illustration represents the temperature-development in the **heating chamber.** It varies within a range from approximately +45°C to approx. +72°C. The different values have the following meanings:
  - +60°C: Target temperature (= current-temperature) of the heating chamber with the cradle.
  - +72°C: +60°C + 12K (target-value + entered pretempering)
  - +45°C   Temperature shortly after the cold cradle has entered into the heating chamber. The temperature in the chamber sinks.
- The thin reference line in the lower half of the schematic illustration represents the temperature development of the **cooling chamber.** It varies within a range from approx. -22°C to approx. -5°C. The different values have the following meanings:
  - - 10°C: Target temperature (= current temperature) of the cooling chamber with the cradle.
  - - 22°C: -10°C + (-12K) (target-value + entered pretempering)
  - - 5°C   Temperature shortly after the warm cradle has entered into the cooling chamber. The temperature in the chamber rises.

Notice:

The pretempering should (if possible) be selected in such a way that the alteration of temp (in this case, +45°C or -5°C) during the appearance of the cradle into the respective chamber corresponds to the temperature target-value.

7.4.4 Creation of a shocktest program

The following steps are necessary for creating a shocktest program:

1. Enter the pretempering for the heating and cooling chambers:
   (chapter 7.4.3 -Pretempering).
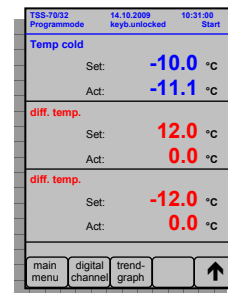
2. Change into the shocktest menu with the program key.
   If the unit is not in the manual mode → the program key must activate again until the unit-mode "**shock editor**" appears.

3. Enter the **wait-duration** into the upper heating chamber.
   (Entry is made by activating all of the blue time-field through the block of numbers which appears)

4. Enter the **temperature target-value** for the upper heating chamber.
   (Entry is made by activating all of the red temperature-field through the block of numbers which appears)

5. Enter the **number of cycles** for the complete program.
   (Entry is made by activating all of the blue cycle-field through the block of numbers which appears)

6. Enter the **temperature target-value** for the lower cooling chamber.
   (Entry is made by activating all of the red temperature-field through the block of numbers which appears)

7. Enter the **wait-duration** into the lower cooling chamber.
   (Entry is made by activating all of the blue time-field through the block of numbers which appears)

8. Start the newly created shocktest program by using the **start/stop-key**.
   The unit mode "programmode" and the unit status "start" appear in the headbar, since this operation deals, in general, with a program.

Notice:
- **The fields for changing the temperatures, times and number of cycles are defined as follows:**
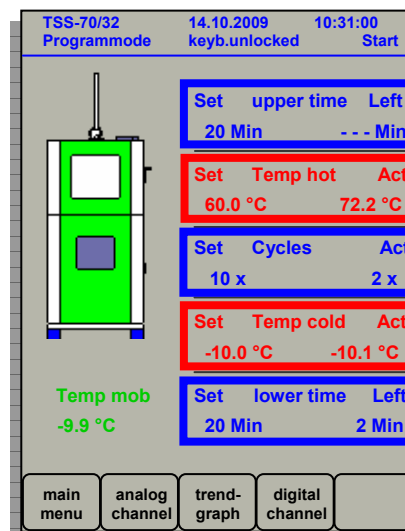
- **The program can be stopped by using the start/stop key. With this operation the current value and remaining values can be reset.**
- **The program can be paused with the pause key and then continued from the same position after pressing the pause key again.**
- **After completion of the program, the unit is stopped and all current and remaining values are reset to an undefined value (---). The unit status "stop" appears in the headbar.**
- **Values can be changed during the runtime.**
- **In order to execute fast changes within the system settings for example, the listing for "shocktestmenu" will be illuminated in the mainmenu 1/3, allowing a quick return to the shocktest picture.**
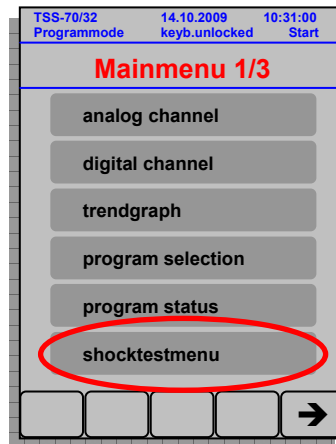
Notice:
The doorlock feature is always built in for a shocktest unit. Therefore, one always has at one's disposal the digital channel → indicator "door lock".

This feature is necessary so that the cradle cannot be operated when the chamber is open.

Danger for hands or other extremities to be crushed!

7.4.5 Graphic visualizing of the status of the shocktest unit

In order to get a quick overview of the unit, the unit status is graphically represented for the shocktest program as follows:

- Unit **not** in operation:
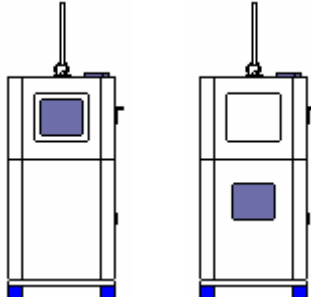
The unit is represented as completely **white.**

- Unit started - cradle up:
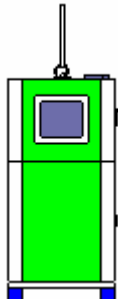
The unit is represented as completely **green.**
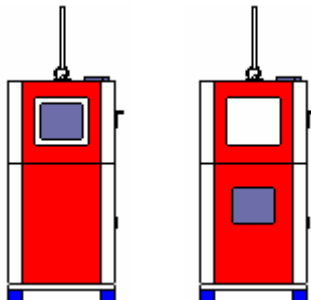
The cradle is located in the upper heating chamber.

- Unit started - cradle down:
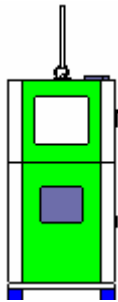
The unit is represented as completely **green.**

The cradle is located in the lower cooling chamber.

- Unit indicates error:

The unit is represented as completely **red.**

7.5 *Program mode*

7.5.1 Basic information regarding programming

7.5.1.1 Components of an assessment program (assessment cycle)

- **Assessment program**

  An assessment program consists of a certain number (1-200) of consecutive program numbers. With the CTS - operating feature, assessment programs can be created and up to 99 different ones can be saved. The program determines the exact procedure for the assessment cycle. Designing of an assessment program is described in chapter 7.5.3.2.

- **Temperature pairs / humidity pairs**

  A temperature and humidity pair consists of a target value for the temperature and, for C - equipment, additionally of a target value for the relative humidity. These values make up the reference values (to be maintained and guided) of the assessment program.

- **Program lines**

  Such lines include a temperature and humidity pair, a definite runtime, an optional wait-function and the optional on/off switch for additional functions. The beginning and the end of a loop includes a complete program line as well.
  An <u>active</u> program line always consists of a temperature and humidity pair
  A <u>passive</u> program line consists of either a loop-beginning and loop-ending or the wait-function. In contrast to the active program line it contains no runtime (t=).

- **Runtime**

  The programmer can determine, with the runtime, either how long a temperature and humidity pair will remain constant, or at what time another temperature and humidity pair should be achieved for the unit.

- **Loop**

  A loop is suitable for simplified programming of repetitious sections of an assessment program. Loop beginning or end will respectively require a complete (passive) program line.

- **Additional function(s)**

  Depending on the unit type and client requests, the unit has several additional functions. The first 24 can be programmed through the CTS operating feature. Up to eight additional functions can be programmed through the CID software of CTS. The possibility exists of turning on or off several additional functions in one program line. However, if one function remains constantly turned on through several program lines, it has to be re-entered into each line.

7.5.1.2 What must be considered prior to programming?

A defined start-value must always be entered as the first program line, consisting of temperature /humidity and runtime t = 0. It can thereby be guaranteed that the guidance will not assume the final value of the previous assessment.

Should a linear temperature / humidity change not be absolutely necessary, it is more useful to program this as a jump (i.e. temperature / humidity set a time t = 0), since the maximum change rate of temperature or humidity will then be utilized to the full. If a linear change nevertheless becomes necessary, a few points are to be considered:

- It must be confirmed that, during the programming process, the maximum temperature change rate has not been exceeded.
- If temperature and humidity are simultaneously regulated with linear changes, one can only achieve a minimal rate of change (max. 0.3 K/min), as compared to when the humidity is turned off prior to the linear change, since differentiated temperature control procedures have to be utilized. Therefore, it should be checked whether a simultaneous linear change at that large capacity is really necessary.
- The regulation of humidity is only possible within a certain temperature-range. If this temperature-range is either exceeded or not achieved, humidity can only be regulated up to the point of going over the limit, then no longer. Should there be a temperature change required, however, from a non-sustainable climate-control range back into the sustainable climate control range, then there can be, if necessary, a linear regulation of the humidity upon re-entry into the normal temperature range can be effected. It is <u>basically valid</u> that: under-achievement or over-achievement of the normal target temperature values results in the humidity regulation being turned off. A possibly pre-set humidity target value will be ignored. The actual value of the humidity assumes, however, desired unregulated values, since a relative humidity exists for every temperature.

The ideal, programmed execution of an assessment program cannot, particularly for jumps within the temperature / humidity curve, be exactly maintained. The following should be noted:

- A considerable and sudden change in temperature and humidity can be dealt with by the unit much quicker than a gradual linear change. Since the change cannot take place at a desired rate, it is better to use the wait-function in this case. It guarantees a secure runtime of stability at a required temperature and/or humidity niveau.
- Also for a linear change in the temperature or humidity, this can be the case, even though the maximum rate of change is not exceeded. This is particularly the case, when an adjustment in the unit has to take place close to the temperature / humidity limits. The closer that a temperature / humidity pair is situated to these limitations, the slower that the actual process approaches the target process in curve. Irrespective of the assessment procedure, a slow linear change in temperature is, however, often times required. In this case as well, the wait-function also guarantees a necessary duration of time at the niveau to be achieved.

7.5.2 Handling of the program mode
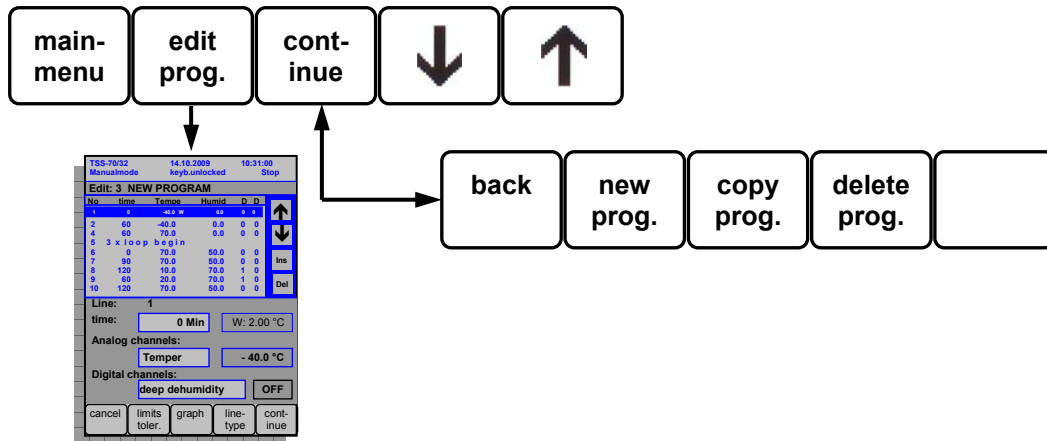
7.5.2.1 Program selection

Program selection is achievable through the [PROG] key.

The selection-window gives a short overview of which programs are saved. Moreover, information regarding the number of program lines, runtime of the program and the start-time are also indicated. In order to select an existing program, the navigation-buttons (arrows) are at ones disposal.
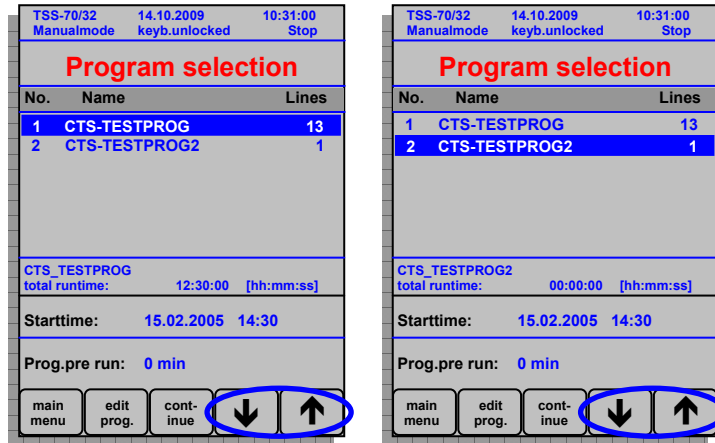
Note: All procedures which are executed through the navigation bar refer exclusively to the selected program!!! (For example: "edit prog." or "delete prog.")

These procedures are listed as follows:

- main menu: Back to main menu – leave program selection.
- edit prog.:   Edit or change an existing program.
- continue: Change to the second navigation area.

- ↓   Scroll down through the program.

- ↑   Scroll up through the program.
                  Notice: Navigation arrows are not visible, when only one or no programs are saved.

- back: Change back to the first navigation area
- new prog.:   Create a new, empty program.
- copy prog.:   Copy a selected program- settings and dates are assumed
- delete prog.:   Delete the selected program.

7.5.2.2 Program start

In order to start the selected program, the start/stop key has to be pressed. If the green LED key begins to light up, then the chamber should start up without problems. The display indicator then jumps to the program status.

7.5.2.3 Program stop

In order to stop the running program, the start/stop key must be pressed once again. The green LED of the start/stop key goes out and the key for the manual mode begins to light up. The display indicator changes to the analog channels.

7.5.2.4 Program state

As is the case with manual mode, it is highly recommended to have a window indicated, which represents the current information of the respective operation. For manual mode, these are the analog channels, which are indicated in the display. In the program mode, this is the program status.
The program status indicates all relevant information for the currently running program:
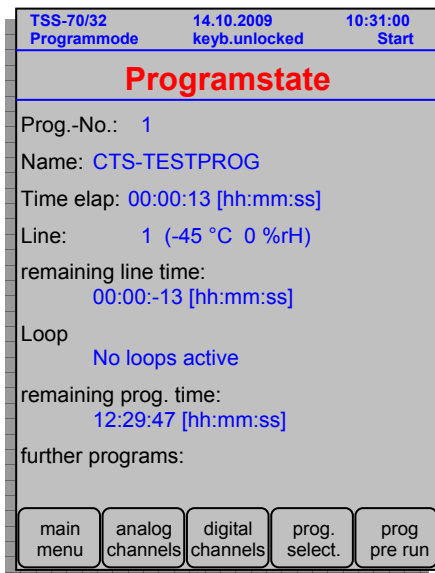
- – Program number
- – Program name
- – Runtime of the program (total)
- – Line number + line information (i.e.: (-45 °C   0%rF))
- – Remaining runtime for the current line
- – Loop information for the current line
- – Remaining runtime for the program (total)
- – Further programs
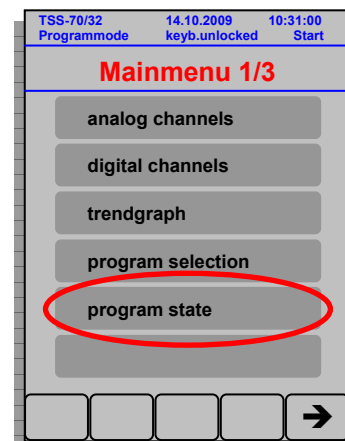
Comment: **If a program was started in program mode, the main menu (1/3) is increased by the selection of the program status.**

## 7.5.2.5 Special features of the running program, i.e. before the program start

■ **Program forerun (in the running program)**

The function "Prog. Forerun" causes a temporal leap in the running program. The input in minutes – by pressing the key – takes place using the number block. The program then jumps to the point (line/time) that was then selected. During this, the information in the program status display (line number, residual running time for line, program and loop information) is updated.

Given a normal input of, for instance, -30 min. or + 30 min., the program jumps to the desired point and may continue the program in a new line.
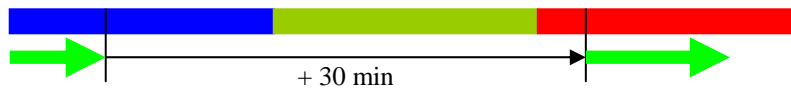
If there is a **negative** input of, for instance, **-5** min, then **ONLY** the current line is put back by this time.
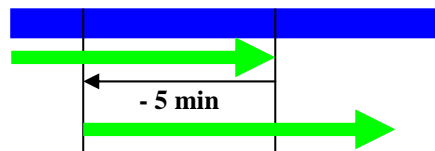
In the event that the response time is longer than the passed line time in the current line, the line runtime will be longer than was programmed in the draft so that the response time can be adhered to.
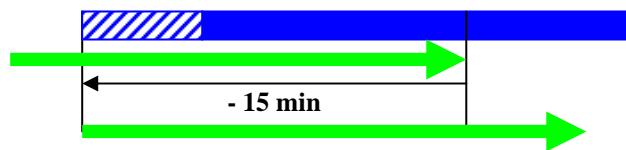
Comments:
- **If the forerun time is positive, the program can jump across lines.**
- **If the forerun times are negative, the program can not jump further than the start of the current line. It is not possible to jump to the preceding line.**

The program forerun causes the following processes:

	Programmed target value process	Positive forerun (e.g.: 30 min)	Negative forerun response (e.g.: -30 min)
Positive gradient		Forerun - forerun	Response – response
Negative gradient		Forerun – forerun	Response – Response

Take note: This kind of process curve only represents the *target values* of an individual channel. In the event that this curve runs in a ramp with a leap (pos. forerun), the actual value curve must first become approximately the same as the target value curve after the leap.

■ **Program starting time (before the program start)**

The starting time has the function of a timer. It can determine a precise moment – date and time – upon which the selected program will start.

Once the starting time has been entered and the start button has been pressed, the program status will be displayed with the following details:

  – Prog no.:   1
  – Name: **wait for start**
  – Runtime: 00:06:27 [hh:mm:ss]
  – Other programs: *current program*

The name: **"wait for start"** renders the timer function visible.
Display of the runtime runs backwards as a countdown until the time has passed.

Display of the manual and the program button reveals the timer function for as long as this mode persists:

Take note: **The start time is set using the marked fields in the display - date and time are separate (using the key block)**

■ **Program forerun time (before the program start)**

The function of forerun time (before the program start) is barely distinguished from the program forerun (compare program forerun (in the running program) - page 44).
The only difference is that there is only one real (positive) forerun, as the program was not yet started.

The forerun time is entered by activating the marked field in the display and the subsequent entry of the forerun time using the key block.

When the selected program is started - immediately or using the timer function -, the program jumps immediately to the line that was selected by the forerun time.

7.5.3 Program construction - Edit prog.

The construction of the program is described in the following:

Edit:
Program number and name

Navigation tools

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Stop

Edit: 3 NEW PROGRAM

No	time	Tempe	Humid	D	D	D	D
1	0	-40.0 W	0.0	0	0	0	0
2	60	-40.0	0.0	0	0	0	0
4	60	70.0	0.0	0	0	0	0
5	3 x L o o p b e g i n						
6	0	70.0	50.0	0	0	0	0
7	90	70.0	50.0	0	0	0	0
8	120	10.0	70.0	1	0	0	0
9	60	20.0	70.0	1	0	0	0
10	120	70.0	50.0	0	0	0	0
11	L o o p e n d						
12	0	20.0	0.0	0	0	0	0

↑ **Scroll upwards**

↓ **Scroll downwards**

Ins **Insert line**

Del **Delete line**

Line overview
Line number
Time
Channel 1- Temp.
Channel 2 - Humidity
Digital channel on/off

Line: 1

time: 0 Min   W: 2.00 °C

Analog channels:
Temper   - 40.0 °C

Digital channels:
deep dehumidity   OFF

Line information and changes
Current line number
Time
Wait-function
Selection analog channel
Selection digital channels

chanel	limits toler.	graph	line-type	cont-inue

Navigation bar:

cancel	limits-toler.	graph	line-type	cont-inue

↕

back	load	save		

- cancel: Back to program selection.
- limits-toler.: Entry of limits and tolerances.
- graph: Indicate the produced program lines in a graphic.
- line type: Define the type of line from a program line.
- continue: Change into the second navigation area.

- back: Change back to the first navigation area.
- load: Load a program.
- save: Save the selected program with its changes.

The **heading** - edit: program number and name - serves to check that the correct program has been selected.

The **line overview** indicates all program lines for the program. Depending on the kind of line - active or passive - the program line is respectively labeled. The line number is always clearly indicated while the other information depends on the kind of line.

One can navigate into the lines by using the **navigation tools -** lines can be selected, deleted, replaced with another line at this position or changed.

The area **line information and line change** represents all information for the selected line or new program-line and serves in the entry of new values. This area is the actual entry area for the production of new programs and the changing of existing programs. In the following, the possibilities for programming are explained in more detail:
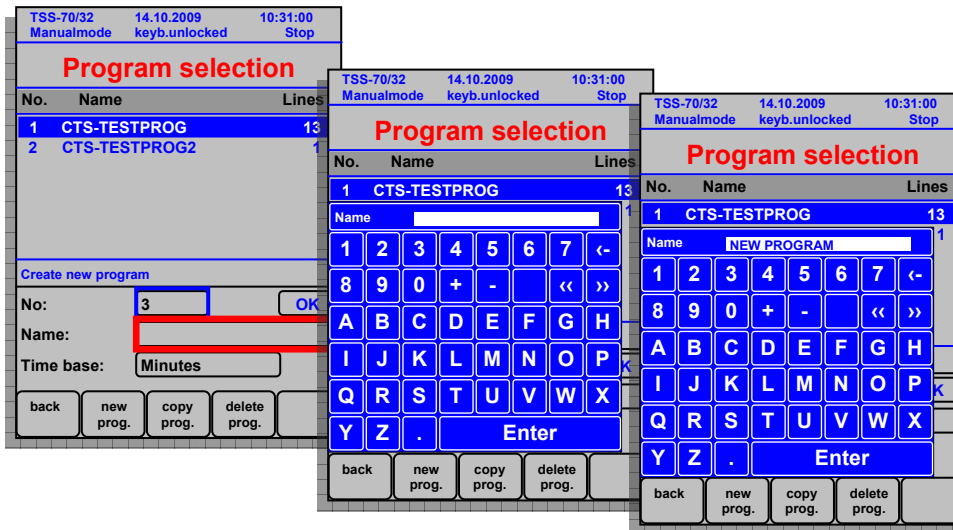
7.5.3.1 Producing a program

- For program selection, press the navigation key "**new prog.**". (This key lies in the second navigational area → first go to "continue", then to "new prog.")
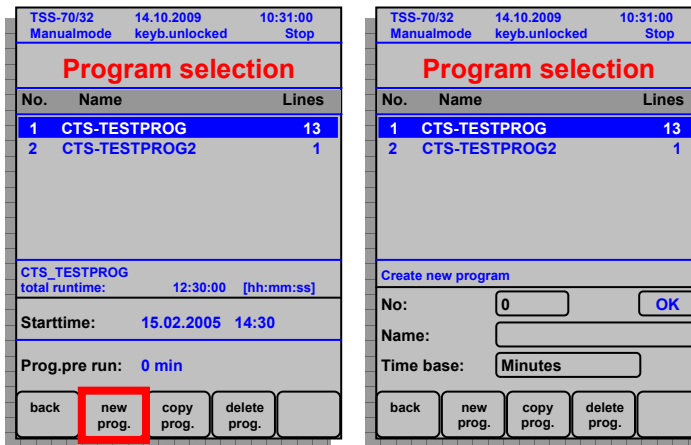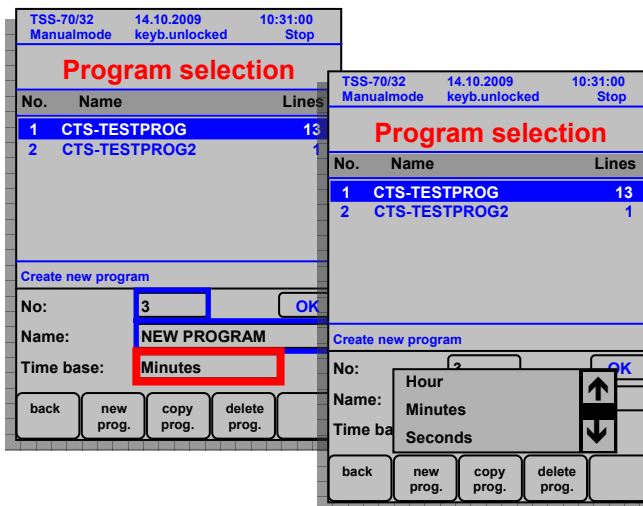

- In the lower area of the display, a new field appears with the heading "Create a new program". In this field the following must be entered regarding explicit specification of information: program number, program name and time-basis. The **program number** is produced through the following key block:
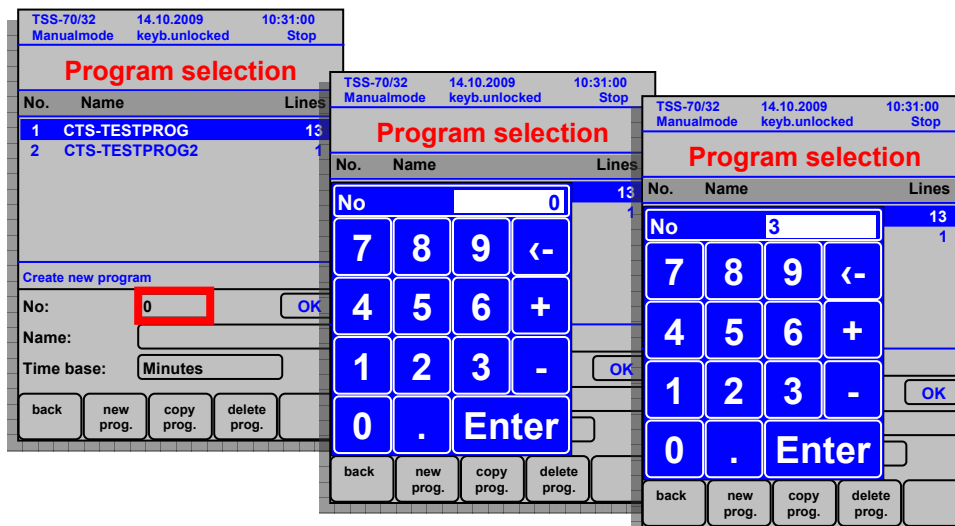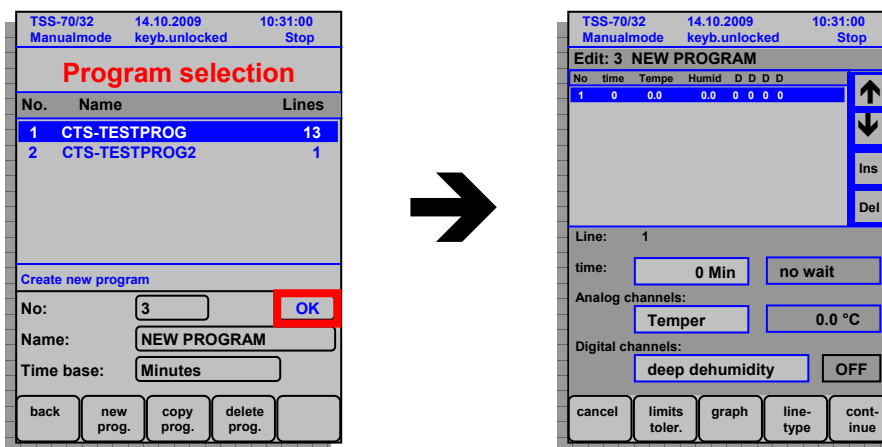
- After entry of the program number, the **program name** must be entered:

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13
2	CTS-TESTPROG2	1

Create new program

No: 3 OK
Name:
Time base: Minutes

back | new prog. | copy prog. | delete prog.

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13

Name: [_____]

1	2	3	4	5	6	7	<-
8	9	0	+	-		<<	>>
A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X
Y	Z	.	Enter

back | new prog. | copy prog. | delete prog.

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13

Name: NEW PROGRAM

1	2	3	4	5	6	7	<-
8	9	0	+	-		<<	>>
A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X
Y	Z	.	Enter

back | new prog. | copy prog. | delete prog.

- The **time-basis** must be selected as the final entry for the program:

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13
2	CTS-TESTPROG2	1

Create new program

No: 3 OK
Name: NEW PROGRAM
Time base: Minutes

back | new prog. | copy prog. | delete prog.

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13
2	CTS-TESTPROG2	1

Create new program

No: 3 OK
Name:
Time ba

Hour
Minutes
Seconds

back | new prog. | copy prog. | delete prog.

- And so the basic data for the program is complete. By pressing the **OK-key,** the program is opened. The program has **one** program line which, at the moment, can be edited/changed. (More in reference to editing in chapter 7.5.3.2 - page 50)

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13
2	CTS-TESTPROG2	1

Create new program

No: 3 OK
Name: NEW PROGRAM
Time base: Minutes

back | new prog. | copy prog. | delete prog.

➔

TSS-70/32 14.10.2009 10:31:00
Manualmode keyb.unlocked Stop
Edit: 3 NEW PROGRAM

No	time	Tempe	Humid	D D D D
1	0	0.0	0.0	0 0 0 0

Ins
Del

Line: 1
time: 0 Min | no wait
Analog channels: Temper | 0.0 °C
Digital channels: deep dehumidity | OFF

cancel | limits toler. | graph | line-type | cont-inue

- In order to avoid losing the produced program and all data with it, the program must be secured with the save key. (This key is also to be found in the second navigational area → first press "continue", then "save".)
 After deleting the indication -

> **"Info!**
> **Program:**
> **No.** [**Program number** (Your prog.-number is here) **saved as**
> [**Program name** (Your prog. name is here)] **"**

- then the program is secured.
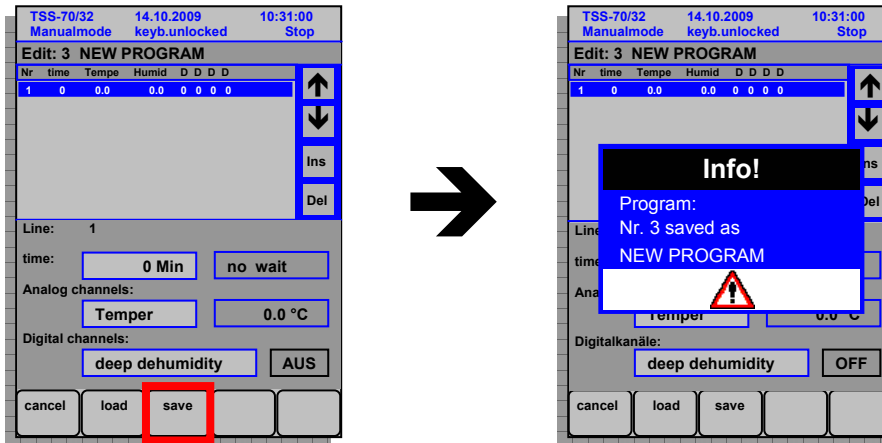
- The newly created program now appears in the program selection with an indication for the number of produced program lines.
  If it is a matter of a new, functional program (program lines with reasonable values and lines), this program can be started **immediately** by pressing the start/stop key.
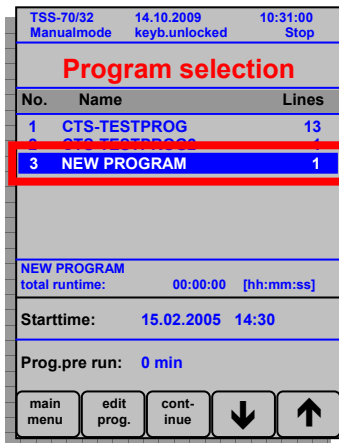
7.5.3.2 Editing/changing the program

And now we are faced with the question of how one can quickly and securely fill out a program with program lines. The graphic on the left shows a newly-created program with empty, pre-defined program lines. The graphic on the right shows an sample program, which is filled out with 13 program lines.
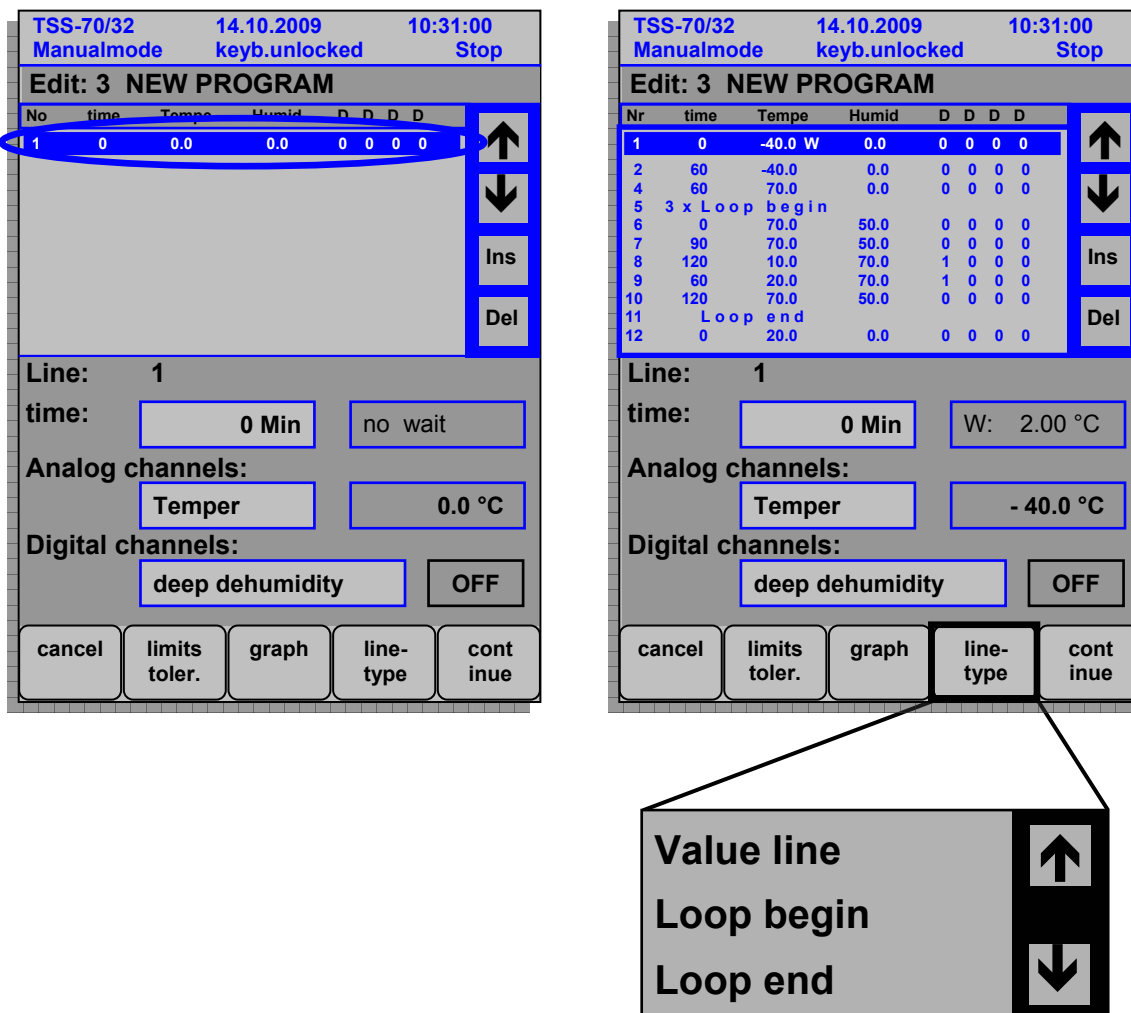
For the active and passive program lines, there are the following differences (accessible through the navigation key "**line type**"):

- **Value line**
  The value line allocates a value-pair of, for example, temperature and humidity to a definite value. A unit status can be determined exactly by use of the analog and digital channels. Moreover, the runtime of this status is also indicated.
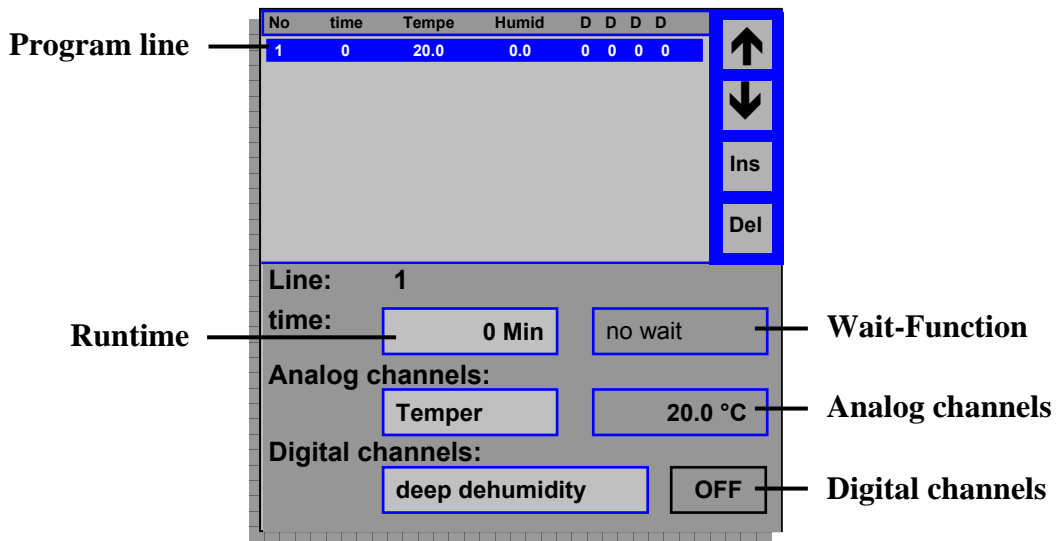
  - **Analog channels**
    The analog channel which is to be changed is selected in the definition field ("temper" in this case).
    In the value field ("20.0 °C" in this case), the value is changed. By pressing the field, the number block appears, in which the new value is entered.

  - **Digital channels**
    In the definition-field ("deep dehumidification" in this case), the digital channel to be changed is selected.
    The status is changed in the value field ("off" in this case). By pressing the field, the channel is turned on or off.

  - **Runtime**
    The runtime, for which the selected program line with the selected configuration will run, is entered into the time-field. Entry of the runtime is executed through the block of numbers. The runtime can be entered in hours, minutes or seconds depending on the time-basis for production of the program, whereby only whole-number values can be entered.

  - **Wait-function**
    In order to make sure that the wait- runtime is kept at a required temperature or humidity level, the wait-function can be implemented. The program is retained at that level for as long as it takes to achieve the required actual value within a tolerance level determined by the programmer. It should be noted in this context that the tolerance level cannot be selected as small as one would like, since it would be reached, under certain circumstances, only after a long period of time or, in the worst case, not at all.

  - **Program line**
    All information is now conglomerated within the program line:

- **Loops - loop beginning**

  A loop is suited to simplified programming of sections from an assessment program which is repetitive. The loop beginning or end requires, respectively, utilization of a whole (passive) program line.

- – **Number of loops**

  All program lines, which are to be found between the loop beginning and the loop end, will be executed as often as the number of loops indicates. The entry ensues through the block of numbers.

- – **Program line**

  In the passive program line, one can then see the definition "loop begin" and the number of loops:

- **Loop - loop end**

  The loop end is the termination of a repetitive section of a program.

No	time	Tempe	Humid	D	D	D	D
1	0	20.0	0.0	0	0	0	0
2	5 x Loop begin						
3	20	20.0	0.0	0	0	0	0
4	40	50.0	0.0	0	0	0	0
5	Loop end						

Program line ──

Line: 5

End of loop

Ins

Del

  - **Program line**

    And now one can see the definition "loop end" in the passive program line:

No	time	Tempe	Humid	D	D	D	D
1	0	20.0	0.0	0	0	0	0
2	5 x Loop begin						
3	20	20.0	0.0	0	0	0	0
4	40	50.0	0.0	0	0	0	0
5	Loop end						

7.5.3.3 Tolerance limits

The tolerance limits in a program enable the allocation of separate limits for each individual line or to give the same limits to the entire program.

Channel:	same for all lines?	
Temper	**Y**	**OK**

Limits: Min	Max
- 80.0 °C	**190.0 °C**

Tolerance:	Value
inactive	**0.0 °C**

The following details can be selected:

–	Channel		Temperature / humidity
–	**same for all lines?**		**Y / N** (yes / no)
–	Limit: Min	e.g.:	-50.0 °C (temperature) / 0.0 %rH (humidity)
–	Max	e.g.:	190.0 °C (temperature) / 100.0 %rH (humidity)
–	**Tolerance**		**active / inactive**
–	Value	e.g.:	5.0 °C (temperature) / 10.0 %rH (humidity)

7.5.3.4 Copying the program

In order to copy an existing program, this program must be selected and the key "prog. Copy" must be pressed. (This key can be found in the second navigation area → first press "continue", then press "prog. copy".
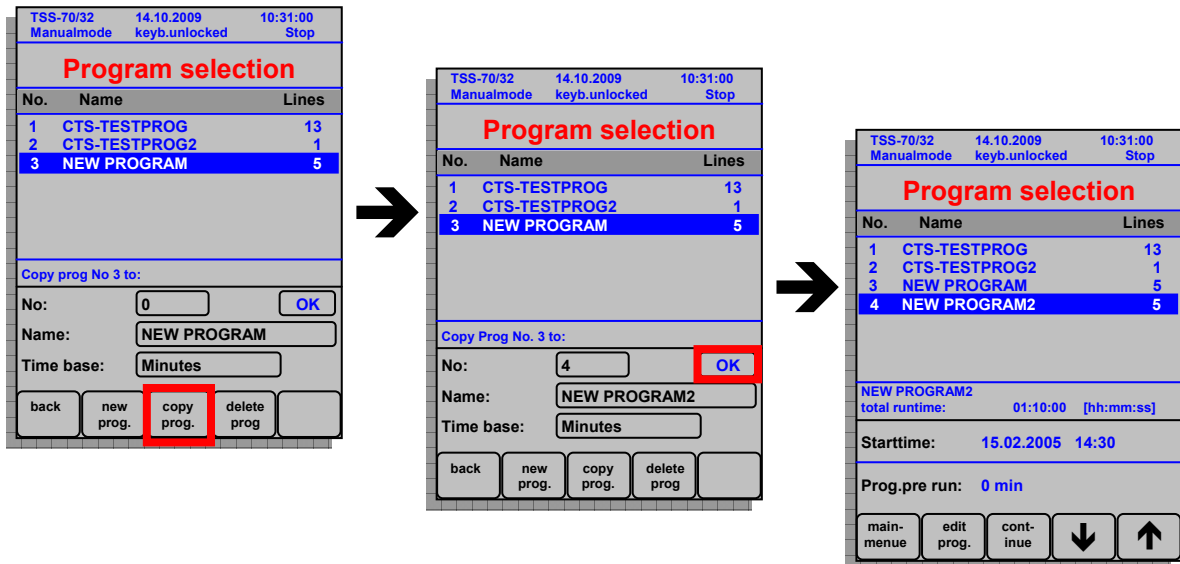
- Press key "prog. copy" → area "**copy program number after..."** will appear
- Enter new **program number**
- Enter new **program name**
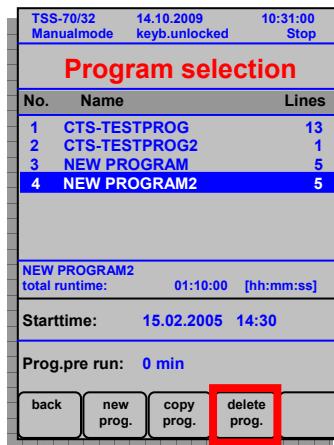- Change **time basis**, if necessary
- Press **OK-key**

Notice:
- **The program number must be unique, i.e. a copied program must be allocated a number which does not yet exist.**
- **The program name must be unique, i.e. a copied program must be allocated a name which does not yet exist.**

7.5.3.5 Delete a program

In order to delete an existing program, this program must be selected and the key "delete prog." must be pressed. (This key is to be found in the second navigation area → first press "Continue", then press "delete prog.")

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Stop

Program selection

No.	Name	Lines
1	CTS-TESTPROG	13
2	CTS-TESTPROG2	1
3	NEW PROGRAM	5
4	NEW PROGRAM2	5

NEW PROGRAM2
total runtime: 01:10:00   [hh:mm:ss]

Starttime: 15.02.2005 14:30

Prog.pre run: 0 min

| back | new prog. | copy prog. | delete prog. | |

Take note:

If the "Delete program" key is pressed, a query dialogue questions whether the selected program should really be deleted. There is a choice between "Yes" and "No"

7.5.3.6 Graphics of the program

A graphic can be viewed as a condensation for the produced program. This is shown when the key "graph" is pressed. The line information and graphics are then represented alternately.

No	time	Tempe	Humid	D	D	D	D
1	0	-40.0 W	0.0	0	0	0	0
2	60	-40.0	0.0	0	0	0	0
4	60	70.0	0.0	0	0	0	0
5	3 x L o o p b e g i n						
6	0	70.0	50.0	0	0	0	0
7	90	70.0	50.0	0	0	0	0
8	120	10.0	70.0	1	0	0	0
9	60	20.0	70.0	1	0	0	0
10	120	70.0	50.0	0	0	0	0
11	L o o p e n d						
12	0	20.0	0.0	0	0	0	0

TSS-70/32 14.10.2009 10:31:00
Manualmode **keyb.unlocked** **Stop**

Edit: 3 NEW PROGRAM

cancel | limits toler. | graph | line-type | cont-inue

Line: 1
time: 0 Min W: 2.00 °C
Analog channels:
Temper - 40.0 °C
Digital channels:
deep dehumidity OFF

70
-40
Z:1 0 min Z:13 540 min

7.6 *Trend graphics*

7.6.1 Representation of the trend graphics

The trend graphics represent the chronological tendency of a limited number of analog channels. Changes in the target value and current value are graphically displayed by means of this tendency/trend. The represented analog channels are numerically indicated in the upper half of the display. These values are moment-values and update themselves immediately with a change in the channel.

The diagram in the lower half of the display consists of the X- and the Y- axis.

On the Y-axis you will generally find all channel values indicated– in this case, the temperature and humidity. The scaling of the Y-axis cannot be changed in this context and stays in the range from approximately -80 °C to +200 °C.

The time is registered in the X axis. Scaling of the X axis is set to 120 minutes (2 hours). However, this detail is changed depending on the settings of the zoom function (see chapter 7.6.2.1 Zooming - page 59).

Each part of the X axis is one 20th part of the total time – for example, the total time of 60 min is equal to a time difference between the individual time parts of 3 min.

The colors of the numerical indicator correspond to those of the diagram-curve. The **temperatures** are represented in **red-tones**, the **humidity** in **blue-tones** and **all other particulars** in **green-tones**. In this framework, the respective current value is indicated darker in color and the target value is indicated a bit lighter in color.
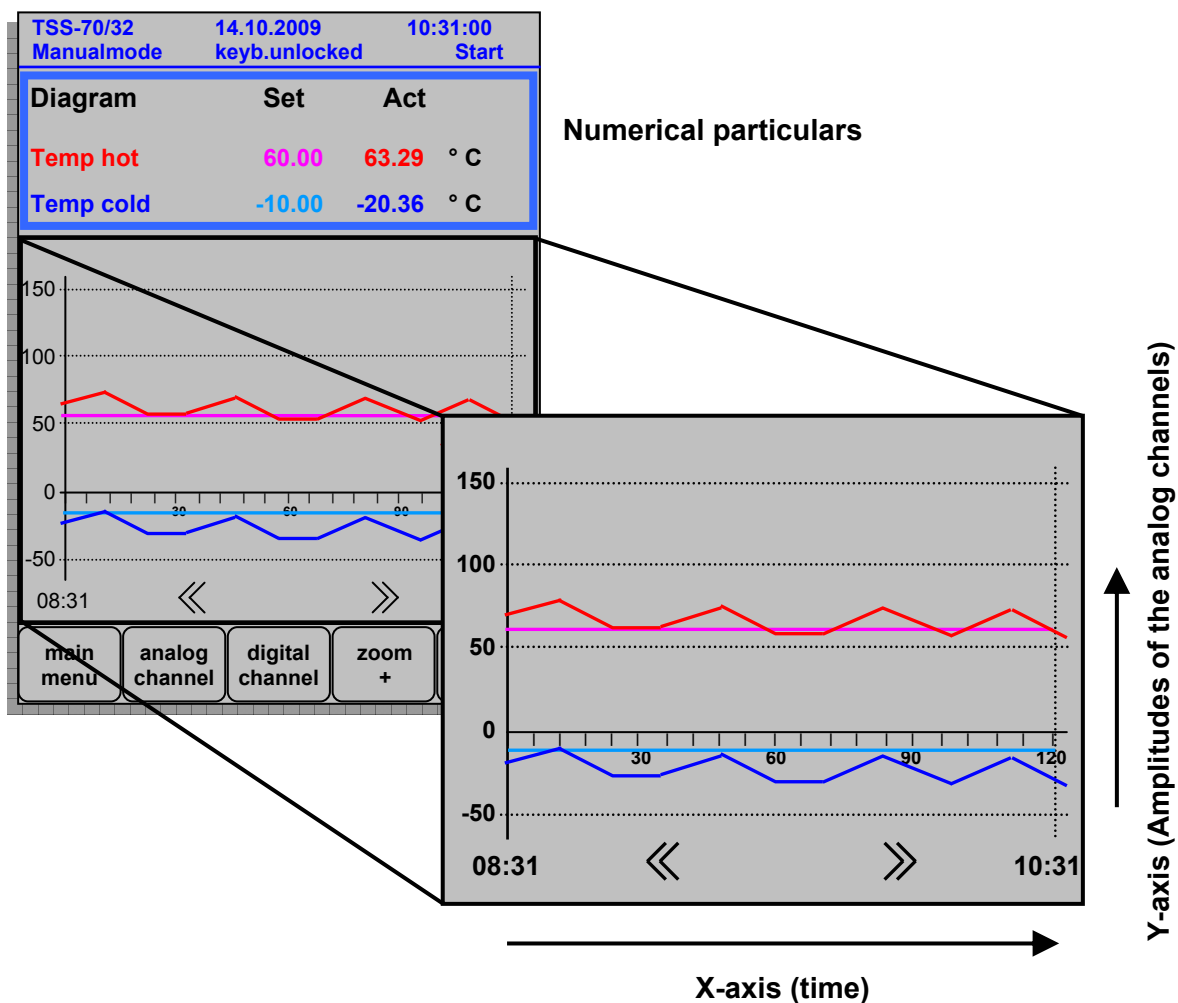
The curves represented here will be updated according to the time-run of an axis section. The values are of the current time are then connected with the values of the time which has already passed (section).

Notice: **Values which lie between two actualization times are not shown. The trend graphic only connects the values of the actualization times.**
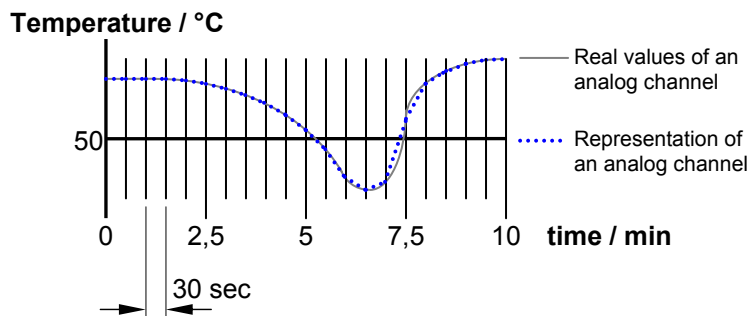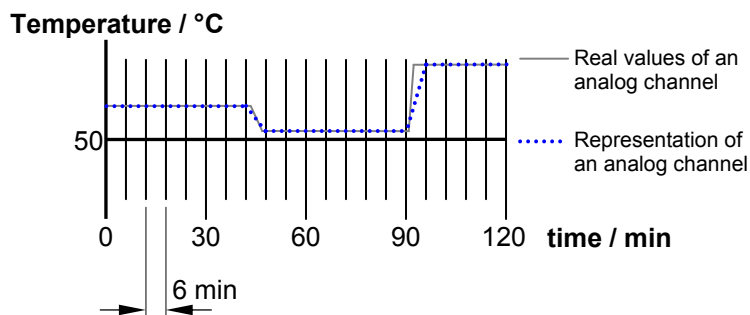
Schematic representation:

Temperature / °C
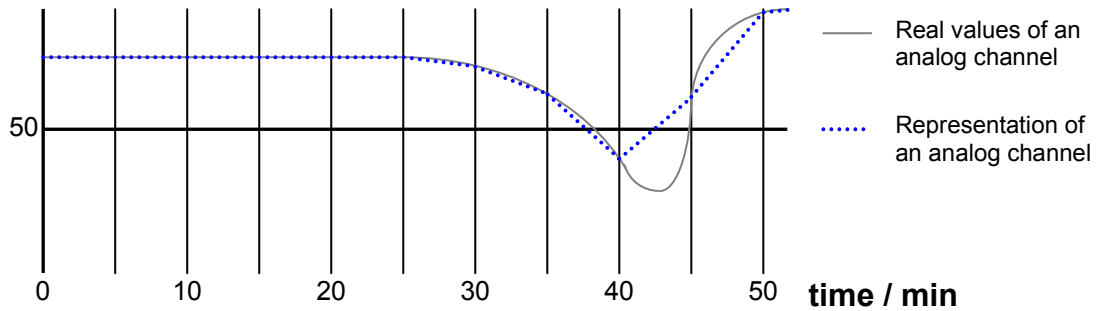
Notice:
- **The smaller the scaling of the X-axis, the more exact this selected range will be represented.**

- **The greater the scaling of an X-axis is, the greater the indicated runtime and, consequently, the greater the probative strength of the trend of a graphic.**

7.6.2 Navigation in the trend graphics

The following functions are available to navigate in the graphics:

7.6.2.1 Zooming

A section of the graphic can be enlarged or reduced in size using the function **Zoom +** or **Zoom -**.

The button **Zoom +** enlarges the current section of the graphics, i.e. the X-axis (time axis) displays a smaller time section.

The button **Zoom –** reduces the size of the current graphic section, i.e. the X-axis (time axis) displays a larger time section.

Scroll-function

Zoom-function

Zoom +   **Zoom -**

Display output
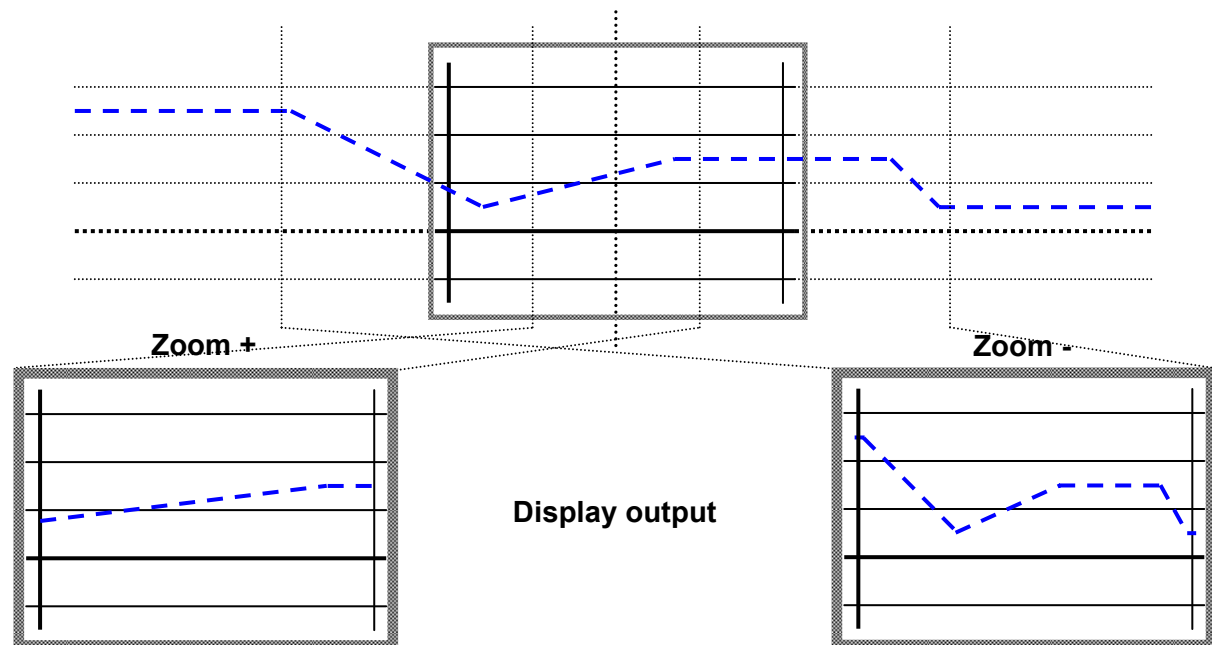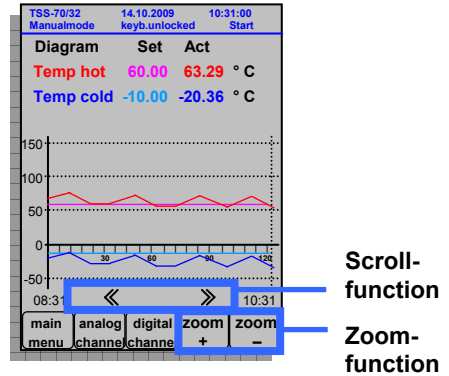
7.6.2.2 Scrolling

One can scroll through the graphic times using the buttons **<<** or **>>**.

You scroll to the right of the graphic using the button **<<** (i.e., theoretically, the display moves left), thus presenting a part of the graphic adjacent to the left it there is one.

You scroll to the left using the button **>>** (i.e., theoretically, the display moves right) thus presenting a part of the graphic adjacent to the right it there is one.

<<   **>>**

Display output

0   5   10   15   20   time / min
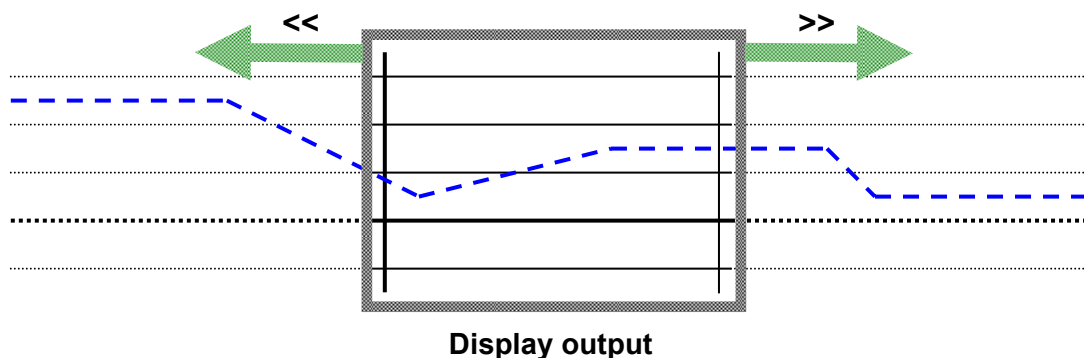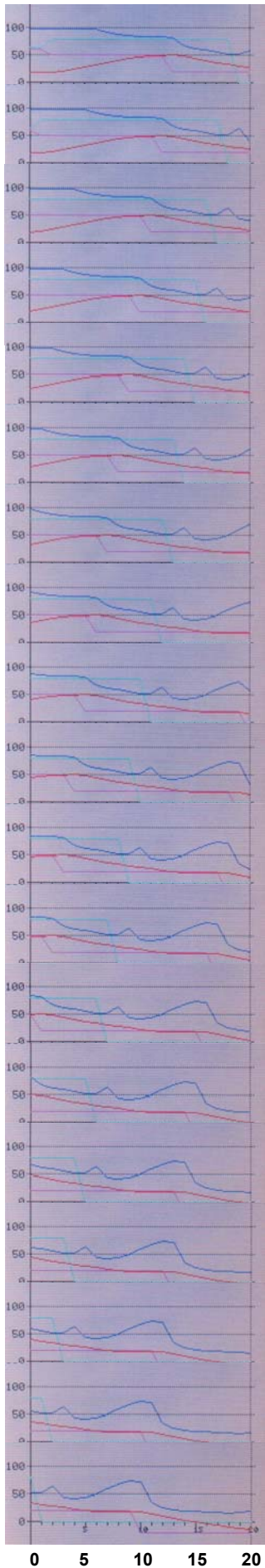
7.6.3 Indication technique of a trend graphic

If new values emerge after a defined duration of time (depending on the scaling of the X-axis - in this case, 1 minute), these values are written into a ring-buffer.

If the ring-buffer is extended with additional values, then all other blocks are shifted by one position.

The representation in the diagram runs analog to the ring-buffer. The graphic is shifted by one position from right to left. The new values are then added onto the right side. The oldest values on the left side fall out of the diagram.

Notice:
  The utilized ring-buffer retains only a limited memory-capacity.
  When the buffer becomes full, older values must be written over.

For example:

Time: 08:40:20

Time: 08:41:20

Time: 08:42:20

7.7 *Error reporting and warnings*

For those reportings, which the operating feature shows, there are the following differences:

- ### Errors (error reporting)
  If an error occurs (see pdf file "II.4 Reports and digital channels" chapter 1.1 - Error re-ports (disruptions in the unit)), the unit is completely shut down, or individual sections of the unit are turned off, such as the climate control.

- ### Warning (warning reports)
  An error of non-technical origin is indicated as a warning report (see pdf file "II.4 Reports and digital channels" chapter 1.2 - Warning reports). Warning reports do not have to be acknowledged, since they are automatically turned off after the cause of the error has been eradicated. A warning report will be, for example, indicated when the water in the reservoir of the climate control system has to be topped up. As soon as the water is filled up, the warning report will be cancelled.

If an error or warning report occurs, it will be graphically represented as follows:

- The unit-status will be set to "**error"** in the head-bar.

- The function key "alarm" begins to light up red.

- For a unit already running, the green LED of the function key "Start/Stop" will go off.

7.7.1 Error menue

If an error or warning report occurs, this will be indicated by means of the red illuminated alarm key. In order to represent this report/these reports, this alarm key must first of all be pressed. Thereafter, the error menu opens up with all relevant information regarding the error or warning at hand. The repre-sentation is explained more specifically in the following graphic:
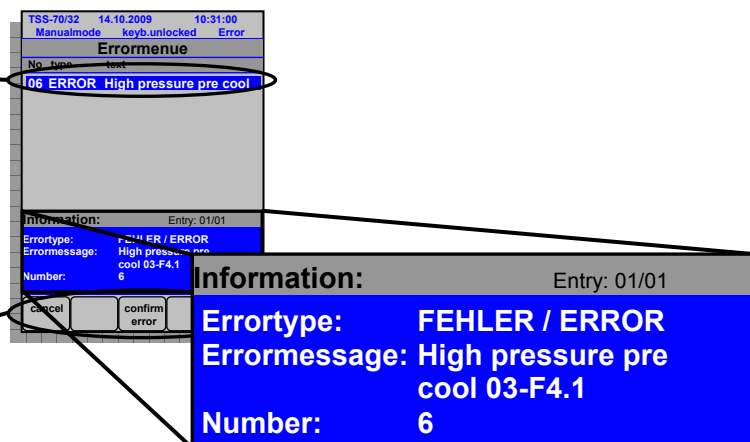
Menu list:
An overview of all reports.

Report details:
Details for the selected report are indicated.

Menu function bar:
For some reports, navigational ar-rows are given, in order to enable selection of a specific report.

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Error

Errormenue

No   type   text

06 ERROR High pressure pre cool

Information: Entry: 01/01

Errortype:	**FEHLER / ERROR**
Errormessage:	**High pressure pre cool 03-F4.1**
Number:	**6**

cancel   confirm error

- The **menu list** indicates all existing errors and warning reports. The information which is represented in the summary is: the internal number, the error type and a small excerpt from the error text.

- The **report details** show more explicit information regarding the selected report, such as:
  - Entry: no. of selected report / number of reports:
    Entry: 01/01
  - Error type: error or warning:
    Error type: ERROR / WARNING
  - Error text: indication of the error text with additional information:
    Error text: high pressure pre cool 03-F4.1
  - Number: internal unit and specific numbering of the report:
    Number: 6

- The **Menu-Function-Bar** offers the following functions:
  - "return" - function   back to the last menu
  - "quit. error" - function   Acknowledge error, when problem is corrected.

  - "upwards" - function   ⬆   turn pages for reports upwards

  - "downwards" - function   ⬇   turn pages for reports downwards

Notice:
- **All error and warning reports will be described in the pdf file "II.4 Reports and digital channels" chapter 1 with cause, consequence and measures taken.**
- **If no error or warning is at hand, then the red LED on the alarm key will not illuminate. It is thereby not possible to open the error menu by pressing this alarm key.**
- **If the cause of an existing <u>warning</u> is taken care of, the indication of this report will be immediately acknowledged (without stopping the warning).**
- **If the cause of an existing <u>error</u> is taken care of, the report must then be acknowledged so that it will be deleted.**

7.7.2 Error history / Errorlog

The view and the information content are essentially analog to the error menu. As it is indicated in the following illustration, the largest difference lies in the fact that the date and the time of the appearance of the report is shown and the error text of the individual reports is visible only in the report details.
Through these reports, sorted according to date and time, a chronological representation of the errors/warnings then remains stored. The error history then can function as a kind of log-file (register, indicate).

The information which is to be found in the error history, consists not only of date and time, but of the following as well:

- **ER + NEW** **ERROR** , which is **new**
- **ER + OK** **ERROR** , for which the cause has been **eradicated**
- **ER + QUI** **ERROR** , which has been **acknowledged**

- **WA + NEW** **WARNING** , which is **new**
- **WA + OK** **WARNING** , for which the cause has been **eradicated**
- **WA + QUI** **WARNING** , which has been **acknowledged**

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Start

Errorlog

date	time	No	type
13.02.05	12:57:01	06	ER+OK
13.02.05	12:56:00	06	ER+QUI
13.02.05	12:54:12	06	ER+NEW
13.02.05	11:24:02	02	WA+QUI
13.02.05	11:23:55	02	WA+NEU
13.02.05	11:23:33	02	WA+QUI
13.02.05	11:23:17	02	WA+NEU

Information: Entry: 01/07

date/time:	13.02.05	12:57:01
Errormessage:	High pressure pre cool 03-F4.1	
Number:	6	

back   ↓

The various kinds of reports allow an extremely exact visualization of a certain chronological sequence, such as a problem.

## Notice:
**Reports in the error history cannot be deleted by means of an acknowledgement.**

7.7.3 The relationship between error-menu and error-history

Since representation of errors and warnings in the two menus (error-menu and error-history) concerns the same reports (only formatted differently), a connection between these two menus can be illustrated:

1) An error is reported → red LED of the alarm key illuminates.
   - The error-menu indicates the error-report "high-pressure in pre-cooling 03-F4.1" upon opening- by clicking on the alarm-key.
   - The error-history lists an **ER+NEW** - report with the error-text "high-pressure in pre-cooling 03-F4.1". The date corresponds to the time of appearance of the error.
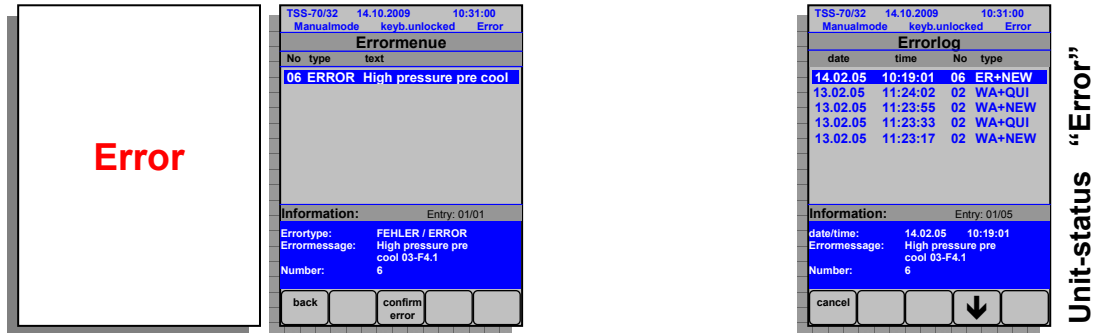
2) Error is **corrected** → red LED of the alarm-key is still illuminated.
   - The error-menu still indicates the error-report.
   - The error-history produces a new **ER+OK** - report with the same error-text. The date corresponds to the correction of the error.
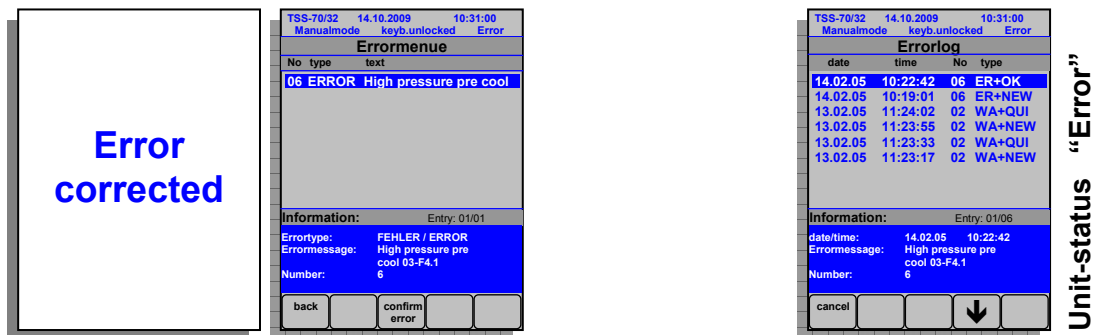

3) An error is **acknowledged** → red LED of the alarm-key is no longer illuminated.
   - The error-menu no longer indicates error-reports.
   - The error-history produces a new **ER+QUI** – report with the same error-text. The date corresponds to the time of acknowledgement of the error.
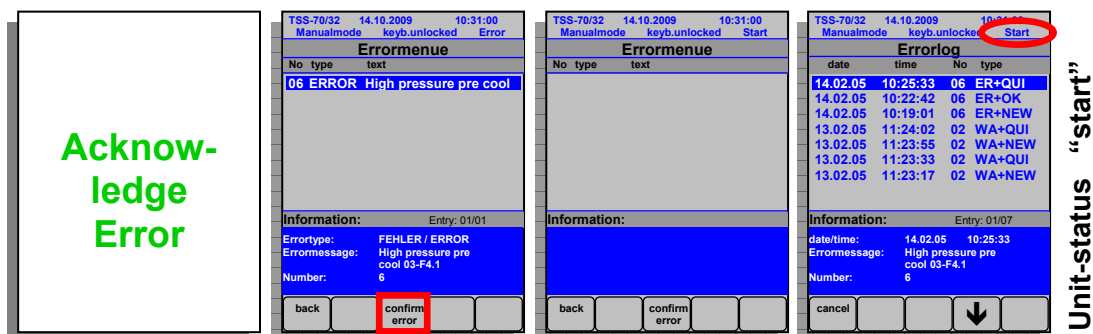
7.8 *Unit-specific menus*

A lot of helpful information on the device and the settings in the device configurations is contained in the main menu (2/3) and (3/3) – reached by arrow navigation in the main menu 1/3 to the right. The specific menus for each device are opened by pressing the respective grey element.
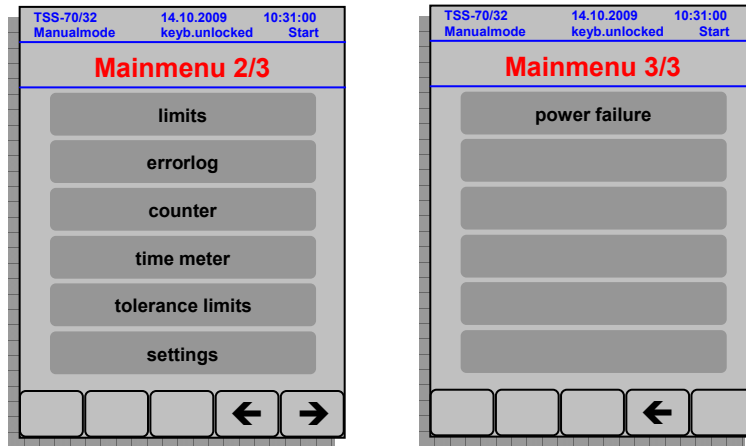
7.8.1 General operation of the menus

Handling of the menus is analog to the handling of the target-value setting in the manual mode:

- Activate either the value to be changed or its framed-in area.
- The block of numbers will be opened.
- Entry of the desired value by using the keys.
  - Confirm with "ENTER"
  - New value is then acquired and indicated.
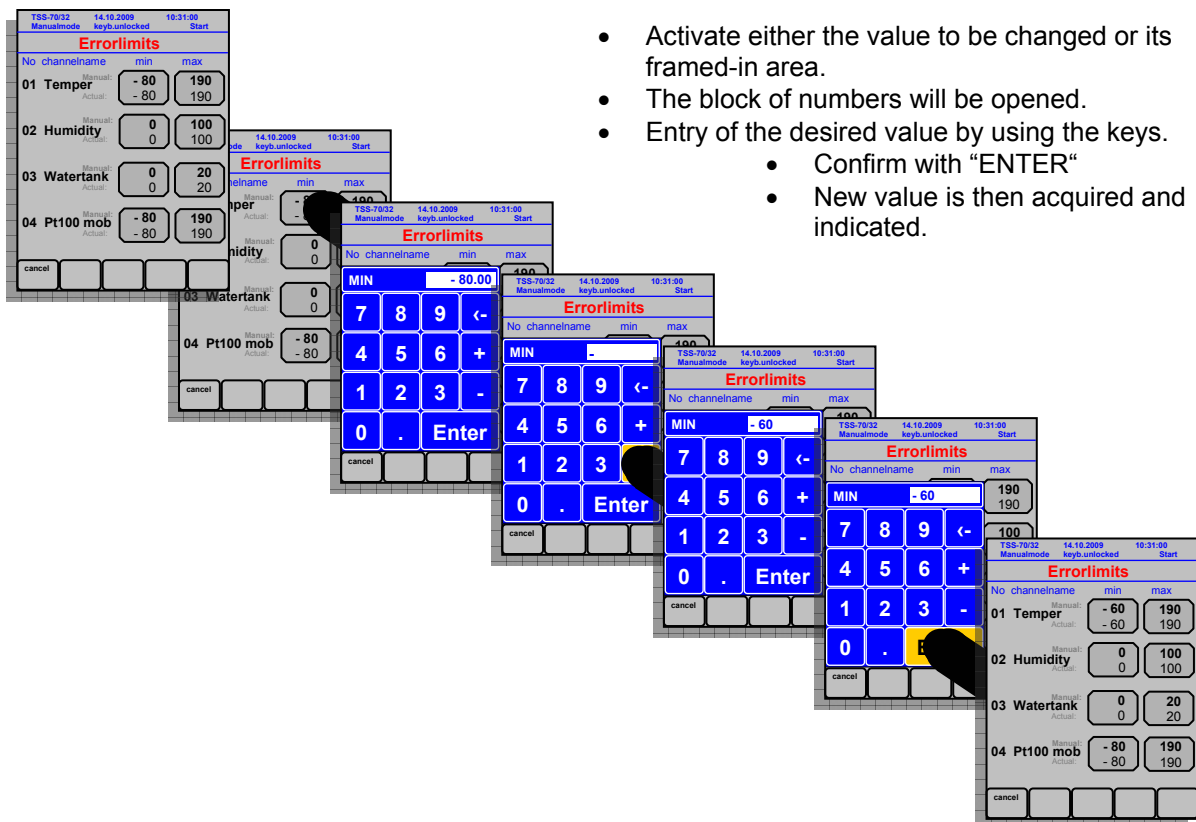
7.8.2 Errorlimits / Limitation values

The permissible range of an analog channel can be confined by means of the limitation value menu. Especially with reference to the maximum/minimum temperature compatibility of the test object, this is of major significance.

The limitation value represents, for each analog channel, a lower (MIN) and a higher (MAX) limitation value. These limitation values can be selected within the range of the respective channel configuration (± 10K). For example, the following limitation values can be set:

Temperature range: -70°C to +180°C

Limitation value range: -70°C - 10K to +180°C + 10K

i.e..:   -80°C to +190°C

Within this range of, for example, the temperature, the limitation value can now be selected as desired. For a test object that should never reach temperatures under 0°C, the limitation values should be set to 0°C to 180°C, that is, 190°C.

Notice:
- **The exact temperature range depends upon the respective unit and can be found in the pdf file "II.6 Controller configuration", as well all other ranges of the analog channels.**
- **The MAX limitation value must always be larger than the MIN limitation value. (MAX > MIN)**
- **The upper limit-line indicates the manual limit (Manual).**
  The lower limit-line indicates the current limit (Actual).
  - **In the manual mode, both limit-lines are the same.**
  - **In the program mode, i.e. a program was started, each program line in the program editing/-changing can become a separate limit. Then both limit-lines can differ.**
    Manual limit - not importance → actual limit = current program lines-limit

7.8.3 Error history / Errorlog

The error history is indeed listed in the main-menu 2/3 in the second position, but is described in more detail under the chapter "Error history / Errorlog" (page 62), since the history is directly connected with the reports and, therefore, the error-menu as well.

7.8.4 Counter

In the counter-menu, the switch cycle of the magnet valve are indicated.
If the status of the unit or element allows a Limit 1 or a Limit 2 to be given out, these limits are there to report limitation values of the counter cycles.
If, for example, a piston must be oil after 100 hours, the counter setting could look as follows:
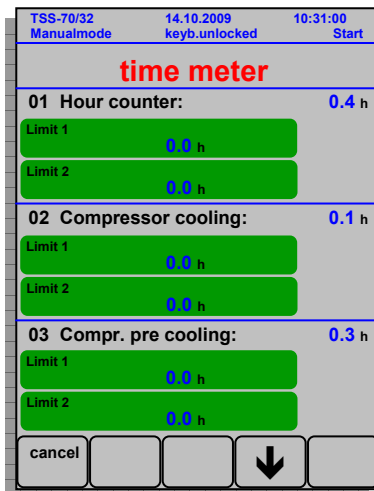
Limit 1:
    Oil piston 1 soon   **95**

Limit 2:
    Oil piston 1 immediately   **99**

7.8.5 Time meter

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Start

time meter

01 Hour counter:	0.4 h
Limit 1	0.0 h
Limit 2	0.0 h
02 Compressor cooling:	0.1 h
Limit 1	0.0 h
Limit 2	0.0 h
03 Compr. pre cooling:	0.3 h
Limit 1	0.0 h
Limit 2	0.0 h

cancel ↓

The menu for time meter lists all possible elements, which have particulars of hours of operation. This ranges from the complete unit down to the individual components.
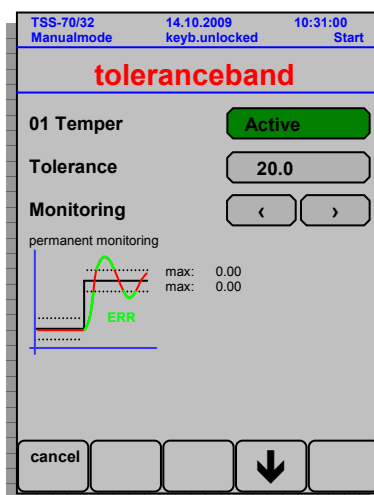
The notice functions analog to the counter-menu (see page 66). The limits stand for, as with the example of the general time meter for the unit, maintenance or a customer service:

Limit 1:
Contact customer service **10000** hours

Limit 2:
Have unit maintained (customer service) **15000** hours

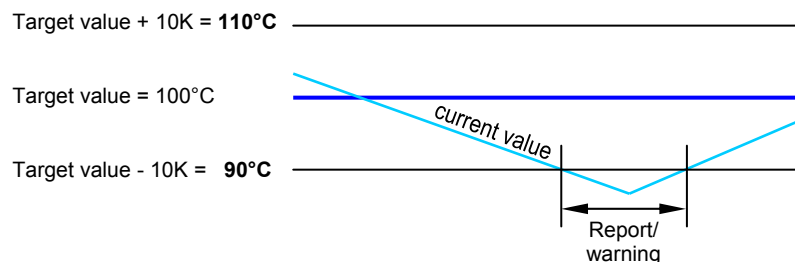## 7.8.6 Tolerance bands

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Start

toleranceband

01 Temper	Active
Tolerance	20.0
Monitoring	‹ ›

permanent monitoring

max: 0.00
max: 0.00

ERR

cancel ↓

As opposed to the counter menu or hours-of-operation menu, there is only **one** analog channel per monitor represented, since numerous points of information per channel are indicated. The other channels can be reached through the 'scroll up' or 'scroll down' key in the navigation bar.
A tolerance band designates the allowable positive (+) and negative (-) deviations of the current value vis-à-vis the target value of an analog channel, if the monitoring is active.

Target value + 10K = **110°C**

Target value = 100°C

current value

Target value - 10K = **90°C**

Report/
warning

For activation of the tolerance band, the following settings can be selected, depending on the analog channel:

- **Monitoring:**
    Permanent monitoring

Notice:
- **Monitoring can be activated in either program mode or manual mode.**
- **If the current value exceeds or falls below the tolerance, a warning report is produced.**
- **Due to outer influences such as strong external electromagnetic radiation, the sensors can indicate deviating values - by activating the tolerance band, such deviations can be reported.**
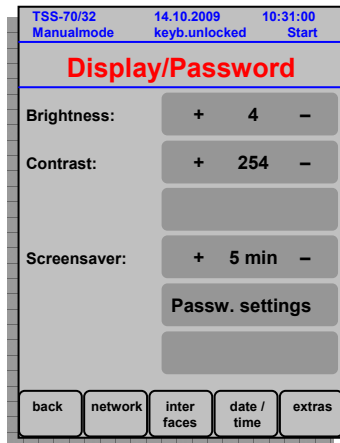
7.8.7 System Settings

All relevant settings for indication and configuration can be viewed and changed in the menu of the system data. For a clearer overview these are separated into sub-menus, which are opened when the respective field is activated.
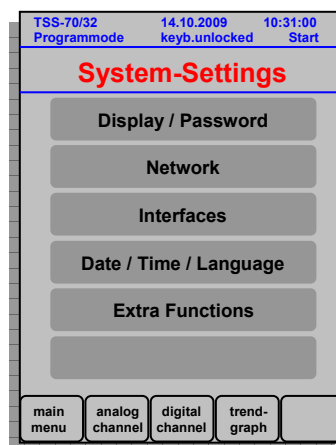

These sub-menus are described in more detail as follows:

7.8.7.1 Display/Password

```
┌─────────────────────────────┐
│ TSS-70/32    14.10.2009   10:31:00 │
│ Manualmode   keyb.unlocked    Start │
│      Display/Password       │
│                             │
│ Brightness:      +    4    – │
│                             │
│ Contrast:        +   254   – │
│                             │
│                             │
│ Screensaver:     +  5 min  – │
│                             │
│      Passw. settings        │
│                             │
│                             │
│ back  network  inter  date /  extras │
│               faces   time         │
└─────────────────────────────┘
```
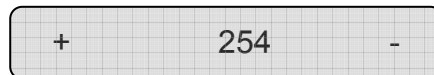
The display sub-menu refers to the settings of the display. The brightness, the contrast and the display screensaver can be increased or decreased by means of the plus-key (+) or minus-key (-).

- **Brightness:**

+	4	-
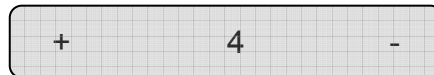
   Brightness is optional within a range from **1 … 4**.
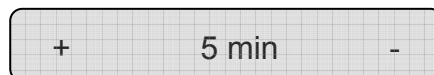   The standard value is **4**.

- **Contrast:**

+	254	-

   Contrast is optional in a range from 230 … 270,
   whereby the value 230 shows a completely black display and the value 270 a completely bright (white) display. The standard value is **254.**

Take note: Brightness and contrast in the display are dependent on the respective ambient temperature and humidity!!!

- **Screensaver:**

+	5 min	-

   The display screen saver has the function of dimming the display, when it has not been used for a pre-determined amount of time. The brightness and contrast are brought down to a fixed value which saves the screen.
   The screensaver is optional in a set-range from **OFF, 1 min … ∞**. If it is activated, a value of "5 min", for example, will be shown. If the screen saver is not active, **"OFF"** will be shown. The standard value is **5 min.**

- **Password settings:**
   See chapter 7.9 - Password protection - page 76.

Notice:
- **The brightness setting produces different results depending on the display.**
- **The contrast setting also produces different results depending on the display.**
- **Both settings are dependent on the user's angle of view to the unit/display (location of the unit).**
- **Correspondingly, every unit can have a different display-setting.**
- **The display-screen -saver function effects an extension of the life of the display, since the display feature is needed for only a portion of the time.**
- **Pressing on any position of the display is enough to remove the mode setting, thereby making the display noticeably brighter again.**

7.8.7.2 Network parameter
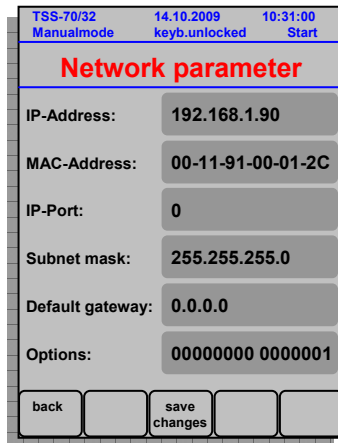
The network-parameter sub-menu contains information concerning the adjustable network parameters. The following explains the network parameters in more detail:

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlocked	Start

Network parameter

IP-Address:	192.168.1.90
MAC-Address:	00-11-91-00-01-2C
IP-Port:	0
Subnet mask:	255.255.255.0
Default gateway:	0.0.0.0
Options:	00000000 0000001

back		save changes		

- **IP-Address:** `192.168.1.90`

    Every unit connected to a network has a universally unique, 32 bit numerical IP-address (Internet Protocol Address), such as 192.168.1.90. Depending on their network-class, the first 3 positions (bytes) represent the network, to which the computer is connected, while the remaining bytes identify the computer within this network.
    IP-Addresses are needed to let a specific unit communicate internally with a specific IP-address within a network with a specific.
    Every unit has a unique IP-address at delivery. This address can be changed if needed, if another address needs to be allocated to the unit within another network.

- **MAC-Address:** `00 - 11 - 91 - 00 - 01 - 2C`

    Every network card identifies itself with the MAC-address (medium access control-address - 8-byte address), which is determined within the card-electronic as universally unique.
    The network-card has, in the guidance-system, a universally unique MAD-address which cannot be changed. It is on standby only for indication.

- **IP-Port:** `0`

    The IP-port is used for internal communication (through an existing network) with the CID-software. The IP-port must be the same for both the unit and the PC.

- **Subnet mask:** `255.255.255.0`

    The subnet mask identified which part of the IP address identifies the network and which part identifies the computer. A subnet mask *255.255.255.0* means that the first three parts of the IP address are used to identify the network and the rest is used to identify the individual computer. All subnet masks within a network must be identical.

- **Default gateway:** 0.0.0.0

    The standard gateway is an IP address for a device in the local subnet that knows how the transition to other subnets may take place. This is the IP address of the local router.

- **Options:** 00000000 0000000**1**

    This display indicates additional network options.
    The respective options are either set in the delivery state or they can be activated by entering a code following retrospective order of a certain option.
    In this example, the option "**Ethernet"** is activated, i.e. the device and the software CID can communicate with each other via an Ethernet connection.

Notice:

Changes in the IP address, the subnet mask and the default gateway are not transferred until the button "Save changes" has been pressed. The controls then implement a reset and then start the control with a new network setting.

Take note:

- **The MAC address cannot be altered.**
- **Changes in the IP address, the IP port, the subnet mask and the default gateway are entered using the key block if the respective field is activated. Input takes place analog to the target value changes of an analog channel.**
- **Input of the options refers exclusively to codes used to release the respective option.**

7.8.7.3 Serial interfaces

TSS-70/32	14.10.2009	10:31:00
Manualmode	keyb.unlockes	Start

Serial interface

Address:	1
Baud rate:	+ 19200 –
Type:	CID / ASCII
Parameter:	Odd Parity

| back | display PW | network- | date / time | extras |
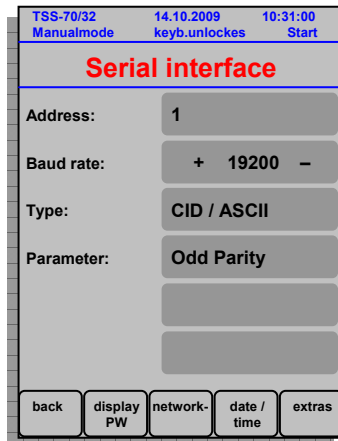
The serial-interface sub-menu contains all information, which is required to connect several units in series through the serial interface. Furthermore, a PC which communicates with the unit/units can be connected through an EDV-connection. This series-switch can also be considered as a small network.

- **Chamber address:**

1

  The chamber address defines the unique chamber in the small network. If, for example, five units in a series are connected, the chamber addresses should be numbered from 1 to 5 - in the sequence, if possible, that the units are situated to one another (location).
  The standard value of the chamber address is **1**.
  It can optionally chosen at any time.

- **Baud rate:**

+	19200	-

  The baud rate is a reference to the transmission speed (bits per second), with which serial data are transmitted. Standard transmission speed of the baud rate of a unit is **19,200** bits/s. The following speeds are possible:

  4,800 bits/s
  9,600 bits/s
  19,200 bits/s
  38,400 bits/s
  57,600 bits/s

- **Type:**

CID / ASCII

  The interface-type describes the communication mode between the unit and a computer/PC. The standard for the type is **CID/ASCII** - especially for use of the CID-software. Another type is CoDeSys, which is only used for service purposes.

- **Parameter:**

Odd Parity

  This parameter represents the parity control for the interface that is used solely for display purposes.

  Odd Parity
  Even Parity
  No Parity

Notice:

- **The chamber address should begin with 1 in a small network, and then be selected in increasing numbers up to a maximum of 32.**
- **It is to be noted for the baud-rate and type, that all utilized components (PC's and units) have, respectively, the same settings.**
- **It is no longer necessary to select between a CID and ASCII type. The correct internal protocol is recognized and set automatically.**

7.8.7.4 Time/Language

The time/language sub-menu refers, basically, to the chronological settings and the selection of language.

The time / date is read from an RTC-module (real-time-clock). If this module is appointed with current through the network-operation or through the battery to the guidance-system, the module must only be programmed once with the correct time and date (status at delivery). The module can then be read at any time.

However, if the data are incorrect are at time, for example, if the flow of current to the RTC module is discontinued, the module must be re-programmed.

- **Time:**

<div style="text-align:center">10:31:00</div>

If there is a diversion of the unit-time from the actual time, the unit-time can be changed through the time-field. The block of numbers is then opened after activation of the time field, in order to enter the correct time.

When entering the time, it should be noted that the format of the time must look like the following:

hh.mm.ss
hour(two digits).minutes(two digits).seconds(two digits)
for example: 08:52:00

- **Date:**

<div style="text-align:center">14.10.2009</div>

Analog to the time, entry of the date must also be formatted as follows:

dd.mm.yy
day(two digits).month(two digits).year(two digits)
for example: 01.01.05

- **Language:**

<div style="text-align:center">+   English   -</div>

The language can be changed during the running time. Standard value is **German.** Another possibility is the representation of the display in **English.**

7.8.7.5 Extras
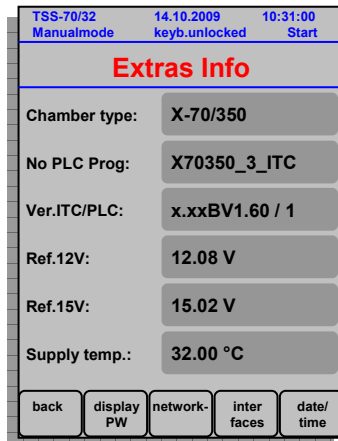
TSS-70/32 14.10.2009 10:31:00 **Manualmode** keyb.unlocked Start **Extras Info** Chamber type: **X-70/350** No PLC Prog: **X70350_3_ITC** Ver.ITC/PLC: **x.xxBV1.60 / 1** Ref.12V: **12.08 V** Ref.15V: **15.02 V** Supply temp.: **32.00 °C** back display network- inter date/ PW faces time	In the extra-menu, relevant unit-data are represented, which cannot be changed.

- **Chamber type:** TSS-70/130 — Exact chamber-type specification

- **No. PLC Prog:** 107199_ITC — Exact PLC-program-number of the unit

- **Version ITC / PLC:** 1_41BV1.60 / 1 — Control-version and PLC-Version

- **Ref. 12V:** 12.08 V — exact 12V-Reference voltage

- **Ref. 15V:** 15.02 V — exact 15V-Reference voltage

- **Supply temp.:** 32.00 °C — Temperature on the control-board

Take note:
- **The information concerning PLC program number and ITC/PLC version facilitates the CTS service in the allocation of the device to the software version and therefore to all relevant device data.**
- **The reference voltages and the temperature sensor on the control circuit board can be controlled here.**

7.8.8 Power failure

status		date	time
ON	from	13.02.05	12:56:00
	to	14.02.05	10:31:00
OFF	from	13.02.05	12:52:39
	to	13.02.05	12:56:00
ON	from	10.02.05	17:43:18
	to	13.02.05	12:52:39
OFF	from	10.02.05	12:50:27
	to	10.02.05	17:43:18
ON	from	03.02.05	09:54:04

Power failure

TSS-70/32   14.10.2009   10:31:00
Manualmode   keyb.unlocked   Start

Number: 01/03

cancel   ↓

The menu for the power failure lists a sequence of dates on which the device was activated or deactivated. Sensibly, the list starts with an "ON" entry -

**ON   from date/time
to   date/time**

and ends with the same, as the device is in operation when displaying the power failure.

In the event that the power failure has occurred, an "OFF" entry is generated -

**OFF   from date/time
to   date/time**

specifying the time in which the power failure took place.

Take note:
   A reset of the controls is also displayed as a power failure.

7.9 *Password protection*

In order to use password protection in a sensible manner, several password and user levels should be integrated, distinguished by different access rights in operation of the device. This means that various user groups – depending on the tasks presented to the operating personnel - can be defined. The following password or user levels are implemented as standard features.

Access rights Display in the head bar	master-level keyb.unlocked	level 1 keyb.locked1	level 2 keyb.locked2
set digital channels	🟢	🟢	⭕
edit analog channels	🟢	🟢	⭕
edit a program	🟢	⭕	⭕
start a program	🟢	🟢	⭕
program forerun time	🟢	⭕	⭕
program starting time	🟢	⭕	⭕
create a program	🟢	⭕	⭕
copy a program	🟢	⭕	⭕
delete a program	🟢	⭕	⭕
show/receipt the errors	🟢 🟢	🟢 ⭕	⭕ ⭕
show/edit the limits	🟢 🟢	🟢 ⭕	⭕ ⭕
show/edit the error history	🟢 ⭕	🟢 ⭕	⭕ ⭕
show counters	🟢	🟢	⭕
show time meters	🟢	🟢	⭕
show/edit the tolerance band	🟢 🟢	🟢 ⭕	⭕ ⭕
show/edit the system settings	🟢 🟢	🟢 ⭕	⭕ ⭕
show the power failture	🟢	⭕	⭕

Legend: 🟢 Full access rights   ⭕ No access rights

7.9.1 Password setting

All of the required changes for password protection are implemented in the menu for the password settings.
Password protection is activated and deactivated using the namesake button ("Password protection").
The display on the status of the password protection is presented in the following table:

	Password protection inactive	Password protection active	
		open	**closed**
entry main menue			
entry head bar	keyb.unlocked	keyb.unlocked	keyb.locked

All password settings are explained in greater detail in the following:

7.9.2 Password level on logout

"Logout" is deemed to be the time when password protection is rendered active. This state is reached either by pressing the "Open lock" symbol in the main menu or by the start of a screensaver protection.
Level 1 and *level 2* are available during the selection of the "Password level upon logout".
Depending on which level is selected here, the control jumps to the respective user level upon logout and defines the matching access rights (see table Access rights - page 76).

7.9.3 Change the level 1 password [code:]

This button can be used to change the level 1 password. This requires the following steps:

- **Input of the old/current level 1 password**
- **Input of the new level 1 password**
- **Repeat of the new level 1 password**

After this, the new password to release level 1 must be used.

In the event that this new password is no longer available, it can be reset with the following chapter 7.9.4:

7.9.4 Delete the level 1 password

The "delete Password for level 1" button is used to delete the previous password for level 1 and to reset the system to the standard password.

7.9.5 Change release everything [code:]

This button can be used to change the current master level password. This requires the following steps:

- **Input of the old/current master level password**
- **Input of the new master level password**
- **Repeat of the new master level password**

After this, the new password to release the master level must be used.

Take note:
- **Keep the passwords in a safe place, but make sure that you will have access to them!**
- **You can reset the passwords for the various levels using the master password.**
- **Please contact CTS-Service in the event that you lose the master password.**

7.9.6 Screen saver password

If this function is set, a password query is implemented for the respective level defined upon logout once the screen saver is reactivated.